PARAMOUNT SCIENCE NOTES
PRIMARY FIVE
TERM ONE

THEME: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATIONS
TOPIC: KEEPING OF POULTRY AND BEES

POULTRY KEEPING

- This is the rearing of domestic birds

POULTRY

- These are domestic birds

Types/examples of poultry

- Chickens
- Ducks
- Turkeys
- Geese
- Guinea fowls
- Pigeons

Examples of poultry products

- Eggs
- Meat
- Feathers
- Poultry droppings
- Bones

Reasons for rearing poultry (Why do farmers keep domestic birds?)

- For egg production/to get eggs
- For meat production/to get meat
- For income after sale/to sell them for money

Importance (uses) of poultry to people

- They provide eggs
- They provide meat
- They are sold for money
- They are used to pay bride price
- Their droppings are used as manure
- Their bones are used to make glue
- Their feathers are used for decoration
- Their feathers are used to make pillows
- Their feathers are used to make costumes

TERMS USED IN POULTRY KEEPING

TERMS	DESCRIPTION
Poultry (fowls)	▪ Domestic birds
Hen	▪ Adult female chicken
Cock	▪ Adult male chicken
Pullet	▪ Young female chicken
Cockerel	▪ Young male chicken
Capon	▪ Castrated male chicken
Chick	▪ Young bird
Incubation	▪ Providing of necessary conditions to a fertile egg to hatch
Incubation period	▪ Time taken by a fertilized egg to hatch

Incubator	▪ Machine used to hatch eggs
Layers	▪ Type of chickens kept for egg production
Broilers	▪ Type of chickens kept for meat production
Dual purpose chickens	▪ Type of chickens kept for both eggs and meat
Brooding	▪ Giving of special care to chicks below 8 weeks
Broody hen	▪ Hen incubating eggs to hatch them
Brooder	▪ Special structure in which chicks are cared for
Culling	▪ Removal of unproductive birds from the flock
Moulting	▪ Shedding of old feathers in birds

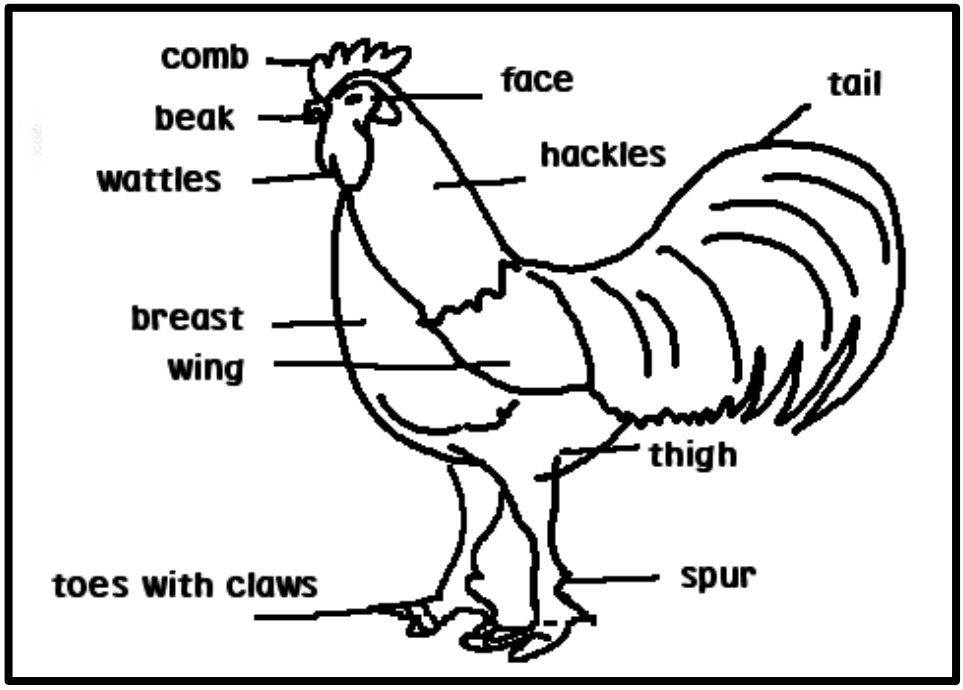
STRUCTURAL DIFFERENCES BETWEEN A HEN AND A COCK

- A hen has a small comb while a cock has a big comb
- A hen has a small wattle while a cock has a big wattle
- A hen has a short spur but a cock has a long spur
- A hen has dull feathers but a cock has bright feathers
- A hen has short hackle and tail feathers while a cock has long hackle and tail feathers

Why do cocks have brightly coloured feathers?

- To attract hens for mating

EXTERNAL PARTS OF A DOMESTIC BIRD



FUNCTIONS OF EACH PART

PARTS OF THE BIRD	FUNCTIONS
Eyes	For sight
Beak	For feeding (for picking up food)

	For protection For egg turning during incubation
Spur	For protection
Nostril	For smelling food
Legs	For walking
Toes with claws	For scratching
Wattle and comb	For temperature regulation

FEATHERS

- These are the outermost covers of the bird's body

MOULTING IN BIRDS

- This is shedding of old feathers in birds
- Birds moult once each year

Why do birds moult their feathers?

- To grow new feathers

Uses of feathers to a bird

- They help a bird to fly (for flight)
- They streamline the bird's body (they give the bird shape)
- They keep the bird's body warm (for warmth)
- They protect the bird's body from injury (for protection against injury)
- They help a male bird to attract mates (for courtship)
- They give the bird colour for identification

Uses of feathers to people

- They are used as costumes
- They are used for decoration
- They are used to make pillows
- They are used to make mattresses
- They are used as writing materials

TYPES OF FEATHERS

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

QUILL FEATHERS (FLIGHT FEATHERS)

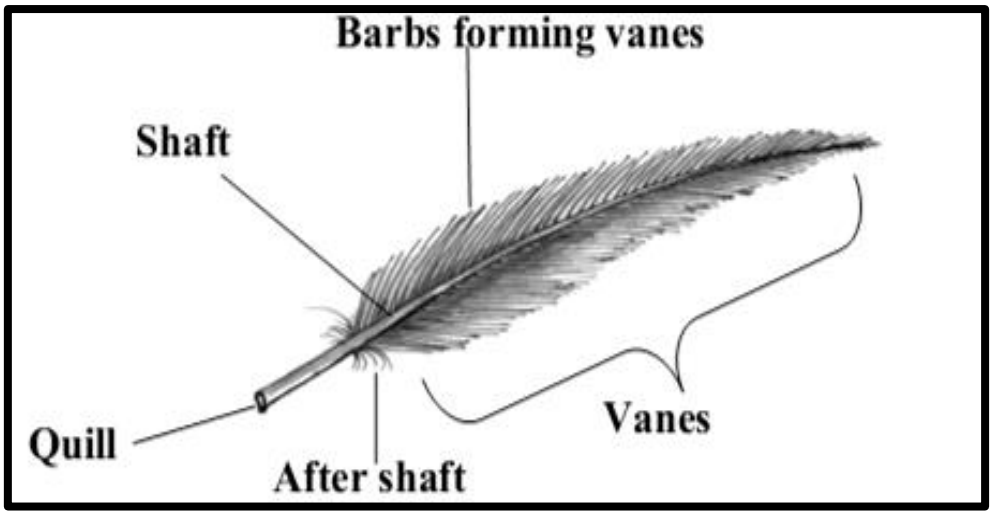
- They are found on the **wings** and **tail.**

- They are divided into **primary** and **secondary feathers**
- Primary feathers are bigger than secondary feathers

Importance of quill feathers

- For flight (they help in flying)

Structure of a quill feather



Shaft (rachis)

- It holds the vane (it is where the vane is attached)

Vane

- It is the flat expanded part of the feather

Barbs

- They form the vane

Quill

- It is the extreme end of the shaft

COVERT FEATHERS (BODY FEATHERS)

- They are found on **the neck** and **bases of wings and tail**
- They cover most of the body
- They are smaller than the quill feathers

Importance of covert feathers

- They insulate the bird's body
- They streamline the bird's shape (they give the bird shape)

Structure of a body feather

Why are bird streamlined?

- To overcome viscosity (to reduce air resistance)

What is viscosity (fluid friction)?

- This is the friction in liquids and gases

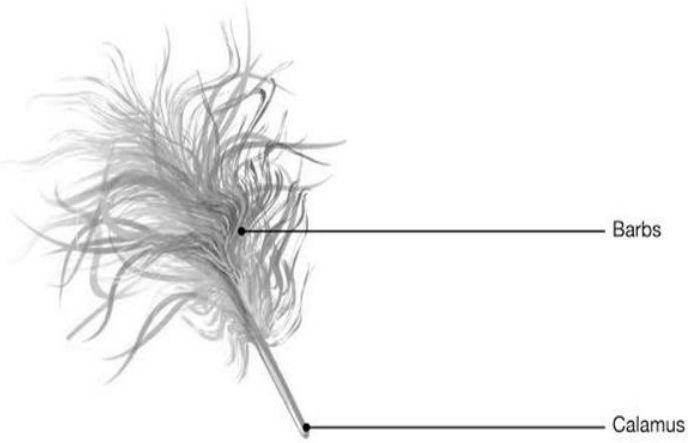
DOWN FEATHERS

- They are found on the **abdominal region**
- They are the first feathers to appear on a bird
- They have no vane
- They have loose barbs

Importance of down feathers

- They insulate the bird's body

Structure of a down feather



FILOPLUME FEATHERS

- These are the feathers that remain when a bird has been plucked
- They are found nearest to the skin between the covert feathers
- They are the tiniest (smallest) feathers
- They have no quill

A drawing of a Filoplume feather

EXERCISE

1. Mention any two types of feathers.
2. Give any two uses of feathers to a bird.
3. State any two ways people can make use of feathers.
4. Give the function of the following parts to a bird
   i) Spur
   ii) Beak
5. Name any one part of a bird where quill feathers are found.
6. Why do birds moult?
7. What type of feathers is shown below?

TYPES OF CHICKEN

- A type of bird is a group of chicken kept for a specific purpose.

There are three main types of chicken, namely;

- Broilers
- Layers
- Dual purpose chicken

BROILERS (HEAVY BREEDS OF CHICKEN/TABLE BIRDS/ROASTERS)

- These are chicken kept mainly for meat production.

Examples of broilers

- Light Sussex
- Plymouth Rock
- Jersey Giant
- Orpington
- Cornish white
- Sykes

LAYERS (LIGHT BREEDS OF CHICKEN)

- These are chicken kept mainly for egg production

Examples of layers

- White leghorn
- Brown egger

- Ancona
- Minorca

DUAL PURPOSE CHICKEN

- These are chicken kept for both egg and meat production.

Examples of dual purpose chicken

- Rhode island red
- New Hampshire
- Malines
- Kuroiler
- Turken (Naked Neck)
- Black Australorp
- Speckled Sussex
- Brown leghorn
- Buckeye

ACTIVITY

1. Give the meaning of the following terms.
   i) Layers.
   ii) Broilers.
2. Why do farmers keep table birds?
3. Give one example of layer birds commonly kept in Uganda.
4. How are Rhode Island Red chicken similar to Kuroilers?
5. Which food value do we get from eggs and meat of birds?
6. Give major reason why farmers keep dual purpose chicken on the farm.
7. Besides Light Sussex, give two other broilers kept in Uganda.
8. Suggest one way one can improve the production birds on the farm?
9. Which type of chicken would you keep for constant supply of eggs at the market?

BREEDS OF CHICKEN

- A breed of chicken is a group of chicken with similar characteristics.

Examples of breeds of chicken.

- Light Sussex
- Plymouth Rock
- Jersey Giant
- Orpington
- Cornish white
- Sykes
- White leghorn
- ❖ Brown egger
- ❖ Ancona
- ❖ Minorca
- ✓ Rhode Island Red
- ✓ New Hampshire
- ✓ Malines
- ✓ Kuroiler
- ✓ Turken (Naked Neck)
- ✓ Black Australorp
- ✓ Speckled Sussex
- ✓ Brown leghorn
- ✓ Buckeye

TYPES OF BREEDS OF CHICKEN

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

LOCAL BREEDS

- These are breeds which have existed in Uganda for a very long time e.g. Nganda, Nsoga and Nteso.
- They are also called **native** or **indigenous breeds**.

Characteristics local breeds

- They are resistant to bad weather conditions.
- They are resistant to diseases and parasites.
- They need less care
- They have mature slowly
- They lay few eggs.
- They produce less meat.
- They have different colours
- They can eat a variety of feeds

ADVANTAGES OF LOCAL BREEDS OVER EXOTIC BREEDS

- Local breeds are more resistant to diseases than exotic breeds.
- Local breeds are more resistant to bad weather than exotic breeds.
- Local breeds are need less care than exotic breeds.

WAYS OF IMPROVING THE LOCAL BREEDS OF POULTRY

- By cross breeding
- By regular vaccination
- By proper feeding

How to best can poultry farmers improve on their local breeds?

- By carrying out cross breeding

EXOTIC BREEDS

- These are breeds which were imported from other countries e.g. White leghorn, Plymouth Rock and Light Sussex.

Characteristics of exotic breeds

- They are vulnerable to bad weather conditions.
- They are vulnerable to diseases and parasites.
- They need much care.
- They have mature quickly.
- They lay many eggs.
- They produce a lot of meat.
- They produce good quality meat.
- They have the same colour.

ADVANTAGES OF EXOTIC BREEDS OVER LOCAL BREEDS

- They mature faster than local breeds.

- They lay more eggs than local breeds.
- They produce more meat than the local breeds.

CROSS BREEDS (HYBRIDS)

- These are breeds got when a local breed mates with an exotic breed.

Advantages of cross breeds over local breeds.

- They mature faster than the local breeds.
- They produce more meat than the local breeds.
- They lay more eggs than local breeds.

Advantages of cross breeds over exotic breeds.

- They are more resistant to diseases than the exotic diseases.
- They are more resistant to bad weather conditions than the exotic diseases.

CROSS BREEDING

- This is the mating of a local breed with an exotic breed.

Why do farmers carry out cross breeding among chicken?

- To improve the quality of their breeds

EXERCISE

1. a) What do you understand by the term **'a breed of chicken'**?
   b) Besides local breeds, name any other two types of breeds of chicken.
   c) State any one breed of chicken commonly kept in your locality.
2. a) Mention any two characteristics of local breeds of chicken.
   b) Why do you think farmers who rear local breeds of chicken should carry out crossbreeding?
   c) Give any one advantage of keeping local breeds of chicken.
3. a) Point out any two characteristics of exotic breeds of chicken.
   b) Name any one exotic breed of chicken you know.
   c) Why do most farmers prefer keeping exotic breeds of chicken to local ones?

SYSTEMS OF POULTRY KEEPING

- Free range system
- Deep litter systems
- Battery system/cage system
- Pen system/fold system

FREE RANGE SYSTEM

- This is when birds are left to move freely looking for their own food.
- In the evening, they come back for shelter

Why is free range system common in rural areas?

- There is enough land

Why is free range system not used in urban areas?

- There is inadequate/limited land
- It needs a big piece of land

Simple diagram to illustrate a free range system

Advantages of free range system

- It is cheap to manage
- It saves time
- Birds get balanced diet
- Birds make enough body exercise
- Birds need little care
- It controls poultry vices

Why is free range system regarded as the cheapest system of poultry keeping?

- The farmer doesn't buy poultry feeds

Disadvantages of free-range system

- It needs a big piece of land
- Birds can easily be stolen
- Birds can easily be killed by predators/vermins/wild animals
- Birds can easily get diseases/there is easy spread of poultry diseases
- Birds can easily destroy crops
- Birds can easily be poisoned
- Eggs can easily get lost
- It is difficult to keep farm records
- It is difficult to cull birds/culling is difficult

What are vermins?

- These are wild animals that attack and harm domestic animals

Deep litter system

- This is when the birds are kept and fed indoors with a floor covered with litter

Simple diagram to illustrate

Advantages of deep litter system

- Many birds are kept in a small space
- Birds are protected from bad weather
- Birds are protected from predators
- Birds are protected from thieves
- Culling is easy
- It is easy to collect manure
- It is easy to collect eggs
- It is easy to keep farm records

Why is deep litter system regarded as a commercial system of poultry keeping?

- Many birds are kept in a small space

Why do poultry farmers in urban areas always use deep litter system?

- Due to limited land/there is shortage of land

Disadvantages of deep litter system

- It is expensive to manage
- Birds do not make enough body exercises
- Birds do not get balanced diet
- It needs much attention
- Poultry vices are common
- There is easy spread of diseases due to overcrowding

LITTER

- Litter are soft materials put on the floor of a poultry house.

Examples of materials commonly used as litter

- Coffee husks
- Wood shavings.
- Crushed maize cobs.
- Crushed groundnut shells.

Why is saw dust not recommended to be used as litter?

- It is poisonous to birds when eaten.

IMPORTANCE OF LITTER

- It prevents dampness in the poultry house (it keeps the poultry house dry)

By absorbing moisture from poultry droppings

- It prevents breaking of eggs

By absorbing shock

- It keeps the floor of a poultry house warm

By reducing heat loss

DISADVANTAGES OF LITTER

- It hides parasites
- Some litter is poisonous to birds when eaten

QUALITIES OF GOOD LITTER

- It should be clean
- It should be dry
- It should not be poisonous to birds

NOTE

- Litter should be kept dry and turned regularly

To prevent dampness in the poultry house

- Old litter should be removed from the poultry house

To prevent ectoparasites like chicken mites

Give two importance of old litter collected from a deep litter house.

- It is used as manure in crop gardens.
- It is used in biogas production

BATTERY SYSTEM (CAGE SYSTEM)

- This is when birds are kept in small cages
- 1 to 3 birds are always kept in each cage
- The cage has a slightly sloping floor to allow rolling of the eggs into the wire trough

ADVANTAGES OF BATTERY SYSTEM (CAGE SYSTEM)

- It prevents contamination of poultry feeds
- It reduces poultry vices
- It reduces loss of eggs
- Eggs laid remain clean (Clean eggs are collected)
- Culling is easy
- Many birds can be kept on a small land
- Birds are protected from predators/vermins/wild animals
- It is easy to collect manure
- It is easy to keep records of individual birds

How does battery cage system reduce loss of eggs?

- It prevents contact of birds with their eggs
- It separates eggs from birds

DISADVANTAGES OF BATTERY CAGE SYSTEM

- It is expensive to manage
- It needs a lot of labour
- Birds do not make enough body exercises

- Birds do not get balanced diet

A SIMPLE DIAGRAM SHOWING BATTERY SYSTEM/CAGE SYSTEM

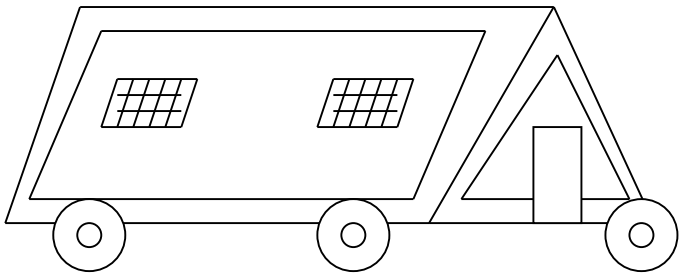
PEN SYSTEM (FOLD SYSTEM)

- This is when the birds are kept inside a small movable house
- The movable house used in this pen system is called pens, folds or arks
- The pen or fold is moved to a new place daily

Importance of a pen to the birds.

- It provides shade to the birds
- It protects birds from predators
- It protects birds from bad weather

A simple structure of fold / pen system



Advantages of pen system

- Birds cannot destroy crops
- Birds are protected from predators
- Birds are protected from bad weather
- Poultry feeds are not wasted

Disadvantages of fold pen system

- Few birds are kept
- Birds do not make enough body exercises
- Folds get old quickly
- Much labour is needed to move the folds daily
- It is expensive to make the pen

- It needs big land since folds are moved to new places daily

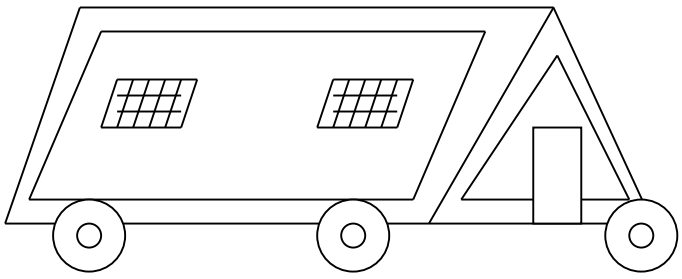
Activity

1. a) Which system of keeping poultry minimizes fowl vices?

b) Besides minimizing fowl vices, mention any **two** other advantages of the above named poultry system.

c) Write down any **one** disadvantage of the poultry system named in 'a' above.

