YUDESI PRIMARY SCHOOL

PRIMARY FIVE SCIENCE LESSON NOTES, 2020

TOPICS

- ✓ Keeping poultry and bees
- ✓ Measurement
- ✓ Immunization
- ✓ The digestive system

Topic One: *POULTRY KEEPING*

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

TERMS USED IN POULTRY KEEPING

- ✓ ***Cock*** is the adult male chicken
- ✓ ***Hen*** is the adult female chicken
- ✓ ***Cockerel*** is a young male chicken
- ✓ ***Pullet*** is a young female chicken
- ✓ ***Chick*** is a young chicken below 8 weeks
- ✓ ***Chicken*** is the meat of a hen/a cock
- ✓ ***Capon*** is a castrated cock
- ✓ ***Brooding*** is the special care given to the chicks below 8 weeks
- ✓ ***Incubation*** is the process by which fertilized eggs are given favorable conditions to hatch into chicks.
- ✓ ***Incubation period*** is the period of time taken by a fertilized egg to hatch into a chick.
- ✓ ***Incubator*** is a machine used to hatch the fertilized eggs
- ✓ ***Brooder*** is the special structure where chicks below two weeks are kept
- ✓ ***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 different 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)

<u>Types of feathers</u>

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

<u>Structures of feathers</u>

Quill feather ***Covert feather***

Down feather ***Filoplume***

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

- ✓ Has a large spur
- ✓ Has a large comb
- ✓ Has a large wattle
- ✓ Does not lay eggs
- ✓ Has large ear lobes
- ✓ Has long strong claws
- ✓ Has a large beak

A hen

- ✓ Has a small spur
- ✓ Has a small comb
- ✓ Has a small wattle
- ✓ Lays eggs
- ✓ Has small ear lobes
- ✓ Has small claws
- ✓ Has a small beak

NB: Observe the real bird (cock and hen)

➲ ***BREEDS OF CHICKEN***

What is a breed?

A breed is a group of animal 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

- ✓ They mature slowly
- ✓ They lay few eggs
- ✓ They are resistant to tropical diseases
- ✓ They have different colours

Advantages of local breeds of chicken (indigenous)

- ✓ Local breeds are easy to manage.
- ✓ Local breeds are resistant to tropical diseases.
- ✓ 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

- ✓ Encourages fast growth in birds
- ✓ Results into more eggs being laid by the offspring.
- ✓ Improves on the productivity of poultry.
- ✓ 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 eggs.

Heavy breeds

- ✓ Rhode Island red
- ✓ New Hampshire
- ✓ Orpington

Light breeds

- ✓ Light Sussex
- ✓ White Leghorn
- ✓ Skyers
- ✓ Ancona
- ✓ 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	***Eexotic breeds***
✓ grow slowly	grow faster
✓ lay fewer eggs	lay very many eggs
✓ resistant to local diseases	not resistant to local diseases.

➲ ***TYPES OF CHICKEN***

Layers: Kept for egg production

***Broilers/table birds*:** Kept for meat production

Dual Purpose: Kept for both meat and egg production.

Feeding poultry

- ✓ Chicks below two weeks feed on chick mash
- ✓ Growers feed on Growers mash
- ✓ Broilers feed on Broilers 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)

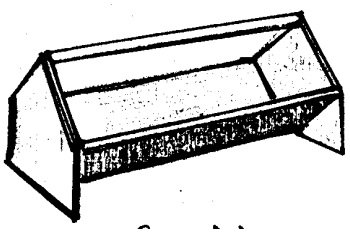
Different types of birds are fed on such feeds for a purpose

- ✓ ***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.
- ✓ ***Broilers***: Broilers mash has a lot of proteins which makes the broilers to grow very fast and put on more weight in short time.
- ✓ ***Growers***: Growers mash is very rich in proteins which make the growers to grow very fast and well.
- ✓ ***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.

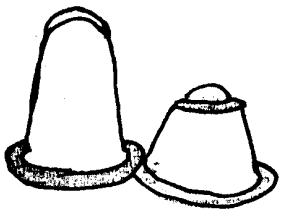
Summary table

Types of chicken	Food	Age
Chicks	Chick mash	0 – 2 weeks
Growers	Growers' mash	3 – 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 beaks
- ✓ They swallow food wholly (food is swallowed wholly)

Alimentary canal of a bird

Functions of different parts of the alimentary canal of a bird

***Beak / bill*:**

- ✓ Picks food.
- ✓ Break food into smaller pieces.

Gullet (Oesophagus) is used to carry food from the beak to the crop.

Crop -Softens / moistens food before it is passed onto the stomach

-Stores food temporarily.

Stomach: Secretes digestive enzymes that mix with food.

Gizzard :Contains small stones (grit/pallables) that grind (crush) food into small particles.

small intestine -It is where digestion takes place.

-It is where absorption of digested food occurs.

Colon (large intestines): It is where absorption of water takes place.

Caeca -Stores undigested food temporarily.

-It is where cellulose is acted upon by bacteria.

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

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

Disadvantages of natural incubation

- ✓ Few chicks can be hatched at once.
- ✓ The hen may get diseases and parasites at an early stage.
- ✓ The hen may not be good at incubation.
- ✓ The mother hen can easily be attacked by a predator/vermins
- ✓ 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 are 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

- ✓ Good temperature (warmth) 32^0C - 38^0
- ✓ Relative humidity (moisture) of 0%
- ✓ Good ventilation (free circulation of air).

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

- ✓ If an egg has double yolks
- ✓ In case an egg has an abnormal shape
- ✓ when an egg is too small in size.
- ✓ When an egg has no air space.
- ✓ If an egg has a soft egg shell.
- ✓ If the egg shell has a crack.

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 is made of mineral salt called calcium.
-It allows gaseous exchange because it is porous.

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: Is where the chicks are kept in a special structure called a brooder..

➲ **BROODER**

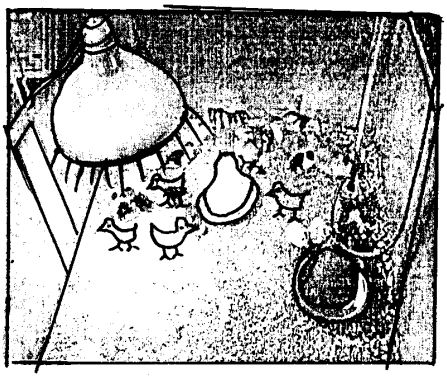
A brooder is a special structure where chicks below 8 weeks of age are kept.

Types of brooders

- Infra-red lamp brooder
- Kerosene lamp brooder
- Charcoal brooder
- Hot water pipe brooder
- 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

- ✓ Chicks are safe
- ✓ Warmth in fully provided
- ✓ Chicks are protected from parasites and diseases.
- ✓ Chicks are given enough food and water.
- ✓ The litter poured on the on the floor makes the chicks feel comfortable.

Disadvantages of the infra-red lamp brooder

- ✓ It is expensive to buy
- ✓ There can be food poisoning
- ✓ This system cannot be used in places where there is no electricity.
- ✓ It is difficult to control disease outbreak.
- ✓ 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.

Advantages of a charcoal brooder

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

Disadvantages of a charcoal brooder

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

Disadvantages of the above brooder

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

➲ **SYSTEMS OF KEEPING POULTRY**

- ✓ Free range system (open system)
- ✓ Deep litter system
- ✓ The cage (battery) system
- ✓ 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

- ✓ Birds eat a variety of foods.
- ✓ Birds look for their own food.
- ✓ Free range system is cheap to maintain
- ✓ It reduces labor to the farmer.
- ✓ Birds get enough exercises.

Disadvantages of free range system

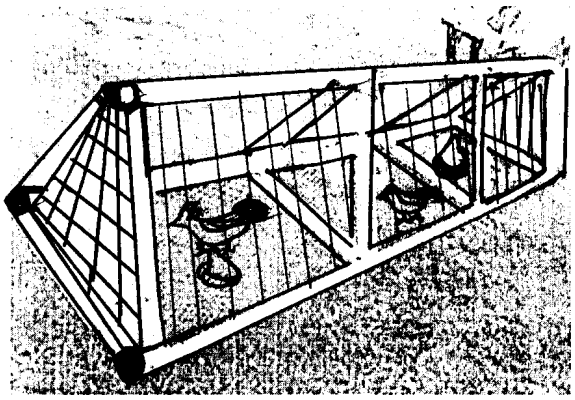
- ✓ Birds can easily get lost
- ✓ The eggs can easily get lost and are difficult to collect.
- ✓ The birds can easily be eaten by wild animals like kites, eagles cats etc.
- ✓ Eggs become dirty easily
- ✓ It is difficult to control diseases and parasites.

Fold / 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

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

Disadvantages of the pen system

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

Deep litter system

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

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

Disadvantages of deep litter system

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

Components of litter

Coffee husks, wood shavings, rice husks, crushed maize cubs and saw dust.

Importance of litter

- ✓ Provide warmth for the birds
- ✓ Prevent the eggs from breaking as they are laid.
- ✓ Litter provides heat that kills parasites / germs.
- ✓ 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 harbors 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

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

Disadvantages of battery system

- ✓ A lot of money is needed to start (so it is very expensive)
- ✓ Birds do not eat whenever they need to.
- ✓ 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

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

- ✓ Vaccinating the birds.
- ✓ Maintaining perfect hygiene
- ✓ Killing and burning the infected birds.
- ✓ Disinfecting the poultry house regularly.
- ✓ 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

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

Control and prevention of fowl typhoid

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

Gumboro diseases

Caused by a **virus**

Signs of Gumboro diseases

NB: 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
- ✓ Dosing

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.

TOPICAL QUESTIONS

1. How are feathers important to a bird?
2. Give the differences between poultry and poultry keeping.
3. Why do farmers keep the following types of poultry?
   a) Layers
   b) Broilers
   c) Dual purposes
4. Give any two examples of poultry.
5. Identify the importance of the following on a poultry farm.
   a) Brooder
   b) Incubator
6. What is the incubation period of a hen?
7. How can a poultry farmer improve upon his local breeds of chicken?
8. Briefly explain the disadvantages of keeping local breeds of chicken.
9. Why do poultry farmers keep farms records?
10. Identify any one poultry diseases caused by each of the following germs
    a) Virus
    b) Bacterium
    c) Protozoa
11. Give the importance of grits/pallables in the alimentary canal of birds.
12. Identify any one cause of poultry vices.

Topic 2: **BEE KEEPING (API CULTURE)**

Apiculture is the keeping and management of honey bees.

Bee keeping is sometimes called Apiculture

TERMS USED IN APICULTURE

Apiculture: Is the keeping and management of bees (refers to bee keeping)

An apiary: Is a farm of bees / a collection of bee hives or a place where bees are kept.

Hiving: Is the act of attracting bees to the hive using baits.

Baits: are things used to attract bees into the hive e.g. fruit juices, ripe bananas, cow dung e.t.c.

A colony: Is a group of bees living together.

Swarming: Is the movement of a swarm of bees from one place to another to look for a new hive.

Maiden / marital flight

Is a flight during which the drone bee mates with the Queen bee.

Brood: are the young ones of bees.

Grub: this is the larva stage

Groups of bees

- ✓ Social bees
- ✓ Solitary 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

- ✓ Termites
- ✓ Red ants
- ✓ Wasps
- ✓ Black ants
- ✓ Honey bees
- ✓ Safari ants

Solitary insects

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

Examples of solitary insects.

- ✓ Mosquitoes
- ✓ Houseflies
- ✓ Butterflies
- ✓ Grasshoppers
- ✓ Dragon flies
- ✓ Cockroaches etc.

TYPES OF HONEY BEES IN A HIVE

- ✓ Queen bee
- ✓ Drone bee
- ✓ Worker bee

THE 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 150-300eggs per day.

Function of the Queen bee in the hive

- ✓ To lay eggs in the hive

Queen bee feeds on

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

THE DRONE BEE



Characteristics of a drone bee

- ✓ It is the male bee in the hive
- ✓ The drone is the second largest bee in the hive
- ✓ It has a blunt hairy abdomen
- ✓ 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.

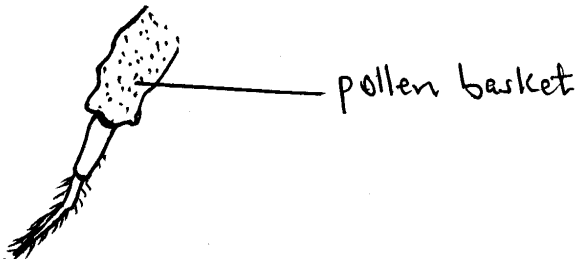
WORKER BEE



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

- ✓ Guard the hive.
- ✓ Collect nectar , water and pollen grains.
- ✓ Build the hive using wax
- ✓ Clean the hive

- ✓ Collect propolis used to repair the cracks on the hive.
- ✓ Feed the grubs (larvae) on honey
- ✓ Feed the queen bee on royal jelly.
- ✓ Fan the hive to reduce(lower) the temperature
- ✓ 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.

Why bees swarm

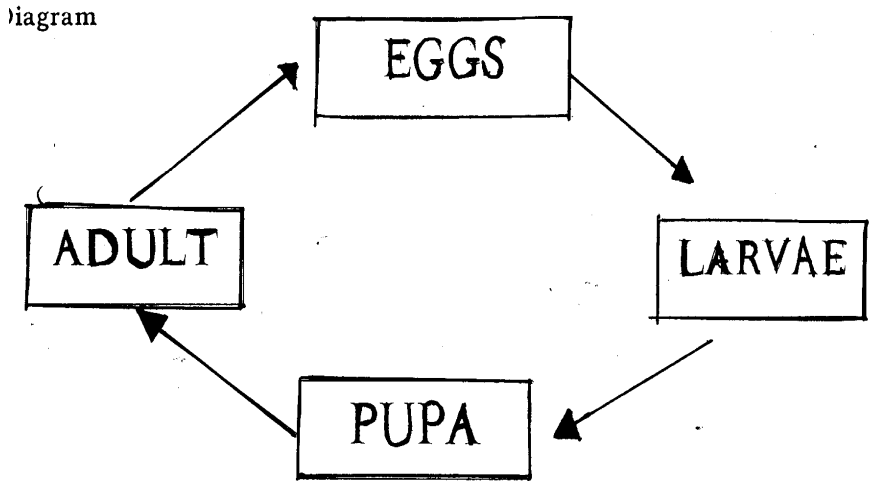
- ✓ Bees swarm due to overcrowding in the hive.
- ✓ Due to a bad smell near the hive or inside the hive.
- ✓ Due to dampness in the hive (incase the hive leaks)
- ✓ Due to direct sunlight into the hive.
- ✓ In case the bees are attached by enemies.
- ✓ Due to shortage of food and water in an area due to drought.
- ✓ In case the queen bee dies.
- ✓ If there are two or more queen bees in the hive.
- ✓ 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

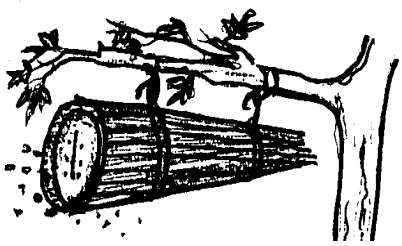
There are two types of bee hive.

