KOLFRAM EDUCATIONAL SERVICES

PRIMARY

# STANDARD KOLFRAM IN USE

# INTEGRATED SCIENCE

## LEARNER'S BOOK

5

**IDENTIFICATION BOX**

**NAME** :.....

**SCHOOL** :.....

**CLASS TR'S NAME** :.....

**ID. NUMBER** :.....

*LET'S DISCOVER OUR POTENTIALS*

## THEME: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATION
## TOPIC 1: CROP GROWING

**Crops**

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

**Types of crops**

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

**Tubber crops**

**Types of tuber crops**

- ✓ Root tubers
- ✓ Stem tubers

i) **Root tubers**

These are crops which store their food in their swollen roots.

**Examples of root tuber crops**

- ✓ Cassava
- ✓ Sweet potatoes
- ✓ Carrots
- ✓ Coco yams

ii) **Stem tubers**

These are crops which store their food in their swollen underground stems.

**Examples of stem tubers**

- ✓ Irish potatoes
- ✓ White yams

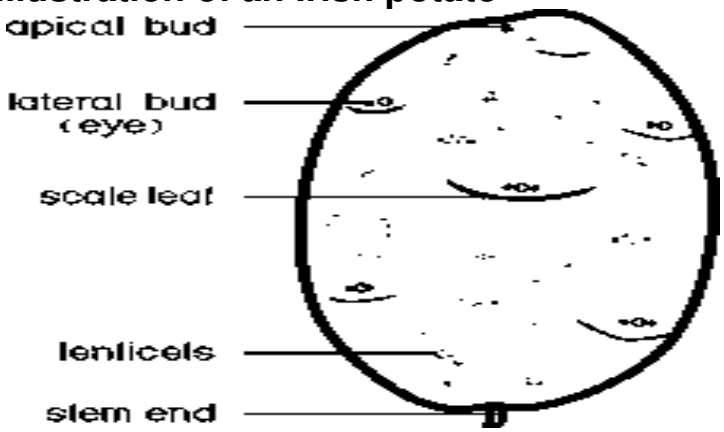
**Characteristics of stem tubers**

- ✓ They have axillary bud (eye)
- ✓ They have scaly leaves

**Which part of an Irish potato do we eat?**

The swollen underground stem.

**Illustration of an Irish potato**



**Root crop pests and diseases**

**Pests:**

Pests are living organisms that destroy crops e.g. birds, worms, insects, rodents etc

**Diseases:**

Diseases are illness /sickness in living organisms i.e. plants and animals.

**A table showing crops, pests and the parts they destroy**

| Crop | Pest | Affected part |
|---|---|---|
| Cassava | Green cassava mite, rat, squirrels, moles Whitefly, | Tips of cassava shoot, roots |
| Sweet potato | Squirrels, rats, moles eel worm | Roots |
| Irish potato | Irish aphid | leaves |
| Carrots | Eel worm | Roots |
| Sugar cane | Stalk borer, aphids, termites | Stem |
| Banana | Banana thrips,<br>Banana weevil | Fruits<br>Stem/corm |
| Tobacco | White fly | Leaves |
| Coconut | Rhinoceros | Fruits |
| Cabbages | Cut worm | Stem |
| Coffee & cocoa | Mealy bug | Leaves |
| Maize | Maize stalk borer | Stem |

**Diseases of some crops**

**The table below shows crops, diseases and the part affected.**

| Crop | disease | Affected part |
|---|---|---|
| Cassava | Cassava mosaic<br>Brown steak | leaves |
| Sweet potato | Sweet potato blight | Leaves & stems |
| Sugar cane | Leaf spot disease, Raton<br>stunting disease | Leaves/Stem |
| Banana | Wilt disease, cigar end rot<br>Panama disease | Leaves<br>Stem/leaves |
| Cabbages | Black rot disease | leaves |
| Coffee tea | Wilt disease<br>Coffee berry disease<br>Armillary root disease | Leaves<br>Coffee berries<br>Roots |
| Maize | Maize streak | Leaves |
| Mangoes | Powdery mildew, smuts | Leaves & stems |
| Ground nuts | Rosette disease | Leaves |
| Cotton | Bacterial blight disease | |

**Characteristics of common root crop pests**

1. Pests which damage the shoot system (leaves and stem /branches) have strong mouth parts to cut and chew the leaves.
2. Pests which destroy the tubers have sharp claws which help them to dig the soil
3. They have sharp incisors which bite or cut the roots /tubers.
4. some have fingers which they use to uproot the root a crop e.g. apes and monkeys.

**Examples of insect pests**

1. Locusts
2. Caterpillars
3. Army worms
4. Sweet potatoes weevils
5. Variegated grasshoppers

**Examples of animal pests**

1. Squirrels
2. rats
3. moles
4. Rhinoceros
5. Warthogs ( wild pigs)

**Dangers of pests to crop farmers**

1. Pests damage farmer's crops
2. Reduces on the crop yields
3. Cause decay of root crops
4. Wastes money to control them

**Uses of pests to farmers**

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

**Common signs of pests and disease damages on crops**

1. Holes in leaves, fruits & stems on crops
2. Change in colour of leaves, stem and fruits
3. Rotten plant parts
4. Pre – mature ripening
5. Abnormal deformed parts
6. The root crops which grow are of poor quality and do not have the right taste
7. Stunted growth
8. Leaf curling occurs

**Effects of pests and disease damage on crops**

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

**Major control methods of pests**

**1. Mechanical control method**

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

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

**2. Biological pest control**

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

**3. Cultural methods**

- ✓ By practicing crop rotation
- ✓ The available pests of a particular crop
- ✓ Early planting and harvesting
- ✓ Practicing resident species /varieties
- ✓ Through proper control of weeds
- ✓ By planting disease free cuttings /vines
- ✓ Chemical control method; is a method where a farmer sprays pesticides /insecticide to kill the pests

**Harvesting and storage of root crops**

**Harvesting**

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

**Methods of harvesting crops**

1. Hand picking
2. Plucking
3. Cutting
4. Digging
5. Uprooting

NOTE: Harvesting is normally done during dry season.

***Q. Why should harvesting be done during dry season?***

There is enough sunshine to dry the harvested crops

**Disadvantages of early harvesting**

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

**Ways of processing crops**

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

**Crop Storage**

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

**Methods of storing root crops**

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

**storage facilities**

1. Granaries
2. Silos
3. Stores

**Why should rat guards be fixed on a granary?**

To prevent rats from entering the granary.

**Q. How are the rat guards adapted to their function?**

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

**Conditions for proper storage**

1. The grains /seeds should be stored when they are dry
2. The roof of the store should not be leaking
3. The store should have good ventilation
4. Rat guards should be fixed on the granary
5. Root crops should be dried first before storing them
6. Seeds should be dusted with pesticides before storing them

**Keeping and using farm record**

**Farm records**

These are details or information concerning all activities that take place on a farm.

**Example of farm records used on root crops**

1. Farm inventory e.g. farm equipment size of lands.
2. Cash record e.g. money spend or received when carrying out the project
3. Non-cash records – unpaid for labour may be family members
4. Records of production e.g. number of acres planted /map of the farm

**Importance of keeping farm records**

1. To know the progress of the farm
2. Proper records can be used to get loans in the bank
3. To plan for the farm for future use
4. To know whether the farmer is making profits or losses.

## SPECIMEN OF FARM RECORDS SHEET

| *Date* | *Crop planted* | *Date of weed control* | *Date of manuring* | *Date of harvest* | *Date of sale* |
|---|---|---|---|---|---|
| 2/2/2005 | cassava | 3/3/2005 | 3/4/2005 | 7/7/2005 | 13/5/2005 |

## SCIENCE CLUBS /SOCIETIES IN THE SCHOOL

### The science clubs

Involve learners in science related activities

### Examples of Science related societies.

1. Wildlife clubs
2. Red cross clubs
3. Young farmers clubs
4. Science contest
5. Science exhibition
6. Science quizzes
7. Science projects
8. Science paper presentation etc

### Importance of science activities to learners

- ✓ Develop a positive attitude in learners towards science.
- ✓ Expose learners to the kind of work that can lead to their career
- ✓ Shape learners for their future career in the science field i.e. doctors, engineers, surgeons, dentists, electricians, and agriculturalist.

### Wildlife club

Enables learners to learn more about uncultivated plants and wild animals that exist in the natural environment.

### Roles of the wild life club

- ✓ Protecting the environment.
- ✓ Conserving the environment.
- ✓ Teaching or sensitizing others to protect or conserve the environment.

### Activities done by the wildlife clubs in school

1. Maintaining a free nursery in the school
2. Tree labelling
3. Establishing wood / tree projects
4. Monitoring wildlife abusers e.g. poachers
5. Bird watching
6. Preventing water, air and soil pollution

7. Setting up a botanical garden
8. Construction of an aquarium

## Aims of the science-oriented clubs in school

1. To promote /boost children's interests in the science subject
2. To enable children to know how scientists work.
3. To equip learners with knowledge and skills for their future career.
4. To promote learning of science in the school.

## The young farmers club

The young farmers clubs include young boys and girls in and out of school who are interested in farming.

## Roles of the young farmers clubs

✓ To keep animals and grow crops.
✓ To teach other farmers better farming methods.

## Importance of the young farmers clubs

**Qn**: When are the activities of young farmer's clubs done?
- After school time

**Qn:** Under which department / ministry in Uganda are the young farmers clubs
- Department of agriculture

## Role of the department of agriculture in young farmers clubs

✓ To unite all the young farmers' clubs in the country.
✓ To set up competitions in school where prizes are given to winners.
✓ Train and send technical people to teach and answer questions of the young farmers.
✓ To teach young farmers better farming methods.
✓ To start money making and savings projects for self support.

## POULTRY KEEPING

✓ **Poultry keeping** is the rearing of domestic birds (fowls).
✓ **Poultry** are domestic birds.

## TERMS USED IN POULTRY KEEPING

1. **Cock** is the adult male chicken
2. **Hen** is the adult female chicken
3. **Cockerel** is a young male chicken
4. **Pullet** is a young female chicken
5. **Chick** is a young chicken below 8 weeks
6. **Chicken** is the meat of a hen/a cock
7. **Capon** is a castrated cock
8. **Brooding** is the special care given to the chicks below 8 weeks

9. **Incubation** is the process by which fertilized eggs are given favourable conditions to hatch into chicks.
10. **Incubation period** is the period of time taken by a fertilized egg to hatch into a chick.
11. **Incubator** is a machine used to hatch the fertilized eggs
12. **Brooder** is the special structure where chicks below two weeks are kept
13. **Moulting** is the shedding of feathers to replace old ones with new ones

## Examples of poultry

- ✓ Chicken
- ✓ Ducks
- ✓ Pigeons
- ✓ Turkeys
- ✓ Guinea fowls

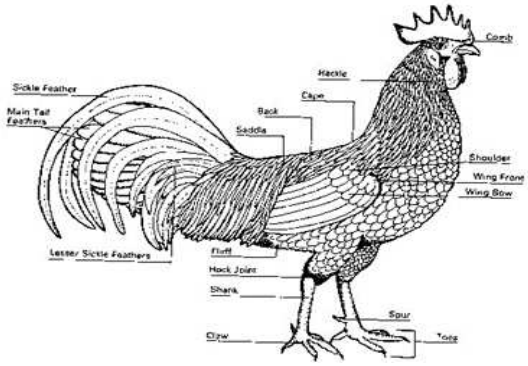
## Reasons why people rear poultry

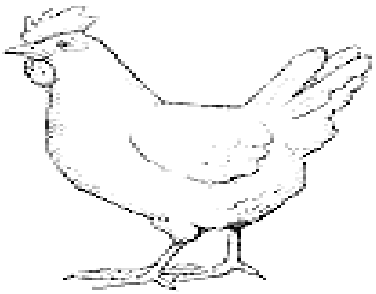
- ✓ For egg production
- ✓ For meat (Chicken) production
- ✓ For sale to get money (family income)

## Other uses of poultry

- ✓ To get feathers for differ ent purposes e.g. making pillows, decoration, dancing props, cushions.
- ✓ Some birds are kept as pets in homes e.g. peacocks, hens, parrots.
- ✓ Source of farm yard manure from the droppings.

## EXTERNAL PARTS OF A COCK



## Importance of each part on a bird

**Spur**

For protection / defence

**Beak / bill**

- ✓ For picking food.
- ✓ For defence.
- ✓ For building their nests.
- ✓ To clean itself and arrange its feathers(preen).

**Toe nails (claws)**

- ✓ To scratch for food
- ✓ For defence

**Comb and wattle**

For identification

**Feathers**

- ✓ For identification
- ✓ To protect the delicate skin.
- ✓ To keep the birds warm.
- ✓ For incubation of eggs.
- ✓ For brooding their young ones.

NB: Cocks have bright feathers for courtship (Attracting of opposite sex for mating)

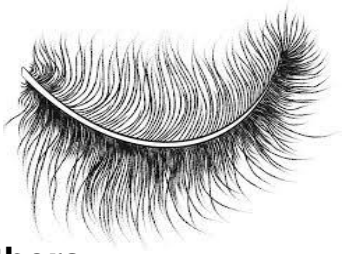
## Types of feathers

- ✓ Quill/flight feathers
- ✓ Covert/body feathers
- ✓ Down feathers
- ✓ Filoplume/hair

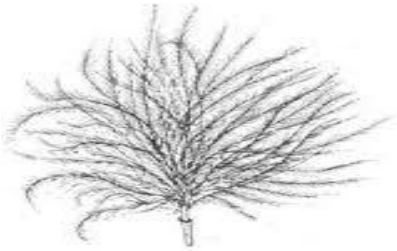
**Quill feather**



**Down feather**



**Filoplume feathers**



**Purpose of the above feathers**:

**Quill feathers**-

- ✓ They are used for flight.
- ✓ The body feathers
- ✓ To keep the bird warm.

**Down feathers**

- ✓ They help in insulating the bird.

**Filoplume feathers**

- ✓ They keep the bird warm.

## Difference between a cock and a hen

| A cock | A hen |
|---|---|
| ✓ It has a large spur | ✓ It has a small spur |
| ✓ It has a large comb | ✓ It has a small comb |
| ✓ It has a large wattle | ✓ It has a small wattle |
| ✓ It does not lay eggs | ✓ It lays eggs |
| ✓ It has large ear lobes | ✓ It has small ear lobes |
| ✓ It has long strong claws | ✓ It has small claws |
| ✓ It has a large beak | ✓ It has a small beak |

## BREEDS OF CHICKEN

A breed is a group of animals with specific characteristics / behaviour.

### Groups/ types of breeds of chicken kept in Uganda

1. Local breeds (Indigenous)
2. Exotic breeds (Imported / foreign)
3. Cross breeds (Hybrids)

### 1. Local breeds

These are breeds of chicken that originated from East Africa.

### Characteristics of local breeds

1. They mature slowly
2. They lay few eggs
3. They are resistant to tropical diseases
4. They have different colours

### Advantages of local breeds of chicken (indigenous)

1. Local breeds are easy to manage.
2. Local breeds are resistant to tropical diseases.
3. They are resistant to bad weather conditions.

### Disadvantages of keeping local breeds of chicken

✓ They grow very slowly
✓ They lay fewer eggs

### How to improve upon the local breeds of chicken

✓ Through cross-breeding of local breeds with exotic breeds to get a hybrid/cross breed.
✓ Through selective breeding (choosing breeds of good quality).
✓ Through out breeding (mating of different families of the same breed.)

### Advantages of cross-breeding

1. It encourages fast growth in birds
2. It results into more eggs being laid by the offspring.
3. It improves on the productivity of poultry.

4. It improves on resistance to tropical diseases.

**2 .Exotic breeds**

These are breeds of chicken that are imported from other foreign countries

NB: Exotic breeds can either be grouped as heavy breeds or light breeds. Light breeds produce meat while light breeds produce

| Heavy breeds | Light breeds |
|---|---|
| ✓ Rhode Island red<br>✓ New Hampshire<br>✓ Orpington | ✓ Light Sussex<br>✓ White Leghorn<br>✓ Skyers<br>✓ Ancona<br>✓ Minorca |

**Characteristics of exotic breeds of chicken.**

- ✓ They mature quickly
- ✓ They lay many eggs
- ✓ They have specific colours
- ✓ They are not resistant to tropical diseases.

**Advantages of keeping Exotic breeds of chicken**

- ✓ Exotic breeds grow very fast.
- ✓ Exotic breeds lay many eggs.

**Disadvantages of exotic breeds of chicken**

- ✓ Exotic breeds are not resistant to diseases.
- ✓ Exotic breeds are expensive and difficult to look after.

**Compare the local poultry with exotic breeds.**

| Local breeds | Exotic breeds |
|---|---|
| They grow slowly | They grow faster |
| They lay fewer eggs | They lay very many eggs |
| They resistant to local diseases | They are not resistant to local diseases |

**TYPES OF CHICKEN**

1. Layers: Kept for egg production
2. Broilers/table birds: Kept for meat production
3. Dual Purpose: Kept for both meat and egg production.

**Feeding poultry**

- ✓ Chicks below two weeks feed on chick mash
- ✓ Growers feed on Grower's mash
- ✓ Broilers feed on Broiler's mash
- ✓ Layers feed on layers mash

## Composition of chicken mash (poultry feeds)

- ✓ Sprat fish
- ✓ Bone meal
- ✓ Common salts
- ✓ Maize meal
- ✓ Sea shells (rich in calcium for the strong growth of bones and egg shells)

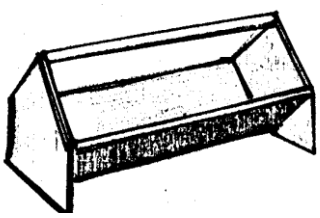
## Different types of birds are fed on such feeds for a purpose

1. Layers:
   Layers mash makes them to lay many eggs with hard eggshell as its rich in calcium. The calcium also helps them to strengthen their bones.
2. Broilers:
   Broiler's mash has a lot of proteins which makes the broilers to grow very fast and put on more weight in short time.
3. Growers:
   Grower's mash is very rich in proteins which make the growers to grow very fast and well.
4. Chicks: Chick mash is soft and easy to digest by the chicks' gut. It is rich in proteins which makes the chicks to grow very fast.

## Summary table

| Types of chicken | Food | Age |
|---|---|---|
| Chicks | Chick mash | 0 – 2 weeks |
| Growers | Growers' mash | 3 weeks–8 weeks |
| Broilers | Broilers' mash | 4 – 8 weeks |
| Layers | Layers' mash | Over 16 weeks |

## Feeding and drinking equipment



**A poultry feeding trough**

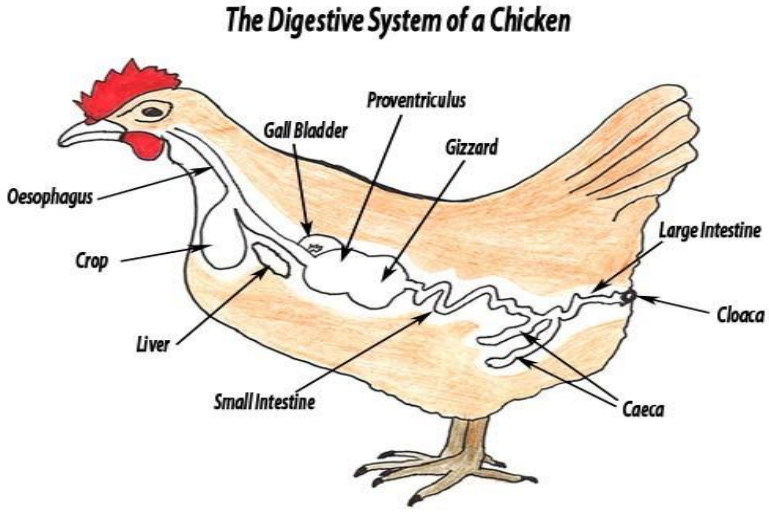


**Drinkers**

## DIGESTION IN BIRDS

- ✓ Digestion is the breaking down of food into smaller particles that can be absorbed into the blood stream
- ✓ Birds have a horny beak
- ✓ They swallow food wholly (food is swallowed wholly)

## Digestive system of a bird




**Functions of different parts of the alimentary canal of a bird**

1. **Beak / bill:**
   Picks food.
   Break food into smaller pieces.
2. **Gullet (Oesophagus)** is used to carry food from the beak to the crop.
3. **Crop**

✓ Softens / moistens food before it is passed onto the stomach
✓ Stores food temporarily.

4. **Stomach**: Secretes digestive enzymes that mix with food.
5. **Gizzard** :Contains small stones (grit/pallables) that grind (crush) food into small particles.
6. **small intestine**
   ✓ it is where digestion takes place.
   ✓ It is where absorption of digested food occurs.
7. **Colon (large intestines):** It is where absorption of water takes place.
8. **Caeca**
   ✓ Stores undigested food temporarily.
   ✓ It is where cellulose is acted upon by bacteria.
9. **Vent** :allows wastes (chicken droppings) out of the body of a bird.

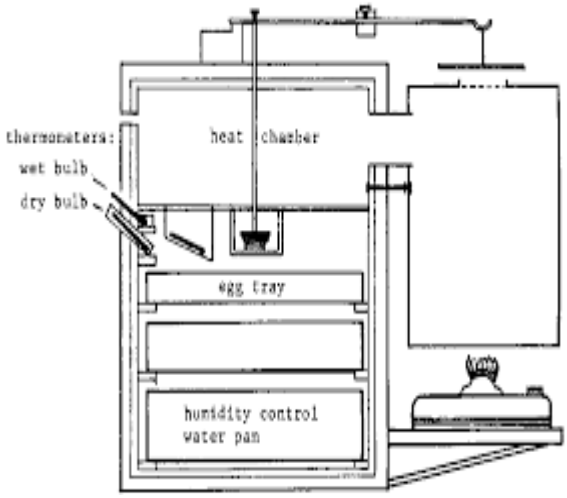
### INCUBATION

Incubation is a process by which fertilized eggs are given favourable conditions in order to hatch into chicks.

**TYPES OF INCUBATION**

✓ Natural incubation
✓ Artificial incubation

## An Incubator (Artificial Incubation)




### Natural incubation

In natural incubation the broody hen provides all the necessary conditions as it sits on the eggs for 21 days

A broody hen can incubate between 15 – 20 eggs at once.

### Advantages of natural incubation

1. Little or no attention is paid to an incubating hen.
2. Chicks get care from the mother hen.
3. It is cheap and easy to manage by the poultry farmer.
4. There is no bother with brooding the chicks.

### Disadvantages of natural incubation

1. Few chicks can be hatched at once.
2. The hen may get diseases and parasites at an early stage.
3. The hen may not be good at incubation.
4. The mother hen can easily be attacked by a predator/vermins
5. Natural brooding is not very effective for commercial production.

### Artificial incubation

Artificial incubation is the type of incubation where the eggs are put inside an incubator to hatch into chicks.

NB: In an incubator the conditions for hatching like temperature, humidity is maintained at good level at all times.

### Advantages of artificial incubation

- ✓ Many eggs can be hatched at once.
- ✓ It can be used for commercial purposes.
- ✓ It does not require the presence of broody hen.
- ✓ Diseases can be easily controlled.

## Disadvantages of artificial incubation

- ✓ Artificial incubation is expensive
- ✓ It requires constant supervision
- ✓ It needs expertise or skilled attention and care.

## Favourable conditions for eggs to hatch

1. Good temperature (warmth) between$32^0$C - $38^0$
2. Relative humidity (moisture) of 0%
3. Good ventilation (free circulation of air).

## Reasons why some fertilized eggs fail to hatch even in the presence of favourable conditions

1. If an egg has double yolks
2. When an egg has no air space.
3. If an egg has a soft egg shell.
4. If the egg shell has a crack.
5. In case an egg has an abnormal shape
6. When an egg is too small in size.

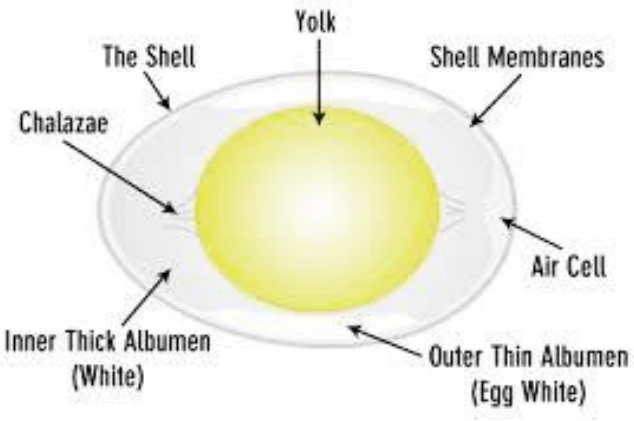
## Incubation period

Incubation period is the time taken by the fertilized eggs to hatch into chicks.

## Incubation period of the following birds

| Birds | Incubation period |
|---|---|
| Hens | 21 days |
| Ducks | 28 days |
| Turkeys | 28 days |
| Geese | 30 days |
| Pigeons | 14 days |

## Parts of an egg



## Functions of each part

### Egg shell

- ✓ It protects the inner parts of egg.
- ✓ It allows gaseous exchange because it is porous
- ✓ It is made of mineral salt called calcium.

### Chalaza

It holds the egg yolk in its central position

### Egg yolk

- ✓ Supplies food and mineral salts to the growing chick.
- ✓ We obtain proteins from the yolk.

Albumen

- ✓ It supplies water and other food values to the growing chick.
- ✓ It allows oxygen from the airspace to pass through to the growing chick and carbon dioxide from the growing chick diffuses to airspace.

## BROODING

Brooding is the act of giving special care and attention to chicks below 8 weeks of age.

### Types of brooding

There are mainly two types of brooding namely;

- ✓ Natural brooding
- ✓ Artificial brooding

**Natural brooding**: Is where the broody hen cares for her chicks.
It provides the chicks with security, warmth and food.

### Advantages of natural brooding

- ✓ The broody hen provides the chicks with food other than the farmer.
- ✓ It saves the farmer from expenses of buying an artificial brooder.
- ✓ Natural brooding is cheap to the farmer.

### Disadvantages of natural brooding

- ✓ Chicks can easily die if poorly protected.
- ✓ Chicks can easily be killed by wild animals like kites, eagles, wild cats, monitor lizards etc.

**Artificial brooding**:
This is where the chicks are kept in a special structure called a brooder..

## BROODER

A brooder is a special structure where chicks below 8 weeks of age are kept.

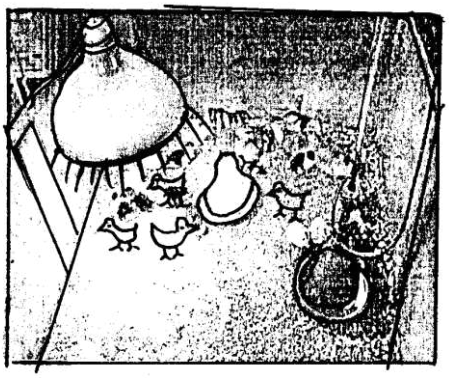
### Types of brooders

1. Infra-red lamp brooder
2. Kerosene lamp brooder
3. Charcoal brooder
4. Hot water pipe brooder
5. Gas brooder

1. **Infra-red lamp brooder** Is where the infra-red lamp provides heat and light energy.

- ✓ Feeding and drinking troughs are kept inside the brooder.
- ✓ Litter is put on the floor to make chicks warm and more comfortable

**The diagram of an infra-red lamp brooder**



**Advantages of an infra-red lamp brooder**

1. Chicks are safe
2. Warmth in fully provided
3. Chicks are protected from parasites and diseases.
4. Chicks are given enough food and water.
5. The litter poured on the on the floor makes the chicks feel comfortable.

**Disadvantages of the infra-red lamp brooder**

1. It is expensive to buy
2. There can be food poisoning
3. This system cannot be used in places where there is no electricity.
4. It is difficult to control disease outbreak.
5. In case of power failure, chicks may die of coldness.

2. **Kerosene lamp brooder**

In this system a kerosene lamp is used to provide warmth and light.
This lamp is put on a raised ground and on the floor or lamp above the chicks.

3. **Charcoal brooder**

In this system a charcoal stove is used to provide (warmth / heat) and light.

**<u>Advantages of a charcoal brooder</u>**

- ✓ It is cheap since charcoal is easily got.
- ✓ It can even be used in rural areas without electricity.

**<u>Disadvantages of a charcoal brooder</u>**

- ✓ It provides a lot of smoke
- ✓ The litter poured on the floor can easily catch fire.

**<u>Disadvantages of the above brooders</u>**

- ✓ They are expensive to use
- ✓ They require a lot of skills and knowledge.

## SYSTEMS OF KEEPING POULTRY

1. Free range system (open system)
2. Deep litter system
3. The cage (battery) system
4. The ark / fold / pen system

### Free range system

Free range system is where birds are allowed to move freely to look for their food but shelter is provided to them.

### Advantages of free-range system

1. Birds eat a variety of foods.
2. Birds look for their own food.
3. Free range system is cheap to maintain
4. It reduces labour to the farmer.
5. Birds get enough exercises.

### Disadvantages of free-range system

1. Birds can easily get lost
2. The eggs can easily get lost and are difficult to collect.
3. The birds can easily be eaten by wild animals like kites, eagles, cats etc.
4. Eggs become dirty easily
5. It is difficult to control diseases and parasites.

### Fold pen / Ark / Open system

Is where a limited number of birds are kept in a small moveable house called a fold / pen / ark.

- ✓ Birds lay their eggs in the pens / folds/ arks.
- ✓ These folds are moved from one place to another every day (daily)
- ✓ The fold is made of wood, wire mesh and sticks tied together.

### STRUCTURE OF A PEN



### Advantages of the pen system

1. It is cheap to maintain compared to cage system or deep litter system.
2. Manure is evenly distributed on the farm.
3. Birds are restricted in movement
4. Birds can easily get vitamins and sunlight.

**Disadvantages of the pen system**

1. It is more expensive than free range system
2. The folds easily get old and break due to constant movements from one place to another.
3. Birds are easily bored since their movement is restricted to their fold / pen.
4. More land is needed to shift the folds.
5. Much labour is needed to move the folds daily.

**Deep litter system**

This is a system where the birds are kept in a house throughout.

- ✓ The feeds and water are given to the birds inside the house.
- ✓ Litter is put on the floor to keep the birds warm among others.
- ✓ The house is well lit to allow the birds to feed constantly.

**Advantages of the deep litter system**

1. The litter poured on the floor can be used as manure.
2. Birds are protected from thieves and wild animals e.g. wild cats.
3. Many birds can be kept in a small house.
4. Clean eggs are collected.
5. This system can be used for all stages of birds.
6. Birds cannot get lost as their movement is controlled.

**Disadvantages of deep litter system**

1. It encourages vices e.g. egg eating, cannibalism, toe pecking etc.
2. Litter can be a fire hazard (can easily catch fire).
3. It is more expensive than free range system.
4. The litter can harbour (keep) pests and parasites.

**Components of litter**

1. Coffee husks
2. Wood shavings
3. Rice husks
4. Crushed maize cubs
5. Saw dust.

**Importance of litter**

1. Provide warmth for the birds
2. Prevent the eggs from breaking as they are laid.
3. Litter provides heat that kills parasites / germs.
4. Litter got from the house can be used as manure by crop farmers.

***Q. How does litter provide warmth in a poultry house?***

A. Litter absorbs moisture

## Disadvantages of litter

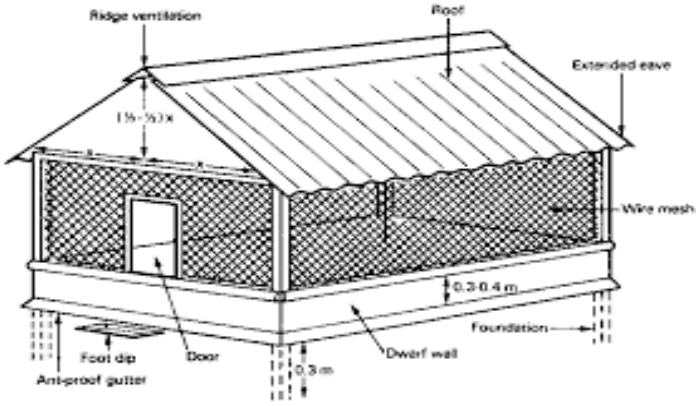
- ✓ Litter harbours parasites
- ✓ Litter is a fire hazard.