2. The diagram below shows a structure used in a certain system of keeping poultry. Study it carefully and answer the questions that follow.



a) Name the system of keeping poultry shown in the diagram above.

b) What scientific name is given to the above portable house shown above?

c) Point out any one advantage and disadvantage of the above poultry system.

i) Advantage

ii) Disadvantage

POULTRY MANAGEMENT PRACTICES (daily/routine activities on a poultry farm)

- Debeaking
- Record keeping
- Vaccination
- Deworming
- Culling
- Dusting
- Egg collection
- Cross breeding
- Housing
- Feeding
- Regular cleaning

DEBEAKING

- This is the shortening of the upper beak of a bird

An illustration showing Debeaking

Importance of Debeaking

- It controls poultry vices (egg eating, cannibalism and feather pecking)

How does debeaking control poultry vices?

- It makes the bird's beak blunt

Danger of debeaking to a bird

- It can damage the tongue of a bird

DEWORMING

- This is the giving of drugs to animals through the mouth to kill worms

Reasons / Importance of deworming

- It controls endoparasites parasites in animals (it kills intestinal worms in animals)

METHODS OF DEWORMING

- Drenching
- Dosing

i) **DRENCHING**

- This is the giving of liquid drugs to animals through the mouth to kill worms
- It is done using a **drenching gun, syringe or bottle**

A drawing showing a drenching gun.

ii) **DOSING**

- This is the giving of solid drugs to animals through the mouth to kill worms
- It is done using a **bolus gun**

FEEDING POULTRY

- This is the providing of food to poultry

Reasons for proper feeding poultry

- To enable birds grow well
- To enable birds produce more eggs and meat
- To keep the birds healthy
- To enable the birds get energy

CHICKEN MASH

- These are chicken feeds crushed into small pieces

Components of chicken mash

- Maize bran
- Fish meal
- Bone meal

- Sunflower seeds
- Snail shells
- Cotton seeds

Why are poultry feeds always mixed with grit?

- For easy crushing of food in the gizzard

TYPES OF MASH (CHICKEN FEEDS)

MASH/CHICKEN FEEDS	CHICKENS	AGE
Chick mash/starter mash	chicks	1 day to 8 weeks
Growers mash	Growing layers	8 weeks to 16 weeks
Layers mash	Layers	16 weeks onwards
Broilers mash	Broilers	3 weeks onwards

CHICKEN AND DUCK MASH

- It is fed to a chick from 1 day to 8 weeks
- A chick needs about 40 grams per day of chick mash
- Chick mash has a lot of proteins **to give the chick a fast growth**

GROWERS MASH

- It is fed to growing layers from 8 weeks to about 16 weeks
- It contains less calcium than the layers mash

LAYERS MASH

- It is fed to layers at 16 weeks onwards
- It is introduced once the birds have started to lay eggs

Why are crushed snail shells always added to layer mash?

- To provide calcium to the birds

Why do layers sometimes lay soft shelled eggs?

- Due to lack of calcium in their diet

Why should layer mash contain a lot of calcium?

- To enable birds lay hard shelled eggs

BROILERS MASH

- It is fed to broilers at 3 weeks onwards
- It enables broilers to produce more meat

Reasons why birds should be fed on green vegetables?

- To provide vitamins and mineral salts to birds
- To keep the busy to prevent vices

Why is it not advisable to feed birds on vines and tobacco leaves?

- They are poisonous (toxic) to birds

FEEDING EQUIPMENT FOR BIRDS

- **Food trough**

It is where poultry feeds are put for the birds to eat

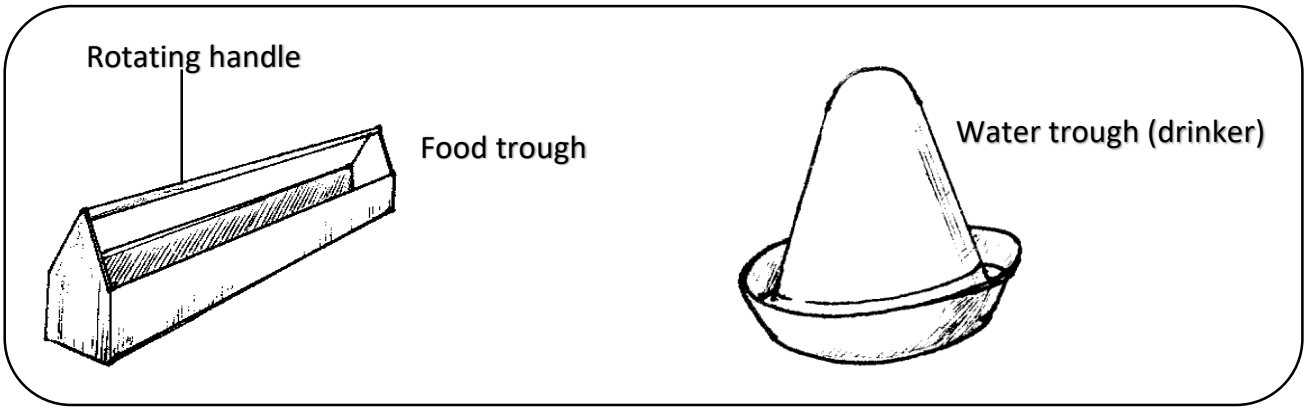
- **Water trough (drinker)**

It is where water is put for the birds to drink

NOTE

- A food trough has a spinning/rotating handle **to prevent food contamination by the birds**

DIAGRAMS SHOWING FEEDING EQUIPMENT FOR BIRDS



EXERCISE

1. Which routine activity helps to reduce egg eating on a poultry farm?
2. How is drenching different from dosing?
3. Give one reason why birds need to be fed properly.
4. What is chicken mash?
5. What type of feeds are suitable for the following:
   a) Chicks
   b) Broilers
   c) Layers of 8-16weeks
6. What is the danger of failure to include calcium in layer's mash?
7. How are vegetables hung in a poultry house useful?
8. How are the following containers important in a poultry house?
   a) Drinker
   b) Food trough

HOUSING POULTRY

- This is the providing of shelter to birds

Reasons for proper housing poultry

- To protect birds from bad weather
- To protect birds from predators/vermins/wild animals
- To protect the birds from thieves
- To prevent eggs from getting lost

Qualities of a good poultry house

- It should be well ventilated
- ✓ To allow free air circulation
- It should have dim light

- ✓ To prevent egg eating among layers
- It should have enough space for the birds
- ✓ To prevent poultry vices
- It should have strong doors
- ✓ To prevent attack from predators
- It should be well roofed
- ✓ To prevent leaking of rain water
- It should be clean and dry
- ✓ To prevent easy spread of diseases

CULLING

- This is the removal of unproductive birds from the flock

Examples of unproductive birds that should be culled

- Sick birds
- Off layers
- Birds with vices

Ways of culling

- Slaughtering/killing
- Selling
- Isolation

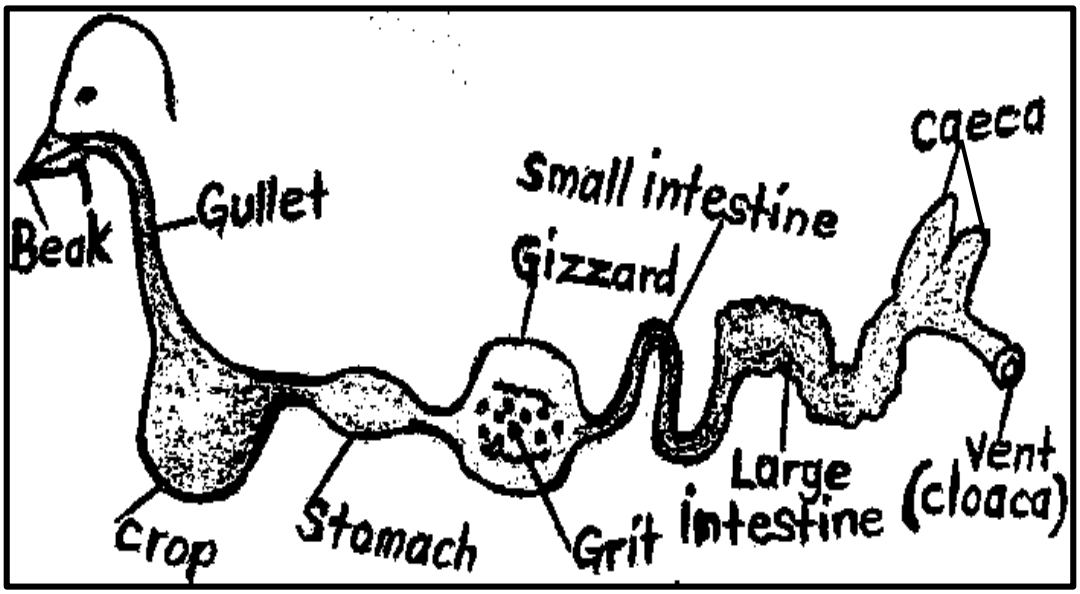
CROSS BREEDING

- This is the mating of a local breed with an exotic breed
- Local breed + Exotic breed = crossbreed (hybrid)

Why do poultry farmers carry out cross breeding?

- To improve the quality of their breeds

DIGESTIVE SYSTEM OF A HEN



FUNCTIONS OF EACH PART OF THE DIGESTIVE SYSTEM OF A BIRD

BEAK (BILL)

- It picks food

GULLET (OESOPHAGUS)

- It passes food to the crop

CROP

- It stores food for a short time (for temporary storage of food)
- It moistens and softens food
- It produces crop milk to feed the chicks e.g. in pigeons

Things that happen to food while in the crop of the bird

- Food is moistened
- Food is softened

Examples of birds that do not have a crop

- Owl
- Goose
- Button quail

Why does a goose have no crop on its alimentary canal?

- It eats little food at a time

TRUE STOMACH (PROVENTRICULUS)

- It is where food is mixed with digestive juices
- It secretes digestive enzymes that begin the digestion of proteins

GIZZARD

- It crushes (grinds) food

How is the gizzard adapted to its function?

- It has grit (small stones) that grind food

How is the gizzard able to withstand the grit?

- It has thick (muscular) walls

Which part of the human digestive system perform the same function as the gizzard of a bird?

- Teeth

Grit

These are small stones found in the gizzard

- They crush food into small particles

SMALL INTESTINES (ILEUM)

- It is where food digestion ends
- It is where food absorption occurs (it absorbs digested food)

Main processes that take place in small intestines

- Food absorption
- Food digestion

LARGE INTESTINES

- It is where water absorption occurs (it absorbs water)

CAECUM

- It stores undigested food for a short time

VENT (CLOACA)

- It passes out droppings

Activity

1. Give any one importance of proper housing to poultry.
2. State any two qualities of a good poultry house.
3. Why should a poultry house be well roofed?
4. What is culling as used in poultry management?
5. Write down any one method of culling?
6. What name is given to a breed got after mating a local breed with an exotic one?
7. Besides cross breeding, how else can poultry farmers improve the quality of their local breeds?
8. How is a crop useful to a bird during digestion?
9. What do we call the small stones found in the gizzard of a bird?
10. How are teeth in human beings similar to the gizzard in birds?

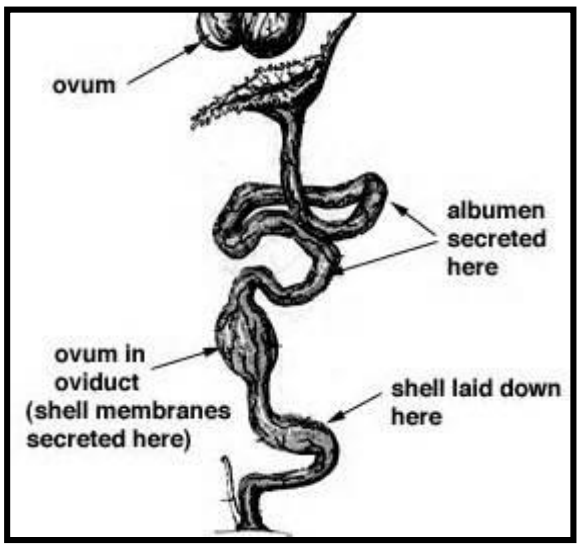
DEVELOPMENT OF AN EGG

- An oviduct of a hen contains thousands of ova (eggs)
- After fertilization the yolk, egg white or albumen develop
- The hen undergo internal fertilization

NOTE

- Eggs can only be fertilized before the formation of albumen (egg white)

A SIMPLE STRUCTURE OF AN OVIDUCT OF A HEN

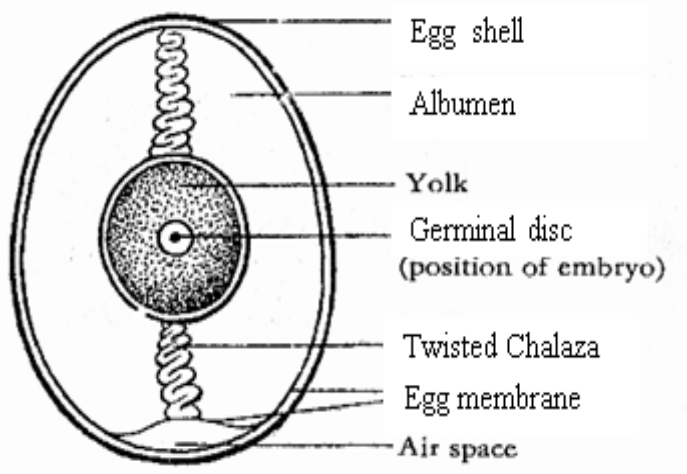


REPRODUCTION IN BIRDS

- They reproduce by laying eggs (they are oviparous)
- Their eggs are fertilized internally
- Birds undergo **internal fertilization**

- Fertilization in birds occurs in the **oviducts**

STRUCTURE OF A FERTILIZED EGG OF A BIRD



FUNCTIONS OF EACH PART OF A FERTILIZED BIRD'S EGG

EGG SHELL

- It protects the inner parts of an egg
- It allows exchange of gases

Why is the egg shell porous?

- To allow gaseous exchange

How is the egg shell adapted to gaseous exchange?

- It is porous

How is the egg shell adapted to protection of the inner parts of an egg?

- It is hard

Why should layers be given mash (feeds) rich in calcium?

- To lay hard shelled eggs

Why should layers be given mash (feeds) rich in calcium?

- To lay hard shelled eggs

SHELL MEMBRANE

- It prevents an egg from drying up

AIR SPACE

- It keeps oxygen for the embryo
- It supplies oxygen to the embryo

EGG YOLK

- It provides fats and proteins to the embryo

ALBUMEN (EGG WHITE)

- It provides water and proteins to the embryo

CHALAZA

- It holds the yolk and embryo in position
- It is the passage of oxygen to the embryo
- It is the passage of wastes from the embryo

GERMINAL DISC

It is found in unfertilized egg

- It develops into an embryo after fertilization

EMBRYO

It is found in a fertilized egg

- It develops into a young bird

FUNCTIONS OF AN EGG TO THE EMBRYO

- It protects the embryo
- It provides food to the embryo

ABNORMALITIES IN BIRD'S EGGS

- Blood and meat spots
- Soft shells
- Double yolks
- Yolklessness

KINDS OF ABNORMAL EGGS OF BIRDS

- Blood stained eggs
- Soft shelled eggs
- Double yolked eggs
- Yolkless eggs

QUALITIES OF A GOOD EGG

- It should have an oval shape
- It should have a porous egg shell
- It should be hard shelled
- It should be clean

FACTORS THAT MAY MAKE AN INCUBATED FERTILE EGGS FAIL TO HATCH

- When the egg is soft shelled
- When the egg has two yolks
- When the egg has no yolk
- When the egg has meat spots/blood spots
- When the egg is very dirty
- When the egg has a crack
- When the egg is boiled

ACTIVITY

1. How do birds reproduce?
2. Which type of fertilization do birds undergo?

3. In the space below, draw an egg and show the following parts; **yolk, chalaza, albumen, and air space.**

4. Give any one function of the yolk to an embryo.
5. Which part of an egg grows into a chick?
6. State any one abnormality found in eggs.
7. Mention any one factor that can prevent an egg from hatching into chick.

INCUBATION PERIOD

- This is the provision of necessary conditions for a fertilized egg to hatch

INCUBATION PERIOD

- This is the time taken by a fertilized egg to hatch

Incubation of different birds

- Pigeons – 16 days (2 weeks, 2 days)
- Hens – 21 days (3 weeks)
- Turkeys – 28 days (4 weeks)
- Ducks – 28 days (4 weeks)
- Geese – 28 days (4 weeks)
- Guinea fowls – 28 days (4 weeks)

INCUBATION

- This is the providing of necessary conditions to a fertilized egg to hatch

Conditions necessary for incubation

- Warmth (optimum temperature)
- Moisture (Humidity of 60%)

To prevent eggs from drying up

- Egg turning

To prevent the embryo from sticking to the shell membrane

- Good oxygen supply

For respiration of the growing embryo inside an egg

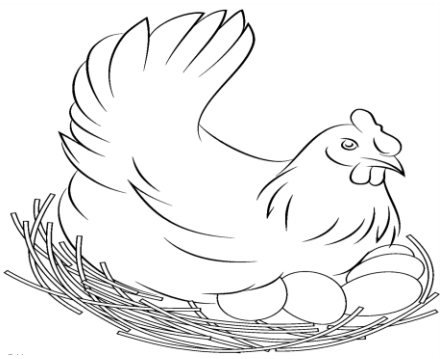
TYPES OF INCUBATION

- Natural incubation
- Artificial incubation

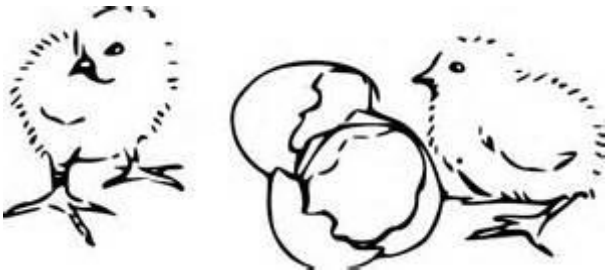
NATURAL INCUBATION

- This is when a hen sits on the eggs to hatch them
- **A broody hen** is a hen incubating the eggs
  - The broody hen usually comes off to feed and gets little exercise

Diagram of a hen incubating eggs



A chick hatching from an egg



How can a farmer care for a broody hen?

- Provision of clean dry nest
- Provision of food to a broody hen
- Provision of shelter to a broody hen
- Protection of the broody from vermins (rats and snakes)
- Provision of dim light in the place

Advantages of natural incubation

- It is cheap and easy to manage
- Chicks get extra care from the mother hen
- Chicks get protection from the mother hen

Disadvantages of natural incubation

- Few chicks are hatched at a time
- Some eggs are not hatched
- The mother hen may eat the eggs
- The mother hen may not be good at incubation
- Eggs are not tested for their fertility
- In case the broody hen dies, the eggs may not hatch

Why is natural incubation not good for commercial farmers?

- Few chicks are hatched at a time

ARTIFICIAL INCUBATION

- This is when an incubator is used to hatch eggs

Incubator

- This is a machine used to hatch eggs

Types of incubators

- Electric incubators
- Kerosene incubators

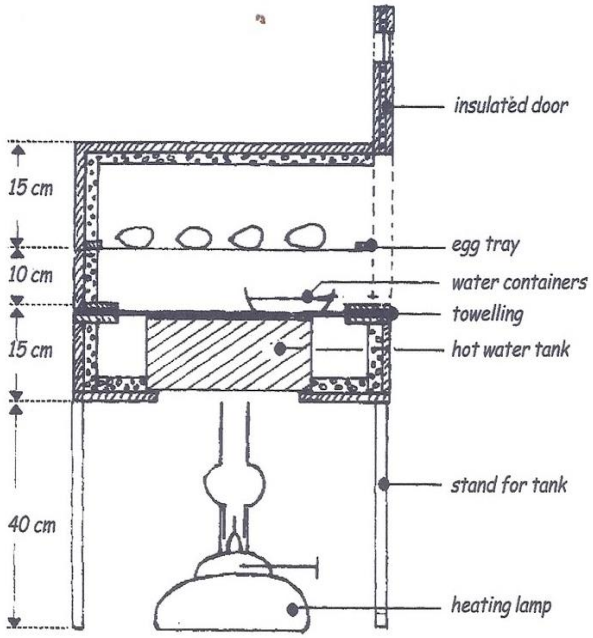
Electric incubators

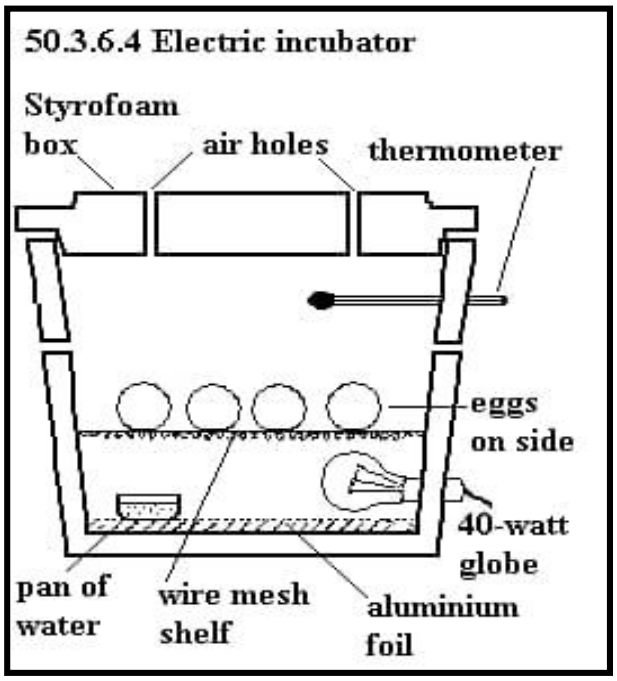
- These are incubators that use electricity to provide warmth

Kerosene incubators

- These are incubators that use kerosene to provide warmth

A diagram showing an incubator





A clutch:

- This is a group of eggs in a nest or incubator

How are the following important in an incubator?