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

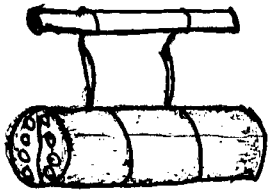
Local bee hive

Examples of local bee hive

a).Woven bee hive



b).Dug out log beehive



Advantages of local bee hive

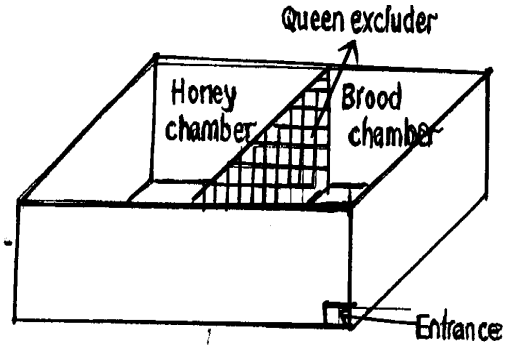
- They are easy to make
- They are made from locally available materials
- They are cheap to maintain.

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

- The hive can easily be inspected
- Harvested honey is always clean
- Top bar hive is durable (lasts for along time)
- 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.

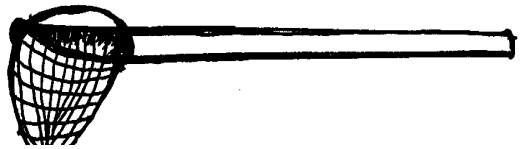
Stocking a hive

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.

Location of an apiary (farm of bees)

- ✓ Away from people or animals to avoid disturbances
- ✓ Away from the main road
- ✓ In a sheltered and quiet (under shade)
- ✓ Near a water source
- ✓ 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

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

The best time of the day for harvesting honey

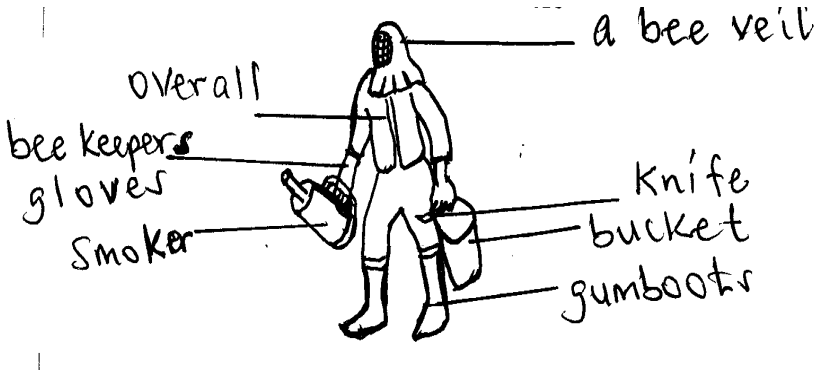
In the evening when it is cool and all the bees are settled or calm.

Equipments for harvesting honey

- ✓ A bucket (pan) for collecting honey.
- ✓ A knife used to cut honey combs
- ✓ Overall to protect the harvester from stings.

- ✓ Bees veil to protect the face from bee stings
- ✓ Gloves to protect the hands
- ✓ Gumboots to protect the feet.
- ✓ 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

- ✓ Propolis
- ✓ Royal jelly
- ✓ Combs
- ✓ Brood
- ✓ Bee venom

How is honey processed?

- ✓ Golden yellow combs are removed and crushed.
- ✓ The crushed combs are sieved / filtered.
- ✓ The wax remains on the sieve as honey drops into a clean container under the sieve.
- ✓ Collected honey is then melted over a steam bath.
- ✓ After settling, the scum that forms on top of the honey is removed using a spoon or knife.
- ✓ At this stage, honey is ready for eating.
- ✓ 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

- ✓ Honey is eaten directly as food
- ✓ Honey is used to sweeten tea.
- ✓ Liquid honey is eaten with bread and cakes.
- ✓ Honey is used to make alcoholic drinks.
- ✓ Honey is used to treat cough.
- ✓ Honey can be sold to get money.
- ✓ Honey is used to make medicine.

Industrial uses of honey

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

Importance of bee wax to man

- ✓ For making shoe polish
- ✓ For making crayons used in painting
- ✓ For making candle wax
- ✓ To make varnish for furniture
- ✓ To make cosmetics like body creams / Vaseline.

Advantages of keeping bees

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

BEE ENEMIES AND DISEASES

Examples of bee pests include

- ✓ Wood ants
- ✓ Safari ants
- ✓ Rats
- ✓ Wasps
- ✓ Wax moths
- ✓ Sugar ants

Diseases of bees

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

- ✓ American foul brood
- ✓ Stone brood
- ✓ Bald brood
- ✓ European foul brood
- ✓ 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 10 150cm high.

Topic 3: **MEASUREMENT**

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

Mass

It 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

- ✓ It is the distance between two points
- ✓ It is measured in metres (m), centimeters (cm) Hectometres (hm), millimetres (mm, decametre (Dm) decimeters (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.

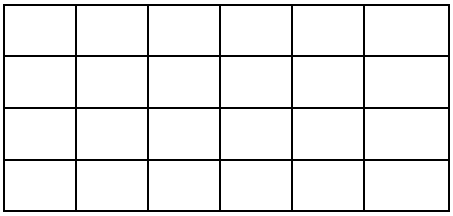
Area of a rectangle



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



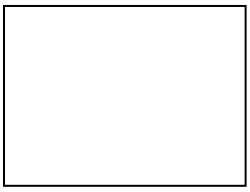
6 squares

4 squares

By counting the squares
24 squares
Area = L X W
= 6 squares X 4 squares
= 24 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



4cm

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

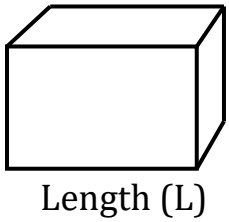
<u>Volume</u>

It 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



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.

<u>Displacement method</u>

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.

<u>Using an over flow can (Eureka can)</u>

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 **<u>Newton</u>**

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
- ✓ Leaves
- ✓ Soft dry wood
- ✓ Paper
- ✓ Petrol
- ✓ paraffin

Sinking

It is when an object thrown on water goes to the bottom of the water.
Objects sink because they are more dense than water.

Examples of sinking objects

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

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

Density

It 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>

$$D = \frac{\text{Mass}}{\text{Volume}} \quad \left(\frac{M}{D}\right)$$

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

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

$$D = 20g$$

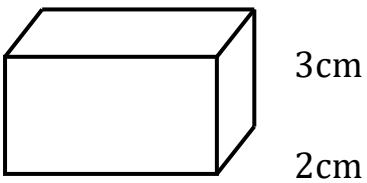
TOPICAL QUESTIONS

Write one sentence to show the meaning of measurement.

2. How are irregular objects different from regular objects?
   Calculate the area of the figure below



Calculate the volume of the cuboid below.



3. What is the standard measure (units) for length?
   Calculate the volume of the cuboid below.

Why does paraffin and petrol float when mixed with water?

5. Give one difference between mass and weight.
6. Identify one object that can float when thrown on water.
7. State any two machines that can be used to measure mass.
8. Calculate the density of an object with mass 20gm and volume 2cc.
9. Use the experiment below to answer the questions below.

10. What is the volume of the stone

Name the objects marked

11. Why is the above method used to find the volume of the stone?
12. Why do we use displacement method to find the volume of irregular object?
13. What is the meaning of the term sinking?
14. Give any two examples of sinking objects.
15. Why do some objects sink in water?

Topic 4: **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 can not 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 color
- ✓ 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 bacteria 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

- ✓ Immunize with D P T vaccine
- ✓ Immunize with T.T vaccine for females between 15 – 45 years

<u>Qn</u> 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, waters 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
- ✓ No treatment

Prevention

	AGE	VACCINE	DISEASE	METHOD OF IMMUNISATION
a.	At birth	BCG & polio vaccine	Tuberculosis, polio	Injection – right upper arm Drops in the mouth
b.	6 weeks	DPT vaccine Polio vaccine	Diphtheria Pertussis, Tetanus Poliomyelitis	Injection on the left upper thigh Drops in the mouth
c.	10 weeks	DPT vaccine Polio vaccine	Diphtheria Pertussis, Tetanus Poliomyelitis	Injection on the left upper thigh Drops in the mouth
d.	9 months 36 weeks	Measles vaccine	Measles	Injection on the left upper arm.

IMMUNIZATION SITES

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

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

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

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 centers in our communities include; hospital, clinics, dispensaries, health centers etc.

Topic Four: 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

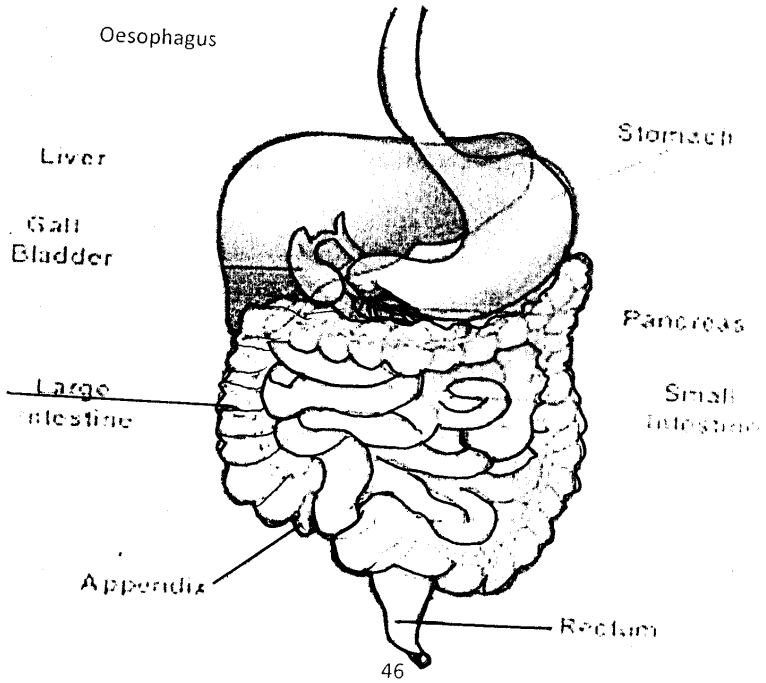
Is the muscular tube that runs from the mouth to the anus.

N.B: Food bolus moves through the alimentary canal by <u>peristalsis</u>

Parts of the digestive system

- ✓ Mouth
- ✓ Gullet
- ✓ Colon
- ✓ Appendix
- ✓ Rectum
- ✓ Pancreas
- ✓ Liver
- ✓ Appendix
- ✓ Rectum
- ✓ Pancreas
- ✓ Liver

THE DIGESTIVE SYSTEM OF MAN



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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.

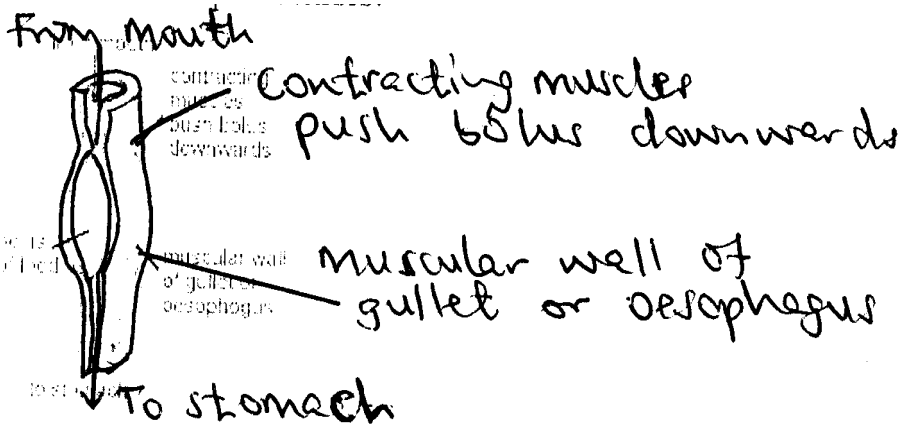
The tongue

- ✓ 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.

The ileum

- ✓ 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.

Absorption

- ✓ Is a process by which digested food is taken into the blood stream.
- ✓ The ileum has finger like projection called the **villi**
- ✓ The villi absorbs food
- ✓ The walls of the lleum produce a juice called intestinal juice that completes the digestion of food.

How the small intestines is 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 digestion

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.

Constipation

It is when the undigested matter stays in the rectum for too long.

Causes

- ✓ 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 e.t.c.
- ✓ Doing plenty of physical exercises.
- ✓ Drinking water before and after eating food.
- ✓ Eating a balanced diet.

Indigestion

It occurs when the food we eat is not properly digested

Causes of indigestion

- ✓ Improper chewing of food
- ✓ Over eating

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.

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

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.

cholera

- ✓ cholera is used 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
- ✓ It can be spread by house flies
- ✓ Typhoid can be spread by drinking contaminated water and eating dirty food

Signs of typhoid

Diarrhea

Symptoms of typhoid

- ✓ Headache
- ✓ Fever

Prevention of typhoid

- ✓ Boiling water for drinking
- ✓ Spraying insecticides to kill houseflies
- ✓ Washing hands before eating food
- ✓ Wash hands after visiting the latrine or toilet
- ✓ Properly disposing rubbish and faeces

Dysentery

- ✓ The frequent passing out of watery stool with blood stains.
- ✓ Amoebic dysentery is caused by amoeba.
- ✓ Bacillary dysentery is caused by a bacteria

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

TOPICAL TEST

1) Why is it important for a young child to properly chew food before swallowing?
2) How is the hydrochloric acid produced by the stomach importance to us?
3) Mention the process that takes place in the following parts of the alimentary canal?

a) Stomach
b) Small intestines
c) Colon

4) How is bile produced by liver important to our bodies?
5) How is the small intestine adopted to its function?
6) Write down any two diseases that affects the digestion system?
7) Briefly explain the term digestion?
8) Where does digestion begin in a P.5 child's body?
9) Where does digestion end in our bodies?
10) State any two ways of keeping our digestive system in proper working conditions.
11) State any two disorders of the digestive system. In which parts of the digestive system are the following juices produced.
    a) Bile juice
    b) Gastric juice
    c) Saliva

P.5 SCIENCE LESSON NOTES TERM 2, 2020

THEME 1: THE ENVIRONMENT

TOPIC: COMPONENTS OF THE ENVIRONMENT

SOIL: is the top layer of the earth's surface.