## Battery (cage) system

In this system, birds are kept in separate cages.

- ✓ It is not commonly used in Uganda.
- ✓ Each cage has one or two birds put inside the cages.
- ✓ This enables people to feed the birds easily and reduce contamination of feeds by the birds themselves.
- ✓ Cages can also be constructed in rows / one above the other.
- ✓ The cage should have good ventilation.

## A DIAGRAM SHOWING A CAGE




## Advantages of battery system

1. Diseases and diseased birds are easy to identify
2. It is easy to identify a bird that does not lay eggs.
3. Birds are very easy to control.
4. They are protected from thieves and wild animals.
5. Farmers can get manure easily.
6. There are less poultry vices than in the deep litter system.

## Disadvantages of battery system

1. A lot of money is needed to start (so it is very expensive)
2. Birds do not eat whenever they need to.
3. Birds need much attention.

## POULTRY DISEASES

- ✓ Coccidiosis
- ✓ Newcastle disease
- ✓ Fowl typhoid
- ✓ Fowl pox
- ✓ Gumboro diseases
- ✓ Avian leucosis
- ✓ Salmonellosis

## Diseases caused by a virus

- ✓ Newcastle diseases
- ✓ Fowl pox
- ✓ Gumboro disease
- ✓ Avian leucosis




***A hen suffering from coccidiosis***

### Coccidiosis

Is caused by protozoa.

### Signs of Coccidiosis

- ✓ Ruffled feathers
- ✓ Yellowish White diarrhoea
- ✓ Chicks are thin and not lively.
- ✓ Blood stained (faeces) droppings.
- ✓ Chicks crowd together
- ✓ Dullness and drooping of wings.

### Prevention of Coccidiosis

- ✓ Put drugs in food and water for the birds
- ✓ Should keep all the feeding troughs clean
- ✓ Isolate or kill infected birds.
- ✓ Keep the brooder and the areas around clean and dry.

### New castle disease

Caused by a virus

### Signs of New castle diseases

- ✓ Difficulty in breathing, coughing, sneezing and rattling.
- ✓ Lameness
- ✓ Several birds suddenly die
  Greenish yellow dropping
- ✓ Birds twist their necks
- ✓ Staggering and dropping of wings.

### Prevention, treatment and control of New Castel diseases

- ✓ Disinfect the poultry house regularly
- ✓ Vaccinate the birds after every 6 months
- ✓ Incase of out break, the flock should be killed.

NB: There is no treatment for New Castle disease so far.

### Fowl pox

Caused by virus

### Signs of fowl pox

- ✓ Difficulty in breathing
- ✓ Egg production and fertility reduces
- ✓ Watery sores on the comb, wattle and around the eyes.
- ✓ Discharge from the nostril and eyes.

- ✓ Molting and shedding feathers.
- ✓ Ulcers in the mouth (small wounds)

**Prevention and treatment of fowl pox**

1. Vaccinating the birds.
2. Maintaining perfect hygiene
3. Killing and burning the infected birds.
4. Disinfecting the poultry house regularly.
5. Using a foot bathe

**Fowl typhoid**

Fowl typhoid is caused by Bacteria called Salmonella.
These salmonella bacteria can attack the human beings as well, therefore it is dangerous for people to eat raw eggs.

**Signs of fowl typhoid**

1. Raffled feathers and a pole wattle
2. Folding their heads close to the body
3. Watery greenish yellow droppings
4. The liver, kidneys and spleen may become enlarged.

**Control and prevention of fowl typhoid**

1. Vaccinate the birds at 5 weeks.
2. Revaccinate at 4 months
3. Kill and burn the infected birds
4. No specific treatment for fowl typhoid.

**Gumboro diseases**

Caused by a virus

**Signs of Gumboro diseases**

NB: It affects the chicken between 3 to 6 weeks.

- ✓ Ruffled feathers
- ✓ Drooping of the wings
- ✓ Diarrhoea and later blood-stained droppings.
- ✓ Chicks die in a short time.

## POULTRY PARASITES

A parasite is a living organism that depends on others for food and shelter.

**Types of parasites**

- ✓ Endo-parasites/internal parasites
- ✓ Ecto -parasites /external parasites

**Examples of ecto- parasites**

- ✓ Lice
- ✓ Depluming mites
- ✓ Red mites
- ✓ Fleas

**Examples of internal parasites**

- ✓ Roundworms
- ✓ Pinworms

**Signs of worms**

- ✓ White chalky droppings
- ✓ Watery diarrhoea
- ✓ Fewer eggs are laid

**Control of worms**

Deworm at 6 weeks and every month

-**Deworming** is the giving of drugs to kill endo-parasites.

**Forms or methods of deworming**

- ➢ Drenching is the giving of liquid drugs to kill internal parasites
- ➢ Dosing is the giving of solid drugs to kill internal parasites

**How to control ecto -parasites**

- ✓ Dusting laying nests
- ✓ Ensure good hygiene in the poultry house
- ✓ Dusting birds with disinfectants
- ✓ Dipping the birds' feet in kerosene to kill the fleas

**POULTRY VICES**

Poultry vices are bad habits in poultry.

**Examples of common poultry vices**

- ✓ Cannibalism
- ✓ Egg eating
- ✓ Feather pecking
- ✓ Toe and skin pecking
- ✓ Vent/cloaca pecking

**Causes of vices in poultry**

- ✓ Boredom
- ✓ Starvation (little or no food)
- ✓ Over crowding of poultry
- ✓ Lack of a balanced diet

**Signs of poultry vices**

- ✓ Blood-stained beaks / bills
- ✓ Bleeding at the vent
- ✓ Yellow stains of egg yolk on the beak
- ✓ Broken egg shells in the poultry house.
- ✓ Fighting amongst poultry

**How to control poultry vices**

- ✓ Debeaking birds that eat eggs.
- ✓ Avoiding over crowding the birds
- ✓ Give the poultry feeds rich in calcium
- ✓ Cull or isolate the birds that are aggressive.

- ✓ Hang green leafy vegetables in the poultry house to keep the birds busy.
- ✓ Provide proper nestling for the layers.
- ✓ Collect laid eggs regularly.
- ✓ Remove broken egg shell from the house.
- ✓ Provide enough feeds to the birds.

## RECORDS IN POULTRY KEEPING

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

### Types of records kept on poultry farm

- ✓ **Flock records**: Shows the number of birds on a farm i.e. (number sold, dead or killed daily).
- ✓ **Health records**: Shows the treatment given to the birds.
- ✓ **Production records**: Shows the production percentage and the number of eggs collected daily.
- ✓ **Feeding records**: Shows the type of feeds, quantity or amount consumed or wasted.
- ✓ **Sales and expenditure**: Shows the expenditure and income from the feeds, eggs, sales of birds etc.

### Importance of keeping records on a farm

- ✓ Help to plan for the future of the farm
- ✓ To know the profit or losses made on the farm
- ✓ For fair tax assessment
- ✓ Enable the farmer to get loans
- ✓ To know the progress of the farm
- ✓ Enables the farmer to review the history of the farm.

## KEEPING BEES

## TERMS USED IN APICULTURE

1. **Apiculture**: Is the keeping and management of bees (refers to bee keeping)
2. **An apiary**: Is a farm of bees / a collection of bee hives or a place where bees are kept.
3. **Hiving**: Is the act of attracting bees to the hive using baits.
4. **Baits**: are things used to attract bees into the hive e.g. fruit juices, ripe bananas, cow dung e.t.c.
5. **A colony**: Is a group of bees living together.
6. **Swarming**: Is the movement of a swarm of bees from one place to another to look for a new hive.
7. **Maiden / marital flight i**s a flight during which the drone bee mates with the Queen bee.
8. **Brood**: are the young ones of bees.
9. **Grub**: this is the larva stage

**Groups of bees**

1. solitary bees
2. social bees

**Social bees**

These are bees that live ,move and work together in an organized group called a **colony**.

Honey bees are social insects because they live ,move and work together.

**Solitary bees**

These are bees that do not live ,move and work together.

**Examples of solitary bees**

Bumble bees

**Examples of social insects**

1. Termites
2. Red ants
3. Wasps
4. Black ants
5. Honey bees
6. Safari ants

**Solitary insects**

Solitary insects are the insects that do not live ,move and work together.

**Examples of solitary insects.**

1. Mosquitoes
2. Houseflies
3. Butterflies
4. Grasshoppers
5. Dragon flies
6. Cockroaches

**TYPES OF HONEY BEES IN A HIVE**

1. Queen bee
2. Drone bee
3. Worker bee

**THE QUEEN BEE**



A queen bee

**Characteristics of a queen bee**

✓ It has along abdomen and long legs.

- ✓ It is the largest bee in the hive
- ✓ It has shorter wings as compared to its body
- ✓ It has a sting.

NB: Its life span is 4 -5 years. It lays between 150-300 eggs per day.

**Function of the Queen bee in the hive**

To lay eggs in the hive

**The feeding of the queen bee**

The queen bee is fed on royal jelly collected by the worker bees

**THE DRONE BEE**



**Characteristics of a drone bee**

1. It is the male bee in the hive
2. The drone is the second largest bee in the hive
3. It has a blunt hairy abdomen
4. It is the only bee without a sting in the hive.

NB. It is almost never in the hive because it is killed after mating the queen.

**Function of a drone bee**

To mate with the queen bee

**Wedding flight / maiden flight**

A wedding flight is a flight during which the drone bee mates the queen bee.

***Why does the drone bee die after the wedding flight?***

Due to loss of its reproductive organ (truct) during mating.

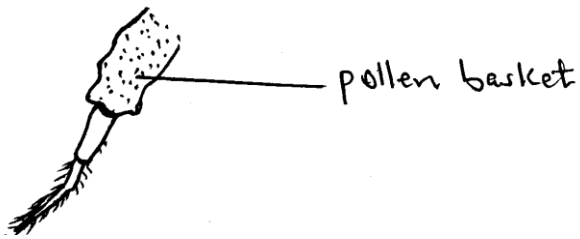
**WORKER BEE**



**Characteristics of the worker bees**

- ✓ They are the smallest and busiest bees in the hive.
- ✓ They have a sting used for defence
- ✓ They have a pollen basket on their hind leg for carrying pollen grains.
- ✓ They are female sterile bees because their reproductive organs are under developed.

**Diagram showing the hind leg of a worker bee**




**Roles of the worker bees**

1. Guard the hive.
2. Collect nectar , water and pollen grains.
3. Build the hive using wax
4. Clean the hive
5. Collect propolis used to repair the cracks on the hive.
6. Feed the grubs (larvae) on honey
7. Feed the queen bee on royal jelly.
8. Fan the hive to reduce(lower) the temperature
9. Make honey and store it in the honey combs.

**General habits of honey bees**

- ✓ Bees make woggle and round dances to communicate
- ✓ Bees swarm from one place to another
- ✓ Bees collect nectar and pollen grains from flowers.

**SWARMING**

- ✓ **Swarming** is the movement of a swarm of bees from one place to another to look for a new hive
- ✓ **A swarm** is a group of bees moving together.
- ✓ Bees always store enough honey in their stomachs to last for some days.
- ✓ After swarming, the bees settle down on a branch to wait for the scouts or messenger bees that are sent to look for a new hive to come back.

**Reasons why bees swarm**

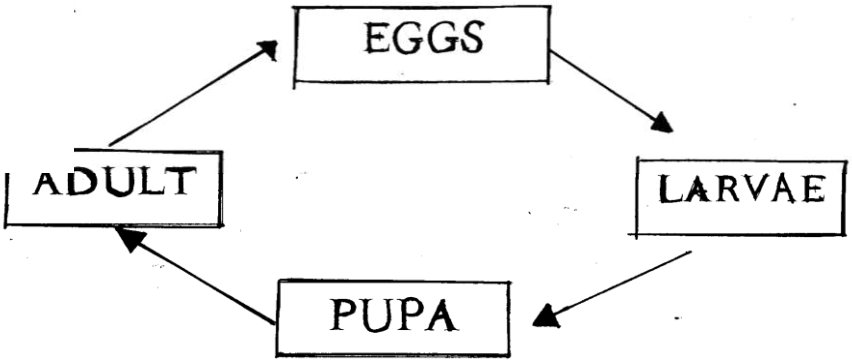
1. Bees swarm due to overcrowding in the hive.
2. Due to a bad smell near the hive or inside the hive.
3. Due to dampness in the hive (incase the hive leaks)
4. Due to direct sunlight into the hive.
5. In case enemies attach the bees.
6. Due to shortage of food and water in an area due to drought.
7. In case the queen bee dies.
8. If there are two or more queen bees in the hive.
9. Lack of flowering plants around the hive

**LIFE CYCLE OF A HONEY BEE**

Bees undergo a complete metamorphosis i.e.

Eggs  Larva (grubs) - Pupae  Adult (Imago)

**Diagram**




## BEE HIVES

Bees naturally hive in holes in the ground, caves or in hollows in big trees. When a farmer wants to keep bees, he provides for them a shelter called a bee hive.

**Types of bee hives**

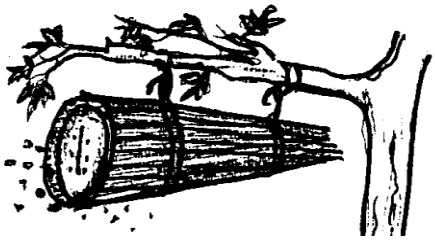
There are two types of bee hives

- ✓ Traditional (local bee hive)
- ✓ Modern been hive.

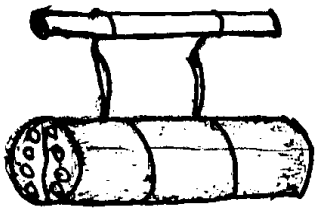
**Local bee hive**

Examples of local bee hive

**a).Woven bee hive**



**b).Dug out log beehive**



**Advantages of local bee hive**

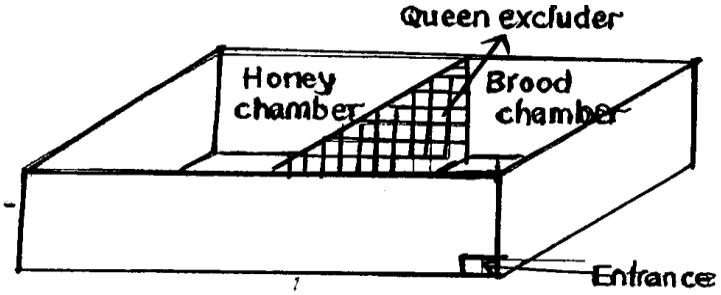
- ✓ They are easy to make
- ✓ They are made from locally available materials
- ✓ They are cheap to maintain.

**Disadvantages of local bee hive**

- ✓ It is easily destroyed
- ✓ Not easy to inspect
- ✓ Lasts for time
- ✓ Honey is not always clean
- ✓ Not easy to harvest honey.

**Modern bee hives**

Internal structure of a modern beehive




**Section in a modern bee hive**

- **Brood chamber**: Where queen lays eggs which later hatch into grubs (larvae)
- **Honey chamber**: This where the worker bees keep honey.
- Only workers can reach this section.
- The honey is clean without eggs or larvae.
- **Queen excluder**: Prevents the queen from entering the honey chamber or separates the honey chamber from the brood chamber.
- Therefore the queen excluder prevents honey from getting contaminated

**Advantages of a top bar hive**

1. The hive can easily be inspected
2. Harvested honey is always clean
3. Top bar hive is durable (lasts for along time)
4. Only the honey combs which are ready can be harvested.

**Disadvantages of a top bar hive**

✓ A top bar hive is expensive to make.

**STARTING A COLONY**

**Requirements for starting a colony**

✓ Queen bee
✓ Baits e.g. sugar solution for the bees to feed on.
✓ A trough of water to place near the hive.

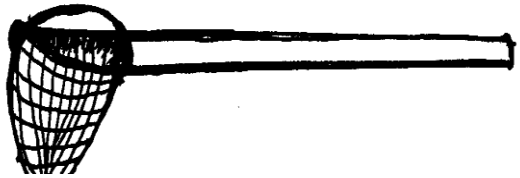
**Stocking a hive**

Stocking a hive means putting bees in an empty hive to occupy it.

**How is stocking done in apiculture?**

By setting up a hive, putting baits and waiting for the bees to occupy it or Trapping bees into the hive using a swarm catching net.

**Diagram of a swarm catcher**



NB. The farmer uses the above swarm catcher to transfer the bees trapped to the main hive.

**Proper location of an apiary (farm of bees)**

1. Away from people or animals to avoid disturbances
2. Away from the main road
3. In a sheltered and quiet place (under shade)
4. Near a water source
5. Near flowering plants.

**HARVESTING HONEY**

This is the removal of honey combs from the hive.

**Extracting honey.**

This is the removal of honey from honey combs

**Factors considered when harvesting honey**

1. Dress in suitable clothing e.g. overall
2. Make sure the smoker works properly.
3. Lower the hive to the ground to avoid damaging the combs.
4. Avoid killing the bees.
5. Leave some old combs for the bees to suck honey.

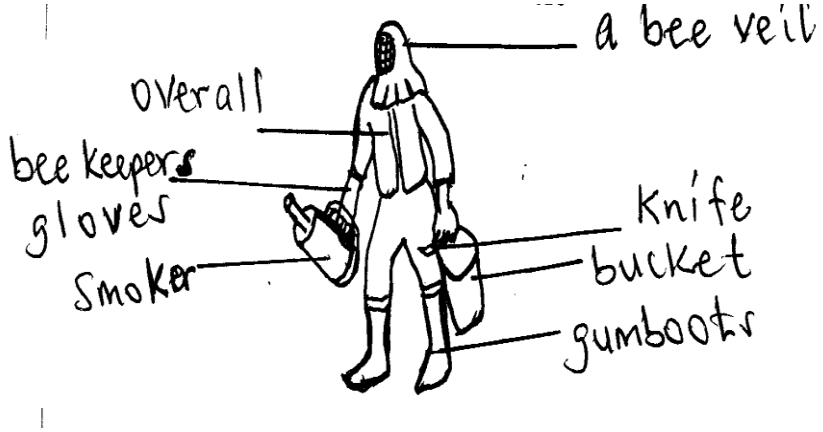
***The best time of the day for harvesting honey***

In the evening when it is cool and all the bees are settled or calm.

**Equipment for harvesting honey**

1. A bucket (pan) for collecting honey.
2. A knife used to cut honey combs
3. Overall to protect the harvester from stings.
4. Bees veil to protect the face from bee stings
5. Gloves to protect the hands
6. Gumboots to protect the feet.
7. A smoker to produce smoke that calms bees.

**THE HONEY HARVESTER**




**Bee products (summary)**

Honey and bee wax are the main products from bees.

**Other bee products include**

1. Propolis
2. Royal jelly
3. Combs
4. Brood
5. Bee venom

**How is honey processed?**

1. Golden yellow combs are removed and crushed.
2. The crushed combs are sieved / filtered.
3. The wax remains on the sieve as honey drops into a clean container under the sieve.
4. Collected honey is then melted over a steam bath.
5. After settling, the scum that forms on top of the honey is removed using a spoon or knife.
6. At this stage, honey is ready for eating.
7. However, it can be sieved a gain to make it purer and give it clean clear colour.

**How to obtain bee wax**

- ✓ Honey combs are placed in a sauce pan filled with warm water.
- ✓ The water may be heated but not at boiling point.
- ✓ The bee wax melts into the warm water.
- ✓ After cooling, wax forms on top of the water.

**Which food value do you mostly got from eating honey?**

We mostly get energy giving food from eating honey.

**Importance of honey to man**

1. Honey is eaten directly as food
2. Honey is used to sweeten tea.
3. Liquid honey is eaten with bread and cakes.
4. Honey is used to make alcoholic drinks.
5. Honey is used to treat cough.
6. Honey can be sold to get money.
7. Honey is used to make medicine.

**Industrial uses of honey**

1. Honey is used to make medicine e.g. cough syrups.
2. It is also used to make sweets, chocolate.
3. It is used in fruit canning as a preservative.
4. Honey is used to make cosmetics e.g lip shiner.
5. Honey is also used in hospitals to dress wounds in surgical cases.

**Importance of bee wax to man**

1. For making shoe polish
2. For making crayons used in painting
3. For making candle wax
4. To make varnish for furniture
5. To make cosmetics like body creams / Vaseline.

**Advantages of keeping bees**

1. Apiculture requires little space i.e. the land under the lives can be used for crop farming.
2. Less labour and attention are needed since bees look for their own food.
3. Bee farmers get regular income from bee products like honey.
4. Bees pollinate flowers.

## BEE ENEMIES AND DISEASES

Examples of bee pests include

1. Wood ants
2. Safari ants
3. Rats
4. Wasps
5. Wax moths
6. Sugar ants

**Diseases of bees**

Bees are resistant to diseases but the following diseases can attack them:-

1. American foul brood
2. Stone brood
3. Bald brood
4. European foul brood
5. Nosema

**How can we prevent enemies from destroying bees?**

- ✓ By oiling the base of the poles on which bees are.
- ✓ Putting grease on the wires to prevent the ants from climbing.
- ✓ Spraying insecticides at the base of poles to kill the pests.
- ✓ Keeping the grass around the hives short.
- ✓ Hanging the hives in trees 100 to 150 cm high.

# THEME: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATION

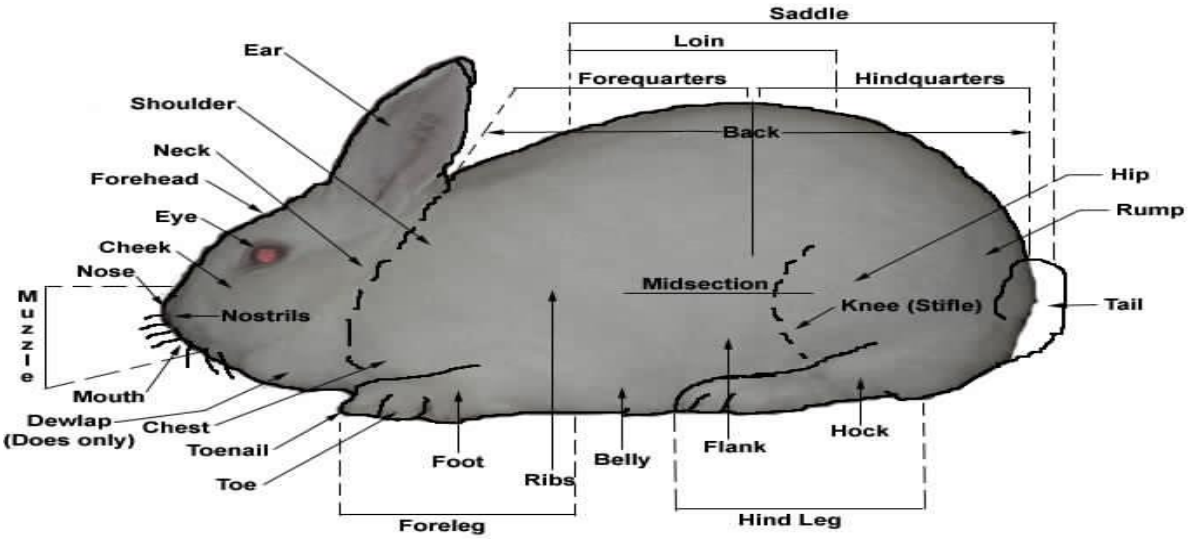
## TOPIC 3: KEEPING RABBITS

**Rabbitry** is a farm of rabbits.
It is a place where rabbits are kept.

**Terms used in keeping of rabbits.**

1. Rabbit keeping :This is the rearing of rabbits.
2. Hutch / pen :This is the home / housing structure of a domestic rabbit.
3. Burrow :Is a hole dug by a rabbit.
4. Buck :This is a mature male rabbit.
5. Doe : This is a mature female rabbit.
6. Reveret / kit/ kitten :This is a young rabbit.
7. Litter : Is a group of young rabbits born together at the same time by one doe.

**External parts of a rabbit**




**Reasons why people keep rabbits / uses of rabbits**

1. Rabbits provide us with meat which is a source of proteins.
2. Rabbits are sources of income / money when sold.
3. The dung of rabbits can be used as manure in our gardens.
4. Some rabbits are kept for their fur.
5. Rabbit skins are used to make articles like bags, shoes, etc.
6. Rabbits can be kept as pets (for pleasure)

**Advantages of keeping rabbits over other animals.**

1. Rabbits need less food than other animals like goats.
2. They do not need a lot of land.
3. Management practices like feeding and housing are easily carried out.
4. Rabbits multiply quicker than other animals.
5. They mature quickly.
6. They are cheaper to buy.

## Breeds of rabbits

1. Local rabbits

These have been kept in Uganda for a long time.

### Characteristics of local rabbits

1. They are resistant to most diseases.
2. They take long to mature.
3. They are hard in resisting harsh weather conditions.
4. They have many different colours.
5. They are smaller than exotic breeds.
6. They can live in the bush.
7. They dig holes in the ground where they live.

## Exotic breeds of rabbits

These are breeds which were imported from other countries.

### Characteristics of exotic breeds

1. They have the same colour.
2. They produce bigger quantities of meat.
3. They have the same weight and size.
4. Their young ones carry parents habits.
5. They take short period to mature.
6. They are bigger than local breeds
7. They are unresistant to most diseases

## Differences between local and exotic breeds of rabbits.

| Local breeds | Exotic breeds |
|---|---|
| They have different colours | They produce young ones with the same colour. |
| They grow slowly | They grow fast. |
| They are small in size. | They are big in size. |
| They are resistant to diseases. | They can easily get sick. |
| They take long to mature | They take shorter period of time to mature |

## Examples of exotic breeds of rabbits.

They include the following:-

- Angora rabbit.
- Californian rabbit
- Chinchilla rabbit.
- Ear – lops
- New Zealand white

## Characteristics of exotic breeds of rabbits

### 1. The Angora rabbit

- They are white in colour.
- They produce fine silky hair which has ready market in Europe.
- They produce good quality meat.

**2. California rabbit**

- The body is white with the nose; tail and feet are black or dark brown.
- Grow faster than other breeds of rabbits.
- They weigh up to 5kg when mature.

**3. Chinchilla rabbit**

- They are grey in colour.
- Lighter compared to New Zealand and California.
- They weigh 3½ kg when mature.
- They are kept for meat.
- Their skins have ready market in Europe.

**4. Ear – lops**

- They are bigger compared to others (6kg when mature)
- Their ears drop on the sides of the head.
- They grow slowly compared to other breeds.

**5. New Zealand white**

- They are white in colour.
- Have short legs and produce a lot of meat.
- Have pink eyes.
- The doe produces 25 – 30 rabbits per year.
- Can reach 5kg when mature.

**Qualities of good rabbits to rear**

The following factors should be considered when selecting good rabbits to rear.

1. Select healthy rabbits with a shiny coat, bright eyes, dry clean nose, without any discharge from the eyes.
2. Select rabbits that have plenty of hair and are well shaped.
3. Select rabbits that produce a lot of meat.

**Housing of rabbits**

A house of a rabbit is called hutch.

**Qualities of a good rabbit house (hutch):**

- Should be strong enough to keep off predators.
- Should be raised from the ground to protect rabbits from dogs and other wild animals.
- It should always be kept clean.
- Should be kept dry to minimize breeding of germs.
- Should allow enough air entering it.
- Should not leak on rainy days.

**Materials used to construct a hutch**

Wood, nails, wire mesh, iron sheets, etc.

**Types of hutches (with diagrams)**

1. Morant hutch ( Diagram of each hutch)
2. Caged modern hutch
3. Traditional hutch

**Management practices in rabbit keeping**

(a) Feeding: Rabbits can be fed on the following

- Green vegetables
- Carrots
- Sweet potatoes leaves.
- Green grass.
- Pellets
- Banana peelings
- Potato peelings
- Cabbage leaves

**Points to note:**

- Pellets are manufactured animal feeds.
- Rabbits should be given a block of salt to lick, to provide them with mineral salts.
- They should be given salt dissolved in water.
- Does with young ones need more water in order to make milk for their litter.

**(b) Reproduce in rabbits**

- The act of producing young ones in rabbits is called Kindling.
- The buck mates with the doe.
- The doe then becomes pregnant.
- The doe takes 30 days to produce young ones.
- This period of pregnancy is called Gestation period.
- The doe prepares a soft bed made of soft hair from its body when it is about to produce.
- It produces between 7 – 11 young ones.
- If more are produced, they should be killed as the doe's milk may not be enough for all of them.
- The buck should not be kept together with the doe as it may kill the young ones.

**Common Diseases of Rabbits**

**1.Coccidiosis**

**Signs and symptoms**

- Diarrhoea with blood (dysentery)
- Rabbits have swollen stomach.
- Rabbits lose weight (become small and thin)
- They have rough hair.

**Control of coccidiosis**

- Keep the hutch clean.
- Feed rabbits on clean food and water.
- Put drugs in clean drinking water.

**2. Scours**

**Signs and symptoms**

- Rabbits stop feeding.
- Pain in the stomach.
- Rabbits develop diarrhea

**Control of scours**

- ❖ Do not give rabbits wet and moldy grass.
- ❖ Do not give rabbits young grass.
- ❖ Clean the hutches and spray regularly.

**3. Ear canker**

**Signs and symptoms.**

- ❖ Itching ears.
- ❖ Ears develop wounds with a discharge and become painful.
- ❖ Control of ear cancer.
- ❖ Clean the ears using paraffin on cotton.
- ❖ Do not overcrowd the rabbits in one hutch.

**4. Pneumonia**

**Signs and symptoms**

- ❖ Rabbits begins shivering.
- ❖ Difficult breathing
- ❖ Rabbits lose appetite.
- ❖ They have high temperature

**Control of Pneumonia**

- ❖ Keep hutches dry and clean.
- ❖ Keep rabbits away from rain.
- ❖ Treat rabbits with drugs.

**5. Colds**

**Signs and symptoms**

The rabbit sneezes a lot.
Rabbit has a runny nose.

**Ways of preventing diseases in rabbits**

1. Always keep rabbit hutches clean and dry.
2. Avoid rain into hutches.
3. Keep sick rabbits away from others.
4. Feed rabbits well.
5. Avoid overcrowding rabbits in one hutch.
6. Always call a veterinary officer to check on the health of rabbits.

**Keeping records on a rabbit farm**

Records means the written information on a farm e.g.

1. Feeds records.
2. Health records.
3. Production records
4. Breeding records
5. Financial records.

**Importance of keeping records.**

1. It helps to tell where to profit or loss is made.
2. It enables the farmer to plan better for the farm.

# THEME: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATION

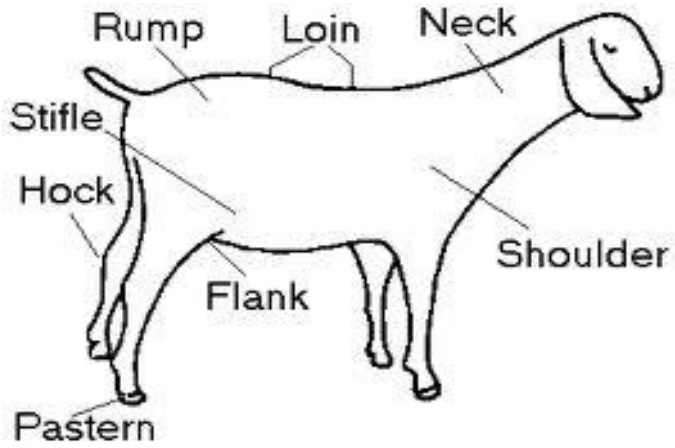
## TOPIC 4: KEEPING GOATS, SHEEP AND PIGS

### GOAT KEEPING

**Terms used in goat keeping**

1) **Nanny goat**: is a mature female goat
2) **Billy goat**: is a mature male goat
3) **Kid**: is a young goat
4) **Kidding**: is the giving birth to a young goat
5) **Gestation period**: is the period of pregnancy
6) **Heat period:** Is a period when a nanny goat is ready to be mated
7) **Browsing**: is free movement of animals to look for pasture
8) **Tethering:** Is the system of grazing where an animal is tied on a peg (stake) on a rope
9) **Drying off**: This is the stopping of milking and suckling before a nanny goat gives birth
10) **Steaming up**: This is the feeding of a nanny goat on special feeds to prepare it for kidding.