Thermometer

- ✓ It helps to regulate temperature in an incubator

Heater (Heating lamp/infrared bulb)

- ✓ It provides warmth to the eggs

ADVANTAGES OF ARTIFICIAL INCUBATION

- Very many eggs are hatched at a time
- Eggs are tested for their fertility
- All eggs are hatched

Why is artificial incubation good for commercial farmers?

- Very many eggs are hatched at once

DISADVANTAGES OF ARTIFICIAL INCUBATION

- It is expensive
- It needs skilled labour
- It needs much attention
- It is tiring
- Eggs can be affected in case of frequent black out or load shedding

BROODING

- This is the giving special care to chicks below 8 weeks

Examples of special care given to chicks

- Food
- Warmth
- Shelter

Ways of caring for chicks below 8 weeks

- By giving them food
- By giving them warmth

- By giving them shelter

How is shelter important to chicks?

- It protects them from bad weather
- It protects them from predators

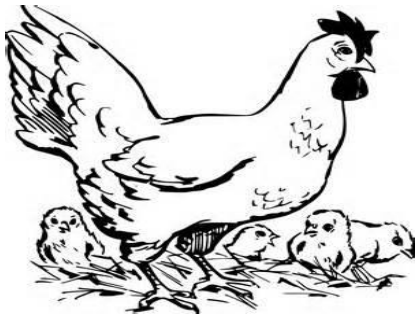
TYPES OF BROODING

- Natural brooding
- Artificial brooding

Natural brooding

- This is the type of brooding where a mother hen takes more care of her chicks.
- Farmers may also provide more food and security to the mother hen and chicks.

A diagram showing natural brooding



ADVANTAGES OF NATURAL BROODING

- It is cheap
- It reduces poultry vices among chicks
- The chicks get security from the mother hen

DISADVANTAGES OF NATURAL BROODING

- Chicks can be killed by bad weather
- Chicks can be eaten by predators
- Few chicks are cared for
- It gives little profits
- In case the hen dies, chicks are left without care

ARTIFICIAL BROODING

- This is the type of brooding where chicks are kept in a brooder.

BROODER

- This is a special structure in which chicks are cared for

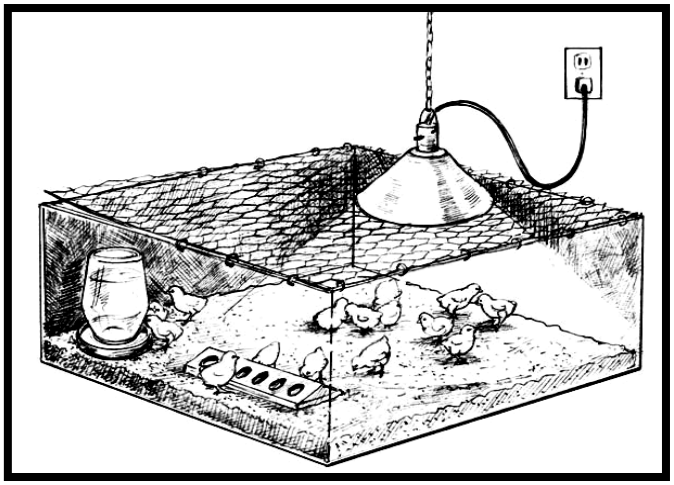
TYPES OF BROODERS

- Infrared brooder
- Kerosene brooder
- Charcoal brooder

INFRARED BROODER

- This is the type of brooder which uses electricity as a source of heat.

A simple diagram of infrared brooder



- The infrared lamp is raised to prevent the chicks from being burnt

Importance of infrared lamp

- It provides light
- It provides warmth

Advantages of using an infrared brooder

- It does not produce soot
- It is easy to use

Disadvantages of using an infrared brooder

- It is expensive to manage
- It cannot be used in areas without electricity

KEROSENE BROODER

- This is the type of brooder which uses kerosene as a source of heat

A simple diagram of Kerosene brooder

- The kerosene lamp has guards to prevent chicks from being burnt

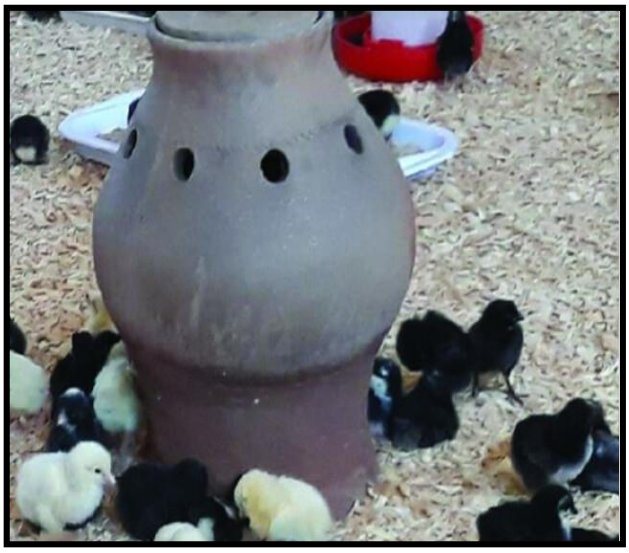
Dangers of a kerosene lamp in a brooder

- It may burn the chicks
- It leads to accumulation of soot

CHARCOAL BROODER

- This is the type of brooder which uses charcoal as a source of heat

A simple diagram of charcoal brooder



- The charcoal stove has guards/charcoal is put in a pot **to prevent chicks from being burnt**

Dangers of a charcoal stove in a brooder

- It may burn the chicks
- It produces smoke that can suffocate the chicks

Activity

1. How is brooding different from incubation?
2. Give any one condition necessary for eggs to hatch.
3. How is egg turning important during incubation?

The diagram below shows a type of incubation, study it carefully and answer questions 4 - 6.

4. What type of incubation is shown in the diagram above?
5. Give any one disadvantage of the above type?
6. How can a farmer care for the above broody hen?

7. Mention any one type of incubators.
8. Why do commercial farmers prefer artificial incubation?
9. Give any one care chicks get from mother hens.
10. State any one advantage of natural brooding.
11. What is a brooder?
12. Write down any two types of brooders?
13. How is a lamp important in a brooder?

POULTRY VICES (FOWL VICES)

- These are bad habits in poultry

EXAMPLES OF POULTRY VICES

- Egg eating
- Feather pecking
- Toe pecking
- Cannibalism

Cannibalism

- This is when a bird eats flesh of other bird

Egg eating

- This is when layers eat eggs

Feather pecking

- This is when a bird uses a beak to pull off feathers of other bird

CAUSES OF POULTRY VICES

- Overcrowding of birds
- Boredom among birds
- Too much light around laying nests
- Lack of poultry feeds
- Failure to collect eggs in time
- Failure to provide enough poultry feeds
- Failure to remove broken eggs from poultry house

CONTROL OF POULTRY VICES

- By Debeaking
- By culling
- By putting perches in the poultry house
- By providing enough space for the birds
- By providing enough food to poultry
- By collecting eggs in time
- By providing dim light in layers' house
- By putting laying nests in dark corners
- By removing broken eggs as soon as possible

- By providing green vegetables to birds

EFFECTS OF POULTRY VICES

- Death of poultry
- Retarded growth
- Loss of eggs
- Poor quality meat

POULTRY DISEASES

- These are diseases that affect domestic birds.

Causative agents of poultry diseases (types of germs that cause poultry diseases)

- Virus
- Bacteria
- Protozoa

EXAMPLES OF POULTRY DISEASES

Viral poultry diseases

- Fowl pox
- Avian leucosis
- Newcastle disease
- Gumboro
- Marek's disease

SIGNS OF NEWCASTLE DISEASE

- ✓ Greenish diarrhoea
- ✓ Drooping wings
- ✓ Sneezing
- ✓ Nasal discharge

Protozoan poultry diseases

- Coccidiosis
- Blackhead

SIGNS OF COCCIDIOSIS

- ✓ Bloody diarrhoea
- ✓ Ruffled feathers
- ✓ Coughing
- ✓ Rapid weight loss
- ✓ Drooping wings

Bacterial poultry diseases

- Fowl typhoid
- Pneumonia

GENERAL CAUSES OF POULTRY DISEASES

- Poor sanitation in the poultry house
- Poor feeding of poultry
- Poor housing of poultry
- Poor ventilation of the poultry house

CONTROL OF POULTRY DISEASES

- Regular vaccination
- Regular cleaning of the poultry house
- Culling
- Proper ventilation of the poultry house
- Proper housing of poultry

EFFECTS OF DISEASES IN POULTRY

- Death of poultry
- Poor growth of poultry

- Drop in egg production
- Poor quality eggs and meat

PARASITES OF POULTRY

- **A parasite** is an organism that depends on host for survival (food and shelter)
- **A host** is an organism from which a parasite gets food and shelter
- A parasite depends on a host for **food** and **shelter.**

TYPES OF PARASITES OF POULTRY

- Ectoparasites (External parasites)
- Endoparasites (Internal parasites)

ECTOPARASITES

- These are parasites that live on the body of a host

Examples of ectoparasites in poultry

- Lice
- Chicken mites
- Fleas
- Fowl ticks

ENDOPARASITES

- These are parasites that live inside the body of a host.
- They are found in the intestines affecting the process of food digestion

Examples of endoparasites in poultry

- Tapeworm
- Hookworm
- Threadworm (pinworm)

GENERAL CAUSES OF POULTRY PARASITES

- Keeping poultry in dirty houses
- Feeding poultry in dirty equipment
- Providing dirty feeds to poultry
- Irregular deworming

EFFECTS (DANGERS) OF PARASITES ON POULTRY

- They suck blood which leads to anaemia
- They create wounds on skin of birds
- They lead to reduction in egg production
- Some ectoparasites cause diseases (chicken mites cause Mange)
- They lead to stunted or poor growth of birds
- They may lead to death of poultry

CONTROL OF PARASITES IN POULTRY

- Regular deworming
- Use of pesticides to kill external parasites
- Regular cleaning of the poultry house
- Providing clean feeds to poultry

- Feeding poultry in clean equipment
- Applying Vaseline or paraffin to kill ectoparasites

FARM RECORDS

- These are written information about different activities done on a farm

TYPES OF FARM RECORDS

- Production records
- Health records
- Labour records
- Sales and expenses records
- Feeding records
- Inventory records
- Breeding records

REASONS FOR KEEPING FARM RECORDS

- To know the profits or losses
- To be taxed fairly
- To get loans easily
- To plan for the farm
- To know the farm history
- To make proper decision

An example of production record

Paramount Poultry Farm
P.O. Box 711
Wakiso
(a) Month: November 2021
(b) Breeds of chicken: White Leghorn
(c) Age of the flock: 18 weeks
(d) Number of birds: 1000

Number of broken eggs	Date	Morning	Afternoon	Total	Remarks
50	24.11.21	650	300	950	Egg eating
-	25.11.21	680	320	1000	Debeaking was done

SOCIAL INSECTS

- These are insects that live and work together

Examples of social insects

- Some bees (honeybees and bumblebees)
- Wasps
- Termites
- White ants

GROUPS OF BEES

- Solitary bees
- Social bees

Solitary bees

- This is a group of bees that live and work alone

Examples of solitary bees

- Mason bees
- Leafcutter bees
- Mining bees
- Carpenter bees
- Sweat bees

SOCIAL BEES

- These are bees that live and work together

Examples of social bees

- Honeybees
- Bumblebees

APICULTURE

- This is the keeping of honey bees
- A group of bees is called a **bee colony**
- A group of bees in motion is called a **bee swarm**

IMPORTANCE OF BEES TO PLANTS AND PEOPLE

People

- Bees provide honey
- Bees provide beeswax
- Bees provide pollen and propolis
- Apiculture project is a source of employment

Plants

- Bees pollinate flowers of crops

DANGER OF BEES IN THE ENVIRONMENT

- They sting people and animals

What causes bees to sting?

- Honey harvesting during day time
- Honey harvesting without a smoker
- Using cosmetics made from beeswax
- Making a lot of noise near the hive
- Standing in path of bee swarm

- Playing near the hive
- Crushing a bee near a hive
- Chasing away bees with naked hands

MAIN BEE PRODUCTS (MAIN PRODUCTS GOT FROM HONEY BEES)

- Honey
- Beeswax

✓ Honey is kept in **honey combs**

Other bee products

- **Propolis:** It is used to heal cuts and wounds
  It is used to make office glue
- **Bee pollen:** It is rich in proteins
- **Bee venom:** It is used to make antivenin for beestings
- **Royal jelly:** It is rich in vitamin B

USES OF HONEY TO PEOPLE

- It is used as food
- It is used to sweeten tea
- It is used as medicine for burns and cough
- It is used to make alcohol
- It is used in baking (to make breads)
- It is a source of income when sold

Why does honey take long to get spoilt?

- It is acidic and contains little moisture

Which food values do we get from the following bee products?

- **Honey:** Carbohydrates
- **Pollen:** Proteins
- **Royal jelly:** Vitamins

BEESWAX

- It is produced by wax glands inside the body of a honey bee
- Beeswax is used by bees to build honey combs

Products from beeswax

- Wax candles
- Shoe polish
- Lip balm
- Skin cream
- Chewing gum
- Aftershave

- Cosmetics
- Crayons

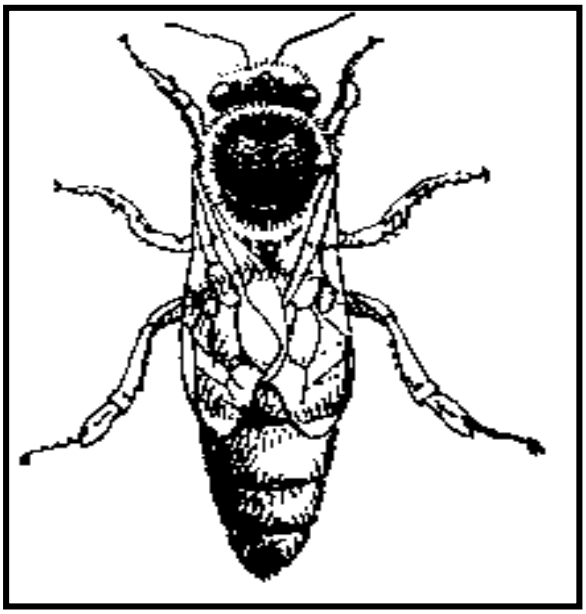
TYPES OF BEES IN A BEE HIVE (CASTES OF HONEYBEES)

- Worker bees
- Drone bees
- Queen bees

QUEEN BEE

- It is the mother bee in the bee hive
- It is head of the colony
- It develops from a fertilized egg
- Its main function is **to lay eggs** (She lays up to 1500 eggs a day)
- It is a fertile female bee **because** it has an ovipositor for laying eggs
- It is the largest bee in the hive
- Her abdomen and legs are longer than for others
- It has an **ovipositor** for laying eggs
- Its fed on special food called **royal jelly** by worker bees
- ✓ Royal jelly is produced by the salivary glands of worker bees
- The queen bee mate once in her life time and the sperms are stored in the sperm sac in her abdomen
- **Mating flight (nuptial flight)** is the flight in which the drone bee mates with the queen bee.
- There is only one queen bee in each hive/colony
- As soon as a new queen is hatched, swarming occurs (the old queen leaves the hive with some worker bees)

A drawing showing a queen bee



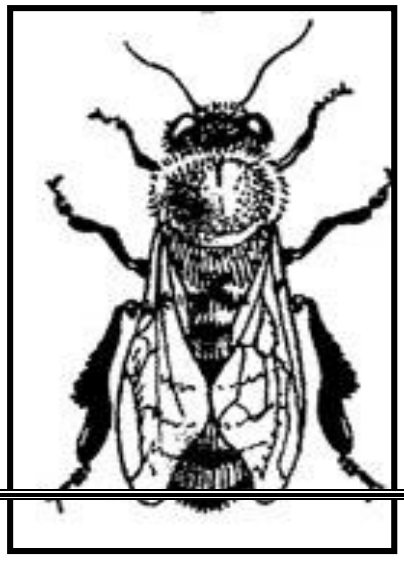
WORKER BEES

- Worker bees are sterile female bees **because** they lack an ovipositor
- They develop from fertile eggs
- They are the smallest bees in size
- They have a stinger **for protection**
- Worker bees die after stinging **because** its abdomen is damaged when the stinger is lost
- Worker bees form the biggest number in the hive **because** they perform all the duties in the hive
- They have a pollen basket **for carrying pollen and propolis**
- They use a proboscis **to suck nectar**
- They use a nectar sac inside their abdomen **to carry nectar**

Roles of a worker bees in the hive

- They feed the queen, drone and grubs
- ✓ Worker bees which feed the queen are called **Nurse bees**
- They guard the hive
- ✓ By stinging enemies
- They collect nectar, pollen, propolis and water
- They make honey
- ✓ Honey is made from water, nectar and pollen
- They clean the hive
- ✓ By removing the bodies of killed drone bees
- They repair the hive
- They build honey combs and brood combs
- ✓ They use wax to build honey combs
- They regulate temperature inside the hive
- ✓ By fanning the hive
- They look for a new site

A drawing showing a worker bee



PROPOLIS

- This is a sticky substance collected by worker bees from plants.

Uses of propolis to bees

- For repairing the hive
- For smoothing the hive
- For trapping dust and germs
- For making the hive water proof

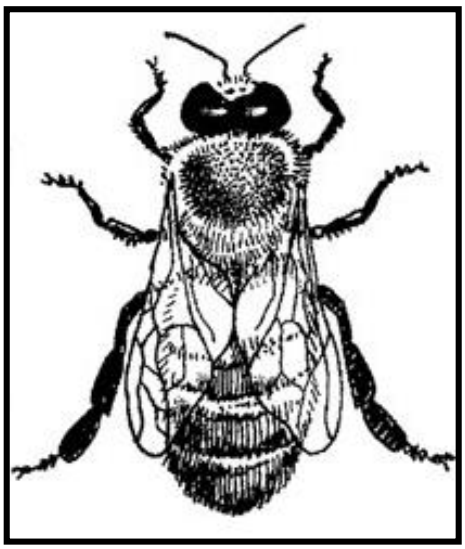
Uses of propolis to people

- It is used to heal cuts and wounds
- It is used to make office glue

DRONE BEE

- It is a male bee in the hive
- It develops from **unfertilized eggs**
- It has a stout shape
- It is the second biggest in the hive
- Its main role in the colony is **to mate with the queen bee**
- It has a broad blunt (round bottomed) abdomen
- It has no stinger
- It makes a buzzing sound when flying
- It dies after mating **because** its male organs break off during mating hence damaging the abdomen
- Drones are rarely found in the hive **because** they are stung to death by worker bees during food shortage

A drawing of a drone bee



Activity

1. Give the meaning of the following terms as used in keeping honey bees.
   a) Apiculture
   b) Apiary
   c) Apiarist
   d) Bee colony
   e) Bee swarm
2. Why are honeybees called social insects?
3. Name any one product got from bees
4. Why do bees visit flowers?
5. How do people make use of honey?
6. How do crops benefit from the act of bees visiting them?
7. Name the special food on which the queen bee feeds?
8. How is an ovipositor important to queen bees?
9. Name the female sterile bee in the hive
10. Give any two characteristics of worker bees.
11. Why does a worker bee die soon after stinging?
12. State any one structural difference between a drone bee and a queen bee.
13. Mention any two roles of worker bees in the hive.
14. Which type of bees make a buzzing sound?