Soil formation processes.

- Weathering
- Decomposition

Weathering: - This is the breaking down of rocks into small particles to form soil.

Decomposition:- is the decay of dead plants and animal matter to form soil

Components of soil

- Air
- Water
- Rock particles
- Humus (Organic matter)
- Organisms like bacteria, earth worms
- Dissolved mineral salts (inorganic matter)

Uses of different components to the soil

1. Air.

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

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

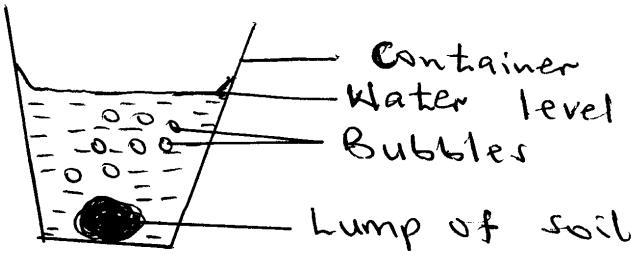
Living organisms which help in aeration of soil include

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

<u>An experiment to show that soil contains air</u>

Materials required

- ✓ Lump of soil
- ✓ Water
- ✓ Container



Observation

Bubbles of air are seen coming out of the soil

Conclusion

Soil contains air

2. Water.

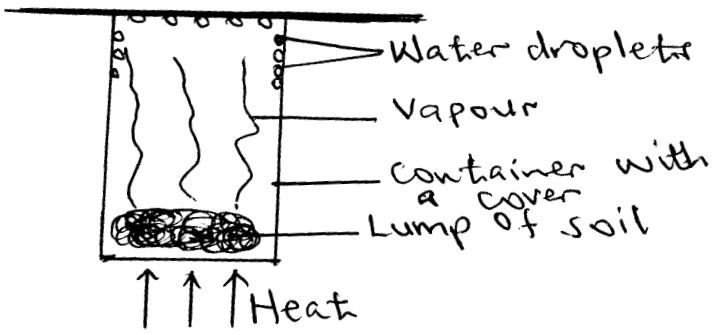
Water dissolves soluble minerals to form solutions

Water is a very important raw material during photosynthesis

<u>An experiment to show that soil contains water or moisture</u>

Materials needed

- ✓ Container with a cover
- ✓ Lump of soil
- ✓ Source of heat



Observation

Water droplets were seen on the sides of the container

Conclusion

Soil contains water/moisture

3. **Living organisms**

- ✓ Living organisms aerate the soil.
- ✓ Living organisms help in the formation of humus.

4. **Dissolved mineral salts (Inorganic matter)**

- ✓ They maintain soil fertility.
- ✓ They dissolve in water to form plant food.
- ✓ Plant roots use the process of osmosis to absorb the mineral salt solution.

Examples of mineral salts needed by plants

i. **Potassium:** helps the plants to build resistance to diseases and drought.

ii. **Calcium:** Helps to strengthen the plant stem and leaves.

iii. **Phosphorus**: Helps in the formation of strong plant cell wall

iv. **Nitrates and phosphate**: They combine to make plant proteins

v. **Magnesium and Iron**: These help in the formation of chlorophyll

5. Humus (Organic matter)

- ✓ Humus adds nutrients to the soil
- ✓ Humus forms soil texture
- ✓ Humus gives the soil a dark colour which helps it to absorb heat from the sun
- ✓ Humus absorb moisture hence improving soil capillarity

NOTE: The bacteria which help in decomposition of matter is called **<u>putrifying bacteria</u>**

6. Rock particles. (Inorganic matter)

They break down into smaller particles to form soil

Importance of soil to plants

- ✓ Soil provides water for plant growth
- ✓ Soil provides nutrients for plant growth
- ✓ Soil provides surface for attachment of plant roots
- ✓ Soil provides air for respiration of roots and soil organisms

Importance of soil to man

- ✓ Man use soil for modeling.
- ✓ Soil is used for growing crops.
- ✓ Soil is used for construction of building.
- ✓ Man use soil for making glasses.
- ✓ Soil maintains the water table.
- ✓ Soil is used for making ceramics.

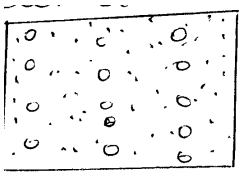
Types of soil

1. Loamy soil
2. Clay soil
3. Sandy soil

Loamy soil

Characteristics

- ✓ It contains balanced particles of sandy and clay
- ✓ It contains more humus than clay and sandy
- ✓ Loam soil is well drained
- ✓ Loam soil is well aerated
- ✓ Loam soil has a good texture



Reasons why loamy soil is good for growing crops

- ✓ Loam soil is well aerated
- ✓ Loam soil is well drained
- ✓ Loam soil has good mineral content
- ✓ Loam soil has good capillarity
- ✓ Loam soil has humus

Clay soil

Characteristics

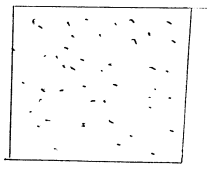
- ✓ Clay soil has fine particles
- ✓ Clay soil has the highest rate of capillarity
- ✓ Clay soil has the lowest rate of drainage
- ✓ Clay soil is poorly aerated
- ✓ Clay soil is sticky
- ✓ Clay soil has little humus
- ✓ Clay soil has compact particles

Reasons why clay soil is not good for crop growing

- ✓ Clay soil is water logged
- ✓ Clay soil is sticky
- ✓ Clay soil has little humus
- ✓ Clay soil is poorly aerated

Reasons why clay soil is good for modeling

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



Sandy soil (Characteristics)

⇒ Sandy soil has little plant nutrients

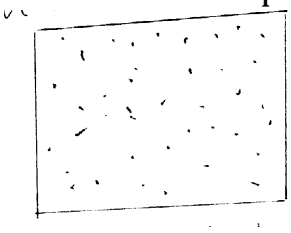
⇒ Sandy soil is the most aerated type of soil

NOTE:

⇒ Sandy soil has wider air spaces (more porous)

⇒ It has the highest rate of drainage

⇒ It has the lowest capillarity



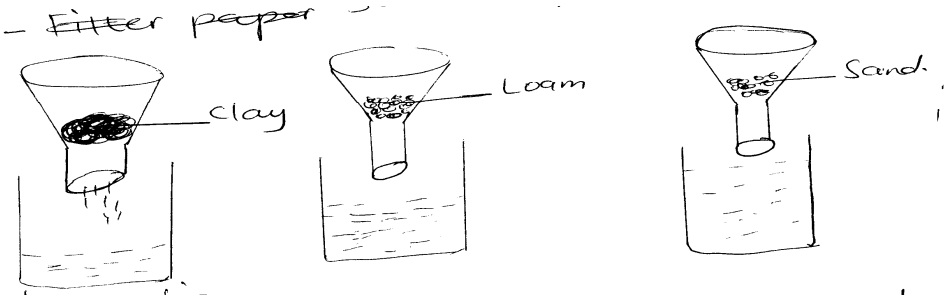
An experiment to find out the drainage of water through different types of soil

Materials needed

⇒ Funnel/filter paper

⇒ Glass jar/container

⇒ Soil samples



Observation

After some time, more water was collected in the jar containing sandy followed by loam and little water in clay soil.

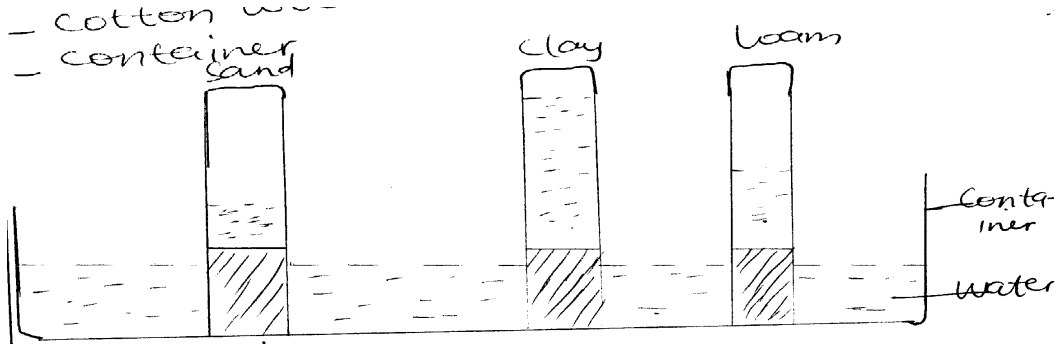
Conclusion

Sandy soil allows more water to pass through it easily because it has wider air spaces.

An experiment to find out capillarity of different types of soil

Materials needed

- ✓ Glass tube
- ✓ Cotton wool
- ✓ Container
- ✓ Soil samples



Observation

Water rises to the greatest height in clay soil, medium height in loam soil and lowest height in sandy soil.

Conclusion

Clay soil has the highest rate of capillarity than sandy soil and loam soil.

Soil erosion

Soil erosion is the removal of top soil by its agents.

Agents of soil erosion

⇒ Flowing water

⇒ Wind

⇒ Moving animals

Causes of soil erosion

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

Overgrazing:

This is where animals are grazed on a small piece of land for a long time

The animals eat up all the grass leaving the soil bare or unprotected.

Overstocking: Is the keeping of many animals on a small piece of land.

Deforestation: Is the massive cutting down of trees

Bush burning: This is the burning of the vegetation cover leaving the soil bare

Mining: This is the extraction of underground minerals

Mono cropping: This is the growing of one kind of crop on the same piece of land.

Over cultivation:

This is when crops are grown on the same piece of land every year without giving it rest.

Types of soil erosion:

- ✓ Rill erosion
- ✓ Sheet erosion
- ✓ Gully erosion
- ✓ Splash erosion
- ✓ River bank 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

Harmful materials in the soil.

Harmful materials are substances which affect the soil and make it lose its fertility

Examples of harmful materials

- ✓ Pouring oil from engines, garages and factories in the soil.
- ✓ Dumping polythene papers in farm areas
- ✓ Dumping used machines or scraps to the soil
- ✓ Using pesticides to the soil
- ✓ Dumping broken glasses and plastics to the soil.

Effects of harmful materials to the soil

- ✓ Used engine oils kill living organisms that help to make humus in the soil
- ✓ Polythene papers, plastics and broken glasses do not allow water to enter the soil. They also make the soil infertile
- ✓ Dumping scraps prevents farmers from using land for agriculture
- ✓ Chemicals used to spray the pests kill organisms in the soil which would help to form humus.
- ✓ Harmful substances make soil infertile leading to food shortage.

Methods of controlling soil erosion

- ✓ Mulching
- ✓ Crop rotation

- ✓ Contour Ploughing
- ✓ Terracing
- ✓ Agro forestry
- ✓ Strip cropping
- ✓ Planting trees
- ✓ Inter cropping
- ✓ Bush fallowing

Mulching

Is the covering of soil with dry plant materials . Examples of mulches include:-

- Dry grass
- Wood shavings
- Coffee husks
- Dry banana leaves
- Dry maize stems

NOTE: Mulching controls soil erosion by reducing the strength of rain drops

Importance of mulching:

- ✓ Mulching control soil erosion
- ✓ Mulching control the growth weeds
- ✓ Mulching improve on the soil fertility
- ✓ It conserves soil moisture

Dangers of mulching

- ✓ Mulching hide some pests
- ✓ Mulches can catch fire and destroy crops
- ✓ Some mulches with seeds can germinate and become weeds
- ✓ Some mulches do not allow direct water percolation into the soil.

Crop rotation.

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

Points to note when designing crop rotation crops

- ✓ Crops with deep roots should alternate with those with shallow roots
- ✓ Crops in the same family should note follow one another e.g millet, rice, sorghum
- ✓ A resting period called bush fallowing should be included in the rotation
- ✓ Legumes should often alternate with other crops

ILLUSTRATION OF CROP ROTATION

(Learners to complete)

Advantages of crop rotation

- ✓ Crop rotation breaks the life cycle of crop pests
- ✓ Legumes add nitrates in the soil
- ✓ Parasitic weeds are controlled
- ✓ Crop rotation controls soil erosion
- ✓ Feeding habits and different root systems benefit the soil.

Contour Ploughing

This is the Ploughing and planting of crops across the hill instead of up and down.

Advantages of contour Ploughing

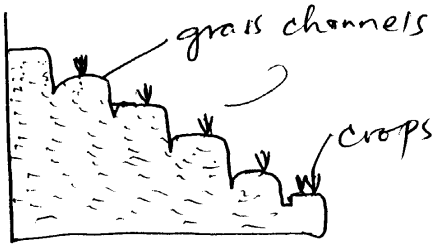
It helps to control soil erosion in hilly areas

Terracing

This is when the slope is cut into steps (terraces) to reduce the speed of flowing water.

NOTE: In Uganda terracing is mostly practiced in hilly/mountainous areas like Kabale and Mbale districts

An illustration of terracing



Advantages of terracing

- ✓ Terracing controls soil erosion in hilly areas
- ✓ Agro – forestry

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

Advantages of agro – forestry.

- ✓ It controls soil erosion
- ✓ It provides double income to the farmer
- ✓ It is a source of fuel
- ✓ It improves soil fertility
- ✓ It is a source of nutritious foods

Strip cropping. This is the growing of crops that cover the soil.

Cover cropping.

This is the growing of crops that cover the soil. Examples of cover crops include:

- Beans
- Peas
- Pumpkins
- Cabbages
- Sweet potatoes

Advantages of cover cropping

- ✓ Cover cropping reduce the speed of flowing water hence controls soil erosion
- ✓ Cover crops act as pasture for animals

Afforestation

This is the planting of trees in an area where they have never been before.

Advantages

- ✓ Trees act as wind brakes hence controls soil erosion
- ✓ Leaves that fall on the ground turn into humus
- ✓ The roots of the tree hold the soil together.

Re – afforestation

This is the planting of trees in an area where they have ever been but they are cut down.

Intercropping/mixed farming

This is when two or more crops are grown on one piece of land e.g maize and beans or coffee and beans

Bush fallowing

This is the practice of leaving the bush to grow on your land after cultivating on it for a long time.

Advantages

⇒ It controls soil erosion

⇒ It enables the soil to regain its fertility

Methods of conserving the soil

- Mulching the garden
- Manuring
- Adding fertilizers
- Good farming practices
- Terracing
- Afforestation

Soil exhaustion. This is the loss of soil fertility

Causes of soil exhaustion

✓ Poor farming methods e.g mono cropping, shifting cultivation, over cropping

✓ Leaching of mineral salts

✓ Soil erosion

Leaching.