**Structure of a goat**




**Why people rear goats**

1. To get meat
2. To get skins
3. To sell goats and get money
4. Some goat breeds are source of meat
5. Goats are kept for social functions like paying dowry, rituals
6. Their droppings are used as farm yard manure

**Products got from goats**

1. Meat
2. Milk
3. Skins
4. Mohair
5. Animal droppings

**Types of goats**

- ✓ Dairy goats: These are goats kept for milk production
- ✓ Meat goats: These are goats kept for meat production
- ✓ Dual purpose goats These are goats kept for both meat and milk production

**Breeds of goats**:

A breed is a group of animals with specific characteristics

**Types of goat breeds.**

1. Local breeds
2. Exotic breeds
3. Cross breeds

**Local breeds** are breeds of goats which have been originally existing in East Africa.

**Examples of local breeds of goats**

1. Mubende goats
2. Golla goats
3. Turkana
4. Sambaru goats
5. Anglo– Nubian
6. The Somali goat East African small goats

**Characteristics of local breeds**

1. They take time to mature
2. They are resistant to tropical diseases
3. They can survive on poor pasture and drought

**Advantages of local breeds**

1. Local breeds are resistant to tropical diseases.
2. Local breeds can with stand harsh weather conditions.
3. Local breeds are easy and easy to manage as they feed by browsing.

**Disadvantages of local breeds**

1. Take long to mature
2. Produce hard meat.
3. They produce less products.

**Exotic breeds** are breeds of goats which originated from other countries.

**Examples of exotic breed of goats**

- ✓ Toggenburg
- ✓ Angora goats
- ✓ Saanen goats
- ✓ Boar goats

**Meat breeds**

- ✓ Boar goat
- ✓ Galla goats
- ✓ Mubende
- ✓ The Somali goats.

**Milk producing breeds**

- ✓ Saanen goats
- ✓ Toggenburg

**Wool breeds**

- ✓ Angora goats (mohair)

**Cross breeds**

- ✓ Somali goats

**Characteristics of exotic breeds**

1. They mature quickly
2. They are not resistant to diseases
3. They can not survive on poor pastures and drought
4. They produce a lot of milk

**Advantages of keeping Exotic breeds of goats.**

1. They grow very fast.
2. They fetch a lot of money when sold.
3. Produce tender meat.
4. They produce a lot of meat and milk.

**Disadvantages of keeping exotic breeds.**

1. They are expensive to keep.
2. They are not resistant to worms and diseases.
3. They cannot withstand harsh weather.
4. They need special feeds to produce better products.

**Cross breeds**: are breeds of goats got as a result of cross breeding the local with exotic breeds

**BREEDING IN GOATS**

A female goat is mated for the first time at the age of 14 – 18 months.

**Gestation period of a goat.**

The gestation period of a nanny goat is 5 months (150 days)

## Some key terms as used in goat keeping

- ✓ **kidding:** The act of giving birth to kids.
- ✓ **Gestation period:** The period between fertilization and birth in mammals (animals).
- ✓ **Lactation:** Is the milking period in animals.

## Heat period in goats

Heat period is the time when the nanny goat is ready to be mated by a Billy goat.

## Signs of a nanny goat on heat

1. Becomes restless (unsettled)
2. The vulva swells and becomes reddish.
3. Whitish discharge from the vulva.
4. Mounting other goats.
5. Standing still when mounted.
6. Loss of appetite.

## Caring for a pregnant goat

- ✓ A pregnant goat needs special care.
- ✓ Concentrates should be given one month before kidding.
- ✓ These feeds have a high carbohydrates and protein content.
- ✓ Mineral licks should be given.
- ✓ Pregnant goats should be separated from others and kept in a clean place.
- ✓ Weaning should be done at least 3 - 4 months after kidding.

## Signs of a good milk breed

1. It has a large under and teats.
2. Have large milk veins which appear below the belly.
3. Have strong and well-placed hind legs.
4. Have strong back muscles.

## Factors considered when selecting a goat breed

1. Heredity
2. Good health
3. Mammary glands
4. Milk yield

## ROUTINE JOBS IN GOAT MANAGEMENT

## What are routine jobs?

Routine jobs are any good management practices carried out on any livestock farm.

## Examples of routine jobs on a livestock farm.

| | | | | |
|---|---|---|---|---|
| i. | Castration | v. | Drenching | ix. Culling |
| ii. | Disbudding | vi. | Spraying or dusting | |
| iii. | Dipping | vii. | Dosing | |
| iv. | Hoof trimming | viii. | Feeding | |

## Castration

Castration is the removal of testes from a young male animal.

## Methods of castration

- ✓ Closed castration (using a burdizzo castrator or elastrator)
- ✓ Open castration. (Scalped operation) – The knife can be used to cut the scrotum / scalped used by veterinarians.

## Advantages of castration.

1. A castrated animal grows fatter and faster.
2. Castration prevents in-breeding.
3. Prevents the spread of STD (Sexually Transmitted Diseases).
4. Helps to make the male animal calm (docile) and easy to handle (tame).
5. Castration helps to improve on the quality of meat.

## Disadvantages of castration

1. Animals feel a lot of pain.
2. The wound may become septic.
3. The cut opens way to germs.
4. It is expensive to buy a burdizzo or hire a qualified person to carryout castration.

## Dehorning

Dehorning is the removal of horn buds to prevent the growth of horns.

## Advantages of dehorning

- ✓ Creates space on the farm.
- ✓ Helps in identification of ones animals.
- ✓ Prevents livestock animals from injuring others.

a) **Hoof trimming:** Is the cutting off of over grown hooves. It is normally done in sheep. A trimming knife or hoof trimming shears are used.

✓ **Importance:** To reduce the chances of infections and injuries.

b) **Dipping:** Is the bathing of livestock in acaricides in a dip tank to kill ecto-parasites.

**Importance:** Helps to kill ecto-parasites e.g ticks.

c) **Drenching:** Is the giving of liquid medicine to the livestock through the mouth.

Drenching is done using a drenching gun or bottle.

d) **Spraying:** Is when a fumigator or knap sack sprayer is used to spray insecticides / pesticides to kill ecto parasites.

**Importance:** Prevents tick borne diseases like Red water, Heart water, etc.

e) **Dusting:** Is the application of powdered medicine on the body of an animal to kill ecto-parasites.

f) **Dosing:** Is the giving of solid medicine e.g Tablets using a dosing gun to kill endo-parasites like worms.

g)**Feeding:** is done using supplements, mineral licks, concentrates and fodder.

**Housing goats**:
The house of goats is called goat shed.

**Reasons for housing goats**
1. Housing protect goats from rain and sunshine
2. Housing protects goats from wild animals
3. Housing promotes good hygiene
4. Housing controls the spread of diseases

**Systems of rearing goats**
These are many methods of grazing animal, namely:
1. Rotational grazing
2. Tethering
3. Strip grazing
4. Paddock grazing
5. Free range grazing (herding)

i) **Tethering:** Is when an animals is tied with a rope onto a peg to graze around.

**Diagram of a tethering goat**



**Advantages of tethering**
1. Ensure efficient use of pasture.
2. Enables the growth of pasture in other areas.
3. Controls soil erosion as over grazing is avoided.
4. Controls spread of parasites and diseases.
5. Allows pasture conservation.

**Disadvantages tethering grazing**
1. Animals cannot get enough food (pasture).
2. It is tiresome to keep on changing the animals.
3. The rope can cause injuries to the animal.

2.**Free range grazing (herding)**
Is where the animals are left to roam and gaze freely.

**Advantages of free range system**
- ✓ Animals can easily get lost and stolen by thieves.
- ✓ Animals can stray and spoil crops.
- ✓ Animal diseases are easily spread.

**3. <u>Zero grazing (stall feeding)</u>**

Zero grazing system needs more attention than tethering.

This method is suitable for small scale farmers and in areas where most land is used for crop growing

**Parasites in goats**

A parasite is a living thing which depends on others for food and shelter.

**Examples of parasites in goats**

1. Ticks
2. Tsetse flies
3. Roundworms
4. hookworms
5. Liver fluke
6. Mites

**Types of parasites**

a) Endo parasites (Internal parasites)
b) Ecto parasites (External parasites)

**Endo parasites**

These are parasites which live inside the body of an animal e.g liver fluke, roundworms, hookworms etc

**Ecto parasites**

These are parasites which live outside the body of an animal e.g

- ✓ Ticks,
- ✓ Tsetse flies
- ✓ Mites etc

**Ways of controlling Endo parasites**

**Deworming goats**

Deworming is the giving of drugs to animals to kill internal parasites

**<u>Methods of deworming</u>**

- ✓ Drenching is the giving of liquid drugs to animals to kill internal parasites.
- ✓ Dosing is the giving of solid drugs to animals to kill internal parasites.

**Ways of controlling ecto parasites**

Spraying goats using acaricides

**Diseases which attack goats and sheep**

1. **Pneumonia**

It is caused by bacteria

**Symptoms of pneumonia**

- ✓ Difficulty in breathing
- ✓ Coughing
- ✓ Loss of appetite
- ✓ Fever
- ✓ Discharge from the nose

**Prevention and control of pneumonia**

- ✓ Isolate infected animals from healthy ones
- ✓ Treat animals with antibiotics

2. **Foot rot**

It is caused by bacteria

It attacks the feet of animals

**Signs and symptoms**

- ✓ Limping
- ✓ The feet swell
- ✓ Pus in hooves
- ✓ Loss of appetite
- ✓ Reduction in milk production in lactating goats and sheep

**Prevention and control**

i Cleaning the animal feet with feet antiseptic
ii Cleaning the animal house
iii Do not force animals to walk
iv Give recommended drugs.

**3. Foot and mouth disease**

It is caused by a virus

i It attacks the foot and mouth of animals
ii The hooves swell and pain
iii The hooves develop pus and become smelly
iv The animal does not feed properly
v The animal limps
vi There is increased salivation from the mouth

**Prevention and control**

i Cleaning the animal house
ii Take the animal for foot bathe
iii Trim the hooves
iv Take animal to dry places for grazing
v Regular vaccination

**4. Nangana /Trypanosomiasis**

It is caused by a trypanosome

It is spread by tsetse flies

**Signs and symptoms.**

- ✓ Eyes will be watery
- ✓ Loss of appetite

**Prevention and control**

- ✓ Clear bushes around the farm
- ✓ Spraying goats and sheep
- ✓ Use tsetse fly traps

5. **Lamb dysentery**

- ✓ It is caused by bacteria
- ✓ It attacks the intestines of the animals like goats and sheep.
- ✓ Diarrhoea with blood
- ✓ Weakness and staggering in animals
- ✓ Sudden death

i

**Prevention and control**

- ✓ Regular vaccination
- ✓ Separate infected animals from healthy ones

6. **Rift valley disease**

It is caused by a virus

**Signs and symptoms**

1. High fever
2. Staggering and diarrhoea
3. Loss of appetite
4. Abortion in female goats and sheep

**Prevention and control**

- ✓ Vaccination of animals
- ✓ Avoid areas where there are mosquitoes

7. **Coccidiosis**

It is caused by protozoa

**Signs and symptoms**

- ✓ Diarrhoea
- ✓ Body weakness
- ✓ Loss of body weight especially in kids
- ✓ Abortion

**Prevention and control**

Cleanliness of food and the house

8. **Heart water**

It is spread by ticks

**Signs and symptoms**

- ✓ Fever
- ✓ Loss of appetite
- ✓ Animals move in circles
- ✓ Tongue comes out
- ✓ Eye lids are found twisting/blinking

**Prevention and control**

Early treatment

9. **Mastitis**

It is caused by bacteria

It attacks the udder of female animals

**Signs and symptoms**

- ✓ Swollen udder
- ✓ Pus and blood in the udder
- ✓ The udder may stop producing milk
- ✓ A nanny goat or ram does not allow suckling

**Prevention and control**

- ✓ Clean the milking place
- ✓ Treat animals with antibiotics
- ✓ Seek assistance from a veterinary doctor

10. **Anthrax**

It is caused by bacteria (Bacillus anthracis)

**Signs and symptoms**

- ✓ High fever
- ✓ Weakness
- ✓ Sudden death
- ✓ Animal does not feed properly

**Prevention and control**

- ✓ Regular vaccination
- ✓ Kill and burry all sick animals

## SHEEP REARING

**Terms used in sheep rearing**

1) **Ram**: A mature male sheep
2) **Ewe**: A mature female sheep
3) **Lamb**: A young sheep
4) **Ewe lamb**: A young female sheep
5) **Ram lamb**: A young male sheep
6) **Lambing**: This is the act of giving birth in sheep
7) **Mutton**: Meat of sheep
8) **Dehorning**: This is a practice of removing horn buds
9) **Shearing**: This is the practice of removing wool from a sheep's body
10) **Docking**: This is the cutting short of the sheep's tail.

**<u>Reasons for docking</u>**

- ✓ Docking allows easy mating in female animals
- ✓ It promotes hygiene in sheep

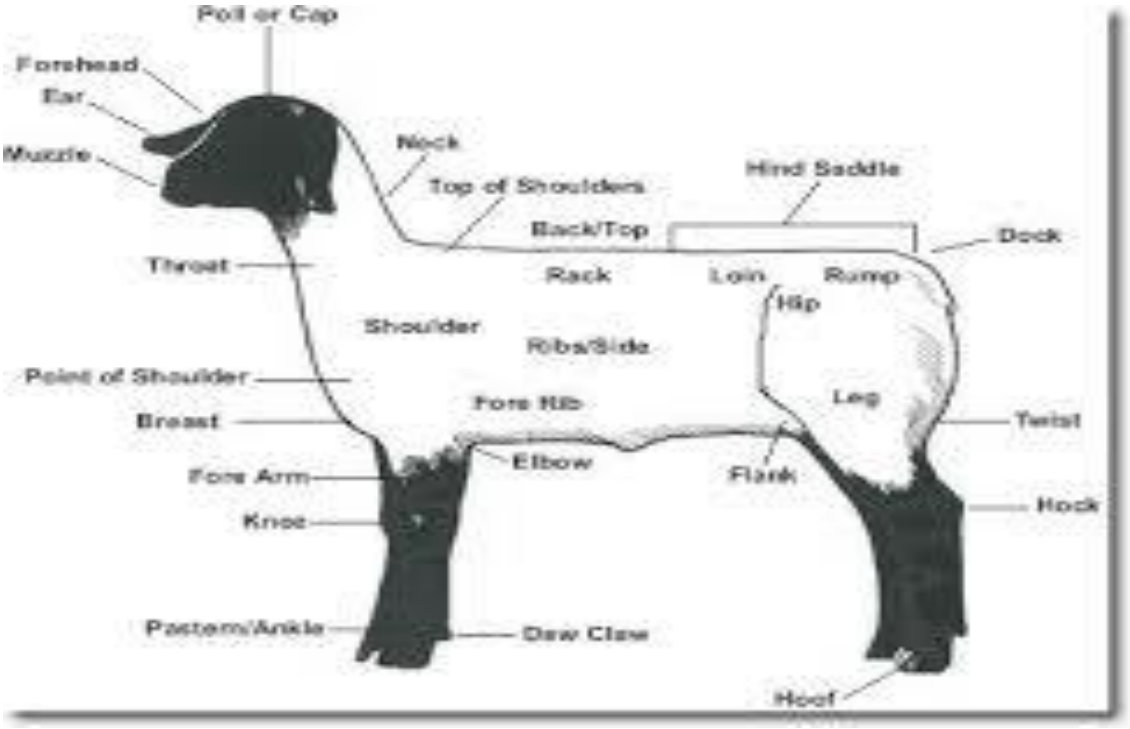
**Reasons why people keep sheep**

- ✓ We get mutton from sheep
- ✓ We get wool from sheep
- ✓ We sell sheep and get money.
- ✓ For cultural purposes e.g sacrifice, rituals, pay dowry or bride wealth.

✓ Sheep provide manure in form of animal droppings

**Products got from sheep**

✓ Mutton
✓ Wool
✓ Skins and hides
✓ Animal droppings (manure)




***N.B: Types of breeds of sheep are the same as those in goats***

✓ Local / Indigenous breeds
✓ Exotic breeds
✓ Cross breeds/Hybrids

**Breed of sheep kept in Uganda**

A) **Local breeds of sheep**

✓ Black head Persian
✓ Masai sheep
✓ Somali sheep

B) **Exotic breeds**

✓ Corriedale
✓ Dorper sheep
✓ Romeoville
✓ Romney marsh
✓ Merino

N.B:

1) Merino sheep is well known for wool production
2) Angora goats are well known for the production of mohair.
3) Systems of sheep rearing are the same as those used in goat keeping.

**Dual purpose sheep**

Dual purpose sheep are the sheep kept for production of both mutton and wool e.g Romney marsh / Corriedale.

**Wool breeds**

- ✓ Marino sheep (fine wool)
- ✓ Romney marsh (long wool)

**BREEDING IN SHEEP**

An ewe should be served at the age of 16 -18 months. ( 1 year 4 months – 1 year 6 months)

The gestation period of sheep is 5 months (150 days).

**Weaning is done by giving.**

Weaning is done by giving semi solid food to young ones besides milk from their mothers.

Weaning is done between 3 – 4 weeks.

Weaning sheep should be sheared at 8 months.

A mature sheep should be sheared once a year.

**Factors considered when choosing a good ewe / ram.**

1. Calmness / docile appearance / easy to handle.
2. The udder and teats should be well developed.
3. Should have good motherly and lambing ability.
4. Should be free from diseases.
5. Should be free from hereditary effects.

**Diseases of sheep**

1. Anthrax
2. Nairobi sheep disease
3. Heart water
4. Red water
5. Blue tongue
6. Sheep scab
7. Sheep pox
8. Mastitis

**Gestation in sheep and goats**

Gestation is the period of time between conception to birth.

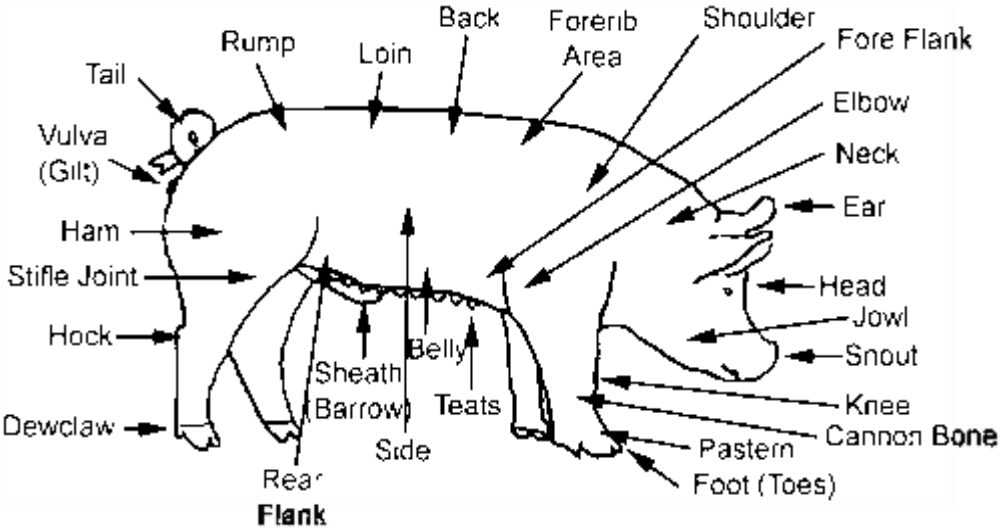
The gestation period of a nanny goat and an ewe is 5 months/150 days

# PIGGERY

**Terms used in piggery**

1) **Piggery**: is the practice of rearing pigs
2) **Boar**: is a mature male pig
3) **Sow**: is a mature female pig
4) **Gilt**: is a young female pig
5) **Bristle**: is a young male pig
6) **Piglet**:is a young one of a pig
7) **Farrowing**: is the act of giving birth to piglets
8) **Litter**: is a group of piglets born at the same time
9) **Pork** is a meat got from pigs
10) **Bacon** is a fat obtained from pigs
11) **Warthog** is a wild pig

**External parts of a pig**




**Reasons for piggery**

- ✓ We sell pigs and get money
- ✓ We get pork

**Types of breeds of pigs**

Types of breeds of pigs are the same as those in goats and sheep

**Examples of exotic breeds of pigs**

1. Large white pigs/York shine
2. Saddle back pigs
3. Hampshire pigs
4. Wessex saddle back
5. Landrace
6. Large black
7. Poland China

**Factors to consider when selecting a good breed of pigs**

1. Heredity
2. Good health
3. Good body formation
4. Mammary glands

**Housing and management of pigs**

A house for pigs is called a pigsty

**Qualities of a good pigsty**

1. It should have a slanting floor
2. It should be well ventilated
3. It should be dry and warm
4. It should have enough space for storage of feeds and water
5. It should be easy to clean

**Reasons for housing pigs**

1. Housing protects pigs from bed weather conditions
2. Housing protects pigs from wild animals and thieves
3. Housing protects pigs from destroying peoples crops
4. Housing prevents easy spread of diseases.

**Management of a pregnant sow or gilt**

- ✓ Sows should produce two litters per sow per year
- ✓ Young female pigs called gilts should not be served until they are about 12 months and weigh 90 – 100 kg
- ✓ Service means allow the gilt or sow to mate with boar.

**Signs of heat in a sow**

When sow or gilt is ready for mating with a boar, it will show signs of heat
Signs of heat last for 3 – 5 days. These are;

1. The sow or gilt becomes restless
2. It mounts other sows
3. It allows to be mounted on
4. The vulva swells and turns red
5. White mucus discharged from the vagina

**Gestation period**

- ✓ The gestation period of a sow is 112 – 115 days or 3 months, 3 weeks and 3 days.
- ✓ During the last 45 days of pregnancy, the sow should be fed on protein rich feeds.

**Feeding**

- ✓ There are three types of feeds given to pigs:
- ✓ Creep feeds
- ✓ Finisher or fattener meal
- ✓ Sow and weaner meal

**Creep feeds**

These are feeds given to piglets from 10 days to 8 weeks

**Finisher or fattener meal**

- ✓ These are feeds for fattening the pigs.
- ✓ They are given to pigs at the weight of 50kg

**Sow and weaner meal**

- ✓ These are feeds given to weaners
- ✓ They are introduced at 8 weeks up to 50kg body weights.

**Reasons for feeding pigs**

1. To promote good body health
2. To grow fat
3. To enable the sow, produce enough breast milk for the piglets
4. To protect them from diseases

**Systems of keeping pigs**

There are two methods of keeping pigs

1. Extensive system (Out door system)
2. Intensive system (Indoor system)

**Extensive system**

This is the system where pigs are left to move freely looking for food.

**Advantages**

1. It is cheap in terms of feeding
2. The pigs get enough body exercise
3. The pigs get variety of food to eat
4. The farmer gets time to do other work
5. It is not tiresome

**Disadvantages**

1. The pigs can easily get diseases and parasites
2. The pigs can destroy farmers' crops
3. Wild animals can eat them
4. Thieves can steal them
5. The pigs can become wild

**INTENSIVE SYSTEM**

This is the system where pigs are kept and fed from their houses (pig sty)

**Advantages of intensive system**

1. Pigs are protected from bad weather conditions
2. The pigs grow and mature quickly
3. Pigs are protected from wild animals

**Disadvantages of intensive system**

1. The pigs do not get enough body exercise
2. It is expensive in terms of feeding and treatment
3. It requires much care and attention
4. The pig sty smells badly thus polluting the environment
5. It requires much labour to clean the pig sty

**Diseases of pigs**

**1. Swine fever:**

✓ This is caused by a virus.
✓ It attacks the alimentary canal of a pig.

**Signs and symptoms**

1. Pigs are weak
2. High fever
3. Loss of appetite
4. Bloody diarrhoea
5. Difficulty in breathing
6. Dullness
7. Sores on the eyes

**Prevention and control**

1. Separate the infected pigs from healthy ones
2. Cleanliness of water, pig sty and equipment
3. Quarantine to the infected areas
4. Kill and burry infected pigs
5. Regular vaccination at 6 – 7 weeks of age

**2. Intestinal worms**

✓ These are like tape worms/round worms
✓ They attack the alimentary canal of a pig

**Signs and symptoms**

✓ Pigs do not eat
✓ Swollen belly

**Prevention and control**

✓ Cleanliness in the animal feeds
✓ Deworming

**Other diseases which attack pigs**

✓ Pneumonia
✓ Foot and mouth disease
✓ Anthrax
✓ Foot rot

**Starting a pig, goat and sheep project**

**Factors considered before starting a piggery project are;**

1. Capital
2. Labour
3. Water supply
4. Land
5. Market

## RECORDS IN PIG KEEPING

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

### Types of records kept on poultry farm

- ✓ **Flock records**: Shows the number of animals on a farm i.e. (number sold, dead or killed daily).
- ✓ **Health records**: Shows the treatment given to the birds.
- ✓ **Production records**: Shows the production percentage and the number of young animals born daily.
- ✓ **Feeding records**: Shows the type of feeds, quantity or amount consumed or wasted.
- ✓ **Sales and expenditure**: Shows the expenditure and income from the feeds, eggs, sales of birds etc.
- ✓ **Litter records;** show the number of piglets born by each sow and the number of times sows produce every year

### Importance of keeping records on a farm

1. Help to plan for the future of the farm
2. To know the profit or losses made on the farm
3. For fair tax assessment
4. Enable the farmer to get loans
5. To know the progress of the farm
6. Enables the farmer to review the history of the farm.

# THEME: MATTER AND ENERGY

## TOPIC 5: MEASUREMENT

**Measurement** is the process of finding out how long, short, big, small, heavy or light an object is.

**Mass** is the amount or quantity of matter in an object.

It is measured in grams (g), kg (kilograms).

NB: Its standard unit is **kg**.

**Gravity** Is the force of the earth that pulls down objects. or Is the force of attraction that objects have on one another because of their masses.

NB: On earth, the gravitational force acting on mass is 10N

The size of the force becomes smaller as the object moves further from the surface of the earth.

**Length** is the distance between two points

It is measured in metres (m), centimetres (cm) Hectometres (hm), millimetres (mm, decametre (Dm) decimetres (dm).

NB: The standard units for length are **Metres**

**Instruments used to measure length**

- ✓ Tape measures
- ✓ Metre rulers
- ✓ Foot rulers
- ✓ Sticks
- ✓ Strings
- ✓ Strides

**A line segment** Is a line between two points.

Activity

**Learners draw line segments of different length.**

a) 4cm b) 6cm c) 8cm d) 14cm

**AREA**

It is the total space covered by an object.

It is measured in Square Units cm2, m2, dm2, km2.

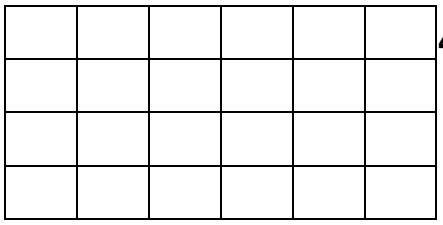
**Area of a rectangle**



*Width (w)*

*Length (L)*

**The width** is the shorter side of a rectangle
**The length** is the longer side of a rectangle
Area = Length x Width = sq units



**4 squares**

By counting the squares= 24 squares

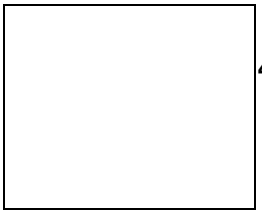
**Area = L X W**
A= 6 squares X 4 squares
= 24 squares

**6 squares**

NB: A regular rectangle has two opposite sides equal.

**Area of a square**

A square has all its sides equal
Area = s x s
$S^2$
Area = s x s



4cm

4cm

Area =s x s
A= 4cm x 4 cm
A=16$cm^2$

**Volume**

Volume is the space occupied by an object
It is measured in cubic units (cc, cm2, mm3, m3)

**Regular objects**

They are objects with specific (definite) shapes e.g. cuboids, bricks, blocks, tins, rectangles, square etc

**Finding volume of regular objects**



*Height (H)*

*Width (W)*

*Length (L)*

V = L x W x H = cubic units.

**Find the volume of the figure above.**
NB: Set word problems as well.

**Irregular objects**
These are objects that do not have a specific shape.

**Displacement method**
Is the method used to find the volume of irregular objects
**Instruments used to measure the volume of irregular objects**
- ✓ Measuring cylinder
- ✓ An over flow can or Eureka can

**Activity**

***1.Why do we use the displacement method to find the volume of stone?***
- It has no specific shape

***2.When is displacement method used?***
- When finding the volume of an irregular object.

**Using a measuring cylinder to find the volume of an irregular object.**
Procedure
Step I
- Pour water into a measuring cylinder about half full and record the volume of the water. Step II
- Gently lower the irregular object tied on a string into the measuring cylinder.

Step III
- Record the final level of the water in the measuring cylinder.

Step IV
- Subtract the first level from the final level.

V = Final level  1st level
V = 10cc
5cc  V =
5cc NB:
The volume of the irregular object is equal to the volume of the displaced water.

**Using an over flow can (Eureka can)**
Step I
- Pour water in the can up to the level of the spout

Step II
- Put the irregular object tied on a thread gently in the can.

Step III

- Collect the water that pours out of the can in a measuring cylinder

1. What is the volume of the stone?
   - 10cc
2. What is the use of the string (thread) in the experiment above?
   - To gently lower the stone into the water and avoid it from splashing.

**Weight**

3. It is the gravitational force exerted on an object by the earth.

The standard unit of weight is Newton  Mass

It is the amount of matter on an object.

It is the quantity of matter contained in a body.

**Machines used to measure weight and mass**

- ✓ Beam balance
- ✓ Spring balance-weight
- ✓ Set of scales
- ✓ Scale of balance
- ✓ Weighing balance

**Difference between weight and mass**

- ✓ Mass does not change from place to place while weight changes.
- ✓ Mass is the amount of matter in an object while weight is the force of gravity exerted on an object.
- ✓ Mass is measured in kilograms while weight is measured in Newton (N).

**Floating**

Floating is when an object stays on top when thrown in water.

Objects float because they are less dense than water.

When an object floats in a fluid, two forces act on it; its own weight and upthrust force of the fluid.

**Examples of floating objects**

- ✓ Cork
- ✓ Plastic
- ✓ Boats
- ✓ Sponge
- ✓ Feather
- ✓ Paraffin
- ✓ Leaves
- ✓ Soft dry wood
- ✓ Paper
- ✓ Petrol

**Sinking**

It is when an object thrown on water goes to the bottom of the water.

Objects sink because they are denser than water.

**Examples of sinking objects**

- ✓ Stones
- ✓ Sand
- ✓ Soil
- ✓ Metal
- ✓ Glass
- ✓ Nails
- ✓ Coin
- ✓ Pins
- ✓ Clay

NB: Any sinking object displaces water equal to its volume.

**Density**

Density is the ratio of mass to volume of a substance.

Density of a substance is defined as its mass per unit volume.

The density of water is 1.0g/cc and ice is 0.92g/cc.

We use density bottle to measure densities of substance.

It is measured in units like (kg / cc, gm /cm3, kg/m).

**Activity**

Find the density of an object with mass 400gm and volumes 20cc>

$$D = \frac{\text{Mass}}{\text{Volume}} \qquad \frac{M}{D}$$

$$D = \frac{\text{Mass}}{\text{Volume}}$$

$$D = \frac{400gm}{20}$$

$$D = 20g$$

# THEME: MATTER AND ENERGY

## TOPIC 6: HEAT ENERGY

Energy is the body's ability to do work

**Matter** is anything that has mass and volume

**OR** anything that has weight and occupies space

***The meaning of each of the following***

1. **Mass:** is a quantity of matter in an object.
2. **Volume:** Is the space occupied by an object.
3. **Molecules:** It is the smallest particles of matter.
4. **Molecules** are held together by cohesion or adhesion forces.
5. **Cohesion force**: is the force of attraction between molecules of the same kind.
6. **Adhesion force**: Is the force of attraction between molecules of different kinds.
7. **Atoms** are the smallest indivisible particles of matter
8. **Weight:** is the gravitational force exerted on an object by the earth.