THE LIFE CYCLE OF A HONEY BEE

- Honey bees undergo **complete life cycle** (4 stages of development)
- The queen bee lays eggs
- Eggs develop into larvae
- Bee larvae are called **grubs**
- **Grubs** are fed by worker bees
- Larvae develop into pupae
- Larvae and pupae are found in **brood combs**
- The pupae neither feed nor move
- Pupae develop into adult bees

TYPES OF EGGS LAID BY QUEEN BEE

- Fertilized eggs
- Unfertilized eggs

Note:

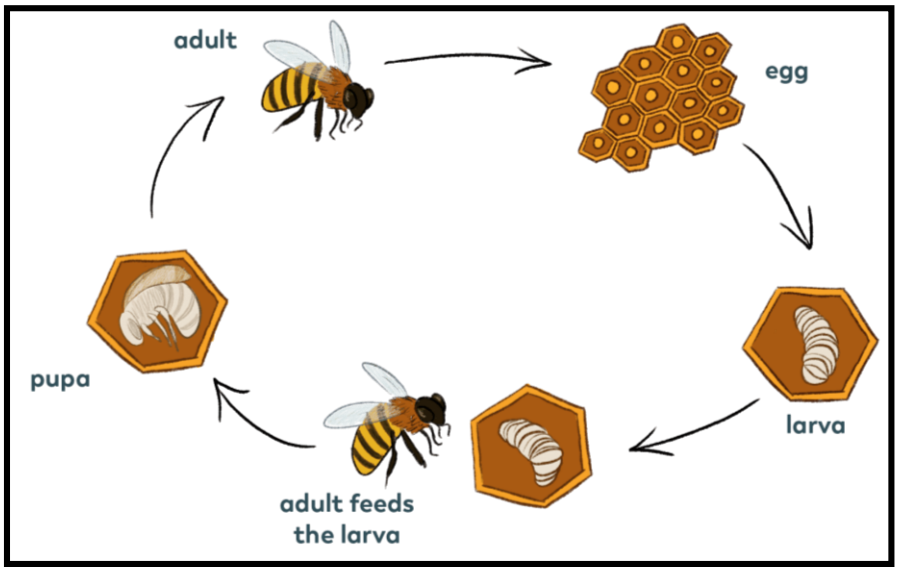
- ✓ Fertilized eggs develop into **queens** and **worker bees**
- ✓ Unfertilized eggs develop into **drone bees**

- ✓ The adult stage in the life cycle of insects is called **imago**

What makes fertile eggs to either develop into a queen or worker bee?

- The change of food during the larva stage
- ✓ Larvae to develop into worker bees are fed on **honey** and **pollen**
- ✓ Larvae to develop into queen bees are fed on **royal jelly**

A diagram showing the life cycle of bees



SWARMING

- This is the massive movement of bees from one place to another looking for a new hive.

What is absconding in bees?

- This is condition when all bees move from the hive looking for a new hive.

REASONS FOR SWARMING IN BEES (CAUSES OF SWARMING IN BEES)

- When the hive is damaged (leaking)
- When bees are attacked by enemies
- When a new queen bee develops
- Bad smell around the hive
- A lot of noise around the hive
- Overcrowding of bees in the hive
- Direct smoke into the hive
- Direct sunshine into the hive
- Lack of flowering plants and water in an area
- Dampness of the bee hive

HOW TO PREVENT SWARMING IN BEES

- Siting a beehive near flowering plants
- Siting a beehive near open water sources
- Feeding bees during drought conditions
- Siting a beehive in a quiet place

- Protecting the beehive from direct sunshine
- Protecting bees from their enemies

BEE HIVE

- This is a habitat for bees
- This is a structure in which bees are kept

Types of beehives

- Traditional (local) beehive
- Modern beehive

i) **TRADITIONAL BEEHIVES**

- These are bee hives made out of local materials e.g. hollow logs, grass, woven sticks, cow dung and reeds.

Examples of traditional (local) beehives

- Kigezi beehive
- Dug out log hive
- Tin hive

DRAWINGS SHOWING TRADITIONAL BEEHIVES

ADVANTAGES OF TRADITIONAL (LOCAL) BEE HIVE

- It is cheap
- The colony is not always disturbed by a bee keeper
- It is easy to make

Why?

- Materials are locally available

DISADVANTAGES OF LOCAL BEE HIVE

- Honey is always mixed with eggs
- The hive is damaged during honey harvesting
- It is difficult to inspect honey combs
- It is difficult to prevent swarming
- The brood is disturbed during honey harvesting
- It is wasteful

ii) **MODERN BEEHIVES**

- These are hives made from modern materials e.g. tins, wire mesh and iron sheets

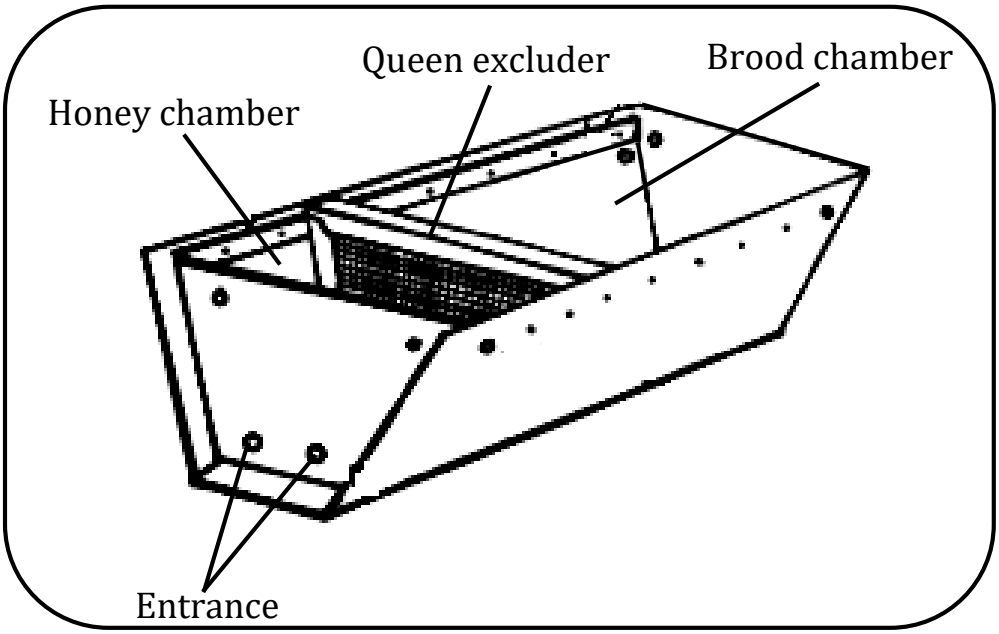
Examples of modern bee hives

- Top bar hive
- Box hive

Modern bee hives have two chambers, namely;

- Brood chamber
- Honey chamber

INTERNAL STRUCTURE OF A MODERN BEE-HIVE



IMPORTANCE OF EACH PART OF A MODERN BEEHIVE

Entrance

- It is the passage of worker bees in and out of the hive

Brood chamber

- It is where honey is kept

Honey chamber

- It is where the queen, drone and the brood are found

Queen excluder

- This is the structure that separates the brood chamber and the honey chamber
- It has small holes to allow only the worker bees to pass through and feed the queen
- The queen cannot move to the honey chamber **because** it is too big to pass through the small holes in the queen excluder

Importance of queen excluder in a modern beehive

- It prevents the queen from laying eggs in honey

ADVANTAGES OF MODERN BEEHIVES

- Clean honey is harvested
- Modern hives are durable (long lasting)

- The hive is not damaged during honey harvesting
- It is easy to inspect honey combs

DISADVANTAGES OF MODERN BEEHIVE

- It is expensive to make

Activity:

1. What name is given to the structure in which honey bees are kept?
2. Name any two materials from which traditional bee hives are made.
3. Point out any one example of local hives.
4. State any one advantage of using traditional bee hives.
5. Mention any one example of modern bee hives.
6. How is a queen excluder useful in a box hive?
7. Why do most bee keepers prefer modern bee hives to local ones?

HARVESTING HONEY

- This is the removal of honey combs from the bee hive
- ✓ Honey should be harvested in the evening **because** all the bees are inside the hive and calm

DISADVANTAGES OF HARVESTING HONEY AT NIGHT

- The brood may be crushed and contaminate honey
- It is difficult to separate brood combs and honeycombs

EQUIPMENT NECESSARY DURING HARVESTING HONEY AND THEIR IMPORTANCE

EQUIPMENT	IMPORTANCE
Bucket	To put in honey combs / for collection of honeycombs
Bee veil	To prevent worker bees from stinging the face of a honey harvester
Bee keeper's gloves	To prevent worker bees from stinging the hands of a honey harvester
Gumboots	To prevent worker bees from stinging the feet of the honey harvester
Protective clothing (Overall)	To prevent worker bees from stinging the body of a honey harvester
Smoker	To puff smoke that calms (tames) bees
Knife	To cut honey combs

STEPS FOLLOWED WHEN HARVESTING HONEY

1. Puff smoke into the hive
- ✓ To tame/calm the bees
2. Lower the hive
- ✓ To prevent damaging the honey combs

3. Open the hive
4. Cut the honey combs

NOTE

- ✓ Some honey combs should be left in the hive **for the worker bees to get food as they build new ones**

A simple drawing showing an apiarist ready to harvest honey

FACTORS TO CONSIDER WHEN HARVESTING HONEY

- Don't frighten the bees while harvesting
- Don't kill bees while harvesting
- Dress properly in suitable clothes
- Use a smoker
- Bees should not be crushed while harvesting honey
- Only remove combs capped with honey
- Don't remove any honey combs containing brood

HONEY EXTRACTION

- This is the removal of honey from honey combs.

METHODS OF EXTRACTING HONEY

- Floating the wax
- Centrifuging method
- Pressing honey method
- Solar melter method

Of what use is a strainer during honey extraction?

- It is used to remove impurities from honey

CARE AND MANAGEMENT OF BEES

SITING THE BEE HIVE (SETTING A BEE HIVE)

- This is the selecting of a suitable place where to put a bee hive

APIARY

- This is a place where many bee hives are kept or set

FACTORS TO CONSIDER WHEN SITING HIVES

- Bee hives should be kept in quiet places (bees don't like noisy places)
- Bee hives should be protected from direct sunshine and wind
- Bee hives should be in places near water source
- Bee hives should be in places near flowering plants
- Bee hives should not be near a school
- Bee hives should not be near farm animals
- Bee hives should not be near market place
- Bee hives should not be near main road and houses
- Bee hives should be in places with short grass

STOCKING THE HIVE

- This is the act of putting bees in an empty hive
- This is the act of encouraging bees to occupy an empty hive

Ways of stocking the hive

- Use of a catcher box
- Use of a swarm catching net
- Smearing beeswax inside the new hive

DIAGRAMS SHOWING CATCHER BOX AND SWARM CATCHING NET

Note

- ✓ A swarm catching net has a longer handle to catch a higher swarm

BAITS IN BEE KEEPING

- These are things used to attract a swarm of bees into a new hive

Examples of baits in bee keeping

- Beeswax
- Syrup (sugar solution)
- Lime juice
- Granulated sugar

FEEDING BEES

- Bees naturally feed on **nectar** from flowers

Conditions that make farmers provide supplementary feeds to bees

- When the colony is new in a hive
- During the drought conditions
- To encourage multiplication

Examples of supplementary feeds for bees

- Syrup (ordinary sugar mixed with water)
- Ordinary water put in a container at a distance of 10m from the hive

HANDLING OF BEES BY A BEE KEEPER

There are three occasions when a bee farmer handles bees;

- When harvesting honey
- When inspecting honey combs
- When stocking the hive

ENEMIES OF BEES (BEE PESTS)

- Safari ants **and** Red ants
- Honey Badgers: These spoil the hives, kill bees and eat honey
- Wax beetles
- Wax moths
- Wasps
- Mockingbirds
- Termites

WAYS OF PROTECTING BEES FROM ENEMIES (BEE PESTS)

- Hang the hive between poles
- ✓ To prevent ants and termites from destroying the hive
- Smear oil at the bases of poles
- ✓ To prevent termites from destroying the poles holding the hives
- Put grease on the wires

- ✓ To prevent ants and termites from reaching the hive
- Repair broken hives
- ✓ To prevent honey badgers

DISEASES OF HONEY BEES

- Varroosis
- American foulbrood
- Chalkbrood
- Sacbrood

CONTROL OF DISEASES IN HONEYBEES

- Keep the hive free from dampness
- Disinfect a hive where bees have died
- Burn all infected combs

TOPIC TWO: MEASURES

Regular shaped objects

- These are objects with defined shape (definite shape)

Examples of regular objects

- Cube
- Cuboid (brick, box, block)
- Cylinders
- Cone

Measuring regular shaped objects.

(a) Length

This is the distance between points

Units for measuring length

- millimetres (mm)
- centimetres (cm)
- decimetres (dm)
- metres

- decametres (Dm)
- Hectometres (Hm)
- Kilometres (Km)
- The standard unit for measuring length is **kilometre**
- The basic nit for measuring length is **metre**

VOLUME

- Volume is the space occupied by an object.
- Volume is measured in **cubic units**

Examples of Cubic units

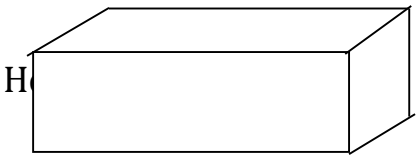
- Cubic metres
- Cubic centimetres (cc)
- Cubic millimetres

Other units of volume apart from cubic units

- Litres
- Millilitres
- Centilitres

FINDING VOLUME OF REGULAR SHAPED OBJECTS

The volume of regular objects like cuboids e.g. boxes blocks bricks etc, can be found after knowing their length, width and height.



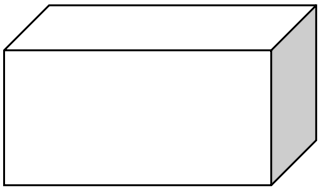
Length (L) width (W)

Volume = Length x width x Height

Exercise

1. Find the volume of the figures.

(a)



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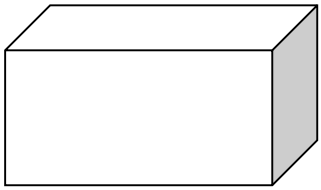


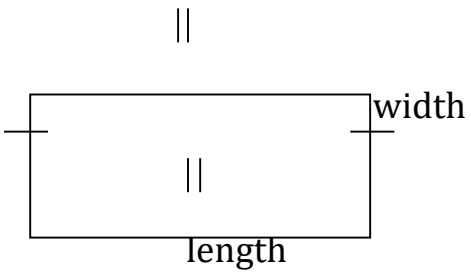
2. Find the volume of a brick of length 6cm width 4cm and height 3cm.
3. Find the area of a cube whose side is 3cm.

CAPACITY

- This is the amount of liquid a container can hold
- Capacity is measured in **litres**

AREA

- Area is the total space occupied by a figure
- Area is measured in **square units**
- In two dimensional figure, the longer side is the length while the shorter side is the width.



IRREGULAR OBJECTS

- These are objects which don't have well defined shape
- These are objects with undefined shape (indefinite shape or improper shape)

<u>Examples of irregular objects</u>

- Stones
- Keys
- Needles
- Broken glass
- Orange
- Mango
- Padlock
- Pen

Finding volume of irregular objects

- The volume of irregular objects is measured using **measuring by displacement.**

Equipment used when using measuring by displacement method

- Measuring cylinder

To measure the volume of displaced water

- Overflow can (eureka can)
- String (thread)

To lower the irregular object gently into the container

- Water

Containers (instruments) used in measuring by displacement

(a) Measuring cylinder
(b) Over flow can (Eureka can)

Why is measuring by displacement method called so?

- It involves measuring the volume of displaced water

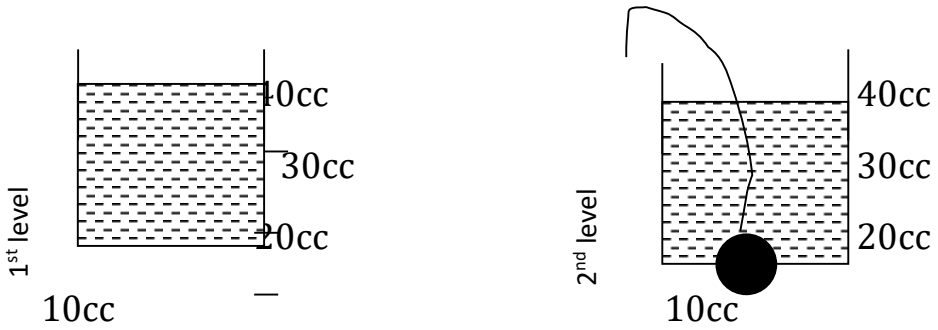
Using a measuring cylinder

Pour water into a measuring cylinder and record its volume

Tie a thread on an irregular object and lower it into the measuring cylinder

Record the new volume of water

The difference between volume of water is the volume of the stone



volume of the stone = 2nd level – 1st lever

= 35cc – 30cc

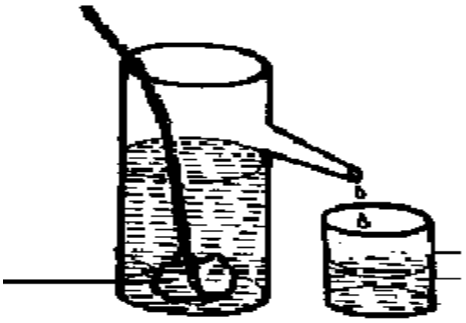
= 5cc

The volume of water is 5cc because the amount of water displaced is always equal to the volume of the irregular object.

Using an overflow can (eureka can) and measuring cylinder

- Fill the overflow can with water up-to level of the spout
- Lower an irregular object into the overflow can using a thread
- Water will overflow via the spout to the measuring cylinder
- The volume of the irregular object is equal to the volume of water in the measuring cylinder
- The volume of irregular object is the same as the volume of water in measuring cylinder

Find the volume of the stone by reading the level of water in the cylinder.



The volume of the irregular object is 10cc.

Weight

- Weight is the force of gravity acting on an object
- Weight is measured in Newtons (N)
- Weight is not constant (it changes)
- Weight is measured using an instrument called **spring balance**

Factors that determine weight of an object

- Size of the object
- Nature of the object
- Upthrust force (buoyancy)
- Force of gravity (gravitational pull)

Note:

Objects weigh less on the moon than on earth **because** the moon's gravity is less than earth's gravity

When lifting up objects, we are overcoming the **force of gravity.**

It is difficult to push a wheel barrow uphill **because** we are opposing the force of gravity.

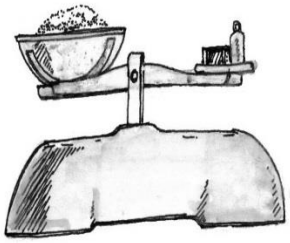
It is easier to push a wheel barrow downhill **because** we are helped by the force of gravity.

MASS

- This is the amount of matter in an object
- Mass is constant **because** it doesn't depend on the force of gravity
- The standard unit for mass is **kilogram (Kg)**
- The basic unit for mass is **gram (g)**

Examples of machines used for measuring mass

- Beam balance
- Set of scales
- Scale balance
- Lever balance

(a) Beam balance	(b) Spring balance	(c)set of scales	(d) scale balance
			

DIFFERENCES BETWEEN MASS AND WEIGHT

MASS	WEIGHT
Mass is the amount of matter in an object	Weight is the force of gravity acting on an object
Mass is constant	Weight changes (it is variable)
Mass is measured in Kilograms or grams	Weight is measured in grams

DENSITY

- Density is the mass of an object per unit volume
- Density (D) = mass (M)
  = Volume

$$D = \frac{M}{V}$$

Density is measured in kilograms per cubic metre (kg/cm3) or grams per cubic centimetre (g/cm3)

IMPORTANCE OF DENSITY

- It enables us to identify pure and impure substances
- It enables us to find mass of an object

- It enables engineers to use strong metals that are not heavy to make bodies of aeroplanes

Finding Density

Example I

Find the density of an object of mass 150g and volume 3cc.

solution

D = M mass = 150g

V volume = 30cc

D = 5g/cc

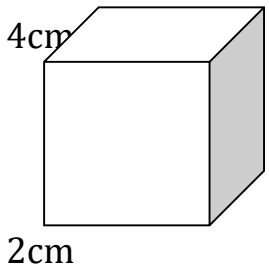
D = 150

30

Example 2

If the mass of the cuboid is 48g.

Find its density



6cm

Now, D = $\underline{M}$ mass = 480g

V volume = $48cm^3$

Solution

Here, we are not given the volume of we first find the volume

V = LxWxH

= 6x2x4

= 48cm^3

Example 3

calculate the volume of a stone of mass 48g and density 6g/cc

Solution

We are asked to find volume

so, D = M $\frac{\text{mass}}{\text{Volume}}$ = 48g but density = 6g/cc

$\frac{6}{1} = \frac{48}{v}$

$\frac{6v}{6} = \frac{48}{6}$

volume = 8cc

(Substitute the values and cross multiply)

Note: We can use the triangle below to help us to remember the formular used.