This is the movement of mineral salts from the upper to the lower layers where plant roots cannot reach.

Causes of leaching

- ✓ Soil erosion
- ✓ Elimino rainfall / too much rainfall
- ✓ Increased use of fertilizers

Soil fertility. This is the ability of the soil to support plant growth.

How to improve soil fertility

- Mulching the garden
- Manuring
- Adding fertilizers
- Crop rotation
- Bush fallowing
- Inter cropping
- Agro – forestry

Fertilizers

Fertilizers are substances added to the soil to increase its fertility.

Types of fertilizers

i) Natural fertilizer/Manure/organic fertilizers

ii) Artificial fertilizer

Natural fertilizer

- ✓ These are fertilizers that are made from plant and animal matter.

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.

Advantages of natural fertilizers

- ✓ They improve soil texture
- ✓ They make soil hold water
- ✓ They stay for a longer time in the soil
- ✓ They are available locally

Disadvantages

- ✓ They smell badly
- ✓ They are tiresome to make
- ✓ Plant and animal matter may not be easily got in some areas
- ✓ They can be a source of weeds

Artificial fertilizers

These are fertilizers which are manufactured in factories. The name of the fertilizers depends on the mineral contained in them as indicated below.

- Sulphate of ammonia
- Single super phosphate
- Nitrogen phosphorus, potassium (NPK)

Advantages

- ✓ They are quick in improving soil fertility
- ✓ They provide the needed mineral salts to plants without fail
- ✓ They are easy to apply
- ✓ They contain the right nutrients in the correct quantity

Disadvantages

- ✓ They are expensive to buy
- ✓ You may not know which type of fertilizer to use
- ✓ You may not know the quality to apply
- ✓ Excessive use pollutes the soil
- ✓ They kill some useful soil organism
- ✓ They are leached out of the soil easily by rain
- ✓ They can damage soil texture if used for a long time

Ways of making compost manure

- ✓ Mix domestic garbage like banana peelings, dry grass, maize stalks, leaves and other forms of plant materials
- ✓ Make out an area of 1.2 m by 1.2 m with corner sticks.
- ✓ When the materials are about 15cm thick, spread farm yard manure, old compost or garden soil over it
- ✓ Water the layer but do not pour too much water
- ✓ Keep soil moist to spread up the decaying process
- ✓ Add another 15cm of plant materials then spread old manures and then water until the head is 1.2 m high.
- ✓ Do not walk over the heap because this will expel the air needed by the organism responsible for the decomposition of the plant materials
- ✓ Turn over the heap after 14 days
- ✓ Remove layer by layer and build into a new heap
- ✓ After another 14 days turn over again
- ✓ After another 14 days the manure will be ready.

Terms used in soil

Soil texture: Is the roughness or smoothness of soil

Soil capillarity: Is the rate at which water rises up the soil

Soil profile: Is the vertical arrangement of soil layers (draw layers of soil

Soil drainage: Is the ability of soil to retain water

Organic Manures: This is manure made from plants and animals

Inorganic manure: These are fertilizers made from manures

Percolations: Is the movement of water molecules down the rock particles of soil.

THEME 2: MATTER AND ENERGY

TOPIC: HEAT AND ENERGY

What is matter?

- ✓ Matter is anything that has mass and volume.
- ✓ Matter is anything that occupies space and has weight.

Properties of matter

- ✓ Matter has weight
- ✓ Matter occupies space
- ✓ Matter exerts pressure
- ✓ Matter expands when heated

States of matter

There are three states of matter

- Solid state
- Liquid state
- Gas state

NOTE:

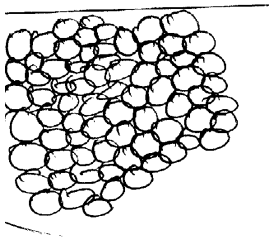
- ✓ Matter is made up of small particles called molecules.
- ✓ Molecules are made up of small tiny indivisible particles called atoms
- ✓ A molecule is a group of atoms that make up matter.
- ✓ Atoms are the smallest indivisible particles of matter
- ✓ Molecules are held together by cohesion or adhesion forces.

Cohesion force: is the force of attraction between molecules of the same kind.

Adhesion force: Is the force of attraction between molecules of different kinds.

Arrangement of molecules in different states of matter

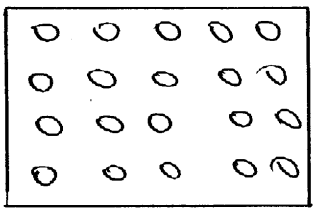
Molecules in solid state



Characteristics

- ✓ Molecules are closely packed together
- ✓ Molecules do not move
- ✓ Heat travels through solid state by conduction
- ✓ Solid have definite shape.

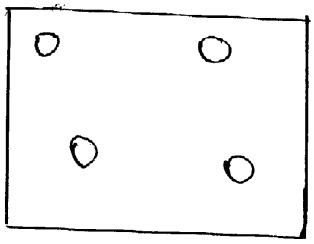
Molecules in liquid



Characteristics

- ✓ Molecules are fairly spaced
- ✓ Liquids take the container of the shape where they are put
- ✓ Heat travels through liquids by convection

Molecules in gases



Characteristics

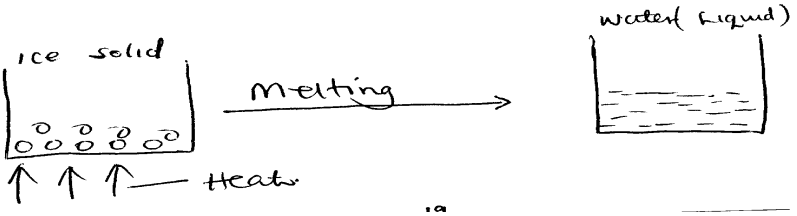
- ✓ Molecules are far apart
- ✓ Do not have shape
- ✓ Heat travels through gases by convection

Changes in the states of matter

Change in the states of matter is as a result of change in temperature i.e heating and cooling. These changes include:

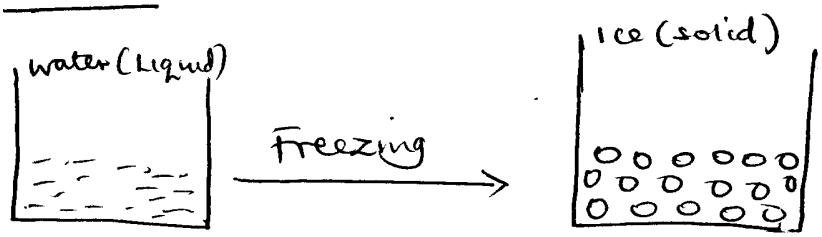
1. **Melting:** Is a change of state from solids to liquids

   Illustration



2. **Freezing:** Is the change of state from liquid to solid.

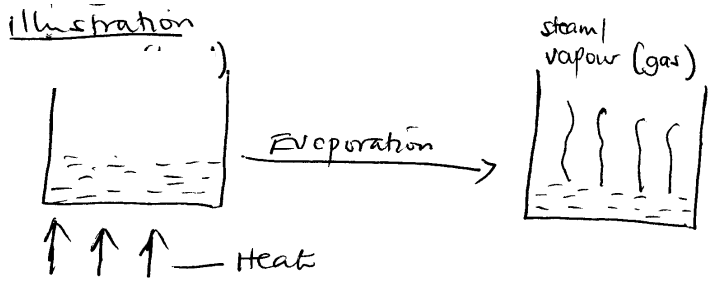
Illustration



3.

Evaporation: Is the change of state from liquid to gas

Illustration

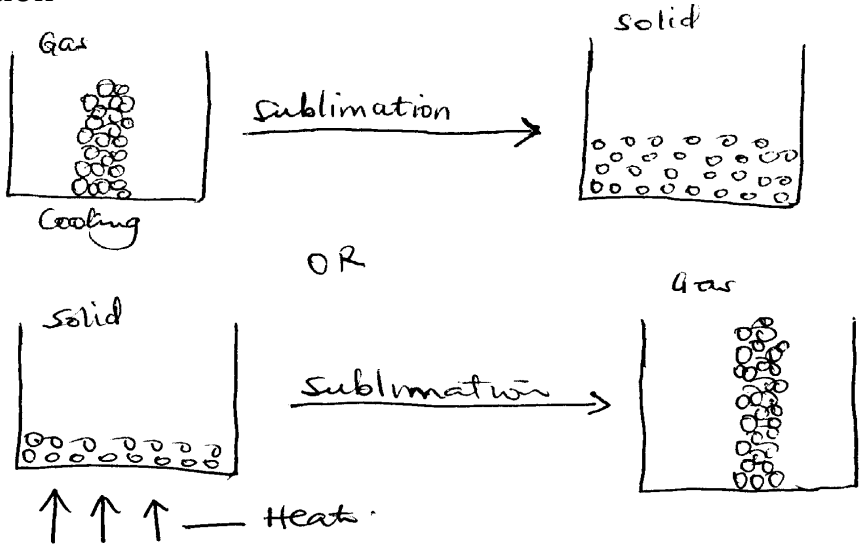


4. **Condensation:** Is the change of state from gas to liquid

Illustration

5. **Sublimation** is the change of state from gas to solid and vice versa.

Illustration



Or

Summary of change of state.

MIXTURES

A mixture is the combination of two or more substances.

Examples of mixtures

- ✓ Concrete blocks (mixture of sand and cement)
- ✓ Concrete (mixture of aggregates, sand and cement)
- ✓ Porridge/posho (mixture of flour and water)
- ✓ Air (mixture of gases)
- ✓ Syrups
- ✓ Orange juice (mixture of orange juice and seeds)

Solutes and solvent

A solute is a substance which dissolve in water or any other liquid.

Examples of solutes

- ✓ Salt
- ✓ Sugar
- ✓ Glucose
- ✓ Milk powder

A **solvent** is a liquid that dissolves a solute.

Examples of solvents

- Water
- Methylated spirits
- Petrol
- Paraffin
- Diesel
- Milk

Water as a universal solvent

Water is a universal solvent because it dissolves almost all solutes

Insoluble substances

These are substances which do not dissolve in any liquid.

Examples of insoluble substances

- Stones
- Sand
- Maize flour
- Seeds

Solution

A solution is a uniform mixture of a solute and a solvent

Examples of solutions

- Oral Rehydration solution
- Salt solution
- Sugar solution

Separating mixtures

Separating mixtures of liquids and solids

- ✓ Decanting/decantation
- ✓ Filtering/filtration
- ✓ Evaporation

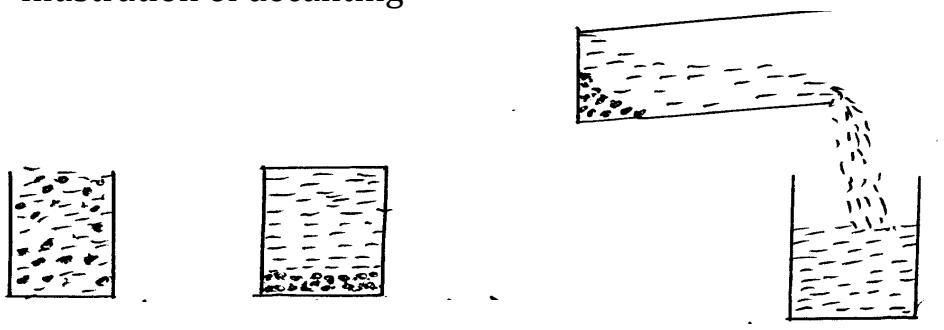
(a) Decanting or decantation

Decanting is a process of separating solid particles in a liquid

This is done by allowing the solid particles to settle at the bottom of the container and then carefully pouring off the clear liquid above.

NOTE: Decanting is used to set clear water from muddy water.

Illustration of decanting



Mixture of liquid and solid particles

solids settled at the bottom

clear liquid poured off

(b) **Filtration or filtering**

Filtration is the process of separating solid particles from a liquid using a filter

The solid particles remain on the filter and a clear liquid passes through the filter.

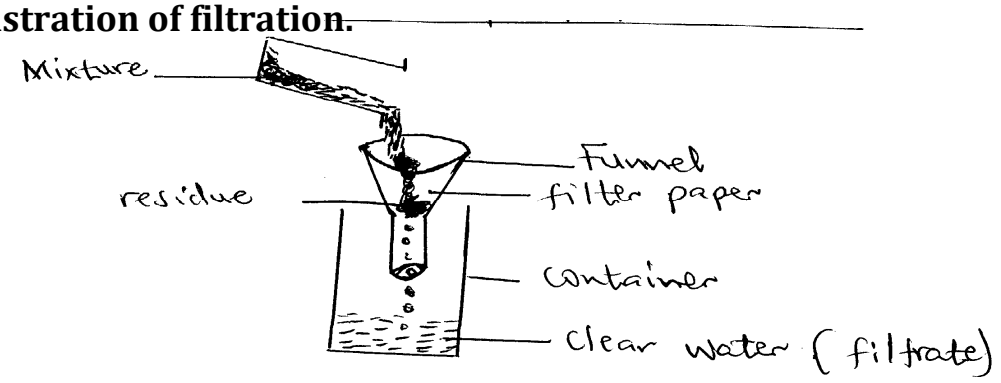
The solid particles are called residues (impurities) and a clear liquid called filtrate.

Uses of filtration in our daily life.

Filtration is used in separating seeds from orange juice and passion juice.

Filtration is used in separating residues from banana juice and pineapple juice.

Illustration of filtration.



(c) Evaporation.

Evaporation is the process by which a liquid changes to vapour

This helps in our homes to regain salt which is poured in sand or dust

When salt mixes in sand or dust, get everything and put them in a container

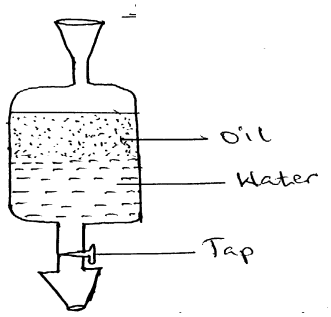
Importance of evaporation

Evaporation is used to obtain salt from lakes and seas

<u>Separating mixtures of liquids</u>

- ✓ Using a separating funnel
- ✓ Fractional distillation

(a) Separating liquids using a separating funnel



Uses of a separating funnel

- To separate liquids which do not mix/immiscible liquids

- To separate liquids with different densities

Examples of liquids which do not mix/immiscible liquids

- Water with cooking oil
- Water with petrol
- Paraffin with water

(b) Fractional distillation

This is a method used to separate liquids of the same density but evaporate at different temperatures.