**Properties of matter**

1. Matter has weight
2. Matter occupies space
3. Matter exerts pressure
4. Matter expands when heated

**States of matter**

**There are three different states of matter**

1. Solids
2. Liquids
3. Gases

**Solids**

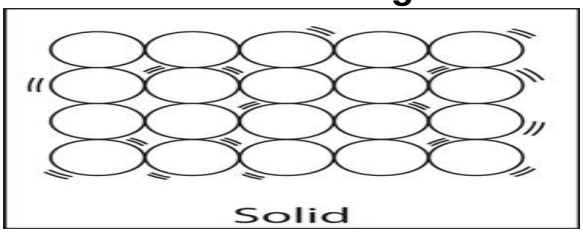
**Examples of solids.**

- ✓ Wood
- ✓ Rubber
- ✓ Glass
- ✓ Plastic

**Characteristics of solids.**

- ➢ Molecules are closely packed together
- ➢ Particles are held together very tightly.
- ➢ Heat travels through solid state by conduction
- ➢ Molecules do not move from position but vibrate.
- ➢ Solids have shape, size and volume apart from irregular objects.

**Diagram to show the arrangement of molecules.**




**Liquids**

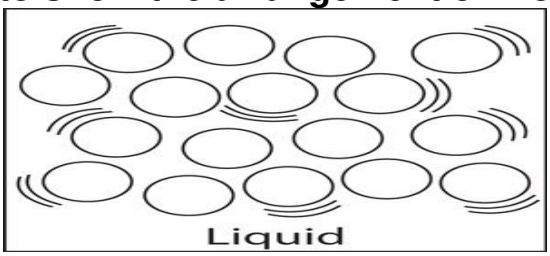
**Examples of liquids.**

- ✓ Water
- ✓ Soda
- ✓ Oils
- ✓ Juice

**Characteristics of liquids.**

1. Molecules are fairly spaced.
2. Molecules are loosely held together.
3. Liquids have a proper volume (capacity)
4. Liquids have no definite shape (take up the shape of the container in which they are poured)
5. Heat travels through liquids by convection

**Diagram to show the arrangement of molecules.**




**Gases**

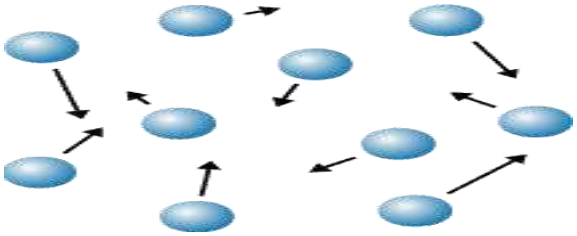
**Examples of gases.**

1. Nitrogen
2. Carbon dioxide
3. Oxygen
4. Rare gases

**Characteristics of gases.**

1. Molecules are far apart
2. Gases have no definite shape
3. Gases have a particular volume.
4. Molecules move freely.
5. Heat travels through gases by convection

**Diagram to show the arrangement of molecules.**



Energy is ability to do work

**Forms of energy.**

- ✓ Heat energy
- ✓ Sound energy
- ✓ Light energy
- ✓ Sound energy
- ✓ Electric energy
- ✓ Magnetic energy
- ✓ Chemical energy
- ✓ Solar energy.

**Types of energy**

1. Kinetic energy
2. Potential energy

**Characteristics of forms of energy**

- ✓ They can make work possible
- ✓ Energy can be changed from one form to another

**Potential energy**

Is the energy that is stored by an object at rest.

**Examples of potential energy**

- ✓ A baby being asleep in a cot
- ✓ A car standing still at traffic lights
- ✓ A pupil sitting and listening to the teacher
- ✓ A stone / book ruler resting on a table /ground /cupboard etc

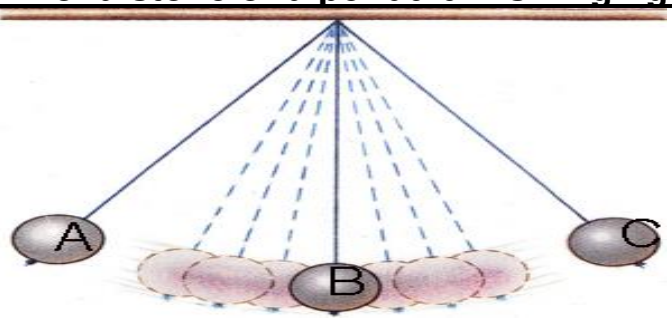
**Kinetic energy**

This is the energy possessed by a moving object or an object in motion. It is also referred to as the energy in motion

**Examples of kinetic energy**

- ✓ A girl running along the road
- ✓ An arrow flying through the air
- ✓ A stone thrown up in air
- ✓ A brick dropping from a wall
- ✓ A leaf falling to the ground from a tree

**Think of a stone or a pendulum swinging in air**




At A, the stone possess potential energy
At B, the stone possess kinetic energy

***NOTE: a person who runs with any object balancing on the head possesses Kinetic energy while the object possesses potential energy***

**HEAT ENERGY**

Heat energy is a form of energy that increases temperature of an object

**Standard units for measuring heat.**

Heat **Calories**

**Instruments used to measure heat**.

Heat **Calorimeter**

**sources of heat**

These are objects that produce heat.

**Types of sources of heat.**

- ✓ Natural sources of heat
- ✓ Artificial sources of heat

**Natural sources**

Natural sources of heat provided by nature.

**Examples of natural sources of heat**

1. Sun (main natural source of heat)
2. Fire
3. Stars
4. Friction
5. Decomposition
6. Fuels like firewood, diesel, oil, charcoal, petrol
7. Compression
8. Erupting volcanoes

**Artificial sources.**

These are sources of heat made by people.

**Examples of artificial sources of heat.**

1. Lamps
2. Bulbs
3. Electricity
4. Candles

**Uses of heat to man**

1. used for ironing clothes
2. Heat is used to run some machines e.g. steam engines. Diesel engines, rockets etc.
3. used to dry harvested crops before storage.
4. Heat helps in rain formation
5. Heat enables us to cook our food
6. Heat can act as a disinfectant.
7. Heat or warmth is used for seed germination

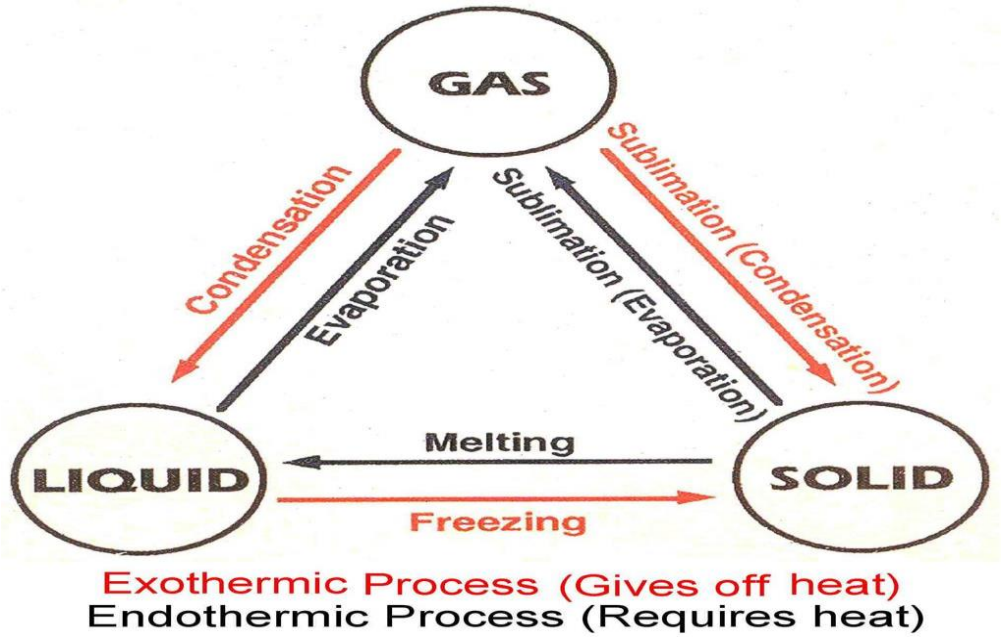
**Effects of heat on matter**

1. Heat makes matter expand
2. Heat causes rise in temperature
3. Heat causes change in state of matter
4. Heat makes molecules in gases and liquids mobile
5. Heat causes melting.
6. Heat causes evaporation.
7. Heat causes sublimation

- ➢ **Evaporation**: Is the change of state from liquid to gas.

- **Melting**: Is a change of state from solids to liquids
- **Sublimation** is the change of state from gas to solid and vice versa.

**Diagram to show physical changes of state of matter.**




**A** - Melting is the physical change from solid to liquid
**B** - Evaporation is the physical change from liquid to gas.
**C** - Freezing is the physical change from liquid to solid.
**D** - Condensation is the physical change from gas to liquid
**E** - Sublimation is the physical change from solid to gas.
**F** - Sublimation is the physical change from gas to solid.

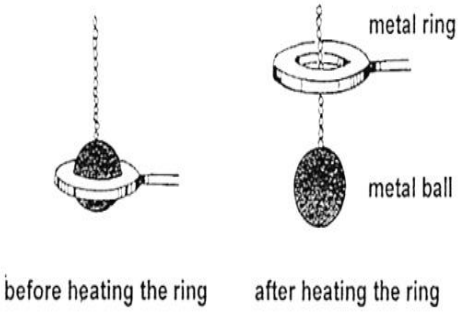
## EFFECTS OF HEAT ON EACH STATE OF MATTER.

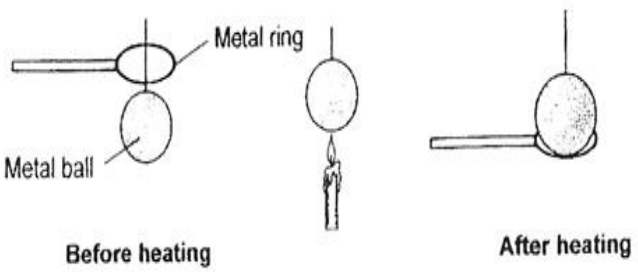
### SOLIDS.

- Metals expand.

### Metallic ball ring experiment

a). Before heating the metallic ball goes through the ring.




**Observation**

When the ball is cold, it passes through the ring
When the ball is heated, it expands and it cannot pass through the ring

**Reasons why metallic ball did not go through the ring after heating**

The metallic ball had expanded

**Conclusion**

Metals expand when heated

**Bimetallic strip**

- ✓ This is a strip which consists of two metals with different expansion rates.
- ✓ Bimetallic strips are used in thermostats.
- ✓ A thermostat is a device that switches electric appliances on and off automatically.

**Things that use the thermostat**

- ➢ Electric flat irons
- ➢ Refrigerators
- ➢ Car indicators
- ➢ Air conditioners

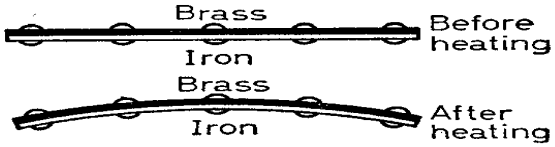
**Experiment**

**What do you think can happen to the metallic ball if dipped into cold water?**

The hot metallic ball will contract and pass through the ring again.

**Bimetallic strip.**

Before heating and after heating




Bimetallic strip

**Observation**

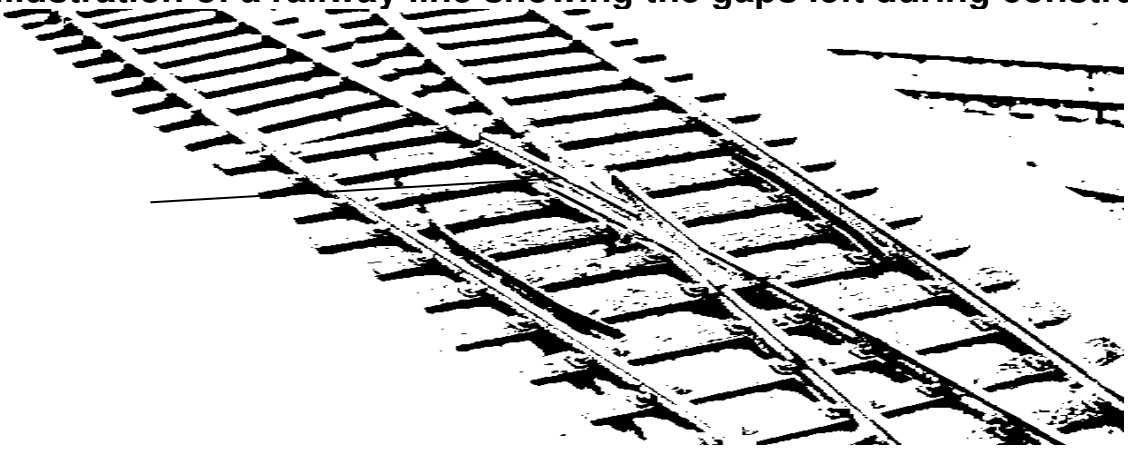
The iron strip heats up and expands faster than the copper strip hence bending to wards the copper.

**Qn: 1.** which of the two metals is the best conductor of heat?

**IMPORTANCE OF A Bimetallic.**

Bimetallic strips are used in automatic switches of electric kettles, flat irons, fridges, freezers etc.

**illustration of a railway line showing the gaps left during construction.**



**Qn: What happens if gaps were not left between rails during construction?**

The rails would expand on hot days bend and cause railway accidents.

**Why are gaps left between railways during construction?**

To leave room for expansion on a hot day.

**Diagrams to show the effect of heat on electric / telephone wires**

**On a hot day.**



Electric / telephone wires expand become loose and starts sagging / slacking

**On a cold day** wire contract and become shorter appearing relatively tight.



**Qn; 1. Why are gaps left between electric / telephone wires during construction?**

To allow room for expansion.

**2. What would happen to the wires when tied tightly fixed on the poles?**

The wires would break due to contraction on cold days

**Activity**

1. Why gaps left between the railway lines during construction?
2. Why telephone wires are loosely fixed on the poles?
3. what happens to electric wires on the following
   a. Cold days.
   b. Hot days.

**EFFECTS OF HEAT ON ICE.**

**What happens to ice when heated?**

- Ice melts
- The volume decreases, the density increases and the mass remains the same.

**EFFECTS OF HEAT ON GASES**

What happens to gases when:-

a). Heated - Gases expand

b). Cooled - Gases contract

**EXPERIMENT TO SHOW THAT GASES EXPAND WHEN HEATED.**

**QN:1.** Why does the balloon in diagram A expand?

Due to expansion of air inside the plastic bottle.

3. What happens to the balloon when the bottle is removed from the hot water?
The balloon collapses due to contraction of the air inside the plastic bottle.

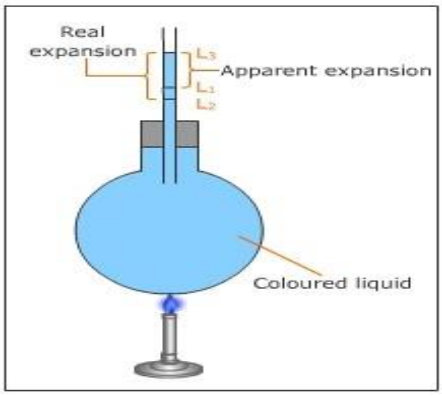
## Effects of heat on liquids

- ✓ Liquids expand when heated.
- ✓ Liquids evaporate when heated.
- ✓ Liquids contract when cooled

**Effects of freezing of liquids**

- ✓ Liquids increase in volume
- ✓ Liquids reduce in density
- ✓ Mass of liquids remains the same.

**Diagram to show that liquids expand when heated.**



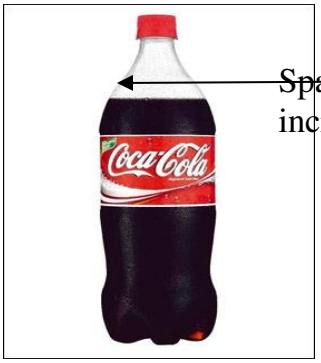

***Qn: 1. why is space left while bottling drinks like soda?***

To leave room for increase in volume when frozen.

***2. Why is carbon dioxide packed in bottled drinks like soda?***

To preserve the soda.

**A bottle with the space left**




Space left to give room for increase in volume on freezing.

## Effects of heat on sublimates

**NB:** Sublimates are substances which can directly change from solid to gas.

**Examples of sublimates**

- ✓ Iodine granules (crystals)
- ✓ Ammonium chloride(salts)
- ✓ Solid carbon dioxide.

## TEMPERATURE

Is the degree of hotness or coldness of an object.

**Standard units for measuring temperature.**

Temperature **Degrees**

**Instrument used to measure temperature.**

Temperature **Thermometer**

**Thermometer**

Thermometer is an instrument used to measure temperature.

**The following thermometer measure the following:-**

1. Lowest temperature of the day **Minimum thermometer**
2. Highest temperature of the day **Maximum thermometer**
3. Room temperature or temperature of the air **Wall thermometer**
4. Highest and lowest temperature of the day **Six's thermometer**
5. Human body temperature **Clinical thermometer**

**Places where we find clinical thermometer in daily life**

- ✓ In clinics
- ✓ In hospitals
- ✓ In dispensaries

***Places or common sites on our bodies where a clinical thermometer can be placed while measuring the human body temperature***

- ✓ Under the arm pits
- ✓ In the anus
- ✓ In the vagina
- ✓ In the mouths / under the tongue

NOTE: A clinical thermometer is commonly placed in the above parts because they completely cover the bulb

**Diagram of clinical thermometer**

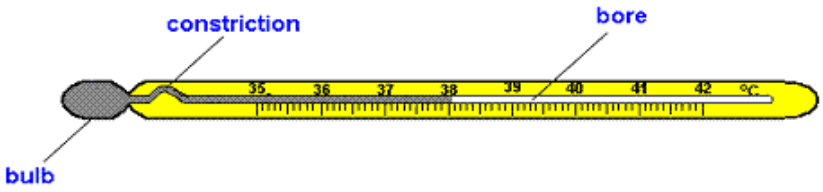



*Fig. 10.5*

**Importance of each part**

1. **Stem:** Protects the inside parts of a thermometer
2. **Kink:** Prevents the back flow of mercury to the bulb before the actual temperature is taken.
3. **Glass envelope:** this acts as a magnifying glass
4. **Bore:** The bore has a regular scale.
5. **Bulb:** The bulb store mercury.

**Liquids commonly used in thermometers.**

- Alcohol
- Mercury

**SIX'S THERMOMETER ( MINIMUM AND MAXMUM THERMOMETER)**

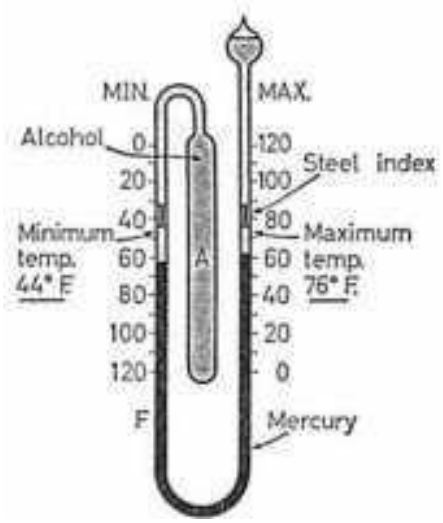
1. A six's thermometer is used to measure both minimum and maximum temperature.
2. It uses both mercury and alcohol.

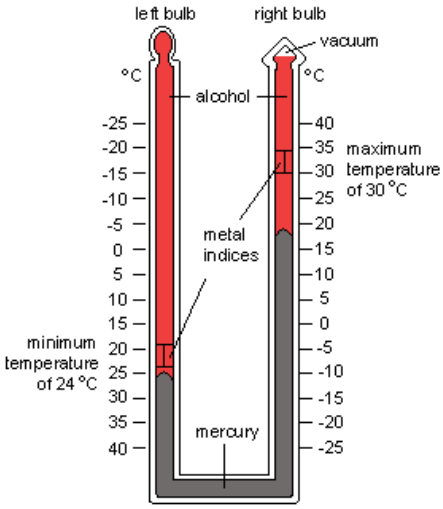
3. The left-hand side measures minimum temperatures and the right hand side measures maximum temperatures.
4. A six's thermometer uses indices
5. Readings are taken at the lower part of an index
6. Indices are re-set using a magnet

**Differences between a clinical thermometer and maximum & minimum thermometer**

| Clinical thermometer | Minimum and maximum thermometer |
|---|---|
| It uses mercury | It uses both mercury and alcohol |
| Measures body temperature | Measures temperature of a place |
| It has a kink/bend | Has no kink/bend |
| It has no indices | It uses indices |

**<u>Drawing of</u> clinical thermometer and maximum & minimum thermometer**




**Reasons why mercury is used in a thermometer**

1. Mercury is a good conductor of heat
2. Mercury does not stick on the walls of the bulb / bore.
3. Mercury can easily be seen in the glass.
4. Mercury doesn't boil easily
5. Mercury has even and regular expansion.

**Reasons why water is not used in a clinical thermometer**

1. Water is not easily seen
2. Water is a bad conductor of heat
3. Water needs a lot of heat to expand.
4. Water's does not expand uniformly.

**Why do doctors shake a clinical thermometer before using it on other patients?**

- To draw the mercury back to the bulb

**Reason why a clinical thermometer is sterilized using surgical spirit**

- Boiling it will make the stem expand and burst.

**Advantages of using alcohol**

1. Alcohol doesn't solidify easily
2. Alcohol expands by six times than that of mercury

**Types of temperature scales.**

1. Celsius scale or centigrade
2. Fahrenheit scale

**The normal human body temperature**

✓ Celsius $37^0$c.

✓ 98.6/ 98.4 degrees Fahrenheit.

**LESSON 4**

**Changing from Celsius to Fahrenheit**

**a. $20^0$c**

$$F = \frac{(c \times 9)}{5} + 32^0$$

$$F^0 = \frac{(\cancel{20} \times 9)}{\cancel{5}} + 32$$

$$F^0 = (4 \times 9) + 32$$

$$F^0 = 36 + 32$$

$$^0F = 68^0$$

**b. $25^0$c**

$$F = \frac{(c \times 9)}{5} + 32^0$$

$$F^0 = \frac{(\cancel{25} \times 9)}{\cancel{5}} + 32$$

$$F^0 = (5 \times 9) + 32$$

$$F^0 = 45 + 32$$

$$^0F = 77^0$$

**c. $5^0$c**

$$F = \frac{(c \times 9)}{5} + 32^0$$

$$F^0 = \frac{(\cancel{5} \times 9)}{\cancel{5}} + 32$$

$$F^0 = (1 \times 9) + 32$$

$$F^0 = 9 + 32$$

$$^0F = 41^0$$

$$F = \frac{(c \times 9)}{5} + 32^0$$

$$F^0 = \frac{(\cancel{0} \times 9)}{\cancel{5}} + 32$$

$$F^0 = (0 \times 9) + 32$$

$$F^0 = 0 + 32$$

$$^0F = 32^0$$

**d. $80^0$c**

$$F = \frac{(c \times 9)}{5} + 32^0$$

$$F^0 = \frac{(\cancel{80} \times 9)}{\cancel{5}} + 32$$

$$F^0 = (16 \times 9) + 32$$

$$F^0 = 144 + 32$$

$$^0F = 176^{0c}$$

**e. $100^0$c**

$$F = \frac{(c \times 9)}{5} + 32^0$$

$$F^0 = \frac{(\cancel{100} \times 9)}{\cancel{5}} + 32$$

$$F^0 = (20 \times 9) + 32$$

$$F^0 = 180 + 32$$

$$^0F = 212^0$$

**ACTIVITY**

**Change the following from degrees Celsius to degrees Fahrenheit**

1. **$5^{oc}$**
2. **$10^{0c}$**
3. **$100^{0c}$**
4. **$0^{0c}$**

## Changing temperature from Fahrenheit to Celsius

**Example $41^0F$ to $C^0$**

$C^0 = (F - 32) \times {}^5/_9$
$C^0 = (41 - 32) \times {}^5/_9$
$C^0 = (41^0 - 32) \times {}^5/_9$
$C^0 = \cancel{9} \times {}^5/_{\cancel{9}}$
$C^0 = 1 \times 5$
$C^0 = 5^0$

**Change $59^0F$ to $C^0$**

$C^0 = (F - 32) \times {}^5/_9$
$C^0 = (59^0 - 32) \times {}^5/_9$
$C^0 = 27 \times {}^5/_9$
$C^0 = 3 \times 5$
$C^0 = 15^0$

**Change $68^0F$ to $C^0$**

$C^0 = (F - 32) \times {}^5/_9$
$C^0 = (68^0 - 32) \times {}^5/_9$
$C^0 = 36 \times {}^5/_9$
$C^0 = 4 \times 5$
$C^0 = 20^0$

**Change $95^0F$ to $C^0$**

$C^0 = (F - 32) \times {}^5/_9$
$C^0 = (95^0 - 32) \times {}^5/_9$
$C^0 = 63 \times {}^5/_9$
$C^0 = 7 \times 5$
$C^0 = 35^0$

**Change $32^0F$ to $C^0$**

$C^0 = (F - 32) \times {}^5/_9$
$C^0 = (32^0 - 32) \times {}^5/_9$
$C^0 = 0 \times {}^5/_9$
$C^0 = 0 \times 5$
$C^0 = 0^0$

**Change $77^0F$ to $C^0$**

$C^0 = (F - 32) \times {}^5/_9$
$C^0 = (77^0 - 32) \times {}^5/_9$
$C^0 = 45 \times {}^5/_9$
$C^0 = 5 \times 5$
**$C^0 = 25^0$**

**ACTIVITY**

**Change from Fahrenheit to Celsius**

1. **$68^{0c}$**
2. **$32^{0c}$**
3. **$41^{0c}$**
4. **$77^{0c}$**

## HEAT TRANSFER

How heat travels through the states of matter

1. Solids by Conduction
2. Liquids by Convection
3. Gases by Convection
4. Vacuum by Radiation

**Vacuum**

A vacuum is a space without molecules.

**Importance of molecules in heat transfer**

Molecule act as a medium of heat transfer.

**Qn: In** which state of matter does heat travel?

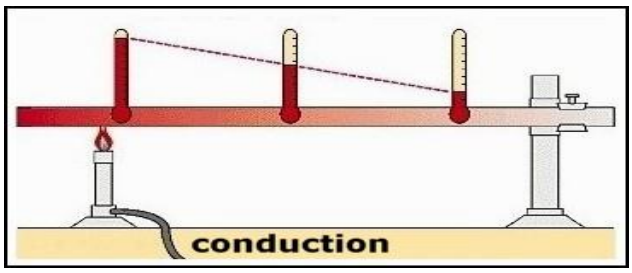
A) **Fastest –** gases

Why? The molecules in gaseous state move freely than in any other state of matter.

**Slowest –** Solids

Why? The molecules do not move freely.

**An illustration of heat transfer in solids**




Qn: 1. how does heat move from point B to point A?
By conduction

**2. Which of the above wax will melt first?**
Wax 1.

**Reason:** Wax 1 is nearest to the flame

**3. Which of the above wax will melt last?**
Wax 4

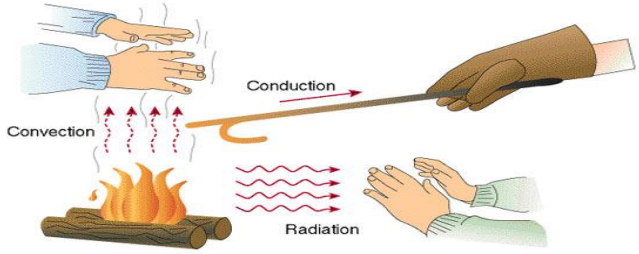
**Reason:** wax 4 is furthest from the flame.

**Importance of heat transfer by conduction**

- Ironing our clothes using hot bodies like flat irons, iron boxes.
- Cooking food.
- Boiling water in a kettle.
- Welding or smelting metallic objects.
- Roasting meat using an iron rod.

**Diagram to show convection of heat**

**a) in gases.**




**b) liquids**



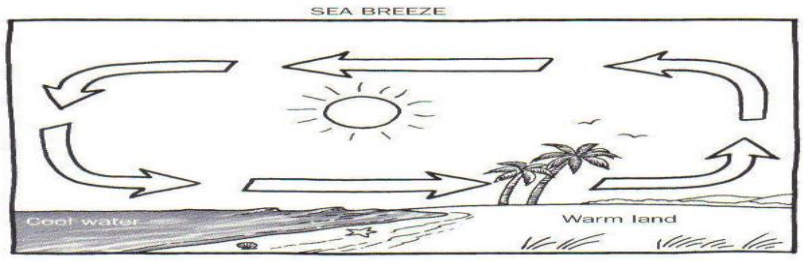
**Importance of convection in our daily life**

1. It helps smoke to move out of the kitchen through the chimney.
2. Convection current helps in free circulation of fresh air in our houses.
3. Convection currents help in formation of breezes.
4. Taking of bad smell through the vent pipes of a VIP latrine**.**

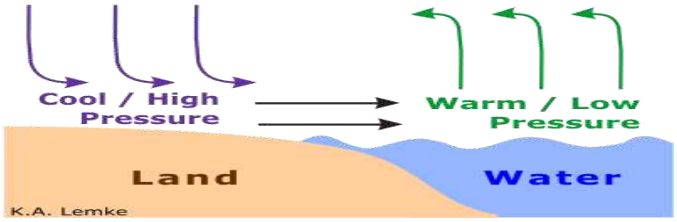
**Importance of each of the following on a house.**
**1. Ventilators:** let out warm air
**2. Windows:** let in fresh air
**3. Doors:** let in fresh air

## SEA AND LAND BREEZE.

**Sea breeze**.
It is when cool gentle current from the sea moves to the land to replace the warm risen air. It occurs during day.




**Land breezes.**
It is when cool gentle current from the land moves to the sea to replace the warm risen air. It occurs at night.




N.B.: Sea breeze brings cool fresh air on land.

## RADIATION.

It is the process by which heat passes through a vacuum.
**QN: How does a person standing in Namboole on sunny day receive heat from the sun?** By radiation.
**Importance of heat transfer by radiation in the environment**

- Radiation is used while roasting meat, fish or chicken in an oven.
- Warming our bodies using warmers or heaters.
- Dries harvested crops / wet clothes on wires.

**Reflectors and absorbers or heat.**
**Reflectors:** are shiny surface that reflect heat and light
**Examples of reflectors**

1. Mirrors
2. Glasses

**Absorbers:** are dull / black surface that absorb heat and light.
**Examples of Absorbers**

1. Black clothes
2. Black cars

*Why are most houses, vehicles and fridges in most tropical countries like Uganda painted white?*

**To reflect heat**

*If John washed a black and a white shirt and spread under sunshine;*
*Which shirt would dry first?*

**The black shirt.**

**Reason:** Black absorbs a lot of heat.

**Last?** The white shirt

**Reason:** The white shirt would reflect heat.

**Conductors and insulators of heat**

Good conductors: - are materials which allow heat to pass through them easily.

**Examples of good conductors of heat**

| | | | | | |
|---|---|---|---|---|---|
| i. | Iron | iv. | Brass | vii. | Silver |
| ii. | Mercury | v. | Zinc | viii. | Lead |
| iii. | Aluminium | vi. | Copper | | |

**Insulators of heat**

Insulators are the materials which don't allow heat to pass through them easily.