DENSITIES OF SOME SUBSTANCES

Substance	**Density** (g/cc)
Gold	19.3
Mercury	13.6
Lead	11.3
Silver	10.5
Copper	8.9
Brass	8.3
Iron	7.8

Tin	7.3
Aluminium	2.7
Glass	2.7
Rubber	1.3
Salt solution	1.2
Water at $4c^0$	1.0
Ice	0.92
Methylated spirit	0.83
Kerosene	0.8
Alcohol	0.8
Petrol	0.7
Cork	0.25
Air	0.0012
hydrogen	0.00009

The density of pure water is 1 g/cc

Materials having density of less than 1 g/cc will float on water

Materials having density of more than 1 g/cc will sink on water

- Aluminum is used to make bodies of aeroplanes because it has low density (Aluminum is light)
- Objects that are less dense than water will always float on water
- A substance which is denser than water always sink in water e.g. iron, brass, nails, stones, sand etc

Hydrometer

This is an instrument used for measuring the density of different liquids e.g. milk, beer, wine, acids in batteries etc.

- A special hydrometer used to measure density of milk is called **lactometer**

Behaviour of objects when put in water

- ❖ Floating
- ❖ Sinking

Floating

Floating is when an object remains on top of water

Floating objects

These are objects that remain on (top) surface of water.

- Objects float on water because they are less dense than water.
- The density of water is 1g/cc and therefore, objects whose density is less than 1g/cc float on water.

Liquids that float on water

- ✓ Kerosene
- ✓ Petrol
- ✓ Diesel
- ✓ Cooking oil
- ✓ Lubricating oil

Other things that float on water

- ✓ Cork
- ✓ Plastic cup
- ✓ Ice
- ✓ Boats
- ✓ Dry wood
- ✓ Sponge
- ✓ Leaf
- ✓ Feathers

Objects weighs less in water **due to upthrust (buoyancy)**

Sinking

Sinking is when an object goes to the bottom of water.

Sinking objects

These are objects that go to the bottom of water.

- Objects sink in water because they are denser than that water.
- Objects whose density is more than 1g/cc sink in water.

Examples of sinking objects

- Stone
- Sand
- Metal rod
- Steel bar
- Glass
- Iron nail
- Mercury

Note:

A sinking object displaces water equal to its volume while a floating object displaces water equal to its weight.

MISCIBLE AND IMMISCIBLE LIQUIDS

MISCIBLE LIQUIDS

- These are liquids which that can mix easily.
- Miscible liquids form a uniform mixture.
- They have the same density but different boiling points

Examples of miscible liquids

- Water and alcohol
- Kerosene and alcohol
- Miscible liquids are separated by **fractional distillation**

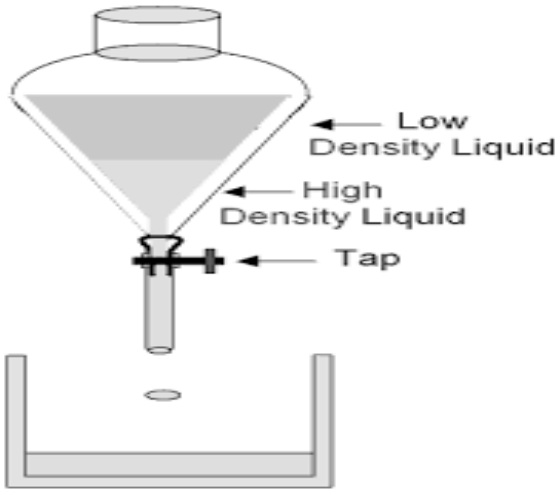
IMMISCIBLE LIQUIDS

- These are liquids that cannot mix
- They cannot form a uniform mixture.

Examples of immiscible liquids

- Water and petrol
- Oil and water
- Mercury and water

Immiscible liquids are separated using a **separating funnel**



TOPIC THREE: IMMUNIZATION

IMMUNIZATION

- This is the introduction of vaccines into the human body to boost immunity

TYPES OF IMMUNIZATION

- Primary immunization
- Mass immunization
- Booster immunization

PRIMARY IMMUNIZATION

- This is done to all children below the age of 5 years

MASS IMMUNIZATION

- This is done to all people in case there is a disease outbreak in an area

BOOSTER IMMUNIZATION

- This is done to maintain the required amount of antibodies in the human body

IMPORTANCE OF IMMUNIZATION

- It prevents immunizable diseases
- It boosts immunity
- It reduces infant mortality rate

IMMUNITY

- This is the ability of the body to resist diseases

TYPES OF IMMUNITY

- Natural immunity
- Artificial immunity

NATURAL IMMUNITY

- This is the type of immunity that does not involve use of vaccines

Ways of acquiring natural immunity

- Through breastfeeding
- After recovering from sickness (illness)

Why is it dangerous to acquire immunity after recovering from illness?

- It may lead to death

ARTIFICIAL IMMUNITY

- This is the type of immunity that involves the use of vaccines

How does the body acquire artificial immunity?

- By immunization
- ✓ This is the best way of acquiring immunity
- Through injection of prepared antibodies (serum) into the body

VACCINES

- These are medical drugs used for immunization

IMPORTANCE OF VACCINES

- They boost immunity

How do vaccines boost immunity?

- They stimulate the production of antibodies (They enable the body to produce antibodies)

What are antibodies?

- These are chemical substances produced in the body to fight against diseases

METHODS OF ADMINISTERING VACCINES (METHODS OF IMMUNIZATION)

- Oral method
- Injection method

TYPES OF VACCINES

- Killed vaccines
- Live-attenuated vaccines
- Toxoid vaccines

LIVE-ATTENUATED VACCINES

- These are vaccines made from wakened live germs

Examples of live-attenuated vaccines

- Yellow fever vaccine
- Rotavirus vaccine
- Measles vaccine
- Rubella vaccine
- BCG vaccine
- Chicken pox vaccine
- Mumps vaccine
- Oral polio vaccine (OPV) or Sabin polio vaccine

KILLED (INACTIVATED) VACCINES

- These are vaccines made from killed germs

Examples of killed (inactivated) vaccines

- IPV (inactivated polio vaccine) or Salk polio vaccine
- Rabies vaccine
- Cholera vaccine
- DPT vaccine (DTaP vaccine) **for** pertussis

TOXOID VACCINES

- These are vaccines made from toxins produced by germs

What are toxins?

- These are poisonous substances produced by germs

Examples of toxoid vaccines

- TT vaccine (Tetanus toxoid vaccine)
- DPT vaccine for diphtheria and tetanus

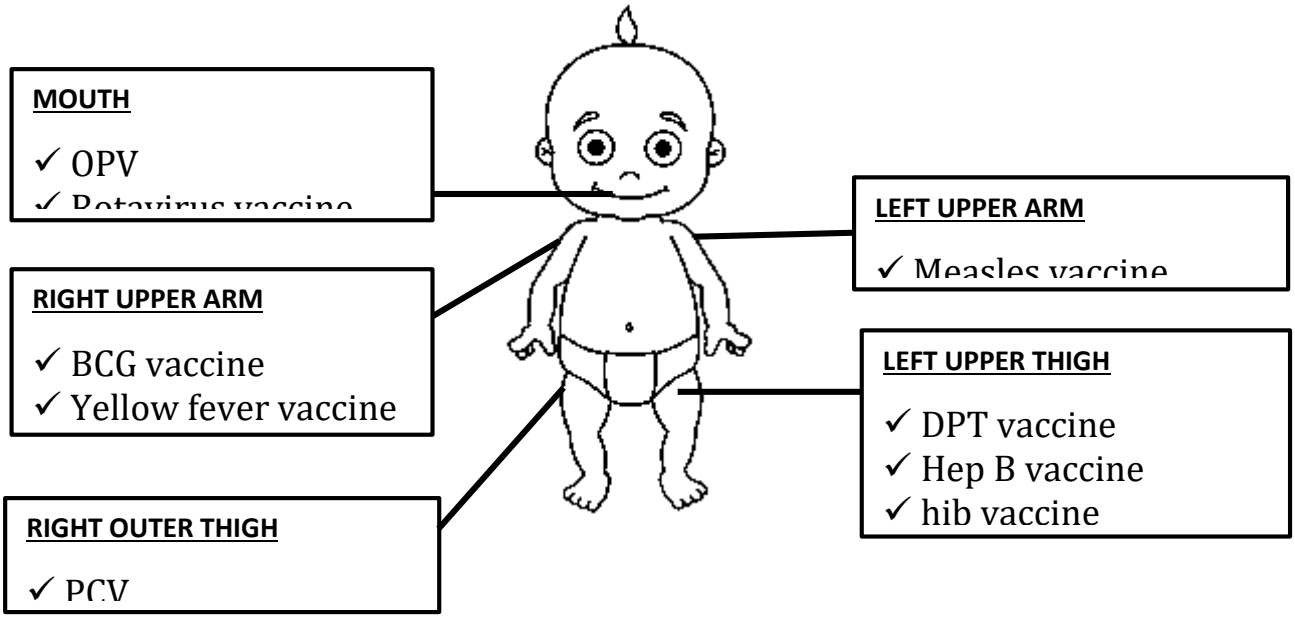
Activity:

1. What do you understand by the term immunization?
2. Which type of immunization is done to all children below 5 years?
3. Give any one reason why patents should take their children for immunization
4. What is immunity?
5. Which type of immunity is acquired through breast feeding?
6. How best can babies acquire artificial immunity?
7. What name is given to medical substances used during immunization?
8. State any one way of administering vaccines.
9. How are vaccines useful in our bodies?
10. Which type of vaccines are made from killed germs?

IMMUNISATION SITE

- This is the part of the human body where a vaccine is administered

IMMUNISATION SITES ON HUMAN BODY



Why are vaccines injected at different parts of the body?

- For easy identification of the disease immunized

EXAMPLES OF VACCINES, METHOD OF ADMINISTRATION, IMMUNISATION SITES AND DISEASE

Vaccine	Method of administration	Immunization site	Disease
BCG vaccine	Injection method	Right upper arm	Tuberculosis (TB)
DPT (DTaP) vaccine	Injection method	Left upper thigh	Diphtheria, Pertussis, Tetanus
Measles vaccine	Injection method	Left upper arm	Measles
OPV	Oral method	Mouth	Poliomyelitis (polio)
PCV	Injection method	Right outer thigh	Pneumonia
Rotavirus Vaccine	Oral method	Mouth	Diarrhoea
HPV vaccine	Injection method	Left upper arm	Cervical cancer
Yellow fever vaccine	Injection method	Right upper arm	
Hep B vaccine	Injection method	Left upper thigh	Hepatitis B
hib vaccine	Injection method	Left upper thigh	Haemophilus influenza type B

Why are babies given BCG and polio vaccines at birth?

- Babies are born without immunity against Tuberculosis (TB) and polio

Why is measles vaccine given at the age of 9 months?

- Babies are born with immunity against measles which lasts for 9 months

Why was DPT replaced with DTaP?

- DTaP has fewer side effects than DPT

Write the following vaccines in full

- **OPV:** Oral Polio vaccine
- **IPV:** Inactivated Polio vaccine
- **BCG**: Bacille Calmette-Guerin (Bacillus of Calmette and Guerin)
- **DPT:** Diphtheria, Pertussis and Tetanus
- **DTaP:** Diphtheria, Tetanus and Pertussis (whooping cough)
- **HPV:** human papillomavirus vaccine
- **Hib:** Haemophilus influenza type B

Why DPT (DTaP) is called a triple vaccine?

- It prevents three immunizable disease

Why is DPT - Hep B + Hib vaccine called a pentavalent vaccine?

- It prevents five immunizable diseases

Why is polio vaccine given very many times?

- Polio virus is very resistant to vaccines
- To build a stronger immunity against polio virus since it is very resistant to vaccines

Why is Polio vaccine always given orally?

- It is very effective when given orally than injection

IMMUNISABLE DISEASES

- These are diseases that can be prevented by immunization

CHILDHOOD IMMUNISABLE DISEASES

- These are immunizable diseases common in children below the age of 5 years

EXAMPLES OF CHILDHOOD IMMUNIZABLE DISEASES

- Measles
- Tuberculosis
- Polio
- Whooping cough
- Hepatitis B
- Haemophilus influenza B

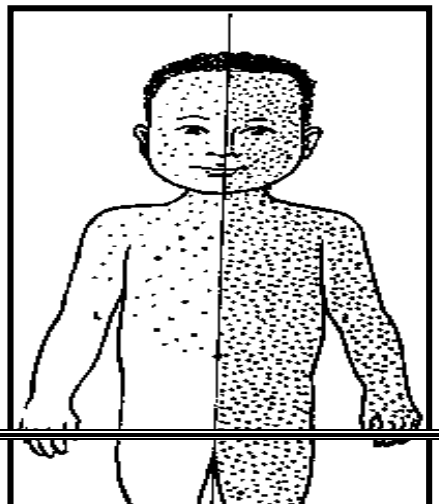
- Diphtheria
- Tetanus

SUMMARY TABLE FOR IMMUNISABLE DISEASES, VACCINES, MODE OF ADMINISTRATION, DOSES AND AGE

DISEASE	VACCINE	HOW IT IS ADMINISTERED	DOSES	AT WHAT AGE
Tuberculosis	BCG	Injection on upper right arm	1	At birth
Poliomyelitis	Polio vaccine (OPV)	Drops in the mouth	4	At birth 6 weeks 10 weeks 14 weeks
Diphtheria Whooping cough Tetanus Hepatitis – B Influenza – B Haemophilus	DPT Hep – B+ Hib	Injection on the left thigh	3	6 weeks 10 weeks 14 weeks
Measles	Measles vaccines	Injection on the left upper arm	1	9 months (36 weeks)

MEASLES (RUBEOLA)

- It is caused by a virus
- It is an air borne disease
- It affects the skin and lungs



How does measles spreads?

- Through inhaling contaminated air
- Through body contact with sick person
- Through sharing dirty clothes with sick person

Signs of measles

- Runny nose
- Skin rash
- Dry cough
- Watery eyes (red eyes)

Symptoms of measles

- Fever
- Sore throat
- Loss of appetite
- Body weakness

PREVENTION OF MEASLES

- Isolate and treat infected ones
- Immunize children against measles

POLIOMYELITIS (POLIO)

- It is an immunizable waterborne disease
- It is caused by a virus
- It affects the skeleton (bones) especially the limbs and the muscles

Signs of poliomyelitis

- Paralysis of the limb
- Stiffness of the neck
- Stiffness of the back
- Vomiting

Symptoms of poliomyelitis

- Muscle weakness
- Headache
- Sore throat
- Fever
- Neck pain
- Back pain

Effect of poliomyelitis to an individual

- It leads to lameness

WAYS OF PREVENTING AND CONTROLLING POLIOMYELITIS

- Immunization using polio vaccines (IPV & OPV)
- Drinking boiled water
- Proper use of latrines (proper disposal of human wastes)
- Wash hands with clean water and soap before eating food

How are crutches useful to a polio victim?

- Crutches help the polio victim to move

TUBERCULOSIS

- It is an immunizable airborne disease (droplet infection)
- It mainly affects the lungs and spine (backbone)
- It affects the respiratory system and skeletal system
- It is caused by a bacterium

Name the germ (bacterium) that causes tuberculosis

- Mycobacterium tuberculosis

How does tuberculosis spread?

- Through inhaling contaminated air
- Through drinking contaminated milk from tubercular (infected) cows
- Through sharing forks, cups and plates with an infected person

Signs of tuberculosis

- Chronic cough
- Loss of weight
- Severe sweating at night (severe night sweats)
- Thick sputum with blood

Symptoms of tuberculosis

- General body weakness
- Backache

- Mild fever

Ways of preventing and controlling tuberculosis

- Immunization using BCG vaccine
- Isolate and treat the infected persons
- Drink boiled or pasteurized milk
- Don't share forks, cups and plates with sick person

How is smoking related to TB?

- Smoking worsens tuberculosis

Name the Sexually Transmitted Disease always mistaken for Tuberculosis (TB)

- AIDS

Why is tuberculosis common among AIDS patients?

- They have weak immunity (due to loss of immunity)

Signs common in both tuberculosis and AIDS patients

- Chronic cough
- Loss of weight
- Severe sweating at night (severe night sweats)

TETANUS

- It is caused by bacteria found in the soil
- It affects the muscles
- The bacteria enters the body through fresh cuts or dirty wounds.
- In new born babies, it can enter through the umbilical cord if it is cut with a dirty instrument like a razor blade or knife

Signs of tuberculosis

- Stiffness of the muscles
- Stiffness of the jaw / Lockjaw

- The baby stops breast feeding

Symptoms of tuberculosis

- Fever
- Difficulty in swallowing
- Fast pulse

Why is tetanus called LOCK JAW disease?

- It makes the jaws of the baby to become stiff

PREVENTION AND CONTROL OF TETANUS

- Immunize children against tetanus (using DPT vaccine)
- Keep the wounds clean all the time.
- Immunize expectant mothers (pregnant women) with TT vaccine
- ✓ To protect them and the unborn babies from tetanus infection
- ✓ To enable the unborn baby get immunity against tetanus
- Immunize teenage girls with TT vaccine
- ✓ To prevent them from getting tetanus

GROUPS OF PEOPLE WHO ARE GIVEN TT VACCINE

- Teenage girls
- Pregnant women
- Accident victims

Why is DPT vaccine given to babies at 6 weeks?

- Babies are born with maternal immunity that lasts six weeks.

Whooping cough (pertussis)

- It is caused by bacteria
- It is an airborne disease (droplet infection)
- It spreads through inhaling contaminated air
- It affects the lungs

Signs and symptoms

- Severe cough (coughing spells)
- Gasps for breath
- Runny nose

Prevention and control

- Immunise babies using DPT vaccine

Diphtheria

- It is caused by bacteria
- It affects the nose and throat
- It spreads through inhaling contaminated air

Signs and symptoms

- Sore throat
- swollen neck

Hemophilus influenza type B

This disease is casued by a virus

It is prevented using Hib vaccine.

Hepatitis B

It is caused by a virus

It affects the liver

How does hepatitis B spread?

Through playing unprotected sex with infected person

Through body contact with infected body fluids

Signs of hepatitis B

Dark urine

Vomiting

Jaundice (yellow eyes and soles of feet)

Prevention of hepatitis B

Immunise with Hep B vaccine

Avoid playing unprotected sex with infected person

Avoid sharing needles with infected person

<u>Other immunisable</u>

- cholera
- meningitis
- Yellow fever
- Diarrhoea
- Pneumonia
- Cervical cancer (affects the female reproductive system)
- German measles (rubella)
- rabies
- Small pox

Effects of immunisable diseases

- ❖ Increased death rate of infants
- ❖ Lameness
- ❖ Mental disabilities

Roles of individuals, families and communities in immunisation

Parents

- Taking their children for immunisation.
- Participating in community immunisation activities and programme
- Assisting schools to identify children who are not immunised

Children

- Taking their siblings (young brothers and sisters) for immunisation
- Informing parents about the day for immunisation
- Reciting songs and plays on immunisation
- Helping to identify children who have not been immunized in the community

Government

- Announcing immunisation centres
- Announcing outbreak of immunisable disease
- Announcing immunisation days
- Educating people about immunisation
- Funding immunisation programmes
- Distributing vaccines to health centres

Community leaders

- Inviting health workers to educate members about immunisation
- Encouraging members to organize immunisation centres

- Encouraging members to take their children for immunisation
- Reporting immunisable disease outbreak

Child to child programme

This is the health programme where older children help their siblings to solve health problems.

Child health card (Immunisation card)

- ❖ This is a document that contains child's health information

Information on the child health card

- ❖ Child's birth weight
- ❖ Child's name
- ❖ Child's date of birth
- ❖ Growth graph of a child
- ❖ Sex of the child
- ❖ Next date for immunisation
- ❖ Diseases immunised
- ❖ Mother's name
- ❖ Father's name
- ❖ Parents' occupation
- ❖ Place of residence

Importance of child health card

- It helps a parent to monitor the child's growth
- It helps the parent to know the next date for immunisation.
- It helps the doctor to know diseases immunised
- It helps the doctor to know which dose is remaining.

How can one identify whether a baby was immunised against TB or not ?