A liquid which evaporates first is distilled first

Examples of such liquids are:

- Water
- Alcohol

<u>Separating mixtures of solids</u>

- Flotation
- Using a magnet

- Hand picking
- Sieving

(a) Flotation

This is a method used to separate a mixture where one is more dense than the other.

Examples of mixtures separated using flotation method

- A mixture of saw dust and sand
- A mixture of bad beans and good beans

(b) Using a magnet

A method used to separate mixtures where one substance is magnetic and the other is non magnetic.

(c) Hand picking

This is a method used to pick big particles from small particles in a mixture. e.g. pieces of stone from rice, beans, soya before cooking

(d) Sieving

This is a method used to separate large particles in a mixture using a sieve.

Energy

Energy is the ability to do work.

Types of energy

i) kinetic energy

ii) Potential energy

Kinetic energy

This is the type of energy possessed by a moving object .

This is the type of energy possessed by an object in motion.

Kinetic energy is also called energy in motion

Objects which possess kinetic energy

- A person running
- An arrow flying through the air
- A stone thrown up in air
- A brick dropping from the wall
- Moving vehicles
- A leaf falling off from a tree.

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

Potential energy

This is the type of energy possessed by an object at rest

e.g

- A baby sleeping in cot
- A car standing still at traffic light

- A pupil sitting still and listening to a teacher
- An object resting on a table or ground

Forms of energy

- Sound energy
- Heat energy
- Light energy
- Solar energy
- Electric energy

Characteristics of forms of energy

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

Heat energy

Heat energy is a form of energy that causes rise in temperature

Sources of heat

These are substances which produce heat of their own.

Examples

- The sun
- Fire
- Friction
- Decomposition
- Fuels like firewood, diesel, oil, charcoal, petrol
- Electricity
- Compression

Uses of heat

- ✓ Heat enables people to cook food
- ✓ It enables us to be warm
- ✓ Heat is used to kill germs
- ✓ Heat helps in rain formation
- ✓ It dries harvested crops
- ✓ Heat or warmth is necessary for seed germination
- ✓ Heat provides power to run machines e.g steam engines, rockets, jets etc

Fuels

These are substances which produce energy when burnt.

Examples of fuels

- Firewood
- Charcoal
- Diesel
- Petrol
- Coal
- Oil
- Paraffin/kerosene

Effects of heat on matter

- ✓ Heat makes matter expand
- ✓ Heat causes rise in temperature
- ✓ Heat causes change in state of matter
- ✓ Heat makes molecules in gases and liquids mobile

Expansion in gases

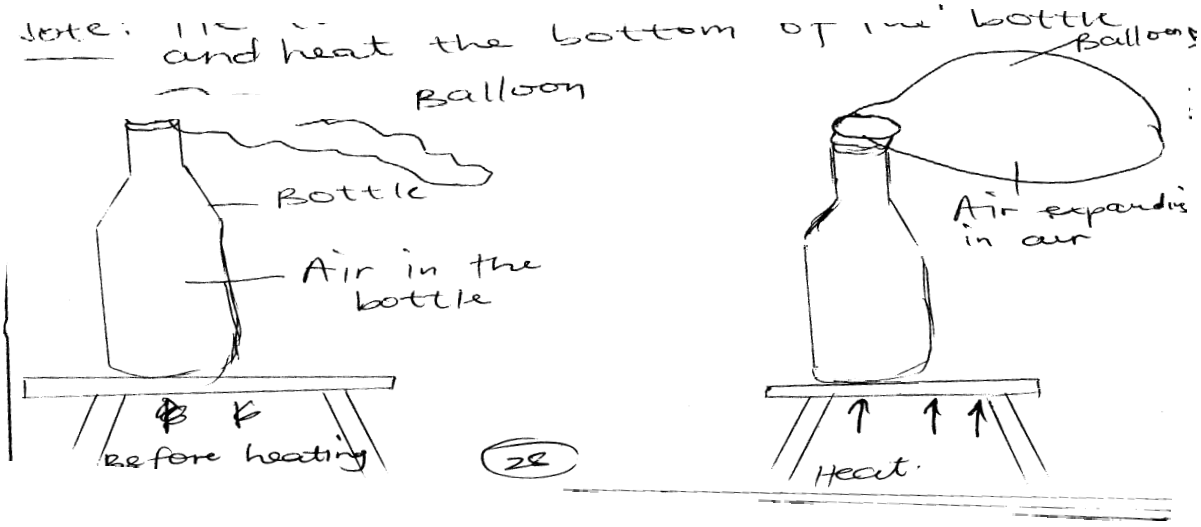
Expansion means increase in size.

Contraction is the decrease in size.

<u>Experiment about expansion in gases materials needed</u>

- Bottle
- Balloon
- Source of heat

<u>NOTE:</u> Tie the balloon on an empty bottle and heat the bottom of the bottle



Observation

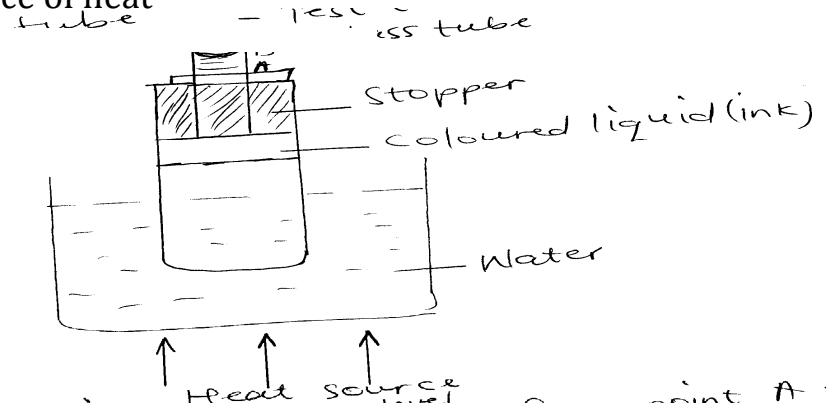
On heating, the balloon started swelling showing that air inside the bottle is expanding

Expansion in liquids (Experiment)

Materials needed

- Water

- Stopper
- Glass tube
- Test tube
- Source of heat

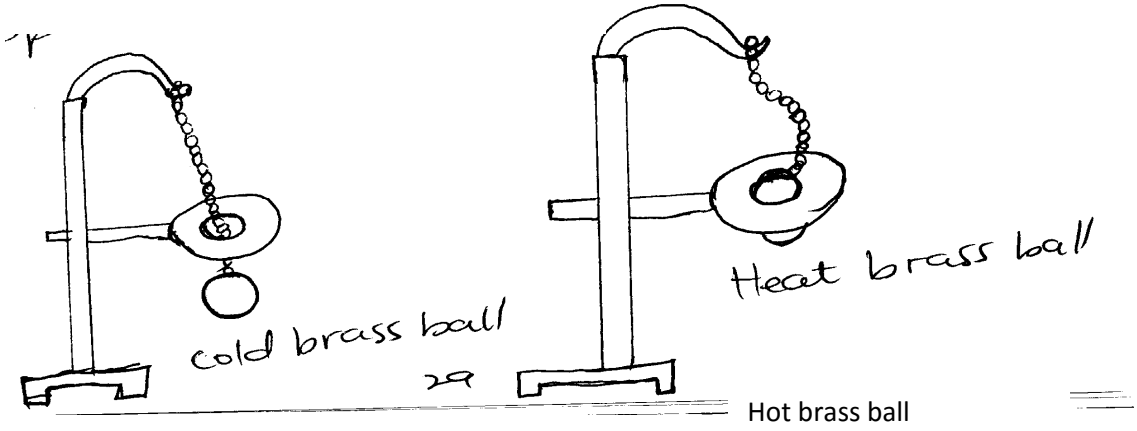


Observation

On heating, the water level rose from point A to point B. this shows that water in the test tube expanded on heating

Expansion on solids

Experiment



Cold brass ball

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

Bimetallic strip

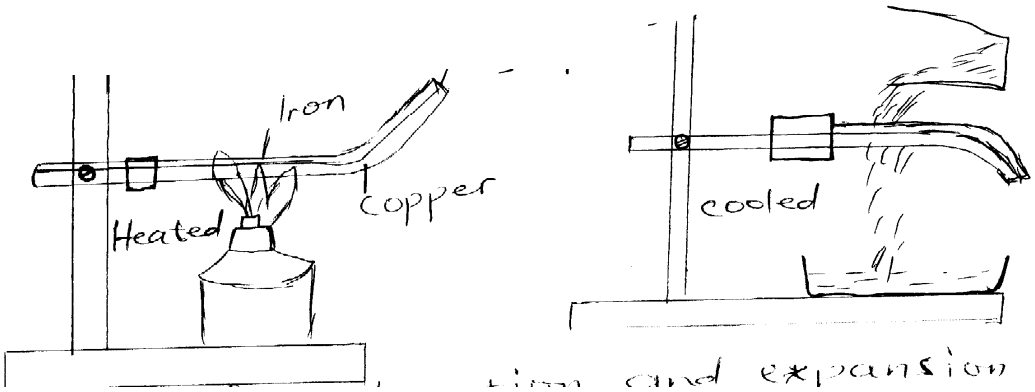
This is a strip which consists of two metals with different expansion rates.

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



Effects of contraction and expansion of solids

Rail line tracks

During the construction of a railway line gaps are left in between rails to give room for expansion on a hot day.

NOTE: Gaps are narrow during a hot weather because the rails have expanded

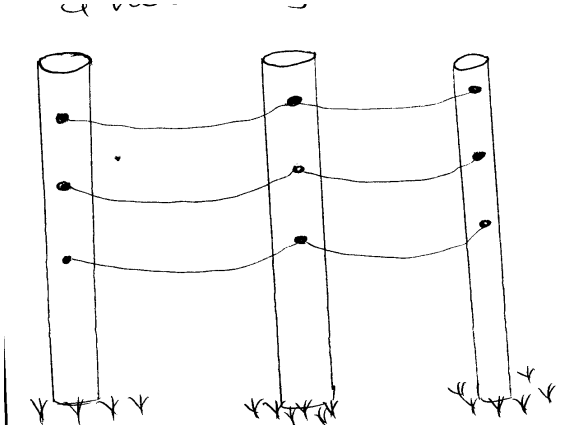
Gaps are wide during a hot weather because the rails have contracted

If the gaps are not left during constructions, the railway may collapse.

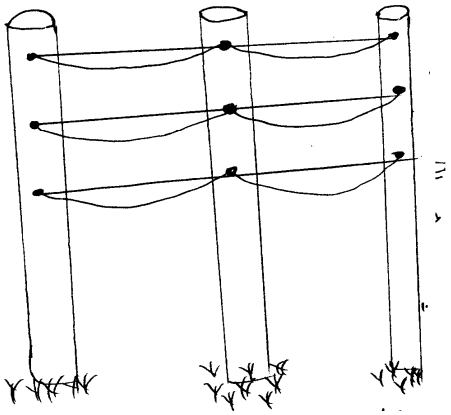
Telephone and electric wires

During construction of telephone and electric lines, the wires are fixed loose to provide room for contraction on a cold day.

1. **Sagging wires on a hot day**



2. **Tight wires on a cold day**



Heat transfer

This is the movement of molecules of matter from one place to another due to rise in temperature

Ways how heat travels

1. **Conduction** This is the process through which heat travels in solids

Illustration

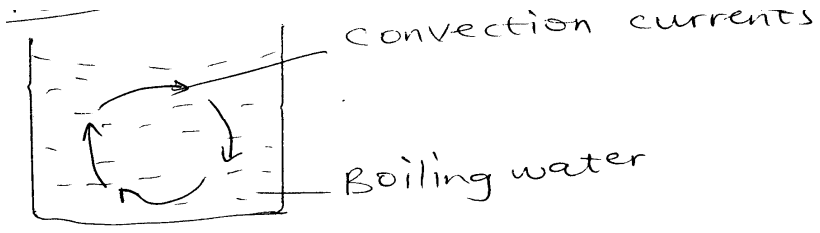
Heat from the burning candle travels through the metal by conduction

Q.Which wax will melt first?

Q.How does heat reach wax 3?

2. **Convection** This is the process by which heat travels through liquids and gases.

Illustration



Convection in gases

Use of a chimney

3. **Radiation** This is the process by which heat travels through space or vacuum.

NOTE: Heat does not need any medium of transmission. That is why heat pass through a vacuum.

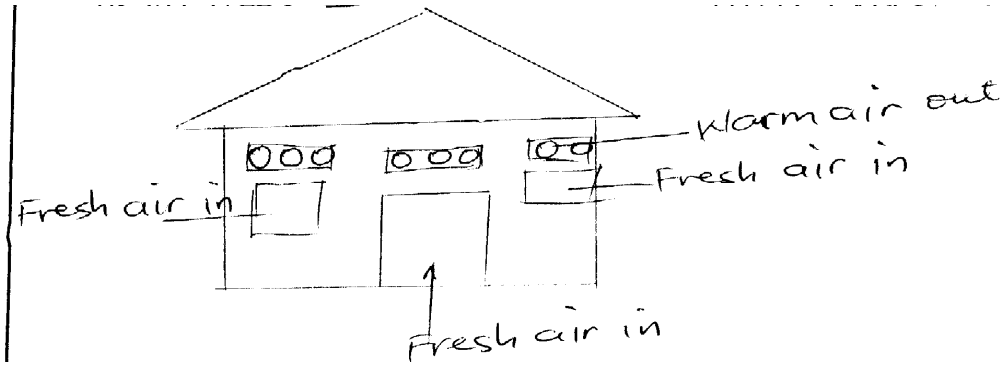
A vacuum is a space without matter

Application of convection

1. **Ventilation** This is the replacement of warm air by fresh air.

Proper ventilation enables free circulation of air.

Ventilation in a house



Activity

1. Why should a living house be properly ventilated?
2. What is the use of doors and windows on a living house?
3. What is the use of ventilators on a living house?
4. Why are ventilators put on top of doors and windows?
5. Why are doors and windows put below the ventilators?

Other illustration about ventilation in:

a) Lantern
b) Charcoal stove
c) Charcoal iron box

Application of radiation

Illustration

Heat from the sun reaches the earth by radiation



Heat from the sun reaches James heat reaches Martha by radiation

by radiation

Application of conduction

Application of conductors and insulators

Conductors: These are substances which allow heat to pass through by conduction

Examples of good conductors

- Iron
- Copper
- Steel
- Aluminium
- Silver
- Brass

NOTE: Silver is the best solid conductor of heat and mercury is the best liquid conductors of heat

Insulators

These are substances which do not allow heat to pass through.

Insulators are also called poor or bad conductors of heat.