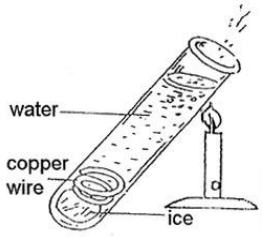
**OR**

Insulators are bad (poor) conductors of heat

**Examples of bad conductors of heat**

i Distilled Water
ii Rubber
iii Plastic
iv Paper
v Wood
vi Cotton wool
vii Cloth
viii Sponges

**Experiment to show that water is a poor conductor of heat**




**Observation**

- Ice did not melt
- The water will boil at the area being heated while the ice cubes at the bottom will remain unmelted.

**Use of conductors**

✓ Used to make saucepans
✓ Used to make kettles
✓ Used to make bottoms of iron boxes

**Uses of Insulators**

✓ Paper is used to make cards
✓ Cloth keeps us warm
✓ Cork prevents heat loss in a vacuum flask.

***Why are handles of iron boxes, frying pans, flat irons made of wood, rubber / plastics?***

To prevent the user from getting burnt.

**Reflectors of heat (Heat reflectors)**

✓ These are objects that reflect heat.
✓ When heat falls on a shiny surface, it is bounced/reflected

**Application of reflectors**

✓ Most refrigerators are painted white to reflect heat and remain cool inside
✓ People in hot areas wear white clothes to reflect heat
✓ Most buildings are painted white to reflect heat and remain cool inside
✓ A Stevenson screen is painted white to reflect heat
✓ Most vehicles are painted white to reflect heat

**Absorbers of heat (Heat absorbers)**

These are objects that absorb heat.

when heat falls on a dull coloured surface, it is absorbed.

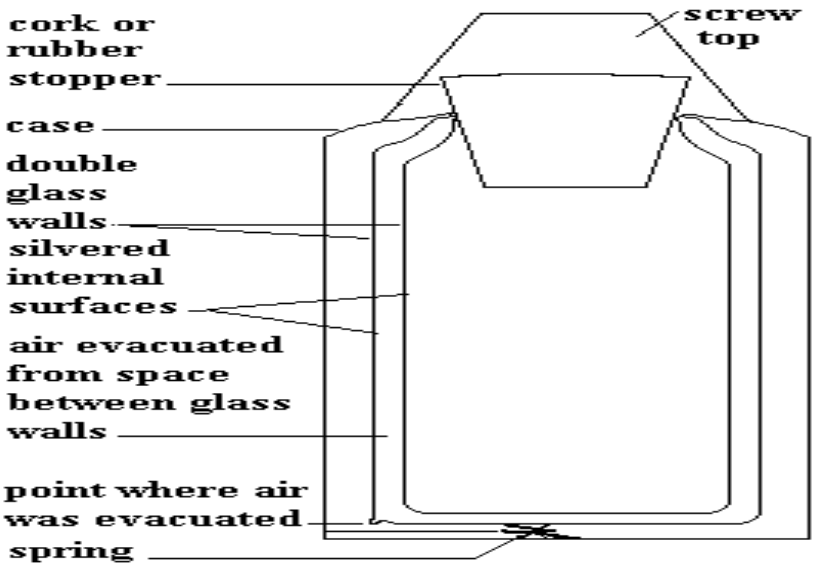
A person wearing a black shirt feels hotter than a person wearing a white shirt on a hot day because black absorbs heat while white reflects heat.

**A VACUUM FLASK (THERMOMETER FLASK)**

A vacuum flask keeps hot things hot and cold things cold.

**A DIAGRAM OF A VACUUM FLASK**

23.05 Dewar flask, vacuum flask




**Uses of each part of a vacuum flask**

1) **Cork:** Prevents heat loss or gain by conduction
2) **Cork base**. This supports the glass in position.
3) **Doubled silvered surfaces:** prevents heat loss or gain by radiation (a good reflect of heat).
4) **Vacuum:** Prevents heat loss or gain by both conduction and convection.
5) **Felt (cork base):** Absorbs shocks to prevent the glass from breaking.
6) Felt are also poor conductors of heat.
7) **Plastic/metal case**. This protects the double walled glass
8) **Vacuum seal:** Prevents matter form entering the vacuum.

**ACTIVITY**

1. Of what importance is the thermos flask at home?
2. Why is a vacuum seal important in thermos flask?
3. What is the use of the cork on the vacuum flask?
4. Why are the walls of a vacuum flask double silvered?

# THEME : THE WORLD OF LIVING THINGS

## TOPIC : BACTERIA AND FUNGI

Bacteria means a microscopic single celled organism that are present almost everywhere.

**Places where bacteria are mostly found**

1. Animal bodies
2. Contaminated water
3. In the Soil
4. In decaying matter
5. Nodules of legumes
6. Latrines
7. Rubbish pits
8. In air
9. Contaminated food

**How do bacteria reproduce**

1) By cell division (binary fission)
2) By spore formation

**Diagram**




**Nature of bacteria**

✓ **Aerobic bacteria**

These are bacteria that live in the presence of oxygen.

✓ **Anaerobic bacteria**

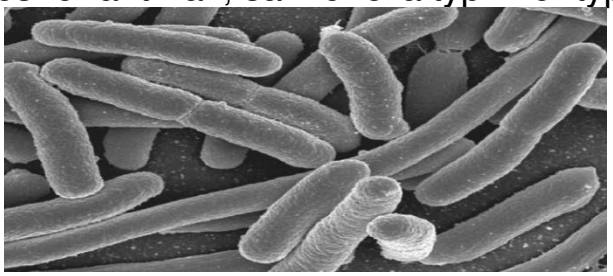
These are bacteria that live in the absence of oxygen.

**Types of bacteria**

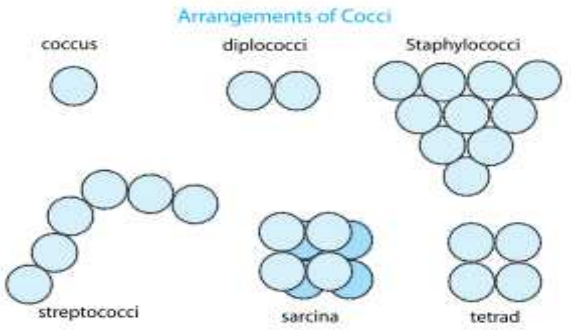
1. Spherical bacteria/cocci
2. Rod-shaped bacteria/bacilli
3. Spirilla(spiral) bacteria/spirochaete
4. Vibrios bacteria

**1. Rod shaped bacteria (bacilli)**

e.g bacillus anthraces for anthrax, salmonella typhi for typhoid



**2. Spherical shaped bacteria(cocci)** e.g staphylococci for boils, streptococcus for sore throat, diplococci




**3. spirochaete** for syphilis



4. **Coma shaped bacteria (vibrios)**




**Conditions necessary for bacteria to breed or multiply**

1. Absence of chemicals that kill them
2. Presence of certain amount of air
3. Warmth

**Importance of useful bacteria**

1. Nitrogen fixing bacteria fix nitrogen back into the soil to improve soil fertility
2. Bacteria break or digest fibre food/ roughage / cellulose in the caeca of birds
3. Bacteria help in decomposition / rotting of dead plants and animals
4. Bacteria help to reduce on the amount of faeces in pit latrines as well as sewage tanks
5. Bacteria help in fermentation of beer, ghee, yoghurt and cheese.
6. Bacteria help in making humus (manure) in compost pits)
7. Bacteria help to reduce on the amount of garbage as they rot.

**Dangers of harmful bacteria**

- ✓ Harmful bacteria cause diseases to both animals and plants.
- ✓ Bacteria cause poor yields to crops
- ✓ Bacteria cause food poisoning
- ✓ contaminates food and makes it poisonous to human health

**Examples of bacterial diseases in animals**

1. Typhoid
2. Diphtheria
3. Mastitis
4. Anthrax
5. Syphilis
6. Diarrhoea
7. Tuberculosis
8. Pneumonia
9. Dysentery

**Examples of diseases caused by bacteria in plants**

- ✓ Blight disease
- ✓ Wilt disease
- ✓ Black rot disease

**How to control dangers caused by harmful bacteria**

1. Immunisation/vaccination of animals
2. Treating animals with antibiotics
3. by using disinfectants to kill bacteria
4. through pasteurization (involves) heating the food stuffs to a high temperature and sealing it before suddenly cooling it
5. Maintaining proper hygiene
6. Through sterilization of medical instruments e/g springs
7. Proper ventilation of animal house (pneumonia)
8. Spraying plants with chemical that kill bacteria

## FUNGI

Fungi are simple organisms that obtain their food from decaying plants and animal matter.

Fungi are saprophytes because they feed saprophytic ally (obtain soluble food from dead organic matter.

**Examples of fungi**

1. Mushroom
2. Puffball
3. Toadstool
4. Yeast
5. Moulds
6. Potato blight fungus

**Characteristics of fungi**

1. Fungi exist in both as single celled (unicellular) or multicellular organisms.
2. Fungi lack chlorophyll (they can make their own food)
3. Fungi feed saprophytically or parasitically
4. They have nuclei in their cells
5. They reproduce by means of spores

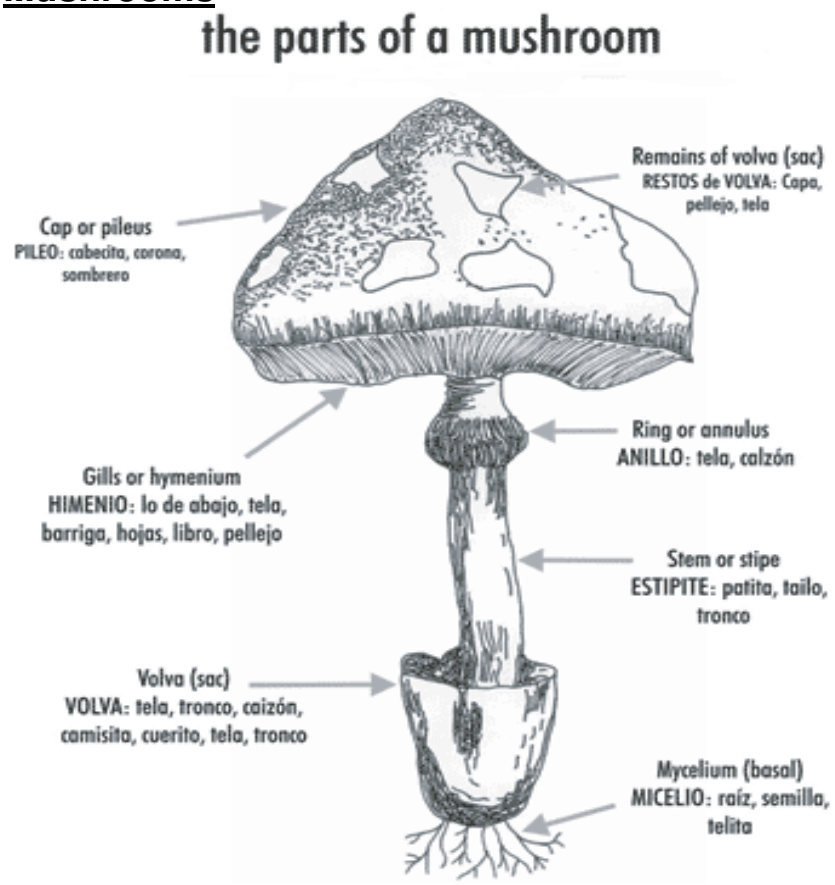
**Groups of fungi**

- ✓ Saprophytic fungi
- ✓ Parasitic fungi

**Importance of fungi**

1. Some fungi like yeast are used to bake bread and cakes
2. Some fungi like mushrooms are a source of food to man
3. Some fungi like moulds (penicillium rotatum) are used to make medicine penicillium
4. Yeast is used to brew local beer or ferment fruit juices to make wine
5. Fungi help in decomposition of rubbish in rubbish pits to make humus
6. Yeast is used to flavours cheese
7. Some are used as herbal medicine like mushroom
8. Some are source of income like mushroom
9. Yeast is a source of vitamin B that prevents beriberi

**Mushrooms**




**Functions of each part of a mushroom**

1. **Cap** holds the gills.
2. **Gills** produce and stores spores.
3. **Stalk/stipe** holds the cap in position.
4. **Hyphae** helps in absorbing food from decaying matter

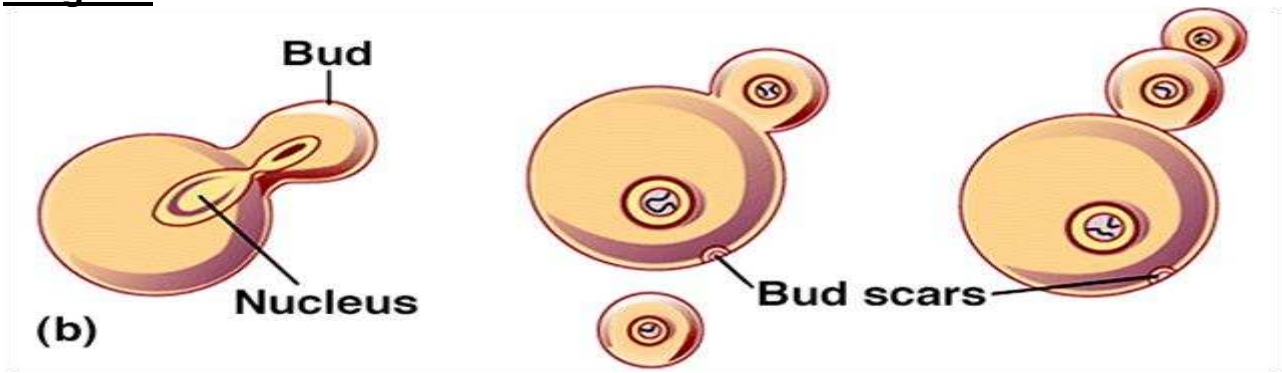
**Importance of mushrooms.**

1. They are eaten as food.
2. Some mushrooms are sold to get money.
3. Mushrooms are used for study purpose.

**How do fungi reproduce?**

Most fungi reproduce by means of **spores** unlike Yeast which reproduces by **budding**

**Diagram**




**Danger of harmful fungi**

- ✓ Harmful fungi cause food poisoning
- ✓ Harmful fungi cause a number of diseases to both plants and animals
- ✓ Some make food to go bad like moulds

**Examples of fungal diseases in animals**

1. Ring worms (cause round patches on the skin)
2. Athletes foot (attacks the skin between the hoes)
3. Oral thrush caused by candida
4. Finger nail deformation
5. Eczema

**Examples of fungal diseases in plants**

1. Panama e.g. in banana
2. Cigarand rot
3. Blast wilt
4. Potato blight
5. Smuts
6. Black rust fungus
7. Coffee berry disease (rust) coffee plant
8. Root rot in tea plants.

**How to control the dangers caused by harmful fungi**

1. Boiling milk and water before drinking.
2. Reheating and warming cold food before eating it.
3. Salting the food.
4. Pickling – putting vinegar in edible vegetables and other foods.
5. Avoid eating uncovered food.
6. Spray plants with fungicides.
7. Get early treatment for any fungal infection /disease.
8. Sterilize all surgical instruments to kill all the germs.
9. Irradiation in canned foods.
10. Avoid eating or catching poisonous fungi.

11. Proper management of house refuse and rubbish
12. Proper use of the latrine.
13. Avoid sharing towels, socks, under wears etc.
14. Use medicated soap to bathe e.g. Dettol , protex, etc.
15. Use disinfectants in cleaning toilets e.g. jeyz.

## Similarities between bacteria and fungi

1. Both feed saprophytic ally
2. Both cause fermentation
3. Both can cause rotting /decomposition
4. Some of them cause diseases while others are useful to man
5. Some are single celled while others are multicellular

## Differences between bacteria and fungi

1. Bacteria reproduce by means of cell division (binary fission) while fungi reproduce by means of budding and spores.
2. Some fungi are edible while bacteria are not eaten
3. Bacteria are single celled while most fungi are multicellular
4. All bacteria are very tiny microscope while some fungi like mushrooms are big
5. Bacteria reproduce much faster than fungi
6. Some bacteria make their own food by combing some simple chemical substance while fungi cannot make their own food

**Ways of preventing bacterial and fungal diseases**

- ✓ Using strong heat to kill germs
- ✓ Opening doors and windows to let in sunlight in the rooms
- ✓ Maintaining proper sanitation
- ✓ Houses should be properly ventilated
- ✓ Using chemicals to kill germs

## Topical questions

1. How are bacteria different from fungi?
2. Where are bacteria found in our environment?
3. Name any one poisonous fungi
4. Give the three types of bacteria
5. Which bacteria do the following?
   a. Add nitrogen back into the soil
   b. Make food go bad
   c. Cause typhoid
   d. Cause cholera

6 Identify any two immunisable disease caused by bacteria
7 How do the following reproduce?
a) Yeast
b) Bacteria
8 Give the importance of fungi to people
9 How are bacteria useful to people?
10 In the space below, draw a mushroom and label all the parts

# THEME: THE ENVIRONMENT

## TOPIC 8 : THE SOIL

Soil is the top layers of the earth surface.

**HOW SOIL IS FORMED**

- By weathering
- By decomposition of organic matter.

**Weathering** is the physical and chemical breakdown of rocks into small particles to form soil.

**Decomposition** is the rotting of dead organic matter.

**TYPES OF SOIL**

There are three types of soil

a) Clay soil.
b) Loam soil.
c) Sandy soil.

**a) CLAY SOIL**

**Characteristics of clay soil**

1. Clay soil has fine particles
2. Clay soil has the highest rate of capillarity
3. Clay soil has the lowest rate of drainage
4. Clay soil is poorly aerated
5. Clay soil is sticky
6. It has a high-water retention capacity
7. Clay soil has little humus
8. It does not allow water to pass through it very fast
9. Clay soil has closely packed particles

**Reasons why clay soil is not good for crop growing**

1. Clay soil is water logged
2. Clay soil is sticky
3. Clay soil has little humus
4. Clay soil is poorly aerated

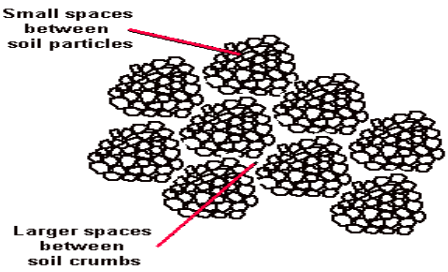
**Reasons why clay soil is good for modelling**

- ✓ Clay soil is sticky
- ✓ Clay soil contains lime

**Importance of clay soil**

- ✓ Clay soil is good for pottery work (making pots, ceramics and modelling).
- ✓ Clay soil is good for making bricks for building.
- ✓ Clay soil is good for making tiles for roofing.

**Illustration of arrangement of particles in clay soil.**




**b) LOAM SOIL**

Loam soil is a mixture of clay soil and organic matter
Organic matter (humus) consists of decayed plants and animal matter
Loam soil usually has adequate water, air and humus to sustain plant growth.

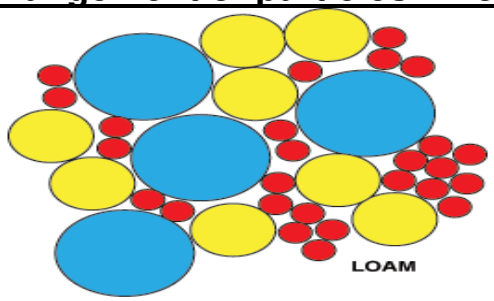
**Characteristics of loam soil.**

- ✓ It contains balanced particles of sandy and clay soil
- ✓ It contains more humus than clay and sandy
- ✓ Loam soil is well drained
- ✓ Loam soil is well aerated
- ✓ Loam soil has a good texture
- ✓ It contains both clay and sand particles
- ✓ It has a lot of humus for plant growth
- ✓ Has fairly larger air spaces as compared to clay soil

**Importance of loam soil**

- It is good for crop growing.

**Illustration of arrangement of particles in loam soil.**

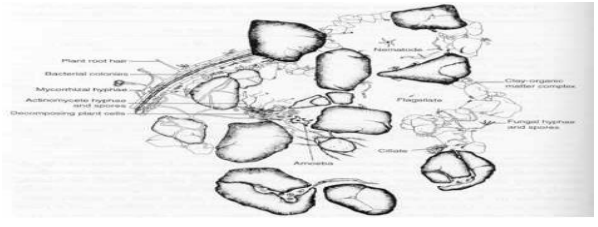



**Reasons why loamy soil is good for growing crops**

- ✓ Loam soil is well aerated
- ✓ Loam soil is well drained
- ✓ It contains balanced particles of sand and clay.
- ✓ Loam soil has good mineral content
- ✓ Loam soil has good capillarity
- ✓ Loam soil has humus

**c) SANDY SOIL**

**Illustration of arrangement of particles in sandy soil.**



**Characteristics of candy soil**

- ✓ Sandy soil has little plant nutrients

- ✓ Sandy soil is the most aerated type of soil
- ✓ Sandy soil has wider air spaces (more porous)
- ✓ It has the highest rate of drainage
- ✓ It has the lowest capillarity
- ✓ Has large particles that make it to be well aerated
- ✓ Has poor water retention capacity
- ✓ It is easy to dig
- ✓ Has a poor rate of capillarity

**Capillarity** is the uptake of water through the soil particles.
**Capillarity** is the tendency of water to rise through small narrow spaces.
**Drainage** is the capacity of the soil to allow water to pass through it.

**Importance of sandy soil.**

- Used for building.
- Used for making glass and sand papers.

**NB**. It is not good for crop growing because it has a low water holding capacity.

**Components of the soil**

These are things which make up soil, they include:

1. Air
2. Water
3. Rock particles
4. Humus (Organic matter)
5. Organisms like bacteria, earth worms
6. Dissolved mineral salts (inorganic matter)

**Importance of components of soil**

**a) Air**

**Aeration of soil** is the addition of air to the soil by creating more pore spaces

- ➢ Air is used during germination
- ➢ Air is used by animals in the soil to respiration.
- ➢ Enables root perspiration to take place for living organisms in the soil.

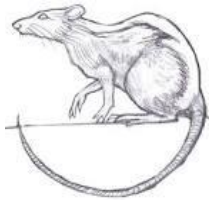
NOTE:

**perspiration** is the exchange of gases between the body of an organism and the surroundings

**Living organisms which help in aeration of soil**

- ✓ Millipedes
- ✓ Centipedes
- ✓ Earthworms
- ✓ Bacteria
- ✓ Fungi
- ✓ Moles
- ✓ Rabbits
- ✓ Squirrels
- ✓ Porcupines

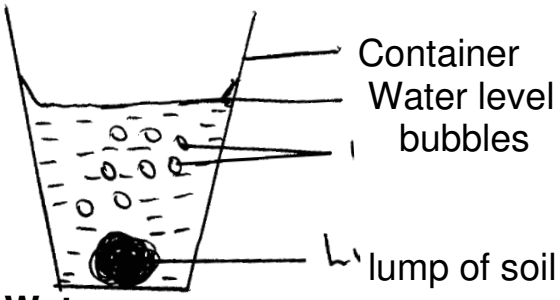




**An experiment to show that soil contains air**

Materials needed

- Lump of soil
- Water
- Container 3




**b) Water**

- Water is used by plants for germination
- Making starch (it is a raw material for photosynthesis)
- Promoting decay of matter

**c) Rock particles ( inorganic materials like: sand, gravels, clay formed by weathering)**

✓ Provide space for air to occupy
✓ They break down into smaller particles to form soil

**d) Humus is a dead decayed plants and animal matter**

✓ Provide plant nutrients to the soil.
✓ Improve soil fertility
✓ Humus forms soil texture
✓ Humus absorb moisture
✓ Makes the soil appear dark in colour

**e) Living organisms**

**Examples of animals that live in the soil.**

Bacteria, moles, porcupines, earth worms and ants

Bacteria like nitrogen fixing bacteria fix nitrogen in the soil and hence improving on soil fertility.

**Earthworms**

✓ Aerate the soil.
✓ Softens the soil /plough the soil
✓ Add soil fertility by breaking down dead plants and animal remains.

**NB**: Why do you think earthworms come out of the soil after raining?

- To breathe /take in oxygen.

**Importance of soil to plants**

1. Soil provides water for plant growth
2. Soil provides nutrients for plant growth
3. Soil provides surface for attachment of plant roots
4. Soil provides air for respiration of roots and soil organisms

**Importance of soil to man**

1. Man use soil for modelling.
2. Soil is used for growing crops.
3. Soil is used for construction of building.
4. Man use soil for making glasses.
5. Soil maintains the water table.
6. Soil is used for making ceramics.

**Properties of soil**.

- It has air.
- It has water.
- It contains mineral salts.

**Soil profile**

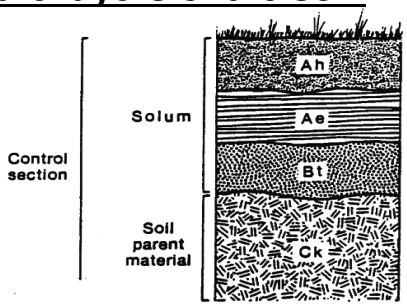
Is the vertical arrangement of soil layers.

**Or** Arrangement of soil layers from top to bottom.

**Areas where one can clearly see soil profile.**

- Pit latrines. – In trenches.

**Illustration of the layers of the soil.**




**Importance of the top most layer.**

- It contains most of the nutrients for plant growth.

**Briefly explain the following terms.**

- **Soil texture.** These are the different sizes of soil particles in an area.
- **Soil structure** is the way soil particles are grouped/ arranged.

**Soil erosion**

Is the washing away of top soil by its agents?

**Agents of soil erosion**

These are forces that carry away top soil from one place to another. These include:

- ✓ Running water
- ✓ Wind
- ✓ Moving animals

**Causes of soil erosion**

These are main activities that enable the agents to take away top soil.

**How?**

**They expose the soil to agents**

These include

**Causes of soil erosion**

- ✓ Overgrazing
- ✓ Deforestation
- ✓ Bush burning
- ✓ Overstocking
- ✓ Mining
- ✓ Mono cropping
- ✓ Brick making
- ✓ Over cultivation
- ✓ Road construction

**Types of soil erosion**

a) Sheet erosion: Top soil is washed away uniformly by running water
b) Gulley erosion (deep channels)
c) Rill erosion (shallow channels)
d) Splash erosion /raindrop erosion
e) Stream /river bank erosion
f) Wind erosion

- ✓ **Splash erosion**

This is the type of erosion which occurs when rain drops hit the bare ground and splash the soil particles from their original position.

- ✓ **Rill erosion**

This is the type of erosion which occurs when flowing water forms deep narrow channels into the ground.

- ✓ **Sheet erosion**

This is when top soil is removed uniformly from the ground by flowing water.

- ✓ **Gully erosion**

This is when deep and wide channels are made into the soil by flowing water.

**Effects of soil erosion.**

- ✓ Soil erosion carries away fertile soil leading to poor plant growth.
- ✓ Soil erosion leads to landslides in mountainous areas.
- ✓ Soil erosion leads to soil exhaustion
- ✓ Soil erosion leads to loss of soil texture

**Prevention and control of soil erosion.**

**Methods of conserving the soil**

a) Mulching the garden
b) Manuring
c) Adding fertilizers
d) Good farming practices
e) Terracing
f) Afforestation

**Terracing:** reduces the speed of running water

**Advantages of terracing**

Terracing controls soil erosion in hilly areas

1. **Strip cropping**: reduces the speed of running water
2. **Contour ploughing**: is the ploughing across a slope.
   It helps to reduces the speed of running water
3. **Afforestation**: is planting of trees where they have ever existed. This also keeps the soil covered from direct rain drops.
4. **Re-afforestation**: is the planting of trees where they have been ever existed. This also keeps the soil covered from direct rain drops.
5. **Cover cropping**: planting cover crops between plants that take long to mature.

**Cover crops**

These are crops that are planted between plants that take long to mature

**Qn:** How does cover cropping prevent soil erosion?

Cover crops reduce the speed of running water

**Qn**: How does inter-cropping reduce soil erosion?

Reduces the speed of running water

**Examples of cover crops include**:

- ✓ Beans
- ✓ Peas
- ✓ Pumpkins
- ✓ Cabbages
- ✓ Sweet potatoes

6. **Bush fallowing:** resting period of land to regain its fertility
   **Importance:**
   - It enables the land to regain its fertility
   - It controls soil erosion
7. **Mulching:** is the covering of top soil with any plant material (dry plant materials)

**<u>Advantages of mulching.</u>**

1. Mulching control soil erosion
2. Mulching control the growth of weeds
3. Mulching improve on the soil fertility
4. It conserves soil moisture

**Disadvantages of mulching**

- ✓ Mulches keep some pests.
- ✓ Dry mulches can be fire hazards.
- ✓ Some mulches can grow into weeds.
- ✓ Some mulches stop water from reaching the soil

**Agro – forestry**

This is the practice of growing crops and planting of trees on the same piece of land.

**Advantages of agro – forestry**.

1. It controls soil erosion
2. It provides double income to the farmer
3. It is a source of fuel
4. It improves soil fertility
5. It is a source of nutritious foods

**Soil exhaustion**

This is the way soil loses its fertility

**Causes of soil exhaustion**

- ✓ Poor farming methods e.g mono cropping, shifting cultivation, over cropping, bush burning, Monoculture (mono-culture
- ✓ Leaching of mineral salts
- ✓ Soil erosion

**Leaching** is the sinking of plant nutrients deeper into the soil where plant roots can't reach**.**

**Causes of leaching**

1. Soil erosion
2. Too much rainfall
3. Increased use of fertilizers

**How to improve on the soil fertility**

1. Mulching the garden
2. Crop rotation
3. Manuring
4. Inter cropping
5. Bush fallowing
6. Addition of fertilizers
7. By terracing
8. Afforestation

**FERTILISERS.**

These are substances put in the soil to increase its fertility.

**Types fertilizer**

- ✓ Artificial fertilizers.
- ✓ Natural fertilizers/ organic fertilizers/ manure

**ARTIFICIAL FERTILIZERS**

Are fertilizers got from inorganic matter artificially.

**Types of artificial fertilizers**

- ✓ Straight fertilizers.
- ✓ Compound fertilizers.

**Straight fertilizers.**

These are fertilizers that supply one nutrient to the soil.

**Examples:** SSP (single supper phosphate), nitrogen, phosphorus, potassium.

**Compound fertilizers.**

These are fertilizers that supply more than one nutrient to the soil.

**Examples:** ammonium phosphate, NPK.

**Advantages of using artificial fertilizers**

1. They have a high nutrient content needed by the plants.
2. They are easy to handle, use and store.
3. They are quick in improving soil fertility
4. They help to make plants resistant to diseases as they grow.
5. They provide the needed minerals without fail.
6. They supply a large quantity of mineral salts.
7. They provide freedom of choice to farmers as they buy the type they need.
8. They improve crop yield.
9. They supply the correct amount of mineral salts to the soil.

**Disadvantages of using artificial fertilizers**

1. They are expensive to buy.
2. They require skilled labour to apply it.
3. They stay in the soil for a shorter period.
4. They are poisonous to animals, people and birds.
5. They pollute water sources when washed there.
6. They destroy soil texture and structure.
7. They make the soil acidic.
8. They kill organisms in the soil.

**Natural fertilizers (manure)**

These are fertilizers made from decayed plant and animal materials (humus)

**Examples of natural fertilizers**

- ✓ Compost manure made from kitchen refuse like banana, sweet potato peelings
- ✓ Farm yard manure made from animal droppings
- ✓ Green manure made from leaves dropping off plants
- ✓ Organic mulch.

**Advantages of natural fertilizers**

1. They improve soil texture
2. They make soil hold water
3. They stay for a longer time in the soil
4. They are available locally

**Disadvantages of natural fertilizers**

1. They smell badly
2. They are tiresome to make

3. Plant and animal matter may not be easily got in some areas
4. They can be sources of weeds

**Compost manure**

Is got from both plant and organic waste matter left to decay.

**Things used for making compost manure**

- ✓ Banana peeling.
- ✓ Dry grass
- ✓ Maize stalks
- ✓ Leaves

**COMPOST HEAP.**



**Importance of compost manure**

- ✓ Adds humus to the soil (improves soil fertility)
- ✓ Controls leaching
- ✓ Improves soil structure

**Advantages of compost manure**

1. It is cheap.
2. Its nutrients last for a longer time
3. It is not poisonous to people, animals and birds
4. It does not require skilled labour to apply it.
5. Provides many nutrients to the soil at the same time.