- ❖ By checking the child health card
- ❖ By checking the injection scar on the right upper arm

Government and NGOs which help to carry out immunisation activities in Uganda

- WHO

WHO stands for World Health Organisation

- UNICEF

UNICEF stands for United Nations Children's Fund

- UNEPI

UNEPI stands for Uganda National Expanded Programme on Immunization

It is under Ministry of Health

Role of UNEPI

- ❖ It organises National Immunisation Days
- ❖ It provides immunisation equipment
- ❖ It distributes vaccines to health centres
- ❖ It educates people about immunisation

NID stands for National Immunisation Days

Other organizations that support UNEPI in immunisation

- ➢ Churches
- ➢ Schools
- ➢ Rotary clubs
- ➢ Save the Children's Fund (SCF)

Why has the government of Uganda made immunisation free of charge?

- ❖ For all ugandans to be immunised

Reasons why children in some families are not immunised.

- ❖ Ignorance of immunisation
- ❖ Cultural beliefs in some families
- ❖ Limited access to immunisation services

Name the vaccine that prevents Neonatal tetanus

- ❖ Tetanus Toxoid vaccine

Activity

1. What is immunization?
2. Define the following terms
   a) Immunity
   b) Antibodies
   c) Immunisation site
   d) vaccines
3. Name the two types of immunisation
4. What type of immunity does a baby acquire from the mother through breast feeding ?
5. Give the meaning of artificial immunity.
6. State two ways the body may acquire natural immunity
7. How does the body acquire artificial immunity?
8. State two methods of administering vaccines in the body
9. Name the vaccine given to children to prevent diarrhoea.
10. How is polio vaccine administered?
11. Name vaccine administered to babies at the age of 36 weeks.

12. Name the vaccine that provides immunity against Diphtheria, whooping and Tetanus.
13. Why is DPT(DTaP) vaccine called triple vaccine?
14. State any two importance of a child health card.
15. Write UNEPI in full.
16. Name any two domestic animals that are vaccinated (Immunised)
17. State two reasons why parents take their children for immunization.
18. Why are expectant mothers given Tetanus Toxoid vaccine?
19. State one vaccine that is given as single dose to a baby.
20. Name one vaccine that is administered orally besides polio vaccine
21. Why is polio vaccine given to a child at birth?
22. Why is measles vaccine given after nine months?
23. How can a P.5 pupil participate in immunization campaign?
24. Name one type of vaccine
25. Why do some families fail to take children for immunization?

TOPIC FOUR: DIGESTION

BODY SYSTEMS

- A system is a group of organs that perform the same function
- An organ is a group of tissues that perform the same function
- A tissue is a group of cells that perform the same function
- A cell is the smallest unit of life

DIGESTIVE SYSTEM

- This is the body system that breaks down food into small soluble particles that can be absorbed into the body

DIGESTION

- This is a process by which food is broken down into soluble particles that can be absorbed in into the body
- It begins in the **mouth** and ends in the **ileum**

Importance of food digestion

- It breaks down food for easy absorption of nutrients

Types of food digestion

- Mechanical digestion
- Chemical digestion

MECHANICAL DIGESTION

- This is the physical breakdown of food into smaller particles
- It is done by the teeth and stomach walls

Examples of mechanical digestion

- Chewing of food
- Churning of food

CHEMICAL DIGESTION

- This is the breakdown of food into soluble particles by the help of enzymes

How does chemical digestion depend on mechanical digestion?

- Mechanical digestion increases the surface area of food for the action of enzymes

ENZYMES

- These are chemical substances that speed up chemical digestion

Importance of enzymes

- They speed up chemical reactions/digestion
- Enzymes act as catalysts in chemical reactions

Characteristics of enzymes

- They are specific in action
- They work at specific pH
- They are destroyed (denatured) by heat
- They work under narrow temperature range
- They are needed in minute amounts

Why are enzymes denatured (destroyed) by heat?

- They are proteins in nature

Types of enzymes

- Amylase
- Lipase
- Protease

Conditions under which enzymes work

- Alkaline conditions
- Acidic conditions

What is meant by pH?

- This is the degree of acidity or alkalinity

Examples of enzymes and the medium (pH) in which they work best

Enzyme(s)	Medium of action (pH)
• Pepsin • Rennin	• Acidic medium
• Salivary amylase • Lipase	• Alkaline medium

• Trypsin • Peptidase (erepsin) • Sucrase	

Alimentary canal

- This is the long muscular tube that runs from the mouth to the anus
- It is up to 10 metres long.

How does food move in the alimentary canal?

- By peristalsis

What is peristalsis?

- This is the wave-like movement of food through the alimentary canal

Parts of the human digestive system

- gullet (oesophagus)
- liver
- stomach
- pancreas
- gall bladder
- bile duct
- Duodenum
- ileum
- large intestine (colon)
- appendix
- rectum
- Anus

Parts of the alimentary canal

- Gullet (oesophagus)
- stomach
- duodenum
- colon (large intestine)
- ileum
- rectum
- anus

Parts of the digestive system besides the alimentary canal

- Liver
- Pancreas
- Gall bladder

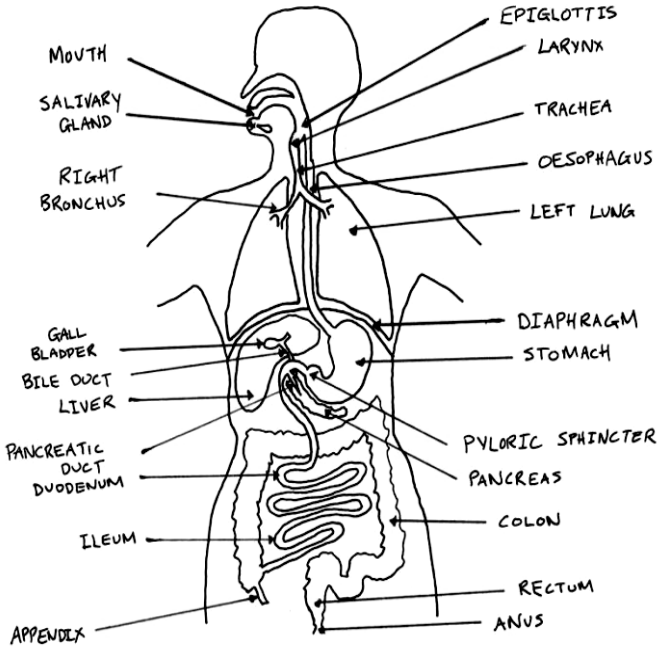
Name the three major glands of the digestive system

- Salivary glands
- Liver
- Pancreas

Activity

1. How does digestion differ from digestive system?
2. Where does digestion of food
   i) Begin?
   ii) End?
3. Name the two types of digestion
4. Mention any one example of mechanical digestion
5. State the role of enzymes in chemical digestion.
6. Name any two enzymes that work under acidic pH
7. How does eating hot food affect the chemical digestion?

THE STRUCTURE OF A HUMAN DIGESTIVE SYSTEM



DIGESTION OF FOOD IN THE MOUTH

- The teeth break down food
- Chewing increases the surface area of food for the action of enzymes

SALIVA (SALIVARY JUICE)

- This is the digestive juice found in mouth
- It is produced by **salivary glands**
- It contains an enzyme called **salivary amylase (ptyalin)**
- Salivary amylase works in alkaline conditions
- Salivary amylase works on carbohydrates
- Salivary amylase changes cooked starch to maltose
- Digestion of carbohydrates begins in the mouth

Importance of saliva

- It moistens/softens food
- It lubricates food for easy swallowing
- It cools hot food
- It contains salivary amylase that works on cooked starch

Why does the action of salivary amylase (ptyalin) stop when food reaches the stomach?

- Salivary amylase cannot work under acidic conditions in the stomach
- There are no alkaline conditions for salivary amylase to work

IMPORTANCE OF THE TONGUE

- It rolls food into bolus (small ball)
- It mixes food with saliva
- It pushes food to gullet

What prevents food from entering the wind pipe (trachea) during swallowing?

- Epiglottis

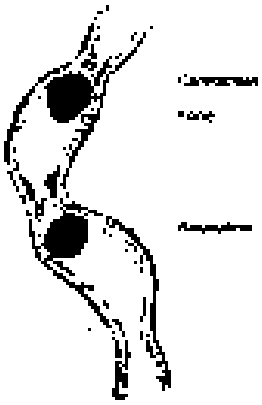
FOOD IN THE GULLET (OESOPHAGUS)

- Gullet is the tube that directs food from the mouth to the stomach
- Food moves from the gullet to the stomach by **peristalsis**

Importance of the gullet

- It passes (directs) food to the stomach

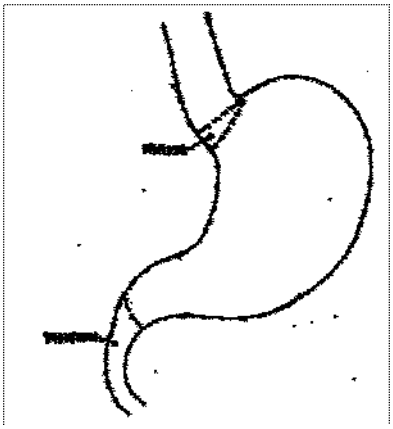
A diagram showing peristalsis in the gullet



FOOD DIGESTION IN THE STOMACH

- Stomach is a muscular bag that stores food for some time
- Food stays in the stomach for about 3 hours
- **Cardiac muscles** allow food into the stomach
- The stomach walls mixes food with digestive juices to form a chyme
- **Chyme** is the mixture of partly digested food and digestive juices in the stomach
- **Pyloric sphincter muscles** allow chyme into the duodenum
- The stomach has acidic conditions
- Chemical digestion of proteins begins in the stomach

Simple diagram to illustrate (The stomach)



Importance of stomach

- It stores eaten food for some time
- It churns food
- It is where digestion of proteins begins

Substances that are absorbed in the stomach

- Simple sugars
- Common salt
- Medicines
- Alcohol

Things produced by the stomach walls

- Gastric juice

- Hydrochloric acid
- Mucus

1. **GASTRIC JUICE**
   - This is the digestive juice found in the stomach

Name the two digestive enzymes in gastric juice

- Pepsin
- Rennin (chymosin)

Pepsin and Rennin work in acidic conditions

IMPORTANCE OF PEPSIN AND RENNIN

Pepsin

- It works on proteins

Rennin (chymosin)

- It clots milk proteins in the stomach of infants
- It curdles (coagulates) milk in the stomach of infants

How important is clotting of milk proteins in babies?

- It allows proper digestion of proteins
- It helps to separate proteins from fats
- It extends the period at which milk is retained in the stomach

2. **HYDROCHLORIC ACID**
   - It kills germs taken in with food
   - It provides acidic conditions for pepsin to digest proteins
   - It activates pepsin
3. **MUCUS**
   - It protects stomach walls from hydrochloric acid and enzymes

THE SMALL INTESTINES (SMALL BOWEL)

- It lies between the stomach and the large intestines

Parts of the small intestines

- **Duodenum:** it is the upper part
- **Jejunum:** it is the middle part
- **Ileum:** it is the lower part

FOOD IN THE DUODENUM

- The duodenum is the first part of the small intestines
- It is U-shaped and about 25cm long
- It is where digestion of fats begins
- No food absorption occurs in the duodenum
- It contains pancreatic juice and bile juice (bile)
- It receives bile juice through the bile duct

- It receives pancreatic juice through the pancreatic duct

Digestive juices found in the duodenum

- Pancreatic juice
- Bile juice (bile)

PANCREAS

- This is a digestive organ/gland below the stomach

Functions of pancreas

- It produces pancreatic enzymes
- It produces insulin hormone

Enzymes found in pancreatic juice (duodenum)

- Pancreatic amylase
- Lipase
- Trypsin

Enzymes in pancreatic juice work under alkaline condition

Pancreatic amylase

- It changes starch to maltose

Lipase

- It changes fats and oils (lipids) to fatty acids and glycerol

Trypsin

- It changes peptides to amino acids

Importance of the pancreas

- It produces pancreatic juice

BILE JUICE (BILE)

- This is a digestive juice which has no enzymes
- It is produced by the liver and stored in the gall bladder
- It does not contain any enzyme

Functions of bile during food digestion

- To breakdown (emulsify) fats in the duodenum
- To neutralize acidic chyme from the stomach
- To provide alkaline conditions in duodenum

GALL BLADDER

- This is a small pouch that sits under the liver
- The gall bladder is full of bile before a meal and it empty after a meal

IMPORTANCE OF GALL BLADDER

- To store bile juice (bile)
- To control the flow of bile juice into the duodenum

FOOD IN THE ILEUM

- The ileum is the lowest part of the small intestines
- The ileum is about 6 metres long
- Food digestion ends in the ileum
- Food absorption occurs in the ileum
- The ileum has finger-like structures/projections called **villi** that absorb digested food
- The walls of the small intestines produce (secrete) a digestive juice called **intestinal juice (succus entericus)**

Digestive enzymes found in intestinal juice (succus entericus)

- Maltase
- Lactase
- Sucrose
- Lipase
- Peptidase (erepsin)

Processes that occur in the ileum

- Food digestion
- Food absorption (it is the main process)

Main material absorbed in the ileum

- Digested food (food)

Food absorption

- This is the process by which digested food is taken into the blood stream.

ADAPTATIONS OF THE ILEUM TO ITS FUNCTIONS

- It is long

To increase surface area for food absorption

- It has many villi

To increase surface area for food absorption

- It has thin walls (thin epithelium)

For easy diffusion of digested food

- It has a dense network of blood capillaries

For easy diffusion of digested food

- It is coiled

To increase surface area for food absorption

- It has narrow lumen

To slow food movement that allows proper absorption

Why does digestion of food end in the ileum?

- It has many enzymes to complete food digestion
- It has villi to absorb digested food

HEPATIC PORTAL VEIN

- It carries blood with digested food from the ileum to the liver

Why does blood with digested food (blood from the ileum) go to the liver?

- For the blood to be detoxified (for the liver to remove toxic substances)
- For the liver to store excess nutrients

THE LIVER

- This is a reddish brown organ in the abdominal cavity below the diaphragm
- It is the largest organ in the human body

FUNCTIONS OF THE LIVER

- It produces bile juice (bile)
- It detoxicates blood (removes toxic substances from blood)
- It helps in deamination (converts excess amino acids into urea)
- It regulates blood sugar level
- It produces body heat
- It stores some **vitamins** (A, D, E and K) and **mineral salts** (iron and potassium)

Why does a dead body (corpse) feel cold?

- The liver that produces heat has stopped working

Why is a liver called a storage organ?

- It stores some vitamins and mineral salts

Name three toxic (harmful) substances removed from blood by the liver

- Alcohol
- Urea
- Expired drugs

FOOD VALUES AND THEIR END PRODUCTS

Food value	End products
▪ Carbohydrates	Glucose
▪ Proteins	Amino acids
▪ Fats and oils	Fatty acids and glycerol

Uses of digested food by our bodies

- Glucose (from carbohydrates)provides energy to the energy
- Amino acids(from proteins) builds/helps in proper growth of the body
- Amino acids repair worn out body tissues
- Fatty acids and glycerol(from lipids) provides heat and energy to the body

THE LARGE INTESTINES (LARGE BOWEL)

- It is about 1.5 metres long

Parts of the large intestines

- Caecum
- Colon
- Rectum
- Anus

CAECUM

- It connects the small intestines to the colon

COLON

- It absorbs water and salts

Main process that place in the colon

- Absorption of water

Materials absorbed in the large intestines (colon)

- Water
- Mineral salts (Sodium and potassium)
- Vitamin K

Apart from the colon (large intestines), where else does water absorption take place?

- In the ileum

RECTUM

- The rectum stores undigested food before it is passed out
- It also stores worn out cells from the digestive tract.

ANUS

- It passes out faeces/stool/excrement

Egestion (defecation)

- This is the elimination (passing out) of faeces from the body

Materials that make up faeces (components of faeces)

- Roughages (Dietary fibres)
- Water
- Dead bacteria
- Dead cells

NOTE

Activity

1. Explain the term absorption of food?
2. Where does absorption of food take place?
3. How is the ileum adapted to food absorption?
4. Where does absorption of the following foods take place?
   i) Alcohol
   ii) Water
5. Where does digestion of fats take place in the mouth?
6. Write down things that happen to food in the mouth?
7. By what process does food move down the gullet?
8. Identify the two enzymes produced in the stomach.
9. State the major function of the following parts of digestive system.
   i) Gall bladder
   ii) Liver
10. Name the enzyme that breaks down carbohydrates into maltose
11. What is the major role of bile produced by the liver in the digestive process?
12. Identify the major function of a spleen.
13. Identify the digestive juice produced by;
   i) Pancreas
   ii) stomach

SUMMARY TABLE OF DIGESTIVE PROCESSES

Part	**Gland**	**Digestive juice**	**Enzymes**	**Food changes**
Mouth	Salivary glands	saliva	Salivary amylase (Ptyalin)	Starch to maltose
Stomach	Gastric glands	Gastric juice	pepsin	Proteins to peptides
			Rennin	clots milk proteins in the stomach of infants

				(curdles/coagulates milk the stomach of infants)
Duodenum	liver	bile	No enzyme	Emulsifies the fats
	pancreas	Pancreatic juice	Trypsin	Proteins to peptides Peptides to amino acids
			Pancreatic amylase	Starch to maltose
			Lipase	Lipids (fats) to fatty acids and glycerol
Ileum		Intestinal juice (succus entericus)	Lactase	Lactose to glucose/galactose
			Maltase	Maltose to glucose
			Sucrase	Sucrose to glucose/fructose
			Lipase	Fats to fatty acids and glycerol
			peptidase	Peptides to amino acids
Colon				Water absorption
Rectum				Storage of faeces

DIGESTIVE DISORDERS (disturbance to alimentary canal and make it fail to function properly)

- Constipation
- Diarrhoea
- Indigestion
- Vomiting
- Intestinal obstruction

- Heartburn

CONSTIPATION

- This is a condition where by a person finds it difficult to pass out faeces. The faeces are very hard and dry and do not come out easily.

Causes

- lack of roughages in one's diet
- having irregular meals
- drinking too little water
- lack of exercise to the body

INDIGESTION

- This happens when food is not properly digested
- A person feels stomach pains, heart burn (burning in the chest) and tiredness.

Causes

- No chewing food properly
- Eating so hurriedly
- Too much drinking of alcohol

INTESTINAL OBSTRUCTION

- Caused when intestine twist or fold themselves causing vomiting, thirsty and death if not reported immediately to the doctor.

VOMITING

- This is a sign of very many diseases.
- It disturbs the digestive system and forces the cardiac sphincter to open and the food in the stomach to be ejected through the mouth.
- Seek for medical attention.

HEARTBURN

- This is when the contents of the stomach back up into the gullet

DISEASES OF THE DIGESTIVE SYSTEM

- Appendicitis
- Peptic ulcer
- cholera
- Typhoid
- Diarrhoea

- Dysentery
- Hepatitis

Appendicitis

- This is the inflammation of the appendix.
- This may due to stones or other indigestible solids that get trapped in the appendix.
- See the doctor for medical attention.

Peptic ulcers

- These are sores in the stomach wall caused by too much acid.
- The victim experiences a chronic sharp pain in the stomach and frequent heart burn.

Dysentery

- It is caused by a bacterium or Amoebas got from uncooked food or dirty food or water.
- The victim visits the toilet very frequently, passing out waterly stools with some blood.

Typhoid

- Caused by bacteria which cause inflammation of the intestine and easily lead to death.

Ways through which food is made dirty

- Handling food with dirty hands.
- House flies landing on food with their hairy bodies.
- Use of dirty containers to keep food.
- Using dirty utensils to handle food.
- Leaving food uncovered.
- Preparing food in dirty places.

Good eating habits

- Washing hands with soap before serving, handling or eating food.

To kill germs in hands

- Washing hands after visiting a latrine/Toilet.
- Chewing food properly before swallowing .

To prevent constipation

- Avoid talking while eating food

To prevent choking

▪ Feeding on a balanced diet.
▪ Wash hands after eating.
▪ Washing fruits/vegetables before eating them
To prevent hookworm infestations

To remove germs

▪ Eat well cooked food
To ease digestion

▪ Brush teeth every after a meal.
▪ Do not eat contaminated
To prevent food poisoning and diarrhoeal diseases

Bad eating habits

- Eating food with unwashed hands
- Opening the mouth while eating food
- Eating hurriedly
- Talking while eating
- Opening bottle tops using the teeth

How to improve on the working condition of digestive system

▪ Eat and serve food with clean hands.
▪ Have regular physical exercises.
▪ Avoid eating stale or rotten food.
▪ Having a balanced diet.
▪ Avoid drinking too much alcohol.
▪ Including enough roughages in the diet.
▪ Have regular meals.
▪ Always eat the right quantity of food.
▪ Avoid eating while talking.

Activity

1. Write down three diseases and three disorders of digestive system.
   a. diseases
   b. disorders
2. Suggest any two ways through which food we eat gets contaminated.
3. Write down at least two examples of good eating habits.
4. Why should food be covered immediately after being cooked ?
5. How are house flies adapted to spreading of diseases?