Examples of insulators

- Plastic
- Wood
- Air
- Rubber
- Water
- Wool
- Asbestos

Application of conductors and insulators

- Electric kettles
- Electric flat irons
- Charcoal iron box
- Frying pans

NOTE:Handles of the above are made of wood or plastic because plastic and wood are poor conductors of heat.

The good conductors of the above include:

- Ironing part of an electric flat iron
- Frying part of a frying pan
- Metallic part of an electric kettle

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)

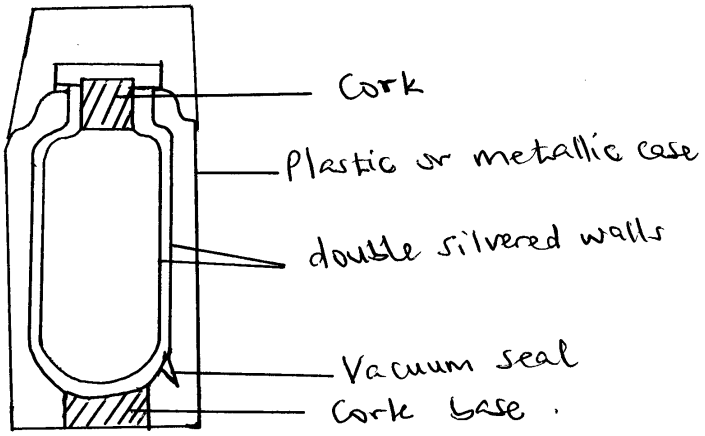
- ✓ These are objects that absorb heat.
- ✓ when heat falls on a dull coloured surface, it is absorbed. A person wearing a black shirt feels hotter than a person wearing a white shirt on a hot day because black absorbs heat while white reflects heat.

THE THERMOS FLASK (VACUUM FLASK)

Functions of a thermos flask

It keeps hot foods and cold foods cold.

Parts of a vacuum flask



Functions of different parts of a vacuum flask

1. **Cork.** This prevents heat loss or gain by conduction because a cork is a bad conductor of heat

2. **Double silvered walls**. These prevent heat loss or gain by radiation because they have a shiny colour (silver)

3. **Vacuum.** This prevents heat loss or gain by conduction and convection

   By conduction because there is no molecule of solids

   By convection because there is no molecule of liquid or gas

4. **Cork base.** This supports the glass in position.

5. **Plastic/metal case.** This protects the double walled glass.

6. **Vacuum seal.** This closes the vacuum.

Temperature

- ✓ Temperature the degree of hotness or coldness of matter or a place.
- ✓ Temperature is measured using a **thermometer**
- ✓ A thermometer uses **mercury** or **alcohol**
- ✓ Temperature is measured in **degrees**

Types of thermometers

1. Clinical thermometer

2. Minimum and maximum (six's) thermometer

Clinical thermometer

It is used to measure human body temperature.

It uses mercury

The body temperature of a normal person is 37^0C or 98.4 ^{0}F

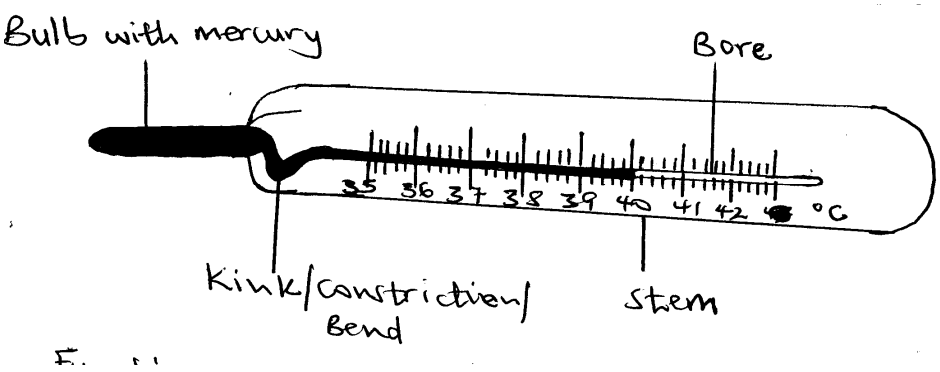
Parts of the body where a clinical thermometer is placed

- ✓ In the anus
- ✓ Under the armpit
- ✓ Under the tongue
- ✓ In the vagina

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

Thermometers should be sterilized with alcohol every after use.

Parts of a clinical thermometer



Functions of each part

1. **Kink/constriction/bend**. This prevents the backward flow of mercury
2. **A stem/glass envelope.** This acts as a magnifying glass
3. **Bore.** This is very narrow to have an accurate scale

The scale runs from 34^0C to 42^0C because the temperature of a living person is between 34^0C to 42^0C

NOTE: A clinical thermometer should be shaken to force mercury back into the bulb before it is used again.

Advantages of using mercury in thermometer.

1. Mercury is easily seen
2. Mercury doesn't wet/stick to the glass
3. Mercury is a good conductor of heat
4. Mercury doesn't boil easily. Its boiling point is 357^0C
5. Mercury has even and regular expansion

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

Celsius scale

1. The freezing point of pure water on this scale is 0^0C.

   The freezing point is also known as <u>lower fixed point</u>.

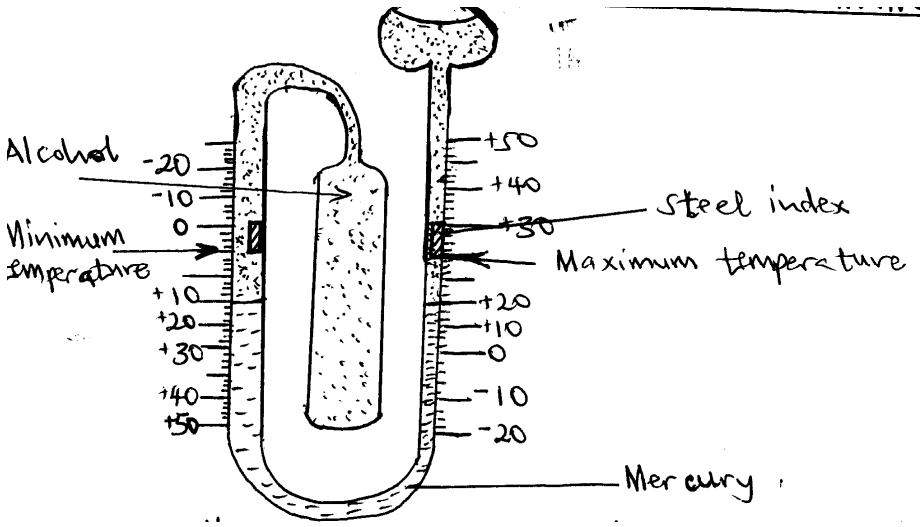
2. The boiling point of pure water on this scale is 100^0C

   The boiling point is also known as <u>upper fixed point</u>

Fahrenheit scale

1. The freezing point of pure water on this scale is 32^0F
2. The boiling point of pure water on this scale is 212^0F

Six's or maximum and minimum 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

Conversion from ^{0}Celsius to Fahrenheit scale.

1. Changing from ^{0}C to ^{0}F

   Conversion from ^{0}C to ^{0}F

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

   Conversion from ^{0}Fahrenheit to Celsius scale

2. Changing from ^{0}F to ^{0}C

   Formular is given by $\frac{5}{9}(F - 32) = {}^0C$

THEME 3: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATION

TOPIC: CROP GROWING

A crop is any plant grown and cared for.

A school garden

Factors to consider while planning a school garden

- ✓ The piece of land must be well drained
- ✓ Enough capital
- ✓ Water source
- ✓ Seeds to plant
- ✓ Labour source
- ✓ It should be protected from animals
- ✓ Garden tools

Qualities of a good school garden

- ✓ Should have a nursery bed
- ✓ Should have a record chart
- ✓ It should have a demonstration garden
- ✓ It should not be very far from the school
- ✓ It should be near a water source

Importance of a school garden to pupils

- ✓ Helps learners to learn how to dig
- ✓ Helps learners to learn how to grow different crops
- ✓ Helps learners to know how to care for crops

Importance of a school garden to a school

- ✓ It is a source of food
- ✓ It is a source of income
- ✓ For learning purposes

Examples of seeds that can be first grown in a seed bed

- Tomato seed
- Onion seeds
- Egg plant seeds
- Coffee seeds

A nursery bed

This is a piece of land where seedlings are first raised before being taken to the main garden.

Crops that can be raised from a nursery bed

- Tomatoes
- Onions
- Egg plants
- Coffee plants

Activities carried out on a nursery bed

- Watering
- Weeding
- Thinning
- Pruning
- Spraying with chemicals
- Hardening off.

Hardening off

This is the gradual removal of the shade to make seedlings get used to harsh weather conditions.

Importance of a nursery bed to seedlings

- ✓ It protects seedlings from harsh weather conditions
- ✓ It helps seedling to get used to harsh weather conditions after hardening off

Importance of a nursery bed to a farmer

- ✓ Helps in proper selection of good seedlings
- ✓ It gives time to a farmer to prepare the main garden
- ✓ It helps the farmer to care for seedlings

Types of crops grown by farmers

- ✓ Fruit crops
- ✓ Tuber crops
- ✓ Cereal crops
- ✓ Vegetable crops
- ✓ Legumes

(a) **Fruit crops**

Examples of fruit crops are

- Apples
- Avocado
- Pineapple
- Oranges
- Mangoes
- Guavas
- Lemons
- Maize

(b) **Cereal crops**

These are crops which produce grain. Examples include;

- Rice
- Wheat
- Millet
- Sorghum
- Oat
- Maize
- Marley

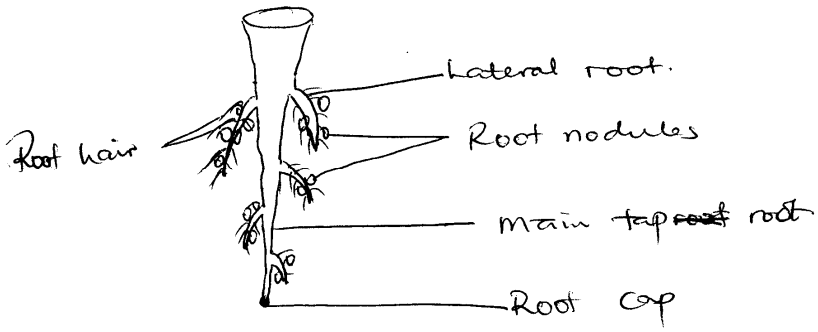
(c) **Vegetable crops**

Examples of vegetables are;

- Spinach
- Lettuce
- Cabbages
- Dodo (Amaranthus)
- Nakati
- Buuga
- Sukuma wiki
- Cucumber

(d) **Leguminous crops;** These are crops with nodules on their roots. Examples are;

- Ground nuts
- Bean crop
- Peas crop
- Soya bean crop



(e) **Tuber 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
- Cocoyams

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

Importance of legumes to the soil

1. They help to fix nitrogen in the soil.

Legume root

✓ NOTE:

- Root nodules contain nitrogen fixing bacteria
- Root cap protects the root tips from damage
- Root hair sucks water and mineral salt from the soil.

Growing and caring for crops

Caring for crops

- Watering crops
- Weeding crops
- Thinning crops
- Pruning crops
- Spraying with chemicals
- Mulching
- Staking/terracing

Weeding

This is the removal of unwanted plants from an area.

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

Examples of common weeds

- Black jack grass
- Wandering jew
- Spear grass
- Star grass
- Couch grass
- Elephant grass
- Wild finger millet grass
- Nut grass
- Timothy grass
- Macdonald's eye
- Sodom apple grass

Importance of weeds

- Some weeds are used in the making of herbal medicine
- Some are food for animals
- Some are used as mulches
- Some are eaten as food
- When weeds rot they improve on soil fertility.

Dangers of weeds

- Weeds hide pests and diseases
- They lead to poor growth of crops
- Some weeds are poisonous to animals
- Weeds compete with crops for sunlight, water and soil nutrients
- Weeds make it hard for farmers during pruning, spraying and harvesting
- It is expensive to control weeds.

Importance of weeding

- Weeding reduces pests
- Weeding reduces competition between crops and weeds for sunlight, water and nutrients
- Weeding reduces overcrowding of plants in the garden
- Weeding gives enough space for pruning, spraying and harvesting crops.

Ways of controlling weeds

- Spraying with herbicides
- Mulching the garden
- Uprooting and burning
- Cutting and burning
- Slashing the weeds
- Rearing natural enemies

Thinning

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

Examples of crops that need thinning

- Maize
- Cotton
- Rice
- Millet
- Sorghum
- Simsim
- Wheat

Methods of thinning

- Uprooting/digging out the plant
- Cutting the plant at the base area

Tools used for thinning

- Panga
- Hoe
- Hands

Importance of thinning

- It reduces hiding places for pests
- It gives good space for pruning, spraying and harvesting
- It reduces competition for sunlight, air, water and soil nutrients among crops
- Thinned materials can be used for mulching
- Thinning reduces overcrowding of plants in the garden
- Crops grow bigger and yield more

Pruning

This is the removal of some branches or leaves from a plant. Examples of plants usually pruned are:

- Banana
- Coffee
- Cocoa
- Lemons
- Oranges
- Tomatoes

Garden tools used for pruning

- Secateur
- Pruning sow
- Shear
- A sickle

Importance of pruning

- It reduces hiding places for pests
- It gives good space for pruning, spraying and harvesting
- It reduces competition for sunlight, air, water and soil nutrients among crops
- Pruned materials can be used for mulching
- Pruning reduces overcrowding of plants in the garden
- Crops grow bigger and yield more

Mulching

This is the covering of soil with dry plant materials.

Materials used for mulching

- Dry maize plants

- Dry leaves
- Coffee husks
- Wood shavings
- Dry banana fibres

Advantages of mulching

- Mulching controls pests
- Mulching improves soil fertility
- Mulching maintains soil moisture
- Mulching controls the growth of weeds

Disadvantages of mulches

- Mulches hide pests
- Mulches can easily catch fire and destroy crops
- When materials with some seeds are used, seeds grow into weeds
- Mulching is tiring

Staking/training

This is the use of sticks or wires to give support to a growing plant. Examples of staked crops are;

- Banana
- Passion fruits
- Vanilla crops
- Tomatoes

Reasons for staking

- Staking enables easy spraying of crops
- Staking protect fruits from damage from the ground
- Staking give support to the plants
- Staking enables easy harvesting and weeding of crops.

Common crop pests and diseases

Crop pests are living things that spoil/destroy crops.