NB: When making compost manure, water should be added to the compost heap to make the rotting faster.

**Disadvantages of compost manure**

- ✓ Produces bad smell
- ✓ It takes a lot of space
- ✓ Soil nutrients take long to be released into the soil
- ✓ It is not easy to tell which nutrients is present in the compost manure

**Green manure**

It is made from green crops especially legumes that are ploughed back into the soil at the flowering stage.

***Qn. Why legumes are widely used?***
**Ans**. They can rot in a shorter time.

**Advantages of green manure**

1. It lasts for several seasons in the soil.
2. It rots and mixes easily into the soil.
3. Its nutrients last for a longer time
4. It is not poisonous to people, animals and birds
5. It does not require skilled labour to apply it.

**Disadvantages of green manure**

1. It is time wasting.
2. It requires a lot of labour to plough it back into the soil.
3. It is not easy to tell which nutrient is present in the green manure.

**Farm yard manure**

Is the manure got from animal wastes like dung and urine mixed with their bedding materials

**Advantages of farm yard manure**

1. It is cheap
2. Its nutrients last for a longer time
3. It is not poisonous to people, animals and birds
4. It does not require skilled labour to apply it.
5. Provides many nutrients to the soil at the same time

**Disadvantages of farm yard manure**

1. It contains little amount of mineral salts.
2. Produces bad smell
3. It takes a lot of space
4. Soil nutrients take long to be released into the soil
5. It is not easy to tell which nutrient is present in the compost manure.

**Soil pollutants**

soil pollutants are substances which pollute the soil
Or. Soil pollutants are harmful materials which lowers the quality of the soil

**Examples of soil pollutants.**

1. Polythene papers (Buveera)
2. Plastic materials
3. Rubber materials (old shoes)
4. Glass and broken bottles
5. Metallic materials like nails, tins, etc
6. Concrete from broken buildings.

**Effects of harmful materials on the soil**

1. Non-degradable materials do not rot or decay
2. They prevent or block air and water from entering the soil
3. They lead to soil exhaustion

**Ways of properly handling wastes.**

1. Reusing plastic materials like jerrycans for other purposes like fetching water.
2. Making new things from some wastes (recycle)
3. Returning some wastes like bottles to the factories that make sodas.
4. Rejecting/ refusing the use of non-biodegradable materials like polythene bags.
5. Reducing on the production of non-biodegradable materials.

## SOIL BARRIERS

These are things (materials) that prevent soil from being carried away by the agents of soil erosion.

**Examples of soil barriers**

- ✓ Grass ( cover crops)
- ✓ Trees /roots
- ✓ Rocks
- ✓ Concrete walls
- ✓ Contours
- ✓ Gabions

## SOIL CONSERVATION

Is the maintaining (preserving) of soil fertility.

**Methods of soil conservation**

- ✓ Crop rotation
- ✓ Mulching
- ✓ Cover cropping
- ✓ Mixed farming
- ✓ Manuring /application of the fertilizers
- ✓ Agro-forestry.
- ✓ Afforestation /re-afforestation
- ✓ Bush fallowing
- ✓ Terracing hilly areas
- ✓ Rotational grazing
- ✓ Contour ploughing
- ✓ Strip cropping

**Importance of soil conservation**

- ✓ Retains soil fertility
- ✓ Retains soil moisture
- ✓ Prevents spread of diseases and pests.

# THEME: MANAGING CHANGES IN THE ENVIRONMENT

## TOPIC 9: TYPES OF CHANGES

**Environment:** Environment means the surrounding of people

There are five types of changes in the environment and they include;

- ✓ Biological changes
- ✓ Chemical changes
- ✓ Physical changes
- ✓ Atmospheric change

**Biological changes**

These are changes which take place in the life of living things

**Examples of biological changes include**

1. Growth
2. Germination
3. Developments of breasts in female
4. Moulting
5. Sweating
6. Falling sick and recovering from sickness
7. Change of colour in chameleons
8. Change of colour in leaves
9. Transpiration
10. Osmosis
11. Translocation
12. Digestion.

**Characteristics of biological changes**

1. They are irreversible
2. New organism comes in to existence e.g. seeds, young ones etc.
3. They occur only in living things
4. Young ones grow old
5. Increase in number of off springs
6. There is change in mass

**Chemical changes**

These are changes which take place and form new substances

**Examples of chemical changes**

1. Burning

2. Respiration
3. Photosynthesis
4. Rusting
5. Photosynthesis
6. Decaying or decomposition of matter

**Characteristics of chemical changes**

1. A new substance is always formed.
2. Chemical changes are irreversible
3. There is change in weight
4. They produce heat
5. There Is change in mass of an object.

**Advantages of chemical changes**

1. Chemical changes like burning produce heat
2. The heat produced is used to cook
3. Production of energy during respiration

**Disadvantages of chemical changes**

1. Rusting results into wearing out of iron materials, steel equipment
2. Bolts become difficult to open unscrew.
3. Keys fail to fit in the padlock after rusting
4. Water and air become poisonous to human life.
5. Pollutes the environment i.e. smoke

**Similarities between biological and chemical change**

1. Both are irreversible
2. Both form new substances

**Physical changes**

These are changes which take place and do not form new substances

**Examples of physical changes**

1. Melting
2. Freezing
3. Evaporation
4. Sublimation
5. Condensation

**Characteristics of physical changes**

1. They are reversible
2. No heat or light is produced
3. No new substance is formed
4. There is no change in mass

**Advantages of physical changes**

1. Formation of rainfall

2. Formation of ice cubes
3. Forms water for drinking

**Disadvantages of physical changes**

1. It causes soil erosion
2. It forms gulley
3. It causes loss of soil fertility

**Natural changes**

These are changes which occur on their own and people have no control over them

**Examples of natural changes**

1. Floods
2. Drought
3. Heavy rainfall
4. Change in seasons
5. Volcanic eruption
6. Land slides
7. Rain formation
8. Earth quakes
9. Storm

**Effects of natural changes**

1. They destroy people's property
2. They lead to death
3. They can lead to famine
4. They can cause soil erosion thus leading to soil exhaustion

**Man made changes**

These are changes caused by man and they can be controlled

**Examples of man-made changes**

1. Deforestation
2. Bush burning
3. Road construction
4. Building houses
5. Afforestation
6. Brick making
7. Swamp reclamation
8. Mining

**Difference between physical changes and chemical changes**

| | Chemical changes | Physical changes |
|---|---|---|
| a) | A new substance is formed | No new substance is formed |
| b) | They are irreversible | Physical change are reversible |
| c) | Heat is produced | No heat is produced |
| d) | There is change in mass | There is no change in mass. |

**Effects of changes in the environment to plants and people**

a. **Mulching**

*Mulching is the covering of top soil with the mulches( mulching materials)*

**Importance of mulching**

1. Kills weeds
2. Preserves moisture in the soil
3. Improves soil fertility

**b. Timely planting**

*Timely planting is the immediate planting of crops at the beginning of the season.*

**Importance of timely planting**

1. Controls soil erosion
2. Helps in fain formation
3. Provision of wood fuel

**c. Tree cutting**

**Effect:**

1. Destroys the environment
2. Exposes soil to agents of soil erosion
3. Reduces the amount of rainfall

**d. Bush burning**

**Effects**

- ✓ Soil erosion
- ✓ Loss of soil fertility

**e. Building houses**

**Effects**

- ✓ Houses protect people and their property from bad weather e.g. rain fall, coldness, sunshine.
- ✓ From thieves
- ✓ Wild animals

d. **Road construction**

**Effects**

- ✓ Road construction helps to improve transport
- ✓ Destruction of vegetation
- ✓ Poor roads cause / lead to accidents and damage of vehicles

e. **Pollution**

- ✓ Air pollution
- ✓ Land pollution
- ✓ Water pollution

# THEME: HUMAN HEALTH
## TOPIC 10: PRIMARY HEALTH CARE

**Primary Health Care** is the essential health care where individuals, families and communities work together to solve their own health problems
Or
**Primary Health Care** is the programme that aims at achieving health for all.
**Health** is the physical, emotional, intellectual wellbeing of an individual and not merely the absence of a disease

**Elements of Primary Health Care**

1. Accidents and first aid.
2. Immunisation
3. Family planning.
4. Water and sanitation
5. Personal hygiene
6. Food hygiene and nutrition.
7. Oral and dental health care.
8. Maternal and child health care.
9. Community health education.
10. Control of Communicable Diseases.
11. Public health, nursing and home visiting.
12. Collection of statistical data.
13. Antenatal and post natal care for mothers.
14. CCD – Control of communicable diseases and CDD (control of Diarrheal Diseases)

**Principles of PHC**

**NB** Principles are basic rules followed while carrying P.H.C programme

- ✓ The health care should be available and affordable by every member of the community.
- ✓ The methods used to provide the health care should be acceptable by the community.
- ✓ All members of the community must be involved.
- ✓ Many approaches must be used while carrying out P.H.C activities
- ✓ People's needs must be dealt with according to priority. (Starting with the most urgent
- ✓ The health care should be suitable for solving problems of the people in the community.

**Responsibilities of the family in promoting good health.**

1. A family should avoid poor disposal of faeces and urine / proper use of latrines.

2. Proper disposal of rubbish / house refuse.
3. Boiling water for family members to drink.
4. Cleaning breeding places for vectors near the home.
5. Feeding family members on a balanced diet.
6. Sharing information on health.
7. Family members should avoid drug abuse.

**Responsibilities of the community in health promotion**

1. Constructing health centres
2. Protecting water sources
3. Digging rubbish pits
4. Constructing rehabilitation centres for the disabled
5. Supporting health workers in organizing immunisation programme.
6. Mobilizing members to produce and store food for future use.
7. Organizing cleaning activities in markets and towns
8. Make sure that every family has a latrine and a rubbish pit

**Activities of promoting PHC in the community**

1. Sweeping or mopping the house at home
2. Slashing grass in the compound
3. Protecting water sources from contamination
4. Constructing health centres
5. Constructing public toilets and latrines
6. Digging public rubbish pits
7. Forming health communities in the community
8. Acquiring first aid skills and preparations of ORS and controlling dehydration
9. Growing enough food crops to improve on nutrition in the community.
10. Planning better skills of farming to improve on food production

**Responsibility of individuals in promoting PHC.**

1. Proper washing of the body and face at least twice a day.
2. Brushing of teeth in the morning and after every a meal.
3. Washing hands with soap before and after every meal and after using the latrine.
4. Cutting short fingers nails and toe nails.
5. Washing clothes and beddings regularly.
6. Washing the face and eyes every morning.
7. Grooming hair.

**Suitable life styles and health practices**

1. Eating good food (balanced diet)
2. Getting adequate exercises

3. Maintaining good posture
4. Avoid smoking
5. Performing body exercises
6. Avoid the use of drugs
7. Trimming our fingernails
8. Washing clothes and bed sheets
9. Visiting health workers in case of sicknesses
10. Getting enough rest and sleep
11. Sharing knowledge about health
12. Conducting health parades

**People with special needs in the community**

1. The lame people/ crippled people
2. The blind people
3. The deaf people

**Care for people with special needs**

- ✓ Constructing rehabilitation centres for the disabled
- ✓ Providing equipment that enable them to move with less difficulty e.g wheel chairs, clutches, artificial legs, arms and shoes
- ✓ Training them to do some activities that earn them income.

**Good health practices in schools**

Health parades to promote personal hygiene in the school.

***Having a school health committee to:***

- ✓ Organise fellow children to do communal work.
- ✓ Encouraging parents to take their children for immunization.
- ✓ Inviting health workers to have talks on health matters with children.
- ✓ Promoting gardening to impart good farming methods in earners,
- ✓ promote good nutrition and develop a positive attitude towards farming in learners among others.

**Child to child programmes**

Child to child programme is a programme where older children teach the younger ones good health habit

They perform which help activities children learn how to work together and help each other on health matters

**Activities which are involved in child to child programme**

- ✓ Older children teaching young children how to maintain personal hygiene e.g brushing teeth.
- ✓ Older children can play with young children.
- ✓ Helping the disabled children in washing their clothes, cooking food, fetching water for them
- ✓ Teaching young children toilet habits.
- ✓ Caring for other children who are sick.

## TOPICAL QUESTIONS

1. Write P.H.C in full.
2. What is Primary Health Care?
3. Give any one principal of primary health care.
4. Which element of P.H.C promotes prevention of the six killer diseases.
5. Which activities can primary five pupils do to promote P.H.C.
6. A part from the elements of P.H.C mentioned above give any other two elements of P.H.C.
7. How can people in the community promote good sanitation?
8. Identify any roles of a family in promoting P.H.C.
9. Give any one suitable lifestyle that can promote good health in an individual.
10. Give any two roles of a school health committee.
11. Why is it very necessary to have the following in a home?

i) a latrine

ii)A rubbish pit

12. Give any one activity of a health club in a school.

# THEME: HUMAN HEALTH

## TOPIC 11: FOOD AND NUTRITION

1) **Food** is a substance that carries one or more life functions in the body
   **Food** is anything good to eat or drink.
2) **Feeding**: Is the taking in of food into the body.
3) **Nutrition**: Is the way how food is used in the body
4) **Balanced diet:** Is a meal which contains all the food values in their right amounts.

**Reasons why people eat food.**

People eat food because of the following reasons;

1. To get energy
2. To build the body
3. To be healthy
4. To get body warmth (body heat)

**Food taboos**

This is a cultural or religious custom that forbids people from eating certain types of food.

**Examples of food taboos**

- ✓ Muslims are not allowed to eat pork
- ✓ Muslims are not allowed to eat meat of animals slaughtered by non – Muslims
- ✓ Christians are not allowed to eat meat during lent period
- ✓ Catholics do not eat meat on Fridays during lent period

**Food beliefs**;

This is a feeling that is established by certain tribes to be true or real about food.

**Examples of food beliefs**

- ✓ Girls and women were not allowed to eat chicken and eggs because they had a feeling that they can make them barren.
- ✓ Men were not allowed to eat oil nuts because they thought they can become impotent
- ✓ Children suffering from measles were not allowed to eat meat because they thought that it could make them more sick
- ✓ Babies were not allowed to eat the liver and eggs because they had a feeling that they could make them take long without talking and they also urinate and defecate on their beds.

**Advantages of food taboos and beliefs**

1. Certain people and tribes have plenty of food stuffs
2. Certain animals and plants may be preserved in game parks by those who do not eat them

3. They protect people from eating poisonous plants

**Disadvantages**

1. Food beliefs and taboos can result into nutritional deficiency diseases
2. Children may lack certain food values in the body and become anaemic
3. Pregnant mothers may become malnourished and produce under weight babies

**Breast feeding**

This is the act of suckling young ones on their mothers' breasts to get breast milk.

**Advantages of breast feeding to the baby**

1. Breast milk contains all food values apart from iron
2. Breast milk does not get contaminated easily
3. The baby easily digests breast milk
4. Breast milk is ever ready for the baby
5. Breast milk contains antibodies which protect the baby against diseases

**To the mother**

1. Breast feeding delays the next pregnancy
2. Breast feeding is time saving to the mother
3. Breast feeding is cheap to the family and mother in terms of expenditure
4. Breast feeding improves the health of the mother as she has to eat in order to maintain breast feeding.

**Bottle feeding**

This is the act of suckling a child using a bottle filled with boiled cows' milk or other drinks.

**Advantages of bottle feeding**

The baby can feed even if the mother is sick or away or dead

**Disadvantages of bottle feeding**

1. It is expensive
2. It takes a lot of time to prepare the milk or drinks
3. Bottle feeding encourages early pregnancy
4. It does not create a love bond between the mother and a child
5. Bottle feeding requires more time to clean bottles
6. It may be a source of diseases if not properly cleaned
7. Cows' milk is difficult to digest because of its high fat content.

**Vulnerable groups of people**

Vulnerable people are people that need special care and diet.

**Examples of vulnerable groups of people**

1. Pregnant women/Expectant women
2. Breast feeding mothers
3. Weaning children
4. Babies

5. The elderly
6. Sick people

**Food for vulnerable people**

**Pregnant mothers**

✓ They need to eat food rich in proteins, vitamins, mineral salts and little fats

**Breast feeding women**

✓ They need to drink a lot of fluids and eat food with plenty of calcium

**Weaning children**

✓ They need to be fed on semi – solid foods to supplement on breast milk

**Babies**

✓ Babies need plenty of breast milk.

**Sick people**

✓ They need to be fed on a balanced diet and extra fluids to help the body fight sickness.

**The elderly**

✓ They should eat food like minced meat, fish, mashed fruits etc

**Weaning**:

Weaning is the gradual introduction of semi – solid foods to babies other than breast milk alone.

Weaning is the process of making a child get used to other foods other than breast milk alone.

Weaning should be done at the age of 26 months.

**How to start weaning children**

1) Start with semi – liquid foods like porridge in which milk is added
2) Introduce one type of food at a time until the baby gets used to it to avoid diarrhoea as the baby's stomach is still weak to digest solid food
3) Continue feeding frequently using other weaning foods like porridge, mashed banana.
4) Mashed posho, mashed rice, and mashed fruits

**NOTE**: Remember children have small stomachs and need many meals a day

**Reasons for weaning children**

1. At six months, the iron the baby is born with in the body is used up.
2. And so a baby needs to get more iron through eating food
3. By the age of six months, the amount of food in breast milk is not enough for the baby.

**Food consumption patterns in the community**

1. People in different communities eat different food stuffS
2. These food stuffs determine their staple food in the community
3. Staple food is one's main food.

**Factors that determine one's staple food.**

1. Its availability in the area
2. Cultural attachments to particular foods

- ✓ In northern Uganda, people eat millet and cassava together with simsim, groundnuts sauce, green vegetables and smoked meat
- ✓ In Eastern Uganda, people eat millet, maize, banana, sweet potatoes, cassava together with beans, green vegetables and fish
- ✓ In Western Uganda, they eat banana, sweet potatoes, irish potatoes, millet and sorghum as their staple food together with green vegetables, beans, milk and peas.

**Malnutrition and deficiency diseases**

- ✓ **Malnutrition** is a condition when the body does not get enough of the essential food values
- ✓ Malnutrition is caused by poor feeding

**Deficiency diseases** are diseases caused due to lack of certain classes of food in the body.

**A table showing difficiency disease, its cause , signs and symptoms**

| Disease | Cause | Signs and symptoms |
|---|---|---|
| Kwashiorkor | Shortage of proteins in the body | ✓ Swollen moon face<br>✓ Swollen belly<br>✓ Little brownish hair<br>✓ Swollen hands and legs |
| Marasmus | Shortage of carbohydrates in the body | ✓ Pot belly<br>✓ The child becomes thin and under weight<br>✓ The face looks like that of an old man<br>✓ The eyes are very bright |
| Scurvy | Shortage of vitamin C in the body | ✓ Bleeding from the gum<br>✓ Poor healing of wounds<br>✓ Anaemia<br>✓ Reduced resistance to infection |
| Rickets | Shortage of vitamin D | |
| | in the body | |
| Anaemia | Shortage of iron in the body | ✓ Pale lips<br>✓ Pale eye lids inside<br>✓ Pale palms<br>✓ Pale sole of the feet |
| Goitre | Shortage of iodine in the body | ✓ Swollen neck<br>✓ Swollen thyroid gland |

| | | |
|---|---|---|
| Night blindness | Shortage of Vitamin A in the body | ✓ Poor night vision<br>✓ Sore eyes<br>✓ Unhealthy skin |
| Beriberi | Shortage of vitamin B1 | ✓ Retarded growth<br>✓ Paralysis<br>✓ Body weakness<br>✓ Lack of appetite |
| Pellagra | Shortage of vitamin B2 in the body | ✓ Skin disorders<br>✓ Eye and mouth sores<br>✓ General body weakness |
| Hemophilus | Shortage of vitamin K in the body | ✓ Poor healing of wounds<br>✓ Poor clotting of blood around cuts and wounds |

**Factors that lead to deficiency diseases in the community**

1. Poverty
2. Crop pests and diseases
3. Ignorance
4. Natural hazards like drought, floods, landslides, hail storms, storms etc

# THEME: THE HUMAN HEALTH

## TOPIC 12: ACCIDENTS, POISONING AND FIRST AID

**Accidents:**

An accident is a sudden happening that can cause harm or death

Or: It is an unexpected injury to the body.

## Examples of accidents in our community

- Fractures
- Poisoning
- Falls
- Cuts
- Burns
- Drowning
- Electric shocks
- Wounds
- Scalds
- Bites (i.e. snake)
- Bruises

**Road traffic accidents**

Traffic refers to the movement of vehicles and people in a particular area. Road traffic accidents are sudden happenings that cause death or harm to road users.

**Examples of road users include:-**

1. Pedestrians: These are people who walk along roads on foot.
2. Cyclists: These are people who ride motorcycles and bicycles.
3. Drivers and passengers:
4. Animals e.g. cattle, camel, horses, donkeys.

**Causes of road traffic accidents.**

1. Over loading
2. Over speeding.
3. Driving under the influence of alcohol.
4. Failure to follow road signs.
5. Playing on roads.
6. Poor conditions of roads.
7. Overtaking in sharp corners.
8. Careless crossing of roads.
9. Driving vehicles in dangerous mechanical conditions (D.M.Cs)

**Prevention of road traffic accidents**

1. Following or observing road signs.

2. Avoid over loading vehicles.
3. Never drive while drunk.
4. Avoid playing on or near roads.
5. Buildings should be at least 20 metres from the road.
6. Put zebra crossings on busy roads.

**How to cross a busy roads**

1. First stop alongside the road.
2. Look right - look left.
3. Look right again.
4. If the road is clear then cross but don't run.

**Where can we cross busy roads from?**

- ❖ At zebra crossing
- ❖ Fly overs
- ❖ Traffic lights
- ❖ Using islands on the road
- ❖ Where there are traffic officers / guides

**Burns**

This is an injury caused by dry heat

**Examples of things that burn.**

1. Hot metals
2. Flat iron.
3. Burning fire.
4. Electric heaters
5. Glowing charcoal.

**Effects of burns**

- ❖ Dehydration
- ❖ Severe pain
- ❖ Severe wounds

**Scalds**

This is an injury caused by wet heat of hot liquids like

- ❖ Hot water
- ❖ Hot tea
- ❖ Hot porridge.
- ❖ Steam.

**How to prevent burns and scalds**

1. Cook from a raised fire place.
2. Avoid playing near cooking places or open fires.
3. Keep young children out of fire reach.
4. Construct fire guards around fire places.
5. Teach children the dangers of fire

**Reasons why we treat burns and scalds**

- To reduce changes of infections.
- To save life

## POISONING

Poison is any substance which affect health or cause death when taken.
Poisoning is the act of taking in something poisonous to the body.

**Examples of poison common in our community (homes, schools)**

1. Rat poison
2. Insecticides, pesticides, herbicides.
3. Liquid cleaners e.g. jik.
4. Paraffin, diesel or petrol.

**Causes of poisoning**

1. Taking expired drugs
2. Eating expired foods
3. Ignorance
4. Taking over dose
5. Poor storage of drugs

**Signs and symptoms of poisoning**

1. Vomiting
2. Rapid breathing
3. Fever and sweating.
4. Loss of body balance
5. Mental confusion
6. Internal and external bleeding.

## FRACTURES

A fracture is a broken or cracked bone.

**Types of fractures.**

There are three types of fractures namely;-

1. Simple fracture
2. Compound fracture
3. Green stick fracture

**Simple fracture**

This is when the broken bone remains inside the skin.

**Illustration**

**Signs and symptoms of a simple fracture.**
The affected part swells.
Too much pain around the injured part.
**Illustration**

**Compound (  fracture)**
This is when the broken bone comes out of the skin.
**Illustration**

**Signs and symptoms**
1. Severe bleeding occurs.
2. Broken bone comes out of the skin.

**Illustration**

**Green stick fracture**
This is when a bone bends but remains inside the skin.
It is common in your children because they have soft bones.
NB :  Greenstick fracture is under simple fracture
**Illustration**

**First Aid for fractures**
**Sprains, strains and dislocation**
- A sprain is a torn or stretched ligament.
- A strain is a torn or stretched muscle.
- A dislocation is when a bone is displaced at a joint.

NB:  Ligament joins bones to bones.

**Signs and symptoms of sprains, strains and dislocation.**

1. A lot of pain is felt around the injured part
2. Swelling around the joint.
3. Difficulty in moving the limbs.

**Cuts**

**Effects of cuts.**

1. They cause wounds.
2. Cuts cause bleeding.

**Types of cuts.**

1. **Minor cuts.** These are cuts which do not go deep in the skin.
2. **Deep cuts** are those which go deep in the skin.

**Signs of cuts**

Severe bleeding.
There is a severe pain

**Bruises**

A bruise is a body swelling caused by internal bleeding.

**Causes of bruise**

Bruise is caused by accidental hitting of the body parts.

**Wound**

A wound is a tear of the body tissues.

**Types of wounds**

1. **Incised wounds:**
   Are wounds caused by sharp objects that cause open bleeding. e.g. razor blade, knives.
2. **Lacerated wounds**
   These are wounds caused by objects with irregular edges e.g. barbed wires, animal teeth; animal claws.
3. **Contused wounds**
   These are wounds caused by direct blows by some objects.
4. **Punctured wounds.**

Are wounds which have a small opening but very deep.
They are caused by very sharp pointed objects e.g. needle, nails, arrows, spears etc.

**Snakes bites**

The first aid for snake bites is to tie a cloth above the bitten part.

**Why:**

Top prevent poison from moving to the heart.

**FIRST AID**

This is the immediate / first / Initial help given to a casualty before being taken to the health centre.

**Who is a casualty?**

A casualty is an accident victim or is a person who has got an accident and needs help.

**Identify the major reason why we give first aid?**

To save life

Note: The major reason for giving first aid is to save life.

**Why do we give first aid?**

1. To save life.
2. To reduce pain.
3. To promote quick recovery.
4. To reduce / stop bleeding.
5. To prevent further injuries.

**Who is a first aider?**

A first aider is a person who gives first aid service to a casualty.

**Qualities of a good first aider**

1. Should be observant
2. Should be knowledgeable
3. Should be sympathetic
4. Should be skilled
5. Should be clean
6. Should be able to use common sense.

**Responsibilities of a good first aider.**

1. To examine the condition of a casualty.
2. To help the casualty as quickly as possible.
3. To take the casualty to the nearest health unit.

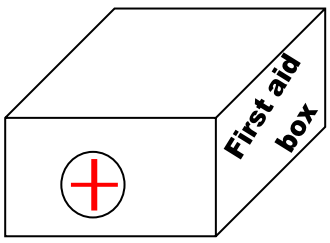
**First aid kit**

First aid kit is a set of first aid equipment.

First aid kit is a collection of things used to give first aid.

**First aid box:**

This is a container where things used to give first aid are kept.



Note: A first aid box should be painted with bright colours.
Reason: For easy identification

**Items found in a first aid box**

1. Razor blades : Used to cut plasters and bandages.
2. Safety pins : Used fasten the bandage.
3. Bandage : Used to tie broken bones
4. Pair of scissors : Used to cut plasters and gauze.
5. Surgical spirit : Used to wash and kill germs around the wound.
6. Pain killer : Used to kill pain.
7. Cotton wool : Used to clean cuts.
8. Clinical thermometer : Used to measure human body temperature
9. Surgical gloves : Used to prevent contamination.
10. Plaster : Used to cover wounds and cuts.
11. Splints : Used to tie and keep the broken in position.

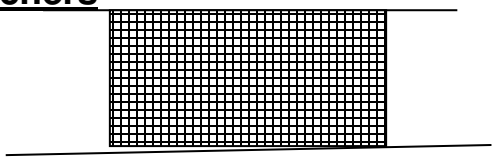
**Places where first aid box can be found**

1. Schools
2. Airport
3. Homes
4. Aeroplanes
5. Industries
6. Offices
7. Vehicles
8. Petrol stations
9. Factories

**Note:**

1. Arm sling holds the broken limb in position.
2. Stretcher is used to carry casualties who can't walk to the health centre
3. First aid kit is used to give first aid.

**Stretchers**



**First aid for injuries**

**1. Burns and scalds**

Put the injured part in cold water

**Why we put or pour cold water**

To reduce heat in the skin

To reduce heat from destroying the body cell.

**2. Poisoning**

Give the casualty plenty of fluids to dilute poison in case of paraffin or petrol
Do not make a person to vomit.
***Why ?*** Vomiting can damage throat and lungs.

Make a casualty to vomit if he has taken rat poison or any other kind of poison.
How to make the casualty to vomit
1. Give him water mixed with soap.
2. Place the finger in his mouth to the throat

**3.Fracture**

Tie a splint around the injured part.
Reason for typing on splint
To keep the broken bone in position so as to prevent further injuries.

**4. Sprain , strains and dislocation**

- ❖ Wrap a cold wet bandage around the injured part
- ❖ Apply a splint in case of a dislocation.

**5. Cuts**

- ❖ Tie the cut with a clean bandage to reduce bleeding pressure.

**6. Bruises**

- ❖ Apply a cold compress
- ❖ Wounds
- ❖ Wash the wound with clean water and soap / surgical spirit.

**7. Snake bites**

- ❖ Tie tightly a piece of cloth above the bitten part.

***Why ?*** To prevent poison from moving to the heart.

# THEME: THE HUMAN HEALTH

## TOPIC 13: DISEASE VECTORS, COMMUNICABLE INTESTINAL DISEASES AND WORM INFESTATIONS

**Vectors**

Vectors are living organisms that spread disease germs.
Germs are living organisms that cause diseases.

**Examples of common vectors**

1. House flies
2. Ticks
3. Tsetse flies
4. Lice
5. Cockroaches
6. Mad dogs
7. Mosquitoes
8. Mites
9. Fleas
10. Water snails
11. Black fly

**a) Insect vectors**

Houseflies , tsetse flies , cockroaches , mosquitoes

**b) Animal vectors**

Mad dogs / rabied dogs.

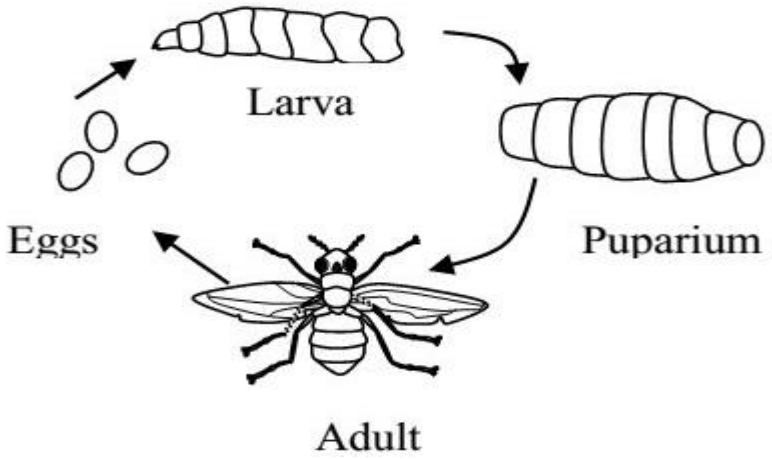
**Life cycle of insect vectors**

These are two types of life cycles namely

**1. Complete metamorphosis:**

This is the life cycle with four stages of development / growth.
These stages are eggs. Larva, pupa and adult.

**Illustration of complete metamorphosis**

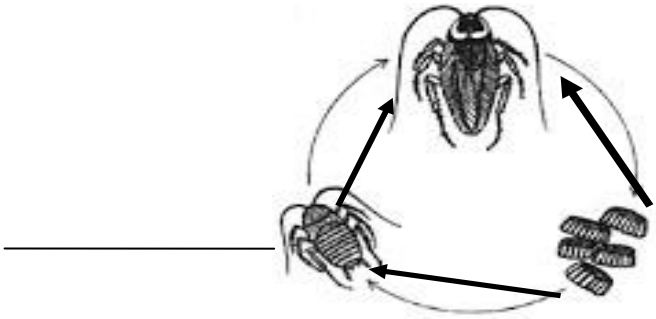



**Examples of vectors which undergo complete metamorphosis**

- House flies
- Mosquitoes
- Black flies
- Bees
- Butterflies
- Moths

**2. Incomplete metamorphosis:**
This is the life cycle with three stages of growth.
These stages are eggs, nymph and adult.