TERM TWO

OUR ENVIRONMENT

- Environment refers to all things that surround an organism

Components of the environment

- Plants
- Animals
- Bacteria
- Fungi
- Protista
- Water
- Air
- Soil

SOIL

- Soil is the top layer of the earth's surface
- It supports both plant and animal life

TERMS USED IN SOIL

- **Soil texture** – This is the roughness or smoothness of soil particles.
- **Soil structure –** This is the arrangement of soil particles in an area.
- **Soil tone -** This is the colour of soil.
- **Soil sampling –** This is the taking of soil samples from an area with the aim of analyzing them in the laboratory

- **Irrigation –** This is the artificial method of providing water to crops in dry areas
- **Soil aeration -** This is the movement of air in the soil
- **Soil pH -** This is the degree of acidity or alkalinity of the soil
- **Soil drainage -**This is the downward movement of water in the soil
- **Soil capillarity-** This is the upward movement of water between small spaces in the soil
- **Soil profile-** This is the vertical arrangement of soil layers / Is the arrangement of soil layers from the top to the bottom
- **Soil Leaching** – Is the sinking of soil nutrients to deeper soil layers where plant roots cannot reach
- **Soil exhaustion**- Is the loss of soil fertility
- **Soil fertility** – Is the ability of the soil to support plant growth
- **Soil erosion**- Is the gradual removal of top soil by its agents

METHODS OF SOIL FORMATION (How soil is formed)

- Weathering
- Decomposition

WEATHERING

- This is the breakdown of rocks into smaller particles to form soil

Types of weathering

- Chemical weathering
- Biological weathering
- Physical weathering

Factors that cause weathering

- Earth quake
- Action of plant roots
- Acid rain
- Frost action
- Action of heat (temperature)
- Mining
- Road construction

How does temperature cause weathering?

- When temperatures are high, rocks expand and when temperatures are low, rocks contract and hence breaking.

How does acid rain cause weathering of rocks?

Decomposition

- This is the breakdown of organic matter to form soil.
- **Bacteria and fungi** help in decomposition

Decomposition is a **chemical change**

How do bacteria help in decomposition?

- They breakdown organic matter

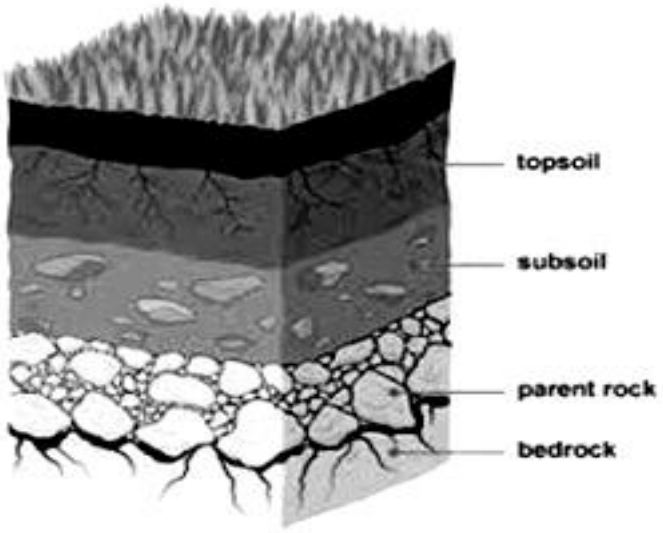
Importance of weathering and decomposition in the environment

- They help in soil formation

SOIL PROFILE

- Soil profile is the vertical arrangement of soil layers

Structure of soil profile



Layers of soil (soil horizons)

- Top soil (A horizon): it is the uppermost layer of the soil

- Sub soil (B horizon)
- Parent/bed rocks (C horizon) – provides materials for road construction

Why does subsoil sometimes tend to be rich in mineral salts?

- Due to leaching

Places where soil profile can clearly be seen

- Rubbish pit
- Pit latrine
- Mining sites

TYPES OF SOIL

- Loam soil
- Clay soil
- Sand soil

Diagrams showing the types of soil

LOAM SOIL

- It is the best soil for crop growing
- It is dark in colour
- It has a bad smell and produces smoke when burnt

Use of loam soil

- It is used for crop growing

Reasons why Loam soil is the best for crop farming

- It has a lot of humus
- It is moderately drained
- It is moderately aerated
- It has a good water holding capacity
- It has moderate soil texture

CLAY SOIL

- It has fine and smooth particles (has smooth texture)
- It is sticky when wet
- It has very little humus
- It has compact particles
- It has poorly aerated
- It is poorly drained
- It has the highest water holding capacity (it retains water for a long time)

- It is water logged
- It has the highest capillarity

Uses of clay soil

- It is used for making ceramics (pottery)
- It is used for brick making
- It is used for building houses
- It is used for growing crops that need a lot of water

Why clay soil is used for brick making and ceramics

- It is sticky when wet

Why clay soil is poorly aerated and drained

- It has very small spaces between its particles

Why is waterlogging dangerous to plant roots and organisms in the soil?

- It leads to lack of oxygen for respiration

Examples of clay products

- Pots
- Bricks
- Teapots
- Clay stoves
- Statues
- Plates

Crops that grow well in swamps/wetlands

- Rice
- Sweet potatoes
- Sugarcanes
- Cabbage
- Yams

Why are some plants not able to grow in waterlogged areas?

- Due to lack fresh air around their roots

How can clay soil be improved?

- By adding humus and lime

SAND SOIL

- It has very big spaces between particles
- It has big rough particles (has coarse/rough texture)
- It has the lowest water holding capacity

- It has the lowest capillarity
- It lacks humus (it is not fertile)/it has low mineral content
- It is well drained
- It is well aerated

Uses of sand soil

- It is used for building houses
- It is used for making glasses
- It is used for making sandpapers
- It is used for washing saucepans
- It is used for putting out petrol fire

How can sandy soil be improved?

- By adding humus

Why is loam soil well drained?

- It has large pore spaces/has spaced particles

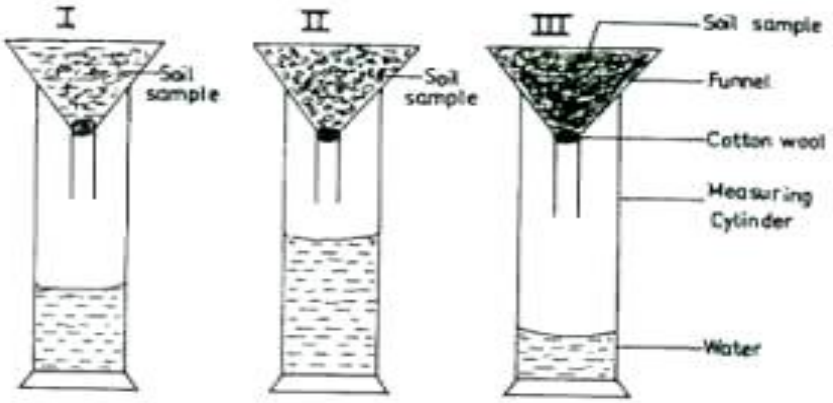
SOIL CAPILLARITY

- This is the upward movement of water between small spaces in the soil

Experiments to show soil capillarity

- Put equal volume of sand, loam or clay soil in glass tubes with open ends
- Stand the glass tubes in a beaker with water
- Observe for several days until the water has stopped rising

Illustration



Observation

- Water rises highest in clay soil
- Water rises moderate in loam soil
- Water rises lowest in sand soil

Conclusion

- Clay soil has the highest capillarity
- Sand soil has the lowest capillarity

Why does water rise highest in clay soil?

- Clay soil has the greatest capillarity than other soils
- Due to closeness of soil particles and small pore spaces

SOIL DRAINAGE (SOIL PERMEABILITY)

- This is the downward movement of water in the soil
- Sand soil has the highest drainage
- Clay soil has the least drainage

Experiment to show soil drainage/soil permeability/water percolation in soil

- Put cotton wool in each funnel

Why? Cotton wool allows water to drain slowly

- Put equal volume of clay, loam or sand soil on each cotton wool
- Place each funnel on a measuring cylinder (glass jar)
- Pour equal volume of water in each funnel

Illustration

Observation

- Much water is collected in a jar of sand soil
- Little water is collected in a jar of clay soil

Conclusion

- Sand soil has the best drainage (greatest permeability)

Why? It has very big spaces between its particles

- Clay soil has least drainage (lowest permeability)

Why? It has compact particles (its particles are closely packed together)

- Loam soil has the moderate drainage (moderate permeability)

COMPONENTS/ELEMENTS OF COMPONENTS (SOIL CONSTITUENTS)

- These are things that make up soil

They include;

- Humus
- Soil organisms
- Rock particles
- Water
- Mineral salts
- Air

Mineral salts occupy the greatest percentage in soil

How are the following components of soil formed?

i) **Rock particles:** By weathering
ii) **Humus:** By decomposition

Examples of soil components found in spaces between soil particles.

- Water
- Air

Organic components of soil

- Humus
- Soil organisms

Inorganic components of soil

- Rock particles

- Water
- Air
- Mineral salts

WATER AS A COMPONENT OF SOIL

- Water is found in spaces between soil particles
- Soil without water becomes dry, light and unproductive
- Soil water that is useful to plants is called **capillary water**

Functions of water in the soil

- It is used during photosynthesis
- It is a weathering agent
- It cools the soil
- It helps in seed germination
- It dissolves mineral salts in the soil
- It speeds up decomposition of organic matter
- It supports life of soil organisms

EXPERIMENT TO SHOW THAT SOIL CONTAINS WATER

- Put a lump of soil in a beaker
- Cover the beaker with a glass cover
- Heat the beaker for some time

Illustration

Observation

- Water droplets are seen on sides of the beaker and on glass cover

Conclusion:

- Water droplets show that soil contains water

State the importance of the following in the experiment shown above

Glass cover

- To trap and condense water vapour into water droplets

Heat /source of heat

- To evaporate water in the soil

AIR AS A COMPONENT OF SOIL

- Air is the mixture of gases
- Air is found in spaces between soil particles
- Air occupies spaces between soil particles unless when soil is waterlogged

Importance of air in the soil

- Nitrogen helps legumes to make plant proteins
- Oxygen helps in seed germination
- Oxygen helps in respiration of soil organisms and plant roots
- Carbon dioxide makes the soil acidic for proper growth of some plants

EXPERIMENT TO SHOW THAT SOIL CONTAINS AIR

- Put water in a beaker
- Add a lump of soil

Observation

- Air bubbles come out of the soil

Conclusion

- Air bubbles from the soil show that soil contains air

HUMUS AS A COMPONENT OF SOIL

- Humus is dark brown in colour

- It is formed **by decomposition of organic matter** (When dead plants and animals rot/decay)
- **Putrefying bacteria** help in decomposition/cause rotting of organic matter

Mention two groups of living things that help in decomposition

- Bacteria
- Fungi

Functions of humus in the soil

- It adds nutrients to the soil (it makes soil fertile)
- It improves water holding capacity of soil
- It binds/holds soil particles together
- It keeps warmth in the soil
- It balances soil temperature
- It prevents waterlogging in the soil

How does humus keep warmth in the soil?

- By absorbing sun's heat

EXPERIMENT TO SHOW THAT SOIL CONTAINS HUMUS

- Put a lump of soil in a beaker
- Strongly heat the soil

Illustration

Observation

- Smoke comes out of the soil
- Stench of burning rubbish will be smelt

Conclusion

- Smoke from the soil shows that soil contains humus

MINERAL SALTS AS COMPONENT OF SOIL

- Mineral salts take the greatest percentage in soil
- They are dissolved into mineral salt solution by water
- Plant roots absorb mineral salt solution (water and mineral salts) by a process called **osmosis**
- **Osmosis** is the movement of water molecules from an area of low salt concentration to an area of high salt concentration through a semi permeable membrane

EXAMPLES OF MINERAL SALTS IN THE SOIL

MINERAL SALTS	IMPORTANCE TO PLANTS
Nitrates and phosphates	▪ They help legumes to make proteins
Phosphorus	▪ It strengthens plant cell
Potassium	▪ It forms the plant cell ▪ It makes the plant resistant to diseases and drought
Iron and magnesium	▪ They form chlorophyll
Calcium	▪ It forms plant cell wall

EXPERIMENT TO SHOW THAT SOIL CONTAINS MINERAL SALTS

- Put water in the beaker and add soil
- Stir the mixture
- Filter to remove the residue
- Boil the filtrate to dryness (evaporate the filtrate)

Illustration

Observation

- Crusts of salt are seen in the beaker

SOIL ORGANISMS AS COMPONENT OF SOIL

- These are living things found in soil

Examples of soil organisms

- Earthworms
- Termites
- Crickets
- Bacteria
- Fungi
- Centipedes
- Millipedes
- Beetles
- Ants
- Rats
- Mice
- Porcupines

EXPERIMENT TO SHOW THAT SOIL CONTAINS ORGANISMS (EARTHWORMS)

- Prepare soapy water
- Pour it on garden soil
- Wait for a few minutes
- Any earthworms present will come

Functions of organisms in the soil

- They help improve soil aeration (they aerate the soil)
- Bacteria and fungi help in decomposition
- Nitrogen fixing bacteria fix nitrogen in the soil
- Termites and earthworms break down organic matter

How do earthworms and termites aerate the soil?

- By making channels (small holes) in the soil/by burrowing in the soil

State the importance of putrefying bacteria in the soil.

- They help in decomposition

ROCK PARTICLES AS COMPONENT OF SOIL

- Rock particles are inorganic components of soil
- They are formed by weathering

Importance of rock particles in the soil

- They provide mineral salts to the soil
- They hold plant roots firmly
- They form the frame work of the soil

SOIL EXHAUSTION (SOIL INFERTILITY)

- This is the loss of soil fertility

Causes of soil exhaustion

- Soil erosion
- Leaching
- Mono cropping (monoculture)
- Misuse of artificial fertilizers
- Over grazing
- Over cropping
- Poor disposal of non-biodegradable wastes e.g plastics and polythene

LEACHING

- This is the loss of mineral salts from the top soil to deeper soil layers
- This is the sinking of mineral salts to deeper soil layers where plant roots cannot reach

Causes of leaching

- Constant irrigation
- Heavy rainfall (floods)

Effects (dangers) of leaching

- It leads to soil infertility (soil exhaustion)
- It makes soil acidic
- It makes soil hard to dig

SOIL EROSION

- This is the removal of top soil by its agents

Agents of soil erosion

These are things that make soil erosion to take place

- Flowing water
- Strong wind
- Moving animals

Causes of soil erosion

These are factors that make it easy for agents to carry away top soil

- Mono cropping (monoculture)
- Overgrazing
- Over stocking
- Deforestation
- Bush burning
- Over cultivation (over cropping)
- Cultivation along river banks
- Landslides
- Floods

How does deforestation cause soil erosion?

- It leaves the soil bare exposing it to the agents of erosion

How does over stocking and over grazing cause soil erosion?

- Animals eat all vegetation and leave the soil bare
- Animals carry soil in their hooves

DEFORESTATION

- This is the massive cutting down of trees without replacement

Why do people practise deforestation?

- To get land for Settlement
- To get land for farming
- For road construction
- For industrialization
- Due to charcoal burning
- Due to lumbering

Effects of deforestation

- It causes soil erosion
- It causes to drought
- It causes global warming
- It destroys habitats for wildlife

WAYS (METHODS) OF CONTROLLING SOIL EROSION

- Afforestation: This is the planting of trees in an area
- Reforestation: This is the planting of trees to replace the cut ones
- Terracing
- Strip cropping
- Contour ploughing
- Mulching
- Strip cropping
- Bush fallowing
- Cover cropping
- Agroforestry
- Bundling: This is the making of embankments on river banks to control soil erosion

CONTROL OF SOIL EROSION IN SCHOOL COMPOUND

- Planting short grass (It is the best way)
- Planting trees

How do trees control soil erosion?

- Trees reduce the speed of wind (trees act as windbreaks)

- Trees leaves reduce the strength of raindrops that fall on soil
- Tree roots bind/hold soil particles together

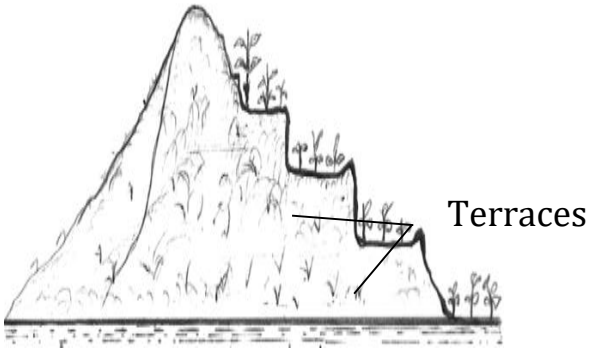
METHODS OF CONTROLLING OF SOIL EROSION ON HILLY AREAS OR MOUNTAINOUS AREAS OR STEEP SLOPES

- Terracing
- Contour ploughing
- Strip cropping

Terracing

- This is when a slope is cut into steps to reduce the speed of flowing water

A diagram showing terracing



How does terracing control soil erosion?

- Terraces reduce the speed of flowing water

TYPES OF SOIL EROSION

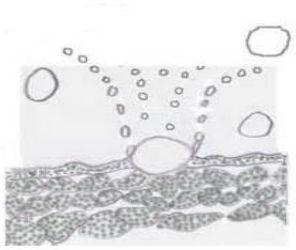
- Splash erosion (rain drop erosion)
- Sheet erosion
- Rill erosion
- Gully erosion
- River bank erosion

SPLASH EROSION

This is occurs when rain drops form small holes in the soil

Rain drops scatter soil particles

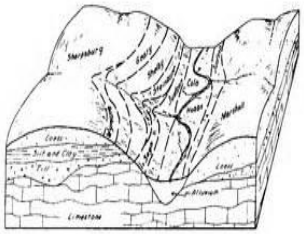
It is common on soil where iron sheets pour water



SHEET EROSION

This is when top soil is uniformly eroded by wind or flowing water

It is common on gentle sloping **school compounds**



RILL EROSION

This is when small channels are formed on the ground by flowing water

These small channels are called **rills**

It is common on **gentle sloping areas**

Rill erosion results from sheet erosion

GULLY EROSION

- This is when big channels formed on soil by flowing water

- It is common on **hilly areas**

EFFECTS (DANGERS) OF SOIL EROSION

- It leads to loss of soil fertility (soil exhaustion)
- It leads to land degradation (makes soil unproductive)
- It leads to silting
- It destroys crops
- It makes soil hard to dig
- It destroys homes of soil organisms

SILTING

- This is the deposition of eroded materials into water bodies

Dangers of silting

- It leads to water pollution
- It reduces the depth of water bodies
- It leads to flooding of water bodies
- It destroys homes of some marine (aquatic) animals
- It leads to death of some marine animals

SOIL CONSERVATION:

- This is the way of maintaining (improving) soil fertility

Soil fertility

This is the ability of soil to support proper plant growth.

Ways of conserving soil (ways of maintaining on soil fertility)

- Mulching
- Contour ploughing
- Manuring
- Planting legumes
- Crop rotation
- Strip cropping
- Bush fallowing
- Agroforestry
- Terracing
- Afforestation
- Inter cropping

Intercropping

- This is the growing of different crops on the same piece of land at the same time.

MULCHING.

- This is the covering of top soil with dry plant materials.

Mulches

- These are dry plant materials used to cover top soil.

Examples of mulches

- Dry grass
- Dry coffee husks
- Dry banana leaves
- Chopped banana stems
- Maize stalks
- Bean husks

Main reason for mulching

- To conserve moisture in the soil (to keep water in the soil)

ADVANTAGES OF MULCHING (REASONS FOR MULCHING)

- It controls soil erosion (sheet erosion)

Mulches reduce the speed of flowing water

Mulches prevent rain drops from hitting the soil directly

Mulches prevent top soil from being blown away by strong wind

- It keeps water (moisture) in the soil

By reducing the rate of evaporation of water in the soil

By preventing direct sunshine from hitting the soil

- It controls weeds
- It improves soil fertility

Mulches rot and form humus

- It moderates soil temperature
- It increases water infiltration into the soil

Disadvantages of mulching to the farmers

- Mulches can be fire hazards (mulches can easily catch fire)
- Mulches hide crop pests.

- Wet mulches can grow into weeds.
- Mulching is tiring

Crop rotation

- This is the growing of different crops on the same piece of land seasonally

Factors to consider when carrying out crop rotation

- Legumes alternate with other crops.
- Bush fallowing should be included in rotation
- Crops with deep roots are alternated with those of shallow roots.
- Crops of the same family should not follow each other

Why?