Examples of common crop pests

- Monkeys
- Squirrels
- Rats
- Locusts
- Moles
- Weevil
- Weaver birds
- American bale worms
- Rhinoceros
- Maize stalk borer
- Eel worms
- Termites

A table showing crops, pests and the part they destroy

Crop	**Pest**	**Affected part**
Cassava	Green cassava mite, rat, squirrels moles	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, Banana weevil	Fruits 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 Brown steak	leaves
Sweet potato	Sweet potato blight	Leaves & stems
Sugar cane	Leaf spot disease, Raton stunting disease	Leaves/Stem
Banana	Wilt disease, cigar end rot Panama disease	Leaves Stem/leaves
Cabbages	Black rot disease	leaves
Coffee tea	Wilt disease Coffee berry disease Armillary root disease	Leaves Coffee berries Roots
Maize	Maize streak	Leaves
Mangoes	Powdery mildew, smuts	Leaves & stems
Ground nuts	Rosette disease	Leaves
Cotton	Bacterial blight disease	

Common signs of pests and diseases damage on crops

- Holes in leaves, fruits & stems on crops
- Change in colour of leaves, stem and fruits
- Rotten plant parts
- Pre – mature ripening
- Abnormal deformed parts
- The root crops which grow are of poor quality and do not have the right taste
- Stunted growth

Effects of pests and disease damage on crops

- The leaves and stems loses chlorophyll
- The root tubers get damaged
- The root crop which develop are of a poor quality
- They lead to poor yield
- They lead to stunted growth

Methods of controlling pests and diseases

- Uprooting infected crops
- Proper spacing
- Early planting
- Spraying with chemicals
- Using scare crows
- Setting traps
- Fencing the garden
- Practicing crop rotation
- Planting good seeds
- Use of natural enemies

Harvesting

Harvesting is the removal of ready(ripe) crops from the garden

Methods of harvesting crops

- Hand picking
- Plucking
- Cutting
- Digging
- 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

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

Ways of processing crops

- Sun drying
- Smoking
- Adding chemicals to crops

Storage

This is the keeping of surplus food safely after harvesting.

Methods of storing crops

There are three methods of storage facilities and they include;

- Granaries
- Silos
- Stores

Illustration of a local granary

Q. 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

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

Young farmers' club

It is a club which consists of members who learn practical skills about agriculture.

Activities carried out by young farmers club

- They care for animals
- They care for crops
- They organize agriculture seminars
- Carrying out research on plants and animals

Importance of young farmers club

- They develop learners skills in agriculture
- They prepare young farmers for future agricultural income generating activities

THEME 4: THE WORLD OF LIVING THINGS

TOPIC: BACTERIA AND FUNGI

Bacteria

Bacteria are tiny single-celled organisms.

- They are so tiny and cannot be seen by our naked eyes.
- Bacteria can only be seed using a microscope.
- Bacteria reproduce by binary fission.
- Bacteria move by the use of flagella.

Structure of a bacterium

Common places where bacteria can be found

- Water
- In the soil
- In decaying matter
- On the body of animals including man
- On plants
- In air

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

- ✓ Spherical bacteria/cocci
- ✓ Rod-shaped bacteria/bacilli
- ✓ Spirilla(spiral) bacteria/spirochaete
- ✓ Vibrios bacteria

1.**The spherical bacteria.** They are also called cocci bacteria (singular coccus). They cause pneumonia, boils, sore throat etc

Examples of spherical bacteria

- Staphylococcus
- Streptococcus
- Streptococcus (diplococus)

2.**Rod shaped called bacilli**. They cause anthrax, typhoid etc.

Examples of rod shaped are;

- Bacillus anthracis
- Salmonella typhi

3.**Spirilla and spirochaete.** They cause syphilis, cholera

Examples of spiral bacteria are;

- Treponema

4.**Comma-shaped bacteria/vibrios**

Example; vibrios cholerae causes cholera

Conditions necessary for bacteria to breed or multiply

- Absence of chemicals that kill them
- Presence of certain amount of air
- Warmth
-

Dangers of some bacteria (Harmful bacteria)

- Some contaminate food (cause rotting)
- Some bacteria cause diseases to plants and animals
- Some make food go bad e.g salmonella species

Uses of some bacteria (useful bacteria)

- Helps in the digestion of food in animals
- Bacteria help in decaying and rotting of organic matter
- Nitrogen fixing bacteria help to fix nitrogen in the soil
- Bacteria help to reduce the volume of faeces in the latrine by feeding on them
- Bacteria help in the formation process like making of yoghurt, cheese butter etc

Bacterial diseases

These are diseases that are caused by bacteria.

Examples of disease caused by bacteria in animals

- Pneumonia
- Tuberculosis
- Typhoid
- Diphtheria
- Mastitis

- Anthrax
- Syphilis
- Diarrhoea
- Dysentery
- Cholera

Examples of diseases caused by bacteria in plants

- Blight disease
- Wilt disease
- Black rot disease

Prevention and treatment of bacterial diseases.

- Immunisation/vaccination of animals
- Treating animals with antibiotics
- Maintaining proper hygiene
- Proper ventilation of animal house (pneumonia)
- Spraying plants with chemical that kill bacteria

Fungi kingdom

Fungi are organisms which do not have chlorophyll.

Characteristics of fungi

- They do not have chlorophyll
- They reproduce by means of spores
- They feed saprophytically/parasitically

Groups of fungi

- Saprophytic fungi
- Parasitic fungi

Saprophytic fungi.

Are fungi which feed by absorbing food from decaying matters

Examples include:

- Mush room
- Puffball
- Toadstool
- Yeast
- Moulds
- Potato blight fungus

A mushroom

The structure of a mushroom

Functions of each part of a mushroom

Cap. Holds the gills.

Gills. Produces and stores spores.

Stalk/stipe. Holds the cap in position.

Hyphae. Helps in absorbing food from decaying matter.

Yeast.

- ✓ This is a group of fungi that exist as single cells

- ✓ Yeast is found on the surface of ripe fruits mainly sweet tasting fruits such as mangoes
- ✓ Yeast reproduces by budding
- ✓ They feed saprophytically

Moulds

- ✓ Moulds are thread like fungi that grow on rotting plant and animal materials such as bread, cassava etc
- ✓ Moulds feed saprophytically

Toad stools

- ✓ They grow on decaying plants and decaying animal materials
- ✓ Toadstools are poisonous
- ✓ Toad stools are brightly coloured unlike mushrooms they feed saprophytically
- ✓ They reproduce by means of spores

Parasitic fungi

These are fungi which depend on other organisms for food and shelter.

Habitat of fungi

- Dead decaying matter
- Rotten food (bread)
- In dump soil

Dangers of some fungi (harmful fungi)

- Some cause diseases like ring worms
- Some fungi are poisonous to man e.g. toadstools
- Some make food to go bad like moulds

Uses of some fungi (useful fungi)

- Some fungi are eaten as food
- Some are used in brewing and baking of bread like yeast
- Some are used in the making of medicine like moulds
- Some are source of income like mushroom
- Yeast is used in the flavoring of cheese
- Some are used as herbal medicine like mushroom

Fungal disease

These are diseases that are caused by fungi.

Examples of fungal disease in people

- Ring worms
- Athletes foot
- Oral thrush (candida)
- Finger nail deformation
- Eczema

Fungal disease in plants

- Black rust fungus
- Root rot
- Coffee berry disease
- Potato blight
- Smuts

Prevention and control of fungal disease

- Boil milk water for drinking and re-heating cold food
- Salting food

- Use vinegar to preserve food
- Spraying plants with fungicides
- Avoid sharing clothes, combs, beddings with an infected person
- Avoid keeping food in warm moist places

Similarities between fungi and bacteria

- Both cause disease
- Both are useful and harmful
- Both are living organisms
- Both have two ways of feeding

Differences between fungi and bacteria

- Most fungi reproduce by spores while bacteria reproduce by binary fission
- Some fungi are edible while bacteria are not eaten
- Bacteria are single celled while most fungi are multicellular
- Some bacteria are spread through air and insects while fungal diseases are spread through close contact with an infected person.

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

Facts about bacteria and fungi

People who made important discovery about fungi and bacteria

1. **Edward Jenner**. He discovered vaccination/immunization against cow pox/small pox in 1749 - 1895

2. **Louis Pasteur.** He discovered decay and various diseases caused by germs

   He discovered fermentation and pasteurization of milk in 1822 - 1895

3. **Sir Ronald Ross.** He was the first to discover the cause of malaria in 1857 - 1932

4. **Sir Alexander Fleming**. He discovered the penicillin on which the growth of disease germs occurs

5. **Joseph Lister**. He discovered the antiseptic which prevents wounds from becoming septic in 1827 – 1912

6. **Robert Koch**. He was a Germany doctor who studied the cause of anthrax and discovered the bacteria responsible for the cause of tuberculosis and cholera.

7. **Sir William Harvey**. He was the first scientist to discover that blood circulates around the body.

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THEME: MANAGING CHANGES IN THE ENVIRONMENT

TOPIC: TYPES OF CHANGES IN THE ENVIRONMENT

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

- ✓ Biological changes
- ✓ Chemical changes
- ✓ Physical changes
- ✓ Natural changes
- ✓ Man made changes

Biological changes

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

Examples of biological changes include

- ✓ Growth
- ✓ Developments of breasts in female
- ✓ Moulting
- ✓ Sweating
- ✓ Falling sick and recovering from sickness
- ✓ Change of colour in chameleons
- ✓ Change of colour in leaves
- ✓ Transpiration
- ✓ Osmosis
- ✓ Translocation
- ✓ Digestion.

Characteristics of biological changes

- ✓ They are irreversible

- ✓ They occur only in living things
- ✓ There is change in mass

Chemical changes

- ✓ These are changes which take place and form new substances

Examples of chemical changes

- ✓ Burning
- ✓ Rusting
- ✓ Decaying or decomposition of matter

Characteristics of chemical changes

- ✓ A new substance is always formed.
- ✓ Chemical changes are irreversible
- ✓ There is change in weight
- ✓ They produce heat
- ✓ There Is change in mass of an object.

Similarities between biological and chemical change

- ✓ Both are irreversible
- ✓ Both form new substances

Physical changes

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

Examples of physical change

- ✓ Melting
- ✓ Freezing
- ✓ Evaporation
- ✓ Sublimation
- ✓ Condensation

Characteristics of physical changes

- ✓ They are reversible

- ✓ No heat or light is produced
- ✓ No new substance is formed
- ✓ There is no change in mass

Natural changes

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

Examples of natural changes

- ✓ Floods
- ✓ Drought
- ✓ El nino
- ✓ Change in seasons
- ✓ Volcanic eruption
- ✓ Land slides
- ✓ Rain formation
- ✓ Earth quakes
- ✓ Storm

Effects of natural changes

- ✓ They destroy people's property
- ✓ They lead to death
- ✓ They can lead to famine
- ✓ 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

- ✓ Deforestation
- ✓ Bush burning
- ✓ Road construction
- ✓ Building houses

- ✓ Afforestation
- ✓ Brick making
- ✓ Swamp reclamation
- ✓ Mining

Difference between physical changes and chemical changes

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

THEME: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATION

TOPIC: KEEPING GOATS, SHEEP AND PIGS

GOAT KEEPING

TERMS USED IN GOAT KEEPING

Nanny goat: This is a mature female goat

Billy goat: This is a mature male goat

Kid: This is a young goat

Kidding: This is the giving birth to a young goat

Gestation period: This is the period of pregnancy

Browsing: free movement of animals to look for pasture

Drying off: This is the stopping of milking and suckling before a nanny goat gives birth

Steaming up: This is the feeding of a nanny goat on special feeds to prepare it for kidding.

Structure of a goat

Ways why people rear goats

- ✓ To get meat
- ✓ To get skins
- ✓ To sell goats and get money
- ✓ Some goat breeds are source of meat
- ✓ Goats are kept for social functions like paying dowry, rituals
- ✓ Their droppings are used as farm yard manure

Products got from goats

- ✓ Meat
- ✓ Milk
- ✓ Skins
- ✓ Mohair
- ✓ Animal droppings

Types of goats

Dairy goats: These are goats kept for milk production

Meat breeds: These are goats kept for meat production

Types of goat breeds.

- ✓ Local breeds
- ✓ Exotic breeds
- ✓ Cross breeds

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

Characteristics of local breeds

- ✓ They take time to mature
- ✓ They are resistant to tropical diseases
- ✓ They can survive on poor pasture and drought

Exotic breeds; These are breeds of goats which originated from other countries.

Characteristics

- ✓ They mature quickly
- ✓ They are not resistant to diseases
- ✓ They can not survive on poor pastures and drought
- ✓ They produce a lot of milk

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

Breeds of goats:

A breed is a group of animals with specific characteristics

Examples of breeds of goats

- ✓ Saanen goats
- ✓ Toggenburg goats
- ✓ Anglo – Nubian goats
- ✓ Boer goats
- ✓ Mubende goats
- ✓ Somali goats/ Galla goats

- ✓ Small east African goats
- ✓ Angora goats
- ✓ Turkana/Samburu goats

Factors considered when selecting a goat bread

- ✓ Heredity
- ✓ Good health
- ✓ Mammary glands
- ✓ Milk yield

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

Reasons for housing goats

- ✓ Housing protect goats from rain and sunshine
- ✓ Housing protects goats from wild animals
- ✓ Housing promotes good hygiene
- ✓ Housing controls the spread of diseases

Systems of rearing goats

Extensive system:

This is the method where goats are free to graze on natural pastures without fencing or housing

Advantages of extensive farming

- ✓ It requires less labour
- ✓ Goats feed on a variety of pastures
- ✓ It gives time for a farmer to do other work
- ✓ Less productive areas can be used
- ✓ Goats gets enough exercises

Disadvantages

- ✓ Diseases can easily be spread among goats
- ✓ Goats can be attacked by wild animals

- ✓ Goats can be affected by bad weather conditions
- ✓ Goats can destroy people's crops
- ✓ Manure is wasted

Intensive system

This is the method where goats are kept in their houses where they are fed from.

This method is also called **zero grazing**.

Advantages

- ✓ It controls diseases
- ✓ It protects goats from wild animals
- ✓ It keeps goats from bad weather conditions
- ✓ A farmer gets time to do other work
- ✓ Manure is easily collected
- ✓ Goats do not destroy crops

Disadvantages

- ✓ It is tiring in terms of feeding goats
- ✓ Goats do not get enough exercise
- ✓ Easy spread of diseases and parasites
- ✓ Balanced diet may not be provided to goats
- ✓ It is expensive to start

Semi – intensive system.

This is the method which combines controlled grazing and feeding goats in stalls with adequate housing.