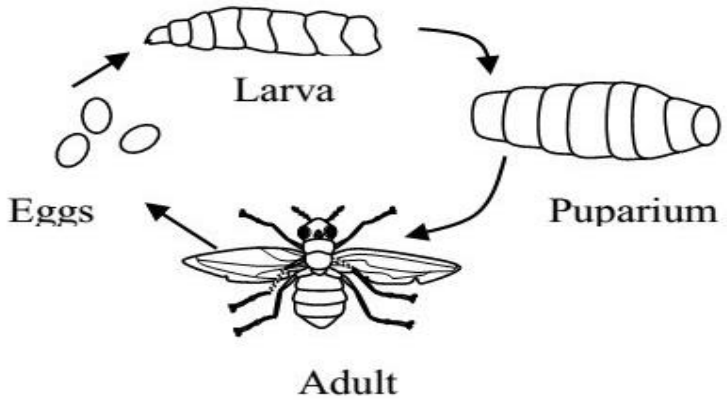
**Diagram of incomplete metamorphosis**



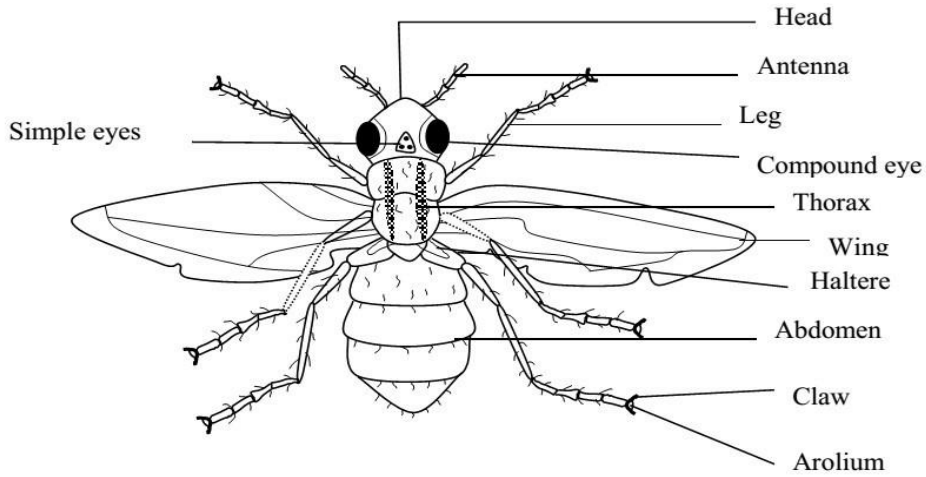
**Examples of vectors which undergo incomplete metamorphosis**

1. Cockroaches
2. Fleas
3. Lice

**The life cycle of a housefly.**




**Structure of a housefly**




**Diseases spread by a housefly**

**1. Dysentery**

These are two types of dysentery namely:-

1. Amoebic dysentery (caused by amoeba)
2. Bacillary (by bacteria)

**Dysentery is caused by the following germs:**
1. Bacteria (shigella)
2. Protozoa (entamoeba)

**How is dysentery spread**
- ❖ By drinking contaminated water.
- ❖ By flies falling on our food.
- ❖ By eating contaminated food.

**Signs and symptoms of dysentery**
- ❖ Severe diarrhea stained with blood.
- ❖ Loss of appetite.
- ❖ Dehydration

**How dysentery is prevented**
- ❖ Use toilets or latrines all the time.
- ❖ Keep toilets or latrines clean.
- ❖ Wash hands before touching or eating any food.
- ❖ Wash fruits and vegetables before eating them.
- ❖ Destroy all breeding places of house flies to stop them from multiplying

**2. Cholera**

-It is a very infectious disease that can kill in a very short time (6 – 24hrs)
-It is caused by the vibrio cholerae bacteria.

**Signs and symptoms of cholera**
1. Serious diarrhea
2. Vomiting
3. Body weakness
4. Dehydration

**How to control and prevent cholera**
- ❖ Use latrines / toilets daily.
- ❖ Cover left over food to avoid flies.
- ❖ Wash hands with soap and water to remove germs.
- ❖ Wash fruits and vegetables before eating them.
- ❖ Boil water before drinking it.

3.**Typhoid**

Typhoid fever is caused by bacteria called salmonella typhi.

**How typhoid is spread**

- By drinking contaminated water.
- By flies falling on our food.

**Signs and symptoms of typhoid**

- Persistent fever with headache.
- Increasing body pain and diarrhea.
- Abdominal pain.

**How to prevent and control typhoid**

- Cover all foods and drinks.
- Use toilets / latrines daily.
- Drink clean boiled water.
- Observe good food hygiene.
- Wash hands with clean water and soap before eating food.
- Wash hands with clean water and soap after latrine / toilet.

**4. Trachoma**

It is a highly contagious / infectious disease which affects the eyes.

It is caused by a virus called Chlamydia.

**How is trachoma spread**

- Sharing of the same basin of water with an infected person.
- Shaking hands with another infected person and then transfer the hands to the eyes.
- Sharing of towels and handkerchiefs with an infected person.

**Signs and symptoms of trachoma**

- Redness and itching of the eyes.
- Swelling of the eye lids.
- Pain while looking at light.
- Watery discharge from the eye lids.

**Prevention and control of trachoma**

- Avoid sharing basins, towels and handkerchiefs with an infected person.
- Avoid shaking hands with an infected person.
- Get treatment as soon as possible because trachoma can make one blind.

**Diarrhoea**

It is caused by either bacteria, virus or worms.

These germs enter our bodies when we eat or drink contaminated water and food.

Most diarrhoeal disease are spread by the 4Fs i.e.

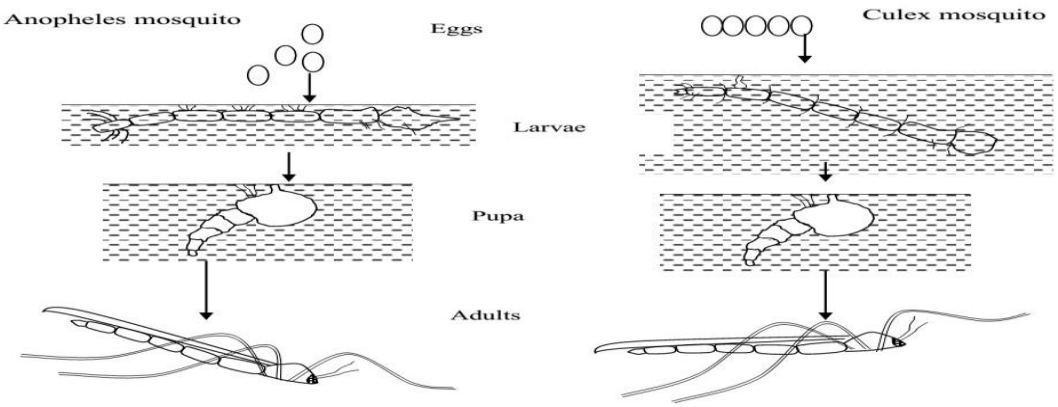
Faeces ⟶ Flies ⟶ Food⟶ Fingers in that order.

## Mosquitoes

There are three types of mosquitoes namely:-

1. The anopheles mosquito.
2. Culex mosquito.
3. Aedes or Tiger Mosquito.

## Life cycle / History of an anopheles and an aedes / Tiger and culex Mosquito



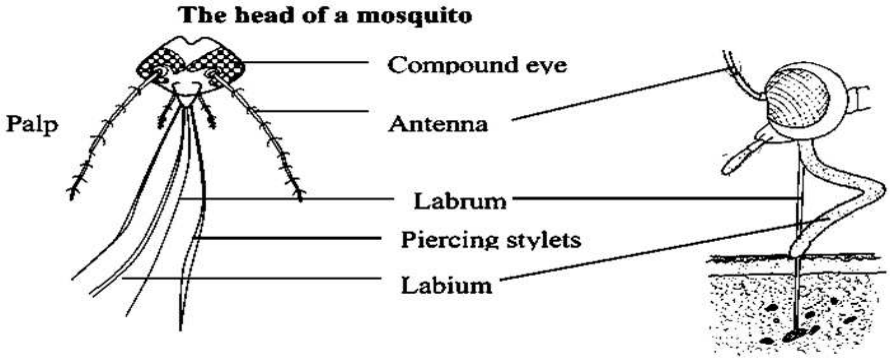

The mosquito lays its eggs in stagnant water.

The eggs hatch into Larva, pupa, adult.

The larva stage of a mosquito is called a wriggler.

Note:

1. A mosquito goes through a complete metamorphosis.
2. Mosquitoes have a sucking mouth part called a proboscis which they use to feed.



## Habitat of Mosquitoes

Mosquitoes lay their eggs in stagnant water or they breed in stagnant water.

## Types of Mosquitoes

### 1. The anopheles mosquito

This mosquito spreads a germ called plasmodium.
This germ (Plasmodium) is spread by a female anopheles mosquito which cause Malaria.
Life cycle of anopheles mosquitoes (diagrams)

A male anopheles mosquito doesn't bite human beings. It instead feeds on nectar of flowers and juices of plants.
Malaria

a) causes - by plasmodia
b) Spread - by female anopheles mosquito

### Signs and symptoms of malaria

1. Tiredness or weakness.
2. Rise in the body temperature.
3. Rapid breathing and rapid pulse rate.
4. Serious sweating of 2 – 4 hours.
5. Abdominal pain, diarrhea and vomiting.
6. Shivering and chattering of teeth.

### 2. Culex Mosquito

This mosquito spreads a worm called filaria which causes elephantiasis.
Elephantiasis makes legs to grow big and look like those of elephants hence the name elephantiasis.
The female culex mosquito feeds on blood before it lays eggs in stagnant water.

### 3. Aedes / Tiger mosquito

This mosquito spreads a virus which causes either yellow fever or dengue fever in human beings.
The mosquito spreads the virus from an infected person to another and it lays eggs in stagnant water.
Note: Yellow fever can be prevented by immunization

## How to control Mosquitoes

1. Destroying any area with stagnant water.
2. Slashing or cutting long grass near home or school.
3. Spray insecticides to kill mosquitoes.
4. Keep fish in ponds and dams to feed on mosquito larva.
5. Pour oil on stagnant water. This stops the larva from breathing by cutting off oxygen supply.

6. Sleep under a treated mosquito net.
7. Using screens on ventilators to prevent mosquitoes from entering.

## COCKROACHES

A cockroach has a flat body. Most cockroaches are dark brown while others are black.
A cockroach is an insect with three main body parts i.e. head, thorax abdomen.

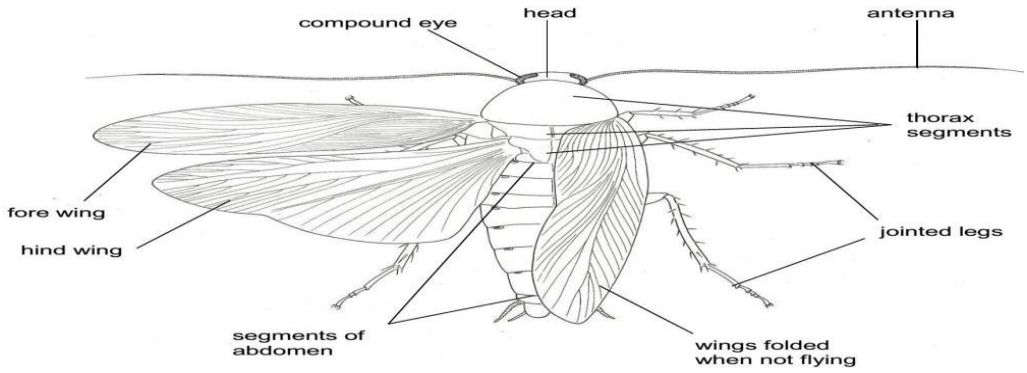
## Feeding habits of cockroach

Cockroaches mainly move at night looking for food and water and during day time, they do not move.
Cockroaches are active at night.
A note: A moth is also an active insect at night.
Cockroaches feed on our food and they transmit germs on it.

## Habitat

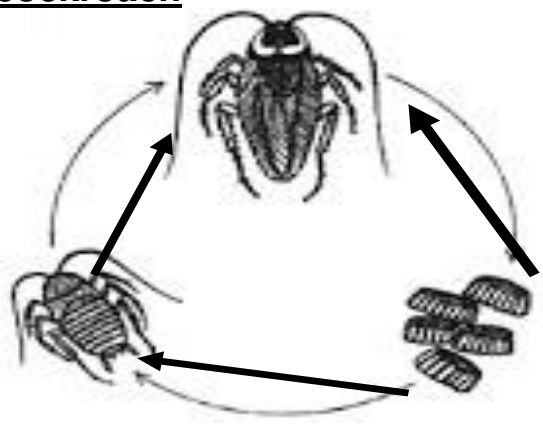
Cockroaches hide or live in dark places like behind cupboards, Old cookers, behind refrigerators, boxes, book shelves, latrines etc.

## Parts of a cockroach




- A cockroach undergoes an incomplete metamorphosis.
- The female lays eggs in an egg case.
- The eggs hatch into nymphs.
- Nymphs look like adult cockroaches but have shorter or n wings.
- Later, nymphs change into adults.

## Lifecycles of a cockroach



**Dangers of cockroaches**

1. Cockroaches carry germs which cause diseases to us.
2. Cockroaches damage our books.
3. They spoil our clothing.

**Diseases spread by cockroaches**

Cockroaches are suspected of carrying germs (pathogens) which cause diseases.

**The disease include:-**

1. Polio
2. Leprosy
3. Typhoid
4. Diarrhoea
5. Amoebic dysentery
6. Cholera
7. Food poisoning

**Prevention and control of cockroaches**

1. Cover all the food.
2. Keep the house clean.
3. Smoke the latrine regularly.
4. Spray the cockroaches with insecticides.
5. Keep covered food in the cupboard.

**Breeding places for tsetse flies**

- ❖ Thick vegetation
- ❖ Along river banks
- ❖ Shady vegetation

**Note:**

1. A tsetse fly undergo complete metamorphosis.
2. A tsetse fly does not lay eggs. The eggs are just hatched within the abdomen.

Diseases spread by tsetse flies

Tsetse flies transmit a germ called Trypanosoma which cause

1. Sleeping sickness (in human beings)
2. Nagana in (Animals)

Note:

Sleeping sickness and Nagana are transmitted by a female tsetse fly.
The female tsetse fly feeds on blood.
The male tsetse fly feeds on plant juices.

**Signs and symptoms of sleeping sickness**

1. Prolonged fever
2. Loss of body weight.
3. Body weakness

4. One becomes sleepy.

**Prevention and control of sleeping**

1. Spray insecticides to kill tsetse flies.
2. Use traps to trap adult tsetse flies.
3. Treat the infected ones in hospitals.

**BLACK FLY**

It is small and black
It is also called Jinja fly or simulium fly.

**Note:**

A black fly breeds in fast flowing rivers where it lays its eggs.
It undergoes a complete metamorphosis.
A black fly spreads a filarial worm called onchocerca vulvulus which causes river blindness.

**Signs and symptoms of river blindness.**

1. Lumps appear on legs and hips.
2. Severe skin itching.
3. Skin rashes appear on the body.

**Prevention and control**

1. Spray insecticides to kill the adult black fly and its larvae.
2. Treat infected people.

**LICE**

**There are three types of lice namely:-**

**1. The body lice:**

They live in clothing.
Their eggs are found in the folds and seams of clothings.

**2. Hair lice:**

They live in the hair on our heads.
They are spread by infected combs, hair brushes, hats, turbans.

**3. Crab lice:**

they live on the hair around our private body parts.
They are spread when the male and female partners join their private parts during sexual intercourse.

Note: The lice suck blood, cause itching, irritation and also spread / transmit diseases called typhus fever and relapsing fever.

**How lice are controlled**

1. Keeping hair short.
2. Washing clothing
3. Ironing clothes.
4. Combing hair every day.
5. Spread beddings in sunshine.
6. Do not share clothes.

**RATS FLEAS**

❖ Rat fleas are carried by rats.

- ❖ They transmit bacteria which causes bubonic plague.
- ❖ Bubonic plague is caused by bacteria called yersinia perstis

**Signs and symptoms**

- ❖ High fever.
- ❖ Swelling in the neck and arm pits.
- ❖ Headache.

**Prevention and control**

- ❖ Kill all rats.
- ❖ Spray with insecticides to kill fleas
- ❖ People should be given anti – plague immunization in case of an outbreak.

**WATER SNAILS**

Water snails transmit the Schistosoma worm which causes bilharzia (Schistosomiasis)
Bilharzias is caused by bilharzia flukes (schistosomes)

**Where does the Schistosoma live in the body?**

1. In the urinary bladder.
2. Large intestines
3. Small intestines.

**How do we get bilharzias**

1. Bathing with contaminated water.
2. Drinking contaminated water.
3. Swimming in contaminated water.

**Signs and symptoms of bilharzias**

1. Passing out blood in urine.
2. Enlargement of the liver and spleen
3. Passing out blood in faeces.

**How to prevent bilharzia**

- ❖ Wearing shoes when walking in wet places e.g. swamps.
- ❖ Boiling water for drinking.
- ❖ Killing water snails
- ❖ Use latrines / toilets for proper disposal of wastes.

**MAD DOGS**

Dogs transmit a virus which causes rabies.

**Other animals which transmit rabies include:-**

- ✓ Infected foxes.
- ✓ Infected domestic cats.

**Signs and symptoms of rabies**

- ❖ Sudden death
- ❖ Fever
- ❖ Headache
- ❖ Body weakness
- ❖ Salivation
- ❖ Mental confusion
- ❖ Difficult in swallowing

**Prevention and control**

- ❖ Kill all suspected mad dogs.
- ❖ Vaccinate all dogs with anti – rabies vaccine

**TICKS**

- ❖ Ticks transmit a germ called rickettsia which causes typhus fever
- ❖ Ticks live on bodies of both wild and domestic animals and humans
- ❖ They feed by sucking blood from animals.

**Prevention and control of ticks.**

- ❖ Spray all domestic animals e.g. dogs and cats.
- ❖ Dip / spray all domestic animals e.g. cattle.
- ❖ Keep the kraal clean.

Note: Ticks are not insects because they have eight legs and have no wings.

**SUMMARY**

| Vector | Disease (s) | Cause |
|---|---|---|
| **Housefly** | Cholera<br>Typhoid<br>Trachoma<br>Dysentery<br>Diarrhoea | Bacteria (Vibro cholera)<br>Bacteria (salmonella typhil)<br>Virus (Chlamydia)<br>Bacteria (Shigella), amoeba<br>Virus, bacteria, worms |
| **Mosquitoes**<br>**Female anopheles**<br>**Culex mosquito**<br>**Tiger / aedes mosquito** | Malaria<br>Elephantiasis<br>Dengue fever and yellow fever | Protozoa (Plasmodium)<br>Filaria worm.<br>Dengue fever virus and yellow fever virus. |
| **Cockroach** | Leprosy<br>Polio<br>Typhoid<br>Cholera<br>Diarrhoea<br>Dysentery | Bacteria<br>Virus<br>Bacteria (salmonella)<br>Bacteria (Vibrio cholera)<br>Virus, bacteria worms.<br>Protozoa (entamoeba), bacteria |
| **Tsetse fly** | Slepping sickness in man. | Protozoa tryponosoma |
| **Black fly** | River blindness | Worm (onchocerca vulvulus) |
| **Rat fleas** | Burbonic plague | Bacteria (Yersinia pestis) |
| **Itch mites** | Scabies | Itch mites |
| **Water snail** | Bilharzias | worm |
| **Dogs** | Rabies | Virus |
| **Lice** | Typhus fever | Bacteria (rickettsia) |

## COMMUNICABLE DISEASES (INFECTIOUS DISEASES) AND WORM INFESTATION

**Communicable diseases** are diseases that can spread from one person to another.

Communicable diseases can be called infectious diseases or transmissible diseases

**Examples of communicable diseases**

1. Measles
2. Diarrhoea
3. AIDS
4. Ebola
5. Malaria
6. Bilharzias
7. Dysentery
8. Polio
9. Tuberculosis
10. Cholera

**Non communicable diseases**

These are diseases that do not spread from one person to another.

**Examples of Non communicable diseases**

1. Anaemia
2. Kwashiorkor
3. Rickets
4. High Blood Pressure
5. Cancers
6. Heart Attack
7. Sickle Cells
8. Nutritional Deficiency Diseases
9. Beriberi
10. Scurvy
11. Pellagra
12. Diabetes

**Diarrhoeal intestinal diseases ( faecal diseases)**

Diarrhoea is the passing out of watery faeces frequently.

**Examples of diarrhoeal diseases**

1. Dysentery
2. Diarrhoea
3. Cholera
4. Typhoid

**Causes of diarrhoea**

1. Bacteria
2. Viruses

**Diarrhoea causes dehydration**

**Dehydration**

Dehydration is a condition of the body when the body does not have enough water in it.

**Causes of dehydration**

1. Severe diarrhoea
2. Severe vomiting

**Signs of dehydration**

1. Sunken eyes
2. Passing out little/no urine out
3. Dry lips
4. Dry eyes
5. Sunken soft spot on a baby's head ( fontanelle )
6. A pinch of skin takes long to go back to its position.

**Prevention of diarrhoea**

1. Covering left over food
2. Washing hands before eating food
3. Drinking clean boiled water
4. Washing hands after visiting a toilet
5. Proper disposal of faeces in latrines
6. Washing fruits and vegetables before eating them
7. Destroying breeding places for houseflies
8. Proper disposal of rubbish

**Treatment of dehydration**

Giving the victim oral rehydration solution (ORS)
Drinking a lot of fluids e.g water , fruit juice , milk

**How to prepare ORS from the Sackets**

1. Wash hands with clean water and soap
2. Measure one litre of clean cold water in a clean container.
3. Open one packet of ORS into water.
4. Mix the solution
5. Taste the solution
6. Give the solution to the victim

**Preparing ORS using salt , sugar and water (local preparation of ORS)**

1. Wash hands with clean water and soap.
2. Measure one litre of clean boiled water in a clean container
3. Measure one leveled tea spoon of salt and eight leveled tea spoon of sugar in water.
4. Mix the sugar and the salt with water to dissolve
5. Taste the solution
6. Give the solution to a dehydrated person.

**Solutes and solvents used in preparing ORS**

**Solutes** is any solid which can be dissolved by water.
**Examples of solutes** are sugar and salt

Solvent is any liquid which can dissolve a solute
**Example of solvent** is water

Qn: **Why is water known as a universal solvent**?
Water dissolves all solutes

**Dysentery**

Dysentery is the passing out of watery faeces with blood.

**Causes of dysentery**

- Bacteria (shigella)
- Amoeba

**Kinds of dysentery**

1. Bacillary dysentery
2. Amoebic dysentery

**How dysentery spreads**

1. Drinking contaminated water
2. Eating contaminated food
3. Eating using unwashed contaminated hands.

**Signs and symptoms of dysentery**

1. Severe bloody diarrhoea
2. Abdominal pain
3. Loss of appetite
4. Dehydration

**Prevention of dysentery**

1. Proper disposal of faeces
2. Proper disposal of rubbish
3. Washing hands before eating
4. Washing fruits and vegetables before eating them
5. Washing hand after visiting latrines

**Cholera**

Cholera is diarrhoeal disease caused by bacteria known as vibrio cholerae.

**Signs and symptoms of cholera**

1. Severe diarrhoea
2. Severe vomiting
3. Dehydration
4. Body weakness

**How cholera spreads**

1. Through drinking contaminated water
2. Eating contaminated food
3. Eating using contaminated hands
4. Eating contaminated fruits and vegetables
5. Prevention of cholera
6. Drinking clean boiled water
7. Covering left over food.
8. Proper disposal of faeces and rubbish
9. Washing hands before eating

**Typhoid fever / enteric fever**

It is caused by bacteria known as salmonella typhi

**Signs / symptoms**

- ❖ Abdominal pain
- ❖ Body temperature rise (fever)
- ❖ Headache
- ❖ Diarrhoea
- ❖ Abdominal discomfort

**How typhoid spread**

1. Drinking contaminated water
2. Eating contaminated food
3. Eating with unwashed hands
4. Prevention and control of typhoid
5. Drinking clean boiled water
6. Covering left over food
7. Washing fruits and vegetables before eating them.
8. Washing hands before eating.

**Intestinal worms**

Intestinal worms are internal parasites

**What are parasites?**

Parasites are living organisms that live and get food from other living organisms for survival.

A host is a living organism on which a parasite depends.

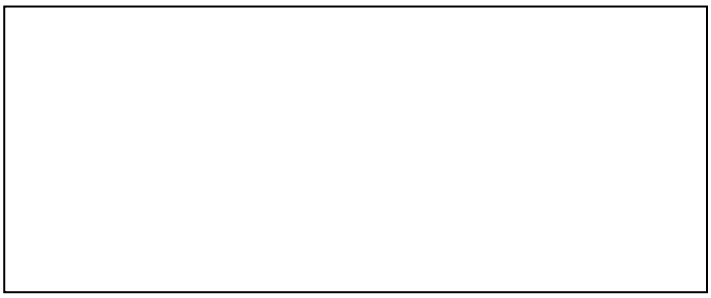
**Examples of intestinal worms include:-**

1. Hook worms
2. Guinea worms
3. Round worms
4. Fluke worms
5. Tape worms
6. Thread worms
7. Pin worms

**Hook worms**

- ❖ They are about 8 – 13mm in length
- ❖ They live in small intestines where they hook themselves to the walls of the intestines with their hooked mouth and feed on blood.
- ❖ The female lays eggs which pass out in stool or faeces.
- ❖ The eggs hatch out in water or damp soil and enter through bare feed especially around the ankles.
- ❖ They penetrate the skin and enter the blood streams where blood carries them to the lungs.
- ❖ From lungs they are coughed to the gullet and swallowed to the stomach and then to the small intestines where they stay.
- ❖ Hook worms are dangerous because when they become many in number they suck blood and cause anaemia (Hook worm anaemia)

## Structure of hook worms



## Signs and symptoms

1. Abdominal discomfort
2. Loss of weight
3. Body becomes tired and weak.
4. Diarrhoea
5. The tongue, gums, eyelids and finger nail becomes pale.

## Prevention

Wear shoes if possible especially in wet places.
Always use latrines and afterwards wash your hands with water and soap.

## Treatment

Go to be examined by doctor in the hospital.
Eat meat, fish, eggs and dark green leafy vegetables.

## Ascaris worms ( round worms)

- They are about 15 – 35cm long.
- They live in the small intestines and feed on digested food.
- Children can get ascaris worms in contaminated food dirt around houses, in gardens and get round worms eggs in the finger nails.
- Ascaris worms enter our bodies through eating un washed fruits and raw vegetables where the eggs may be attached.
- When one eats un washed fruits and vegetables the eggs get into mouth, stomach and into the intestines and remain feeding or digested food.
- When they are many in number, they block the intestines and cause constipation or diarrhoea.
- Ascaris worms cause an infection called ascariasis

## Structure of ascaris worms

**Signs and symptoms**

- ❖ Abdominal pain.
- ❖ Fever, diarrhea and restlessness.
- ❖ Grinding of the teeth in children.

**Prevention**

1. Wash your hands before eating anything.
2. Do not play in dirty places.
3. Do not share plates because others may not have washed their hands.
4. Wash fruits and vegetables before eating.
5. Wash hands after visiting the latrine.
6. Defecate in latrines only.
7. Cut finger nails to avoid keeping round worm eggs.

**Treatment**

Seek medical advice immediately you think you have round worms.

**Tape worms**

- ❖ They grow to more than 30ft or 10m long.
- ❖ They enter our bodies through eating half cooked beef or pork and live in our small intestines.
- ❖ They hook themselves on the walls of the intestines and suck digested food.
- ❖ When mature, the tape worms shed their segments containing thousands of mature eggs which are passed through faeces or stool.
- ❖ The mature eggs can stay up to one year on grass until either a cow or pig eats the grass with the eggs.
- ❖ When the eggs are swallowed by either pig or cow, they enter their bodies into their blood and go for another stage of development in the mucus.

**Structure**

**The scolex**

**Functions of the parts**

a) **Hooks** attach the worm to the walls of the small intestine

b) **Suckers** - provide extra attachment of the worm to the walls of the small intestines

**Signs and symptoms of tape worm infection**

1. The person becomes weak.
2. A person passes out stool with tapeworm mature eggs segments.
3. The person passes out watery stool.

**Spread**

Through eating half cooked meat

**Prevention and treatment of tape worms**

Eating properly cooked meat

Go for treatment as soon as possible.

**PIN WORMS / THREAD WORMS**

- These live in the large intestines especially in the rectum.
- The female crawls out at night through the anus and lays its eggs around the skin.
- This cause itching around the anus especially at night.
- They are white in colour and small of about 8 – 13mm long.
- When the infected person scratches the itching part and later handles food staff or puts fingers in the mouth, the eggs are swallowed therefore reinfecting him / herself.
- If the eggs hatch out around the anus, the worms crawls back into the large intestines.
- However, if the infected person shares edible with someone without washing hands, the eggs are spread and the next person will swallow the eggs and become infected.
- The eggs can be contaminate beddings, under wears, knickers and they can be spread through this way.

**Structure**

**Signs and symptoms**

1. Abdominal discomfort.
2. Lack of sleep
3. Restlessness.

**Prevention and control**

1. Seek treatment from a qualified health worker.
2. Have an infected person wear tight fitting shorts to prevent scratching of the anus.
3. Change under clothing and bedding daily.
4. Scrub toilet seats with soap and water every day.
5. Have family members treated.
6. Wash hands with soap and clean water after the toilet.
7. Cut finger nails short and keep them clear.

**WHIP WORMS**

- They are about 35 to 50mm in length with the head smaller than the tail.
- This is why they are called whip worms because they look like whips worms because they look like whips.
- They live in the large intestines without causing any symptom.
- They produce large numbers of eggs.
- If great in number, they cause diarrhea and intestinal discomfort.
- The eggs pass out with stool and hatch out in the soil.
- They enter our bodies in the same way as the round worms'

**Structure**

# THEME: THE HUMAN HEALTH

## TOPIC 14: IMMUNISATION

**Immunization** is the administration/ introduction of vaccines into the body to cause immunity.
OR
Is a way of putting vaccines into the body in order to cause immunity.

**Immunity**
Immunity is the ability of the body to resist disease attack.

**Types of immunity**
There are two types of immunity.
- ✓ Natural immunity.
- ✓ Artificial (acquired immunity)

**Natural Immunity**
Is the type of immunity a baby or a person gets without introduction of vaccines.

**How natural immunity is acquired**
- ✓ Through breast feeding from mother to baby through the placenta.
- ✓ Eating a balanced diet and develops as a result of infection.
- ✓ The baby gets it as it develops in the mother's womb.
- ✓ After recovering from a disease or an illness.

**Artificial Immunity**
Is the type of immunity a baby gets through receiving vaccines in the body.
After birth, a child is immunized and gets immunity.

**Vaccines**
- ✓ Vaccines are medical substances which are introduced into the body to produce antibodies against certain diseases.
- ✓ Vaccines take the form of dead or weakened bacteria or viruses that can still act as antigens.
- ✓ Vaccines can be administered orally or through an injection.

**Antibodies**
These are chemical substances produced by white blood cells to defend the body against diseases.

**Types of vaccines**
There are three types of vaccines
- ✓ Toxoids
- ✓ Attenuated vaccines
- ✓ Killed vaccines

**Toxoids**
There are prepared from toxins produced by bacteria in the body.
They are made harmless and injected into the body like T.T vaccines.

**Killed / Dead vaccines**

These are killed bacteria or virus that has been grown in suitable host cells. They are made harmless before being injected into a person e.g. cholera and the sack anti-polio vaccine.