- To control pests
- To control parasitic weeds

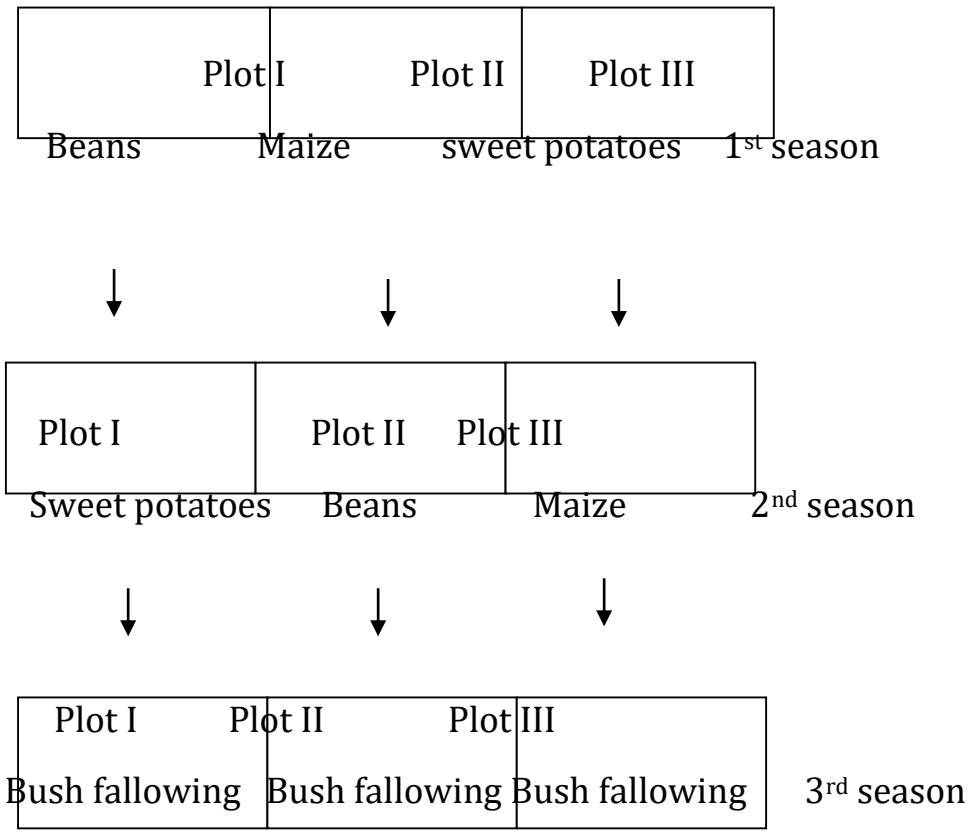
Bush fallowing

- This is the practice of leaving the land to rest for sometime

Importance of bush fallowing

- It helps the soil to regain its fertility

An illustration of crop rotation on a three year cycle



Advantages of crop rotation

- ❖ It controls crop pests

By starving pests to death

- ❖ It controls parasitic weeds
- ❖ It improves soil fertility

It involves legumes which add nitrates to the soil

It involves bush fallowing which help the soil to rest and regain its fertili6

- ❖ It improves crop yields
- ❖ It controls soil erosion

It involves growing of cover crops

FERTILIZERS

- These are substances that are added to the soil to improve its fertility

Methods of applying fertilizers

- ❖ Top dressing (foliar spraying)
- ❖ Broadcasting method
- ❖ Placement method (side dressing or band or ring method)
- ❖ Injection method

TYPES OF FERTILIZERS

1. Natural fertilizers (manure/organic fertilizers)
2. Artificial fertilizers (inorganic fertilizers)

Natural fertilizers (manure or organic fertilizers)

These are fertilizers got from plant and animal remains

They are called organic fertilizers **because** they are made from plants and animals remains

Examples (types) of manure:

- ❖ Farm yard manure (FYM)
- ❖ Compost manure

- Green manure

Farm yard manure: (FYM)

This is the manure got from animal wastes

Materials from which Farmyard manure is made

- Animal dung
- Animal droppings
- Urine

Green manure

This is manure got from decomposed crops and dry grass (e.g maize, beans and cow peas)

Crops are cut before flowering and ploughed back into the garden

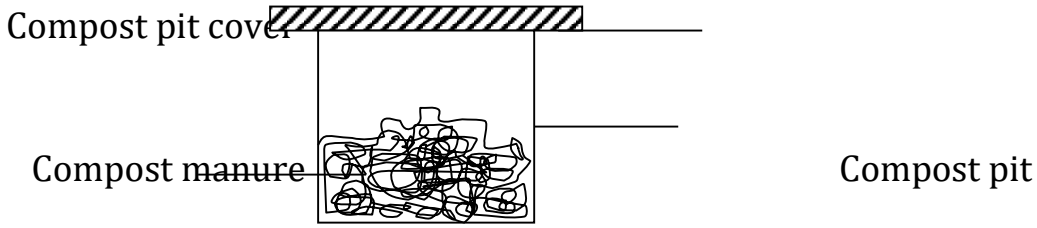
Compost manure

This is manure got from plant remains and animal wastes after decomposition e.g kitchen refuse, weeds, plant remains and left over food.

Methods of making compost manure

- Pit method
- Heap method

A diagram showing a compost pit



A compost pit is a pit where household refuse and left over food are put to rot and form compost manure

Compost cover prevents bad smell from going out of the pit

Why are faeces not always used as manure?

- Faeces can lead to easy spread of faecal (diarrhoeal) diseases.

Advantages of natural fertilizers

- ❖ They are cheap
- ❖ They last longer in the soil
- ❖ They improve soil texture
- ❖ They do not need skilled labour to apply
- ❖ They improve water holding capacity of the soil
- ❖ They do not pollute the soil
- ❖ They do not leach easily

Disadvantages of natural fertilizers

- ❖ They are dirty to handle
- ❖ They are bulky
- ❖ They take long to decompose (nutrients take long to enter the soil)

Artificial fertilizers (inorganic fertilizers)

- These are fertilizers made in factories (industries)

Types (groups) of artificial fertilizers

- Straight fertilizers
- Compound fertilizers

Straight artificial fertilizers

- These are fertilizers made up of one element

Examples of straight fertilizers

- SSP (Single super phosphate)
- DSP (Double super phosphate)
- TSP (Triple super phosphate)

Compound fertilizers

These are fertilizers made up of two or more elements.

Examples of compound fertilizers

- NPK – Nitrogen, phosphorous and Potassium
- CAN – Calcium Ammonium Nitrates
- DAP - Di Ammonium Phosphate
- Sodium nitrate
- Ammonium sulphate

Advantages of using artificial fertilizers

- They are very effective
- They are easy to apply
- They are not bulky
- Their side effects are known
- They contain known amount of chemical elements

Disadvantages of artificial fertilizers

- They are expensive
- They stay in the soil for a short time
- They need skill and care
- They leach easily
- They destroy soil texture if used for a long time
- They cause poisoning to children and poultry

AGROFORESTRY

This is the growing of crops and trees together in the same garden

Importance of agroforestry

Trees provide shades to the crops

Tree leaves form manure when they rot

Trees help in water cycle

Trees help to control soil erosion

Some trees act as fences

Trees reduce global warming

Trees purify air

Trees provide wood fuel

Trees provide wood for timber

Fruit trees provide fruits to the farmer.

Trees are sources of herbal medicine.

Shady trees prevent growth of some weeds

Trees provide extra support to weak stems

Tree leaves form manure when they rot

Soil pollution

This is the releasing of harmful substances to the soil

Soil pollutants

These are substances that are harmful to the soil

These are substances that can make soil infertile

Examples of soil pollutants (harmful substance to soil)

- ❖ Waste engine oil
- ❖ Polythene papers
- ❖ Plastics
- ❖ Metallic scrap
- ❖ Pesticides
- ❖ Herbicides
- ❖ Broken glasses
- ❖ Garbage

Ways of polluting the soil (causes of soil pollution)

- Pouring waste engine oil to the soil
- Dumping polythene papers and plastics on the soil
- Dumping metallic scrap on the soil
- Regular use of pesticides in the garden
- Regular use of artificial fertilizers

Dangers (effects) of harmful materials on the soil

- They lead to soil infertility
- Waste engine oil kills the soil organisms
- Waste engine oil prevent air from entering the soil
- Polythene papers and plastics prevent water and air from entering the soil
- Artificial fertilizers spoil soil texture

Control of soil pollution

- Avoid dumping plastics and polythene papers into the soil
- Using manure instead of artificial fertilizers
- Using 5Rs of waste management

Mention the 5Rs

- Recycle
- Reuse
- Reduce
- Return
- Refuse

MATTER AND ENERGY

Terms used in matter and energy

Cohesion

This is the force of attraction between molecules of the same kind

Adhesion

This is the force of attraction between molecules of different kinds e.g water and glass

Viscosity

This is the friction found in liquids and gases

MATTER

Matter is anything that occupies space and has weight

Examples of matter

- Stones
- Water
- Air
- Human beings
- Soil
- Chalk

Things that are not regarded as matter

Radio waves

Memories

Ideas

Dreams

They neither occupy space nor have weight

Properties of matter

- ❖ Matter occupies space (matter has volume)
- ❖ Matter has weight
- ❖ Matter exerts pressure

- ❖ Matter is made up of molecules
- ❖ Matter can neither created nor destroyed

Note

A molecule is a small particle that makes matter.

Atom is the smallest particle of matter that can take part in chemical reactions.

States of matter

- ❖ Gaseous state (gas)
- ❖ Liquid state (liquid)
- ❖ Solid state (solid)

NOTE

Water can exist in all the three states of matter.

GASEOUS STATE

Properties of gaseous state

1. They do not have definite shape.
2. Molecules in gases are farthest apart
3. Heat travels in gases by **convection**.
4. Gaseous state has the smallest density

Why?

Molecules in gases are mobile (molecules in gas move freely)

5. Gases do not have cohesion forces.

Note

Heat travels **fastest** in gaseous state

Sound travels **slowest** in gaseous state

Gases turn into liquid by **condensation**

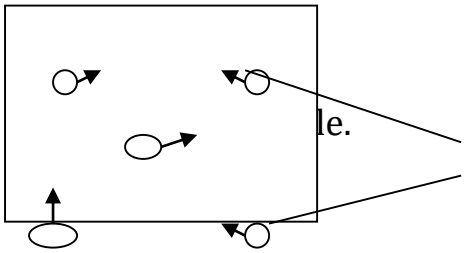
Examples of matter in gaseous state

- Smoke
- Water vapour (steam)
- Air
- Exhaust fumes

Nature of molecules in gaseous state of matter

Molecules are mobile (molecules are farthest apart)

Simple diagram to illustrate



LIQUID STATE

Properties of solid state

- They do not have definite shape.
- They take up the shape of the container in which they are put.
- Liquids flow

Why?

They have weak cohesion forces

- Heat travels in liquid state by **convection**.
- Molecules in liquids are farther apart
- Liquids find their own level
- Pressure in liquids increases with depth
- Pressure in liquids act equally in all directions at the same level

Note

Liquids turn into gases by **evaporation**

Liquids turn into solids by **freezing**

Examples of matter in liquid state

- ❖ Water
- ❖ Alcohol
- ❖ Syrup
- ❖ Soda
- ❖ Milk
- ❖ Petrol
- ❖ Kerosene

- Porridge
- Honey

Viscosity

This is the friction in liquids and gases

Viscous liquids

These are liquids that cannot flow easily

These are liquids with great viscosity

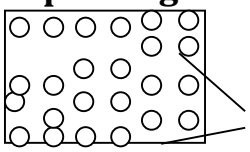
Examples of viscous liquids

- Porridge
- Syrup
- Honey

Nature of molecules in liquid state of matter

Molecules are farther apart.

Simple diagram to illustrate



Molecules are farther apart

SOLID STATE

Properties of solid state

- They have shape.
- They have compact molecules (molecules are closely packed)

Why?

They have strong cohesion forces.

- Heat travels in solids by **conduction**.
- Solids have the greatest density
- Solids cannot be reduced by compression

Note

Heat travels **slowest** in solids

Sound travels **fastest** in solids

Solids turn into liquids by **melting**

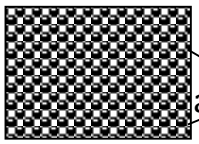
Solids turn into gases by **sublimation**

The solid state of water is **ice**

Nature (characteristics) of molecules in solid state of matter.

Molecules are compact (molecules are closely packed)

Simple diagram to illustrate


are compact (molecules closely packed)

PHYSICAL CHANGES

These are changes that do not form new permanent substances.

Changes in the states of matter

All changes in the states of matter are **physical processes**

Why?

They are reversible

No new permanent substance is formed

Examples of physical processes

- Melting
- **C**ondensation
- Evaporation
- Freezing (solidification)
- Sublimation
- Deposition

Evaporation

This is the physical change of a liquid to a gas

Importance of evaporation

It helps us to separate salt from a mixture of salt and sand

It helps us to obtain salt from seas and lakes

It helps in the formation of rainfall

Condensation

This is the physical change of a gas to a liquid

Dew is formed by condensation

Why is dew formed at night?

At night, there are very low temperatures leading to condensation

Melting

This is the physical change of a solid to a liquid

It is caused by heat energy

Examples of substances that can melt when heated

- Butter
- Ice
- Blueband
- Candle wax

Freezing (solidification)

This is the physical change of a liquid to a solid

Sublimation

This is the direct physical change of a solid to a gas

<u>Examples of sublimates (substances that can sublime)</u>

- Iodine
- Naphthalene (mothballs)
- Potassium permanganate
- Dry ice

Uses of sublimates

Mothballs are used as pesticides

They are used as air fresheners (deodorants)

They are used as perfumes

Deposition (desublimation)

This is the direct physical change of a gas to a solid

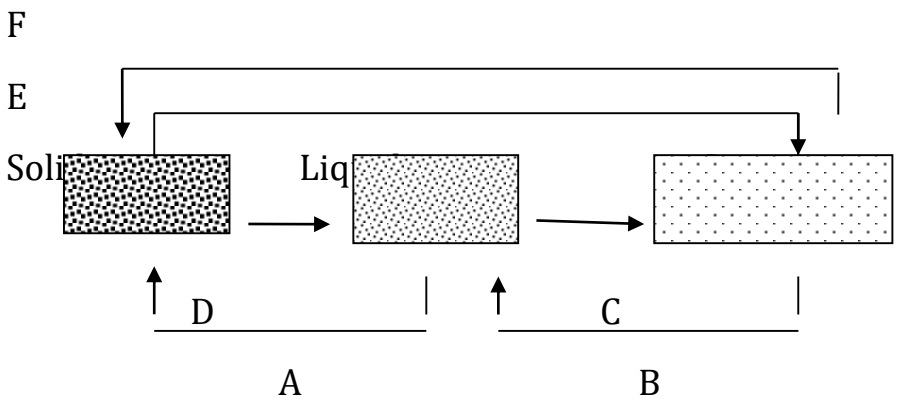
Snow is formed by deposition

<u>Physical processes are involved in water cycle</u>

Evaporation

Condensation

<u>A summary of changes in the states of matter</u>



<u>Name the process at A - F</u>

A is melting

B is condensation

C is evaporation

D is freezing (solidification)

E is sublimation

F is deposition

Physical processes caused by heat loss

- Freezing (solidification)
- Deposition
- Condensation

Physical processes caused by heat gain

- Melting
- Evaporation
- Sublimation

MIXTURE

This is a combination of two or more substances.

Examples of mixtures

Concrete: (cement + sand + stone)

Porridge: (maize flour + water)

ORS: (Sugar + salt + water)

TYPES OF MIXTURES

Solution

Suspension

Solution

This is the mixture of a solute and solvent

This **i**s a uniform mixture of two or more substances

Types of solutions

Saturated solution

This **i**s a solution which cannot dissolve any more solute at that temperature

Super saturated solution

This **i**s a solution which cannot dissolve any more solute even after heating.

Unsaturated solution

This is the solution that can dissolve more solutes.

Solute

This is a substance that dissolves in a liquid (solvent)

Examples of solutes

Salt

Sugar

Glucose

Note

Soluble substances

These are substances that dissolve in a liquid easily.

Sugar and salt crystals dissolve in water

Why?

They are soluble

Insoluble substances

These are substances that cannot dissolve in a liquid

Why?

They are insoluble

Stones and sand particles cannot dissolve in a liquid

Why?

They are insoluble

Solvent

This is a substance that dissolves a solute

Examples of solvents

Water

Milk

Water is called a **universal solvent**

Why?

It dissolves most solutes

Suspension

This is a substance that does not completely dissolve in a liquid (e.g maize flour in water)

METHODS OF SEPARATING MIXTURES

- Decantation (decanting)
- Filtration method (filtering)
- Evaporation to dryness (crystallization)
- Using a magnet
- Hand picking or sorting
- Flotation (floating)
- Distillation (distilling)
- Sieving
- Using a separating funnel
- Winnowing

SEPARATING MIXTURES OF SOLIDS AND LIQUIDS

Filtration method

This is the removal of solid particles from a liquid using a filter

The solid particles are called **residue**

The clear liquid is called **filtrate**

Materials that can be used as filter (used for filtering)

Clean thick cloth

Sieve

Filter paper

Porcelain filter

Application (uses) of filtration at home

To prepare passion fruit juice

To obtain clean water from dirty water

Water obtained by filtration is not good for drinking

Why?

Filtration does not kill germs.

Diagram showing filtration

Decantation method

This is the removal of solid particles from a liquid by allowing them to settle at bottom

Importance of decantation

It is used to obtain clean water from muddy water

Steps for decanting

Put dirty (muddy) water in a container

Allow solid particles to settle at the bottom

Carefully pour off the clear liquid

Diagram illustrating decantation

Water obtained by decanting is not good for drinking

Why?

Decanting does not kill germs

Ways of making water collected by decantation and filtration safe for drinking

By boiling

Using UV light

Adding chemicals (like chlorine and fluorine)

Uses of water collected by decantation and filtration

For washing

For cooking

For irrigation (watering crops)

For mopping

For cooling machines

Evaporation to dryness (crystallization)

This is the method of separating solid particles from a liquid by boiling to dryness

Importance of evaporation to dryness (crystallization)

It is used to obtain salt from a mixture of salt and sand

It is used to obtain salt from lake and sea water

How is evaporation important in the environment?

It helps in the formation of rainfall through water cyclr

Steps to obtain salt from a mixture of salt and sand

Put the mixture in a container

Add water and stir (to dissolve salt in water)

Filter to obtain the filtrate (filter to remove sand)

Boil the salt solution (filtrate) to dryness

How can you obtain salt that has dissolved in water?

By evaporation to dryness

Distillation

This is the process of evaporating impure liquid to obtain pure liquid from condensed vapour

The pure liquid obtain is called **distillate**

Distilled water (distillate) is not good for drinking

Why?

It lacks minerals salts

Uses of distilled water

It is used to mix drugs in injections

It is used in car radiators

Application of distillation

It is used to obtain pure alcohol from crude alcohol

It is used to obtain distilled water from impure water

Dangers of distillation

It can lead to burns and scalds

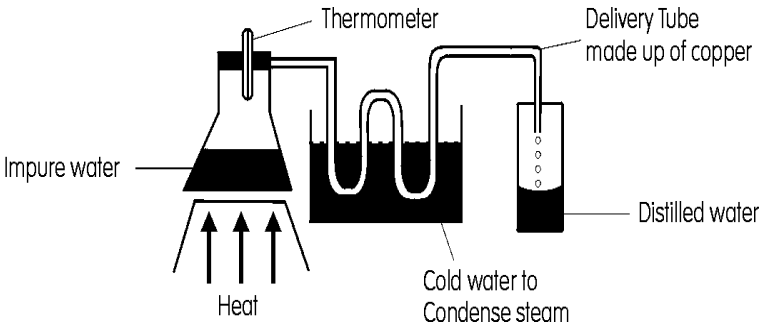
It can lead to fire outbreak

Physical processes in distillation

Evaporation

Condensation

Simple diagram to show distillation



Copper delivery tubes **do not rust**

The delivery tube is coiled as it passes in cold water **to increases surface area for condensation**

SEPARATING MIXTURES OF SOLIDS

Flotation

This method of separating solid substances where one sinks and the other float on water

Examples of mixtures separated by flotation

Saw dust and sand

Bad beans and good ones

Using a magnet

This is the method of separating a magnetic substance from a non magnetic substance

Application of using a magnet in separating mixtures

Searching iron pins from grass

Separating iron wires from copper wires

Separating iron bits and maize flour

Application of hand picking (sorting)

Separating stones from rice

Separating bad beans from good ones

Sieving

This is a method used to separate large solid particles from small ones using a sieve

Winnowing

This is the removal of husks from seeds by help of wind

Application of winnowing

Separating husks from bean seeds

Separating hulls from rice grains

SEPARATING MIXTURES OF LIQUIDS

By fractional distillation