Parasites in goats

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

Examples of parasites in goats

- ✓ Ticks
- ✓ Tsetse flies
- ✓ Roundworms

- ✓ hookworms
- ✓ Liver fluke
- ✓ Mites

Types of parasites

a) Endo parasites (Internal parasites)

b) Ecto parastites (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
- ✓ It attacks the lungs of animals

Signs and symptoms

- ✓ 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 swells
- ✓ Pus in hooves
- ✓ Loss of appetite
- ✓ Reduction in milk production in lactating goats and sheep

Prevention and control

- ✓ Cleaning the animal house
- ✓ Cleaning the animal feet with feet antiseptic
- ✓ Do not force animals to walk
- ✓ Give recommended drugs.

3. Foot and mouth disease

- ✓ It is caused by a virus
- ✓ It attacks the foot and mouth of animals

Signs and symptoms

- ✓ The hooves swell and pain
- ✓ The hooves develop pus and become smelly
- ✓ The animal does not feed properly
- ✓ The animal limps
- ✓ There is increased salivation from the mouth

Prevention and control

- ✓ Cleaning the animal house
- ✓ Take the animal for foot bathe
- ✓ Trim the hooves
- ✓ Take animal to dry places for grazing
- ✓ 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.

Signs and symptoms

- ✓ Diarrhoea with blood
- ✓ Weakness and staggering in animals
- ✓ Sudden death

Prevention and control

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

6. **Rift valley disease**

- ✓ It is caused by a virus

Signs and symptoms

- ✓ High fever
- ✓ Staggering and diarrhoea
- ✓ Loss of appetite
- ✓ 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 caused by protozoa called rickettsia

- ✓ 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

Ram: A mature male sheep

Ewe: A mature female sheep

Lamb: A young sheep

Ewe lamb: A young female sheep

Ram lamb: A young male sheep

Lambing: This is the act of giving birth in sheep

Shearing: This is the practice of removing wool from a sheep's body

Docking: This is the cutting short of the sheep's tail

Reasons for docking

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

Mutton: Meat of sheep

Dehorning: This is a practice of removing horn buds

External parts of a sheep (Diagram showing parts)

Reasons why people keep sheep

- ✓ We get mutton from sheep
- ✓ We get wool from sheep
- ✓ We sell sheep and get money.
- ✓ Sheep provide manure in form of animal droppings

Products got from sheep

- ✓ Mutton
- ✓ Wool
- ✓ 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

A) Local breeds of sheep

- ✓ Black head Persian
- ✓ Masai sheep
- ✓ Somali sheep

B) Exotic breeds

- ✓ Corriedale
- ✓ Rambouillet
- ✓ Romney marsh
- ✓ Merino

N.B: Merino sheep is well known for **wool** production

NOTE: Angora goats are well known for the production of **mohair**.

NOTE: Systems of sheep rearing are the same as those used in goat keeping.

Diseases of sheep

- ✓ Anthrax

- ✓ Nairobi sheep disease
- ✓ Heart water
- ✓ Red water
- ✓ Blue tongue
- ✓ Sheep scab
- ✓ Sheep pox
- ✓ 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

Piggery: This is the practice of rearing pigs

Boar: A mature male pig

Sow: A mature female pig

Gilt: A young female pig

Bristle: A young male pig

Piglet: A young one of a pig

Farrowing: This is the act of giving birth to piglets

Litter: A group of piglets born at the same time

Pork: Meat got from pigs

Bacon Fats obtained from pigs

Warthog Wild pig

External parts of a pig

Reasons for piggery

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

Types of breeds of pigs

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

Examples of exotic breeds of pigs

- ✓ Large white pigs/York shine
- ✓ Saddle back pigs
- ✓ Hampshire pigs
- ✓ Wessex saddle back
- ✓ Landrace
- ✓ Large black
- ✓ Poland china

Factors to consider when selecting a good breed of pigs

- ✓ Heredity
- ✓ Good health
- ✓ Good body formation
- ✓ Mammary glands

Housing and management of pigs

- ✓ A house for pigs is called a **pigsty**

Diagram showing a pigsty

Qualities of a good pigsty

- ✓ It should have a slanting floor
- ✓ It should be well ventilated
- ✓ It should be dry and warm
- ✓ It should have enough space for storage of feeds and water
- ✓ It should be easy to clean

Reasons for housing pigs

- ✓ Housing protects pigs from bed weather conditions
- ✓ Housing protects pigs from wild animals and thieves
- ✓ Housing protects pigs from destroying peoples crops
- ✓ 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;

- ✓ The sow or gilt becomes restless
- ✓ It mounts other sows
- ✓ It allows to be mounted on
- ✓ The vulva swells and turns red
- ✓ 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

- ✓ To promote good body health
- ✓ To grow fat
- ✓ To enable the sow produce enough breast milk for the piglets
- ✓ To protect them from diseases

Systems of keeping pigs

There are two methods of keeping pigs

- ✓ Extensive system (Out door system)
- ✓ Intensive system (Indoor system)

Extensive system

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

Advantages

- ✓ It is cheap in terms of feeding
- ✓ The pigs get enough body exercise
- ✓ The pigs get variety of food to eat

- ✓ The farmer gets time to do other work
- ✓ It is not tiresome

Disadvantages

- ✓ The pigs can easily get diseases and parasites
- ✓ The pigs can destroy farmers' crops
- ✓ They can be eaten by wild animals
- ✓ They can be stolen by thieves
- ✓ The pigs can become wild

INTENSIVE SYSTEM

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

Advantages

- ✓ Pigs are protected from bad weather conditions
- ✓ The pigs grow and mature quickly
- ✓ Pigs are protected from wild animals

Disadvantages

- ✓ The pigs do not get enough body exercise
- ✓ It is expensive in terms of feeding and treatment
- ✓ It requires much care and attention
- ✓ The pig sty smells badly thus polluting the environment
- ✓ 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

- ✓ Pigs are weak
- ✓ High fever
- ✓ Loss of appetite
- ✓ Bloody diarrhoea
- ✓ Difficulty in breathing
- ✓ Dullness
- ✓ Sores on the eyes

Prevention and control

- ✓ Separate the infected pigs from healthy ones
- ✓ Cleanliness of water, pig sty and equipment
- ✓ **Quarantine** to the infected areas
- ✓ Kill and burry infected pigs
- ✓ 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;

- ✓ Capital
- ✓ Labour
- ✓ Land
- ✓ Market

FARM RECORDS: are written information about different activities carried out on a farm.

NOTE: Types of records kept on a piggery farm are the same as those on a poultry farm except **litter records.**

Litter records; show the number of piglets born by each sow and the number of times sows produce every year

THEME: HUMAN HEALTH

TOPIC: FOOD AND NUTRITION

Food: is a substance that carries one or more life functions in the body

Food is anything good to eat or drink.

Feeding: Is the taking in of food into the body.

Nutrition: Is the way how food is used in the body

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;

- To get energy
- To build the body
- To be healthy

- 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

- ✓ Certain people and tribes have plenty of food stuffs
- ✓ Certain animals and plants may be preserved in game parks by those who do not eat them
- ✓ They protect people from eating poisonous plants

Disadvantages

- ✓ Food beliefs and taboos can result into nutritional deficiency diseases
- ✓ Children may lack certain food values in the body and become anaemic
- ✓ 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

- ✓ Breast milk contains all food values apart from iron
- ✓ Breast milk does not get contaminated easily
- ✓ Breast milk is easily digested by the baby
- ✓ Breast milk is ever ready for the baby
- ✓ Breast milk contains antibodies which protect the baby against diseases

To the mother

- ✓ Breast feeding delays the next pregnancy
- ✓ Breast feeding is time saving to the mother
- ✓ Breast feeding is cheap to the family and mother in terms of expenditure
- ✓ 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

- ✓ It is expensive
- ✓ It takes a lot of time to prepare the milk or drinks
- ✓ Bottle feeding encourages early pregnancy
- ✓ It does not create a love bond between the mother and a child

- ✓ Bottle feeding requires more time to clean bottles and may be a source of diseases if not properly cleaned
- ✓ 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

- ✓ Pregnant women/Expectant women
- ✓ Breast feeding mothers
- ✓ Weaning children
- ✓ Babies
- ✓ The elderly
- ✓ 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.

Or

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 **6 months**.

How to start weaning children

- ✓ Start with semi – liquid foods like porridge in which milk is added
- ✓ 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
- ✓ Continue feeding frequently using other weaning foods like porridge, mashed banana. Mashed posho, mashed rice, and mashed fruits

NOTE: Remember children have small stomachs and need many meals a day

Reasons for weaning children

- ✓ At six months, the iron the baby is born with in the body is used up. And so a baby needs to get more iron through eating food
- ✓ 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

- ✓ People in different communities eat different food stuffs
- ✓ These food stuffs determine their **staple food** in the community
- ✓ Staple food is one's main food.

Factors that determine one's staple food.

- ✓ Its availability in the area
- ✓ 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.

Disease	**Cause**	**Signs and symptoms**
Kwashiorkor	Shortage of proteins in the body	✓ Swollen moon face ✓ Swollen belly ✓ Little brownish hair ✓ Swollen hands and legs
Marasmus	Shortage of carbohydrates in the body	✓ Pot belly ✓ The child becomes thin and under weight ✓ The face looks like that of an old man ✓ The eyes are very bright
Scurvy	Shortage of vitamin C in the body	✓ Bleeding from the gum ✓ Poor healing of wounds ✓ Anaemia ✓ Reduced resistance to infection
Rickets	Shortage of vitamin D	

	in the body	
Anaemia	Shortage of iron in the body	✓ Pale lips ✓ Pale eye lids inside ✓ Pale palms ✓ Pale sole of the feet
Goitre	Shortage of iodine in the body	✓ Swollen neck ✓ Swollen thyroid gland
Night blindness	Shortage of Vitamin A in the body	✓ Poor night vision ✓ Sore eyes ✓ Unhealthy skin
Beriberi	Shortage of vitamin B1	✓ Retarded growth ✓ Paralysis ✓ Body weakness ✓ Lack of appetite
Pellagra	Shortage of vitamin B2 in the body	✓ Skin disorders ✓ Eye and mouth sores ✓ General body weakness
Haemophilus	Shortage of vitamin K in the body	✓ Poor healing of wounds ✓ Poor clotting of blood around cuts and wounds

Factors that lead to deficiency diseases in the community

- ✓ Poverty
- ✓ Crop pests and diseases
- ✓ Ignorance
- ✓ Natural hazards like drought, floods, landslides, hail storms, storms etc

THEME: HUMAN HEALTH
TOPIC: 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.

Elements of Primary Health Care

- ✓ Health education
- ✓ Food and nutrition
- ✓ Immunisation
- ✓ Water and sanitation
- ✓ Material and child health care
- ✓ Control of communicable diseases
- ✓ First aid
- ✓ Family hygiene
- ✓ Personal hygiene

Principles of PHC

- ✓ 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.
- ✓ The health care should be suitable for solving problems of the people in the community.

Responsibilities of the family in promoting good health.

- ✓ Taking part in all health education activities in the community
- ✓ Family members should share among themselves knowledge and skills about diseases, prevention, first aid and hygiene

- ✓ Family members should attend health seminars organized by the community leaders.
- ✓ Family members should feed on a balanced diet.

Responsibilities of the community in health promotion

- ✓ Constructing health centres
- ✓ Protecting water sources
- ✓ Constructing rehabilitation centres for the disabled
- ✓ Supporting health workers in organizing immunisation programme.
- ✓ Mobilizing members to produce and store food for future use.
- ✓ Organizing cleaning activities in markets and towns
- ✓ Make sure that every family has a latrine and a rubbish pit

Activities of promoting PHC in the community

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

Responsibility of individuals in promoting PHC.

- ✓ Individuals should get involved in health activities in the community
- ✓ Maintaining proper personal hygiene
- ✓ Keeping the environment clean.
- ✓ Organizing the repairing of damaged roads

Suitable life styles and health practices

- ✓ Eating good food (balanced diet)
- ✓ Getting adequate exercises
- ✓ Maintaining good posture
- ✓ Avoid smoking
- ✓ Performing body exercises
- ✓ Avoid the use of drugs
- ✓ Trimming our fingernails
- ✓ Washing clothes and bed sheets
- ✓ Visiting health workers in case of sicknesses
- ✓ Getting enough rest and sleep
- ✓ Sharing knowledge about health
- ✓ Conducting health parades

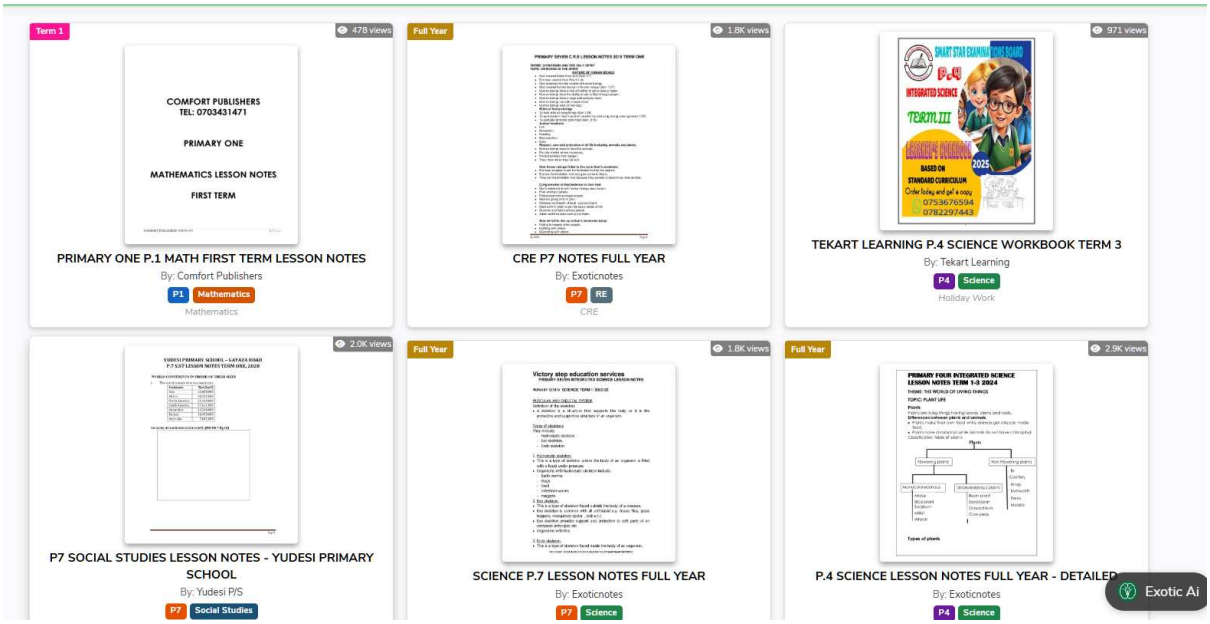
People with special needs in the community

- ✓ The lame people/crippled people
- ✓ The blind people
- ✓ 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.

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