**Attenuated vaccines**

These are live bacteria or virus which has been weakened in such a way that they cannot cause diseases. When injected into the body, they cause immunity.

**Importance of immunity to our body**

- ✓ Protects us from being attacked by diseases.
- ✓ Boosts our body immune system.

**How does baby get immunity?**

- ✓ From mother to child during development in the womb.
- ✓ Through immunization from vaccination.
- ✓ After suffering and recovering from an illness.

**CHILDHOOD IMMUNIZATION DISEASES**

The eight childhood killer diseases attack children below the age of six years. These are:

- ✓ Poliomyelitis (Polio)
- ✓ Measles
- ✓ Tuberculosis
- ✓ Diphtheria
- ✓ Whooping cough (pertussis)
- ✓ Tetanus
- ✓ Hepatitis B
- ✓ Influenza B

**Other Immunisable diseases**

- ✓ Cholera
- ✓ Yellow fever
- ✓ Meningitis
- ✓ Rabies
- ✓ Typhoid
- ✓ Small pox (already eradicated)
- ✓ Haemophilus
- ✓ Rubella (German measles)
- ✓ Typhus fever
- ✓ Plague

**DISEASES, CAUSE, SIGNS, SYMPTOMS, PREVENTATION AND TREATMENT**

**Tuberculosis.**

Cause - bacteria (mycobacterium tuberculosis)
It usually attacks the lungs, bones, joints and the brain

**How its spread.**

Through air/coughing or sneezing

**Signs (what is seen with our eyes)**

- ✓ A lot of sweating
- ✓ Loss of weight
- ✓ Chronic cough
- ✓ Loss of skin colour
- ✓ Thick sputum

Note; Sputum is a liquid from the throat or lungs especially when its coughed as out because of a disease.

**Symptoms**

- ✓ Mild fever
- ✓ Loss of appetite
- ✓ General body weakness
- ✓ Chest pain.

**Treatments**

Use antibiotics

**Prevention**

- ✓ Immunize with(Bacillus Calmette - Guerine) BCG vaccine.
- ✓ Eats a balanced diet
- ✓ Avoid sharing, cutting, cups, plates
- ✓ Isolation of sick people
- ✓ Drinking properly boiled milk

**Measles**

Caused by virus

Measles is spread by contact with the nose or throat secretions of infected people and in air borne droplets.

**Signs**

- ✓ Sore in the mouth
- ✓ Runny nose
- ✓ Skin rash
- ✓ Dry cough
- ✓ Red eyes

**Symptoms**

- ✓ High temperature (fever)
- ✓ Itching skins
- ✓ Body weakness

**Prevention**

- ✓ Isolation of infected persons.
- ✓ Immunize with measles vaccine at months after birth

**Treatment**

There is no proper treatment but we can control symptoms

**Whooping cough (pertussis)**

Its a respiratory disease caused by a bacterium called Bordetella Pertussis.

Its spread through droplet infection (coughing and sneezing)

**Signs**

- ✓ Running nose
- ✓ Severe coughing with spells that end with whoops
- ✓ Watery discharge from eyes, sneezing.
- ✓ Quick deep breath
- ✓ Mild cough.

**Symptoms**

- ✓ Fever
- ✓ A cold

**Treatment**

Treat with antibiotic

**Diphtheria**

Caused by bacteria

**Signs**

- ✓ Swollen neck
- ✓ Sore throat

**Prevention**

- ✓ Immunize with D P T vaccine
- ✓ Isolation of infected persons.

**Treatment**

Use antibiotics

**Tetanus**

Caused by bacteria called Clostridium tetani.

**Signs**

- Stiff muscles all over the body especially the jaws
- Sudden and strong muscles that spasm when touched
- Baby stops suckling  Difficulty in swallowing.

**Symptoms**

Fever

**Prevention / Treatment**

1. Immunize with D P T vaccine
2. Immunize with T.T vaccine for females between 15 – 45 years

***Qn Why is DPT vaccine called a triple vaccine?***

**Poliomyelitis (polio)**

Caused by a virus called poliovirus.

Its spread through drinking or eating contaminated water and food

**Signs**

Paralysis in the limbs (legs / hands)

**Prevention of polio**

- ✓ Drinking boiled water
- ✓ Proper disposal of faeces
- ✓ Immunize with polio vaccine

**Symptoms**

- ✓ High fever
- ✓ Weakness of the body

**Other Immunisable diseases**

**CHOLERA**

Caused by bacteria

- ✓ Spread through drinking contaminated water
- ✓ Spread through eating contaminated food.

**Signs**

- ✓ Excessive diarrhoea
- ✓ Excessive vomiting

**Treatment**

- ✓ Give ORS
- ✓ Give fluids like juice, water and milk.
- ✓ Take to the health centre.

**Prevention**

- ✓ Drinking boiled water
- ✓ Wash hands before handling food
- ✓ Ensure proper disposal of refuse
- ✓ Ensure proper use of latrines
- ✓ Cover all cooked food and leftovers
- ✓ Prepare food in a clean place and eat it from a clean container.
- ✓ Observe general cleanliness of both body and environment

**HEPATITIS B**

Its caused by Hepatitis B virus.
It affects the liver.
Spread through contact with body fluids such as blood, sweat, saliva etc of an infected person.

**Symptoms**

- ✓ Body weakness
- ✓ Stomach upset

**Signs**

- ✓ Very dark urine
- ✓ Very pale stool

**Treatment**

No treatment

**IMMUNIZATION SITES**

Immunization sites are the proper parts of a body in which a vaccine is administered.

| AGE | VACCINE | DISEASE | METHOD OF IMMUNISATION |
|---|---|---|---|
| At birth | BCG & polio vaccine | Tuberculosis, polio | Injection – right upper arm Drops in the mouth |
| 6 weeks | DPT vaccine Polio vaccine | Diphtheria Pertussis, Tetanus Poliomyelitis | Injection on the left upper thigh<br><br>Drops in the mouth |

| | | | |
|---|---|---|---|
| 10 weeks | DPT vaccine<br>Polio vaccine | Diphtheria Pertussis, Tetanus<br>Poliomyelitis | Injection on the left upper thigh<br><br>Drops in the mouth |
| 9 months<br>36 weeks | Measles vaccine | Measles | Injection on the left upper arm. |

**IMMUNIZATION CARD (C H C) / CHILD HEALTH CARD**

This is a card given by health workers at a health centre to every child (baby) who receives immunization

**A child health card shows the following information about a baby**

1. Date of birth (D.O.B)
2. Date of next visit for immunization
3. Vaccine received and date
4. Birth weight of the child
5. Childs name
6. Parents name, place of residence, parents occupation.
7. Birth order
8. Doctors' advice to health growth and nutrition of the child.

**Importance of immunization**

- ✓ Helps to remind the parent of the next date of visit for immunization
- ✓ Helps the parent to monitor the child growth
- ✓ Helps both the doctor and the parent to know which vaccine was already given and which one is remaining.

**Roles of individual families and communities in immunization**

1. **Individuals**

- ✓ Helps to inform other family members and neighbors on immunization dates and venue.
- ✓ Learning how to immunize so that they can help the health workers.
- ✓ Help to accept and convince other people to accept immunization as an important programme
- ✓ Encourage others to take their children for immunization.
- ✓ Assisting health workers in arranging the places selected for immunization

**2. Family**

- ✓ Share all information that they know about immunization.
- ✓ Parents should make sure that all children and pregnant women are immunized.
- ✓ Bigger children should take younger ones for immunization

**3.Community**

- ✓ Organize seminars, workshops, plays and concerts to educate others about immunization
- ✓ Schools should perform plays and concerts about immunization on open days and speech days.

NOTE: The common immunization centres in our communities include; hospital, clinics, dispensaries, health centres etc.

# THEME: THE HUMAN BODY

## TOPIC 15:HUMAN TEETH

**A tooth** is a hard bone like structure in vertebrates used for breaking food into smaller pieces.

### Sets of Teeth

1. Milk teeth (Deciduous teeth) / primary set
2. Permanent teeth / secondary set

### Milk teeth

They are 20 in number and the first to grow in young children.
Milk teeth start growing from the age of 6 months and up to the age of around 7 years.
These teeth begin to fall out and are replaced by the permanent teeth.

### Permanent teeth

This is the second and final set of teeth in the mammals growth.
A person starts developing permanent teeth at 13 years.
An adult normal person has 32 permanent teeth consisting of incisors, canines, premolars and molars.

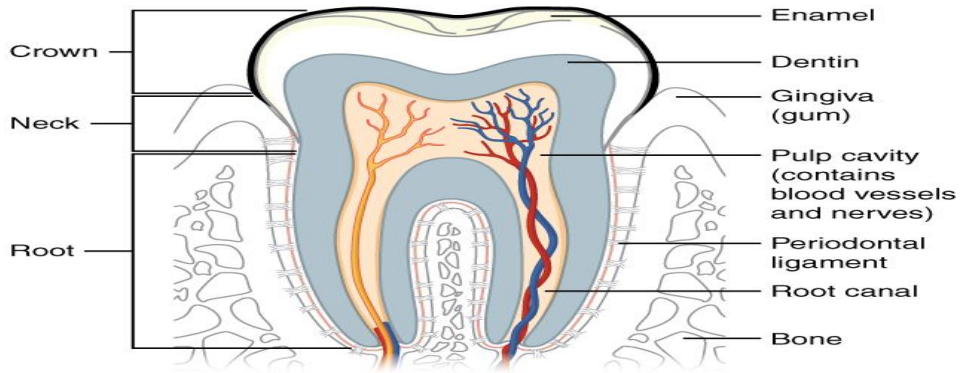
### Types of teeth

- Incisors
- Canines
- Premolars
- Molars.

### Incisors:

- They are used for cutting and biting food.
- They are chisel shaped.
- They are the first teeth to grow.

### Diagram of an incisor.

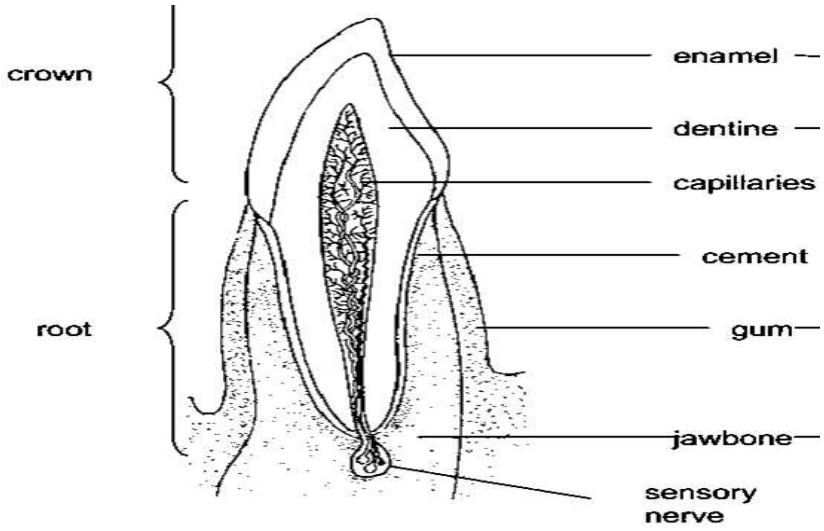


## Canines

They are used for tearing food.

Canines are sharp and pointed.

**Diagram of a canine**




## Premolars

Premolars are used for grinding, chewing and crushing food.

They are broad, blunt and flat ridged.

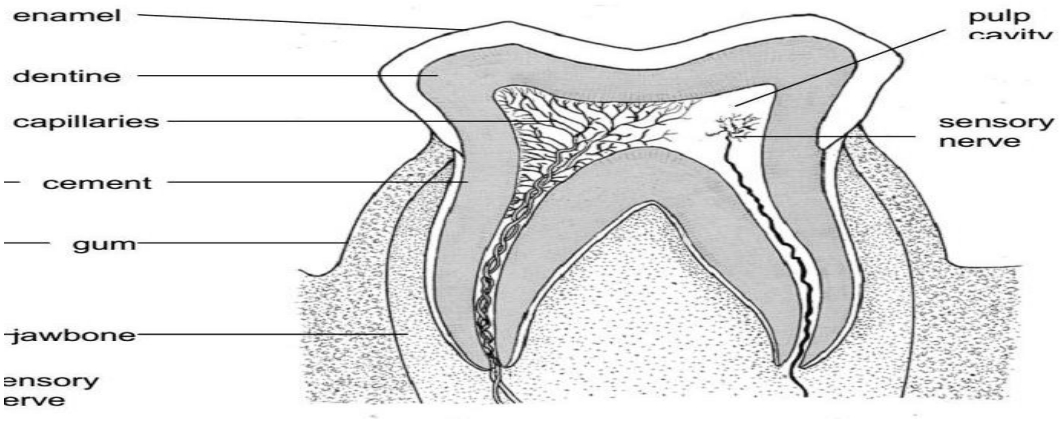
**Diagram of a premolar.**

## Molars

Molars are used for grinding chewing and crushing food.

They are broad, blunt and flat ridged.

**Diagram of a Molar**



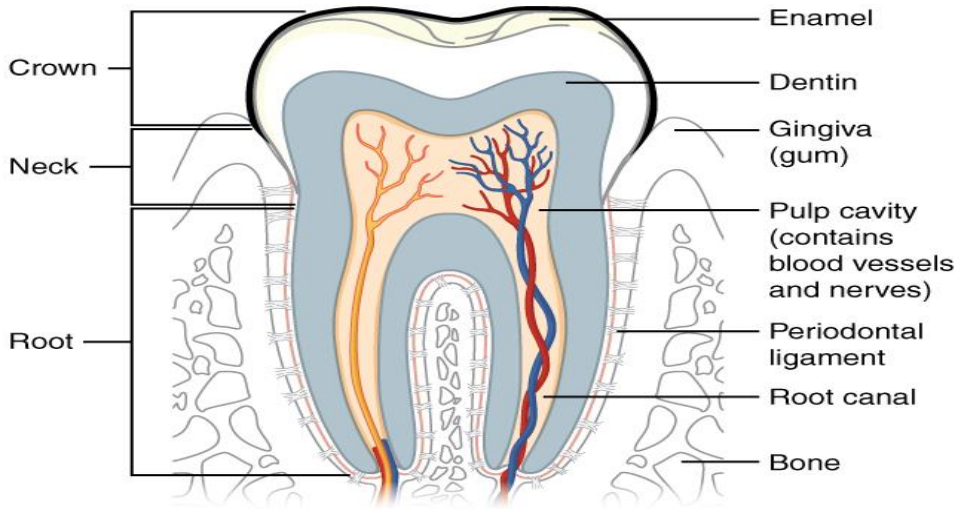
**Dental formula** : Is the number and types of teeth a person has
Dental formula is the arrangement of teeth in the jaws.

| | Incisors | Canines | Premolars | Total | Molars |
|---|---|---|---|---|---|
| **Lower Jaw** | 4 | 2 | 4 | 16 | 6 |
| **Upper Jaw** | 4 | 2 | 4 | 16 | 6 |
| **Total** | 8 | 4 | 8 | 32 | 12 |

## REGIONS OF A TOOTH

### Illustration

1. Crown
2. Root
3. Neck




### Parts of a tooth (incisor and molar)

1. Enamel
2. Dentine
3. Pulp cavity
4. Blood capillaries / vessels / sensory nerves
5. Gum
6. Cement
7. Jaw

### Functions of parts of the tooth

**Enamel:**

- The hardest part of the tooth.
- It is the hardest substance in the body made of calcium of phosphorus.
- Enamel prevents wear and tear of the tooth.
- It protects the inner parts

**Dentine:**

- It keeps replacing the enamel as it may wear off due to friction.

**Pulp cavity**

- It is the most sensitive part of the tooth.
- It contains blood vessels and sensory nerves.

**Blood vessels**
- The supply blood to the tooth

**Sensory nerves**
- They are sensitive to heat, pain and cold.
- The tooth begins paining when bacteria destroy the pulp cavity.

**Cement**
- It fixes the tooth in position
- It protects the tooth.

**Gum**
- Gives extra support to the tooth in the jaw bone.

**Jaw bone**
- Holds the tooth in one position.
- Protects the tooth

**Diseases of the tooth**

**1. Tooth decay (Dental caries)**

It is caused by bacteria.

Bacteria acts on sugar and starch remains on the teeth producing lactic acid that wears and tears the enamel and makes a hole in the dentine and pulp cavity.

Pain begins when the bacteria destroys the pulp cavity.

NOTE: Dental amalgam (cement) can be used to fill the holes made on the teeth.

**2. Dental plague**

A brownish substance forms on the outer surface of the teeth

**Disorder of the teeth**
- Cracked teeth
- Improper growth of teeth
- Broken teeth

**3. Periodontal disease**
- This is an infection of the gums and tooth sockets
- It is caused when plaque is neglected

**4. Gingivitis**
- It is a gum disease caused by bacteria
- It leads to the swelling and bleeding of the gum.
- It also causes bad smell from the mouth

**Improper growth of teeth**

This is when teeth grow in a wrong way.

**Causes of improper growth of teeth**

1. Dental accident
2. Lip biting
3. Early loss of milk teeth
4. Finger nail biting
5. sucking fingers

**Dangers of improper growth of teeth.**

1. Difficulty in chewing
2. Poor facial appearance
3. Speech problems

**Dental Hygiene or oral health**

Dental hygiene or oral health is the way of keeping our teeth free from germs.

**Care for our teeth (Dental Hygiene)**

- ❖ Brush the teeth after every meal.
- ❖ Avoid drinking very hot and cold things.
- ❖ Avoid eating too much sweets.
- ❖ Rinse your mouth with water and salt after every meal.
- ❖ Eat plenty of fruits and vegetables.
- ❖ Visit a dentist regularly for dental checkups.
- ❖ Eat a balanced diet.
- ❖ Dental flossing

**Things used in caring for our teeth**

1. Tooth brush
2. Clean water
3. Tooth paste
4. Small sticks
5. Dental floss
6. Charcoal
7. Tooth pick
8. Ash

**How to brush our teeth**

Brushing the teeth should be up and down movement of the tooth brush but not side ways to avoid damaging the gum

**Reasons why we brush our teeth**

1. Prevent tooth decay
2. Prevent bad breath.
3. To remove food remains (microbes)

# THE DIGESTIVE SYSTEM

Digestion is the breaking down of food into smaller particles that can be absorbed in the blood stream.

## Types of digestion

- ✓ **Mechanical digestion** is the type of digestion where food is broken down into small particles by help of teeth.
- ✓ **Chemical digestion** is the type of digestion where food is broken down into small particles by the help of enzymes.

## ENZYMES

Enzymes are chemical compounds which speed up the rate of digestion.

## Characteristics of enzymes

- ✓ Enzymes are proteins in nature
- ✓ An enzyme always forms the same end product
- ✓ Enzymes are specific i.e. each enzyme acts upon one class of food
- ✓ Enzymes are destroyed by heating
- ✓ Enzymes act on particular conditions i.e. some prefer acidic conditions while others prefer alkaline conditions.

## Examples of enzymes

### In the mouth

- ✓ Salivary amylase/ptyalin digests cooked starch.

### In the stomach

- ✓ Pepsin….digests proteins.
- ✓ Rennin…clots milk in babies in order to separate fats from proteins.

### In the pancreas

- ✓ Pancreatic amylase….digests starch skipped from the mouth.
- ✓ Lipase….breaks down fats to fatty acids and glycerol .
- ✓ Trypsin….breaks down proteins to peptides and peptides to amino acids.

### In the ileum

- ✓ Maltase….breaks down maltose to glucose.
- ✓ Lactase….acts upon lactose to glucose and galactose.
- ✓ Sucrase….breaks down sucrose to glucose and fructose.
- ✓ Peptidase….breaks down peptides to amino acids.

## THE DIGESTIVE SYSTEM

Is the system of the body which works to digest food.

**Alimentary canal**

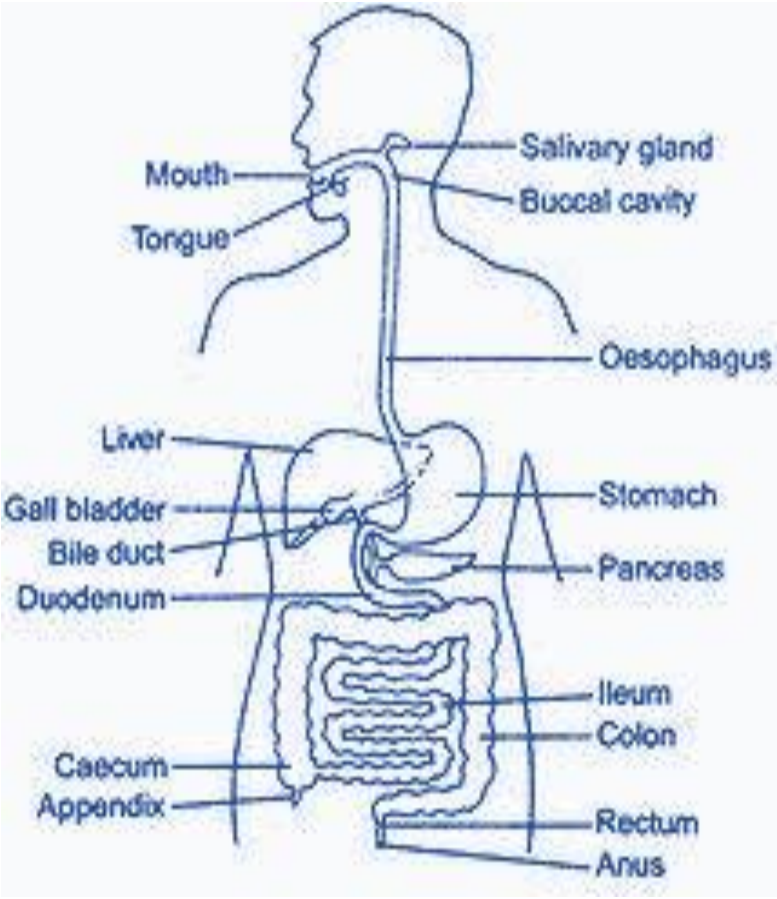
Is the muscular tube that runs from the mouth to the anus.

N.B: Food bolus moves through the alimentary canal by peristalsis

**Parts of the digestive system**

- ✓ Mouth
- ✓ Gullet
- ✓ Colon
- ✓ Appendix
- ✓ Rectum
- ✓ Pancreas
- ✓ Liver
- ✓ Appendix
- ✓ Rectum
- ✓ Pancreas
- ✓ Liver

## THE DIGESTIVE SYSTEM OF MAN




### Uses of the parts of the digestive system

**Mouth**

- ✓ It is where digestion begins.
- ✓ Food is broken into simpler forms.
- ✓ Food is mixed with saliva to make it soft for easy swallowing.

**Saliva**

It is a digestive juice produced by the salivary glands in the mouth

- ✓ It has an enzyme called salivary amylase or ptyalin.
- ✓ Ptyalin breaks down starch into maltose.
- ✓ It also has mucus which lubricates the food.

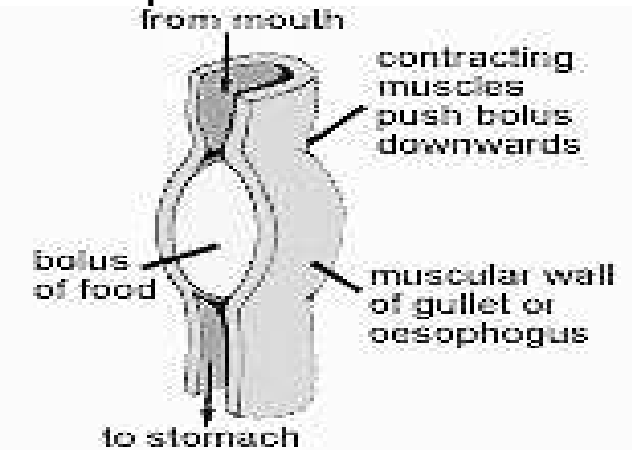
**The tongue**

- ✓ It rolls food into bolus
- ✓ It is used for tasting.
- ✓ It pushes the food into the gullet

**Gullet (oesophagus)**

- ✓ It leads food from the mouth to the stomach.
- ✓ Food passed through the gullet by the process of peristalsis.

**Illustration of peristalsis.**




**Epiglottis**

It prevents food from entering the wind pipe.

**Stomach**

- ✓ It keeps food for 1-4hrs depending on the type of food.
- ✓ The stomach walls produce the gastric juice and hydrochloric acid
- ✓ Hydrochloric acid kills most of the germs brought by the food into the stomach.
- ✓ The gastric juice enzymes that start the digestion of proteins.
- ✓ Alcohol is absorbed in the stomach.

**The duodenum**

- ✓ It is the first section of the small intestine.
- ✓ It receives bile juice and pancreatic juice through the pancreatic duct.

**The liver**

It produces the bile juice

**Gall bladder**

- ✓ It keeps or stores the bile juice.
- ✓ Bile has salts that breaks (emulsify) fats for easy digestion.

**The pancreas**

- ✓ It produces the pancreatic juice.
- ✓ The pancreatic juice has enzymes that complete the digestion of carbohydrates, proteins and fats.

**<u>The ileum</u>**

- ✓ It is the second part of the small intestine
- ✓ It is where the digestion of food ends.
- ✓ It is where the absorption of food takes place.

**<u>Absorption</u>**

- ✓ Is a process by which digested food is taken into the blood stream.
- ✓ The ileum has finger like projection called the villi
- ✓ The villi absorb food

- ✓ The walls of the ileum produce a juice called intestinal juice that completes the digestion of food.

**How the small intestines are adapted to its function**

- ✓ It has a large surface area made of villi and micro villi
- ✓ It has a lot of blood capillaries which allow the transportation of blood molecules all over the body.

**The large intestine**

**I) Colon**

It is where water and mineral salts are absorbed or take place

**II) Rectum**

It keeps the undigested waste materials before they are passed out

**III)Anus**

- ✓ It passes out the undigested materials
- ✓ It is used for indigestion

**Components of faeces**

- ✓ Water
- ✓ Dead cells
- ✓ Roughage
- ✓ Bacteria

**Disorders of the digestive system**

They are problems that can make the alimentary canal fail function well.

**1. Constipation**

It is when the undigested matter stays in the rectum for too long.

**Caus**es

- ✓ Lock of roughage in the diet
- ✓ Drinking little water
- ✓ Lack of physical exercise

**How to prevent constipation**

- ✓ Eat fruits and vegetables e.g. mangoes, apples etc.
- ✓ Doing plenty of physical exercises.
- ✓ Drinking water before and after eating food.
- ✓ Eating a balanced diet.

**2. Indigestion**

It occurs when the food we eat is not properly digested

**Causes of indigestion**

- ✓ Over eating
- ✓ Improper food chewing

**Symptoms of indigestion**

- ✓ Stomach ache
- ✓ Heart burns
- ✓ Tiredness/ fatigue

**Prevention of indigestion**

- ✓ Chewing food properly before swallowing.
- ✓ Drinking enough water before and after eating food.

**3. Vomiting**

- ✓ It is a disorder caused eating poisonous food or over eating
- ✓ It can also be caused due to some diseases e.g. malaria.

**Diseases of the digestive system**

**1. Appendicitis**

- ✓ It is caused by bacteria that enters the appendix
- ✓ It leads to swelling of the appendix
- ✓ It causes too much pain in the lower right side of the abdomen.
- ✓ It can be treated by cutting it off.

**2. cholera**

cholera is caused by bacteria

It is spread by houseflies, cockroaches.

- ✓ It is also spread by drinking contaminated water, eating contaminated food.

**Symptoms of cholera**

Pain around the abdomen

**Control of cholera**

- ✓ Boil water before drinking it.
- ✓ Kill houseflies by spraying
- ✓ Wash hands before eating, serving or handling food.
- ✓ Wash hands after visiting the toilet or latrine
- ✓ Cover cooked food to keep away houseflies.
- ✓ Properly dispose human faeces

**Typhoid**

- ✓ It is caused by bacteria.
- ✓ House flies can spread it.
- ✓ Typhoid can be spread by drinking contaminated water and eating dirty food

**Signs of typhoid**

Diarrhoea

**Symptoms of typhoid**

- ✓ Headache
- ✓ Fever

**Prevention of typhoid**

- ✓ Spraying insecticides to kill houseflies
- ✓ Washing hands before eating food
- ✓ Wash hands after visiting the latrine or toilet
- ✓ Properly disposing rubbish and faeces
- ✓ Drinking properly boiled water

**Dysentery**

- ✓ The frequent passing out of watery stool with blood stains.
- ✓ Amoebic dysentery is caused by amoeba.
- ✓ Bacillary dysentery is caused by a bacterium

**Spread of dysentery**

- ✓ Drinking contaminated water
- ✓ Eating contaminated food
- ✓ Houseflies carry germs onto the food and hands.

**Control of dysentery**

- ✓ Boiling water for drinking
- ✓ Washing fruits before eating them
- ✓ Spraying insecticides to kill houseflies
- ✓ Washing hands before eating, serving food
- ✓ Wash hands after visiting the toilets

**Dangers of dysentery**

- ✓ It leads to dehydration
- ✓ It leads to anaemia

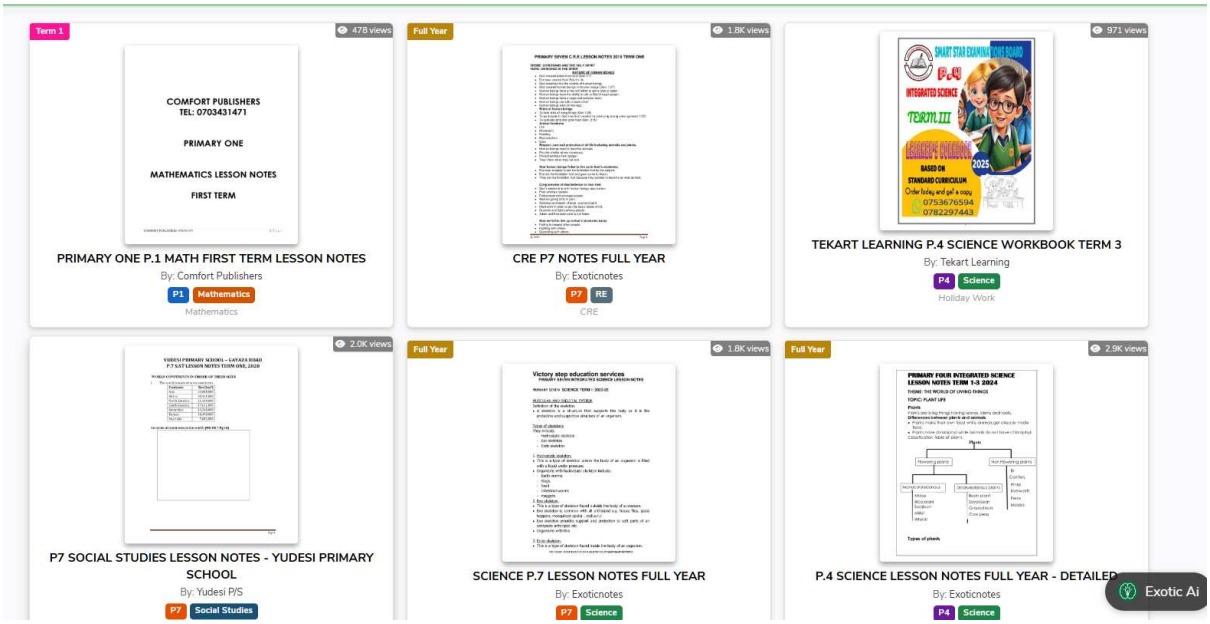
**Peptic ulcers (stomach ulcers**)

- ✓ They are wounds formed in the stomach or small intestine
- ✓ They cause a lot of pain especially when one is hungry

**Care for the alimentary canal**

- ✓ Wash hands before eating
- ✓ Chew food properly before swallowing it
- ✓ Wash hands after visiting a toilet or latrine
- ✓ Eat well looked food
- ✓ Avoid eating very hot or cold food
- ✓ Having regular physical exercise
- ✓ Having enough rest after eating
- ✓ Brushing the teeth after eating food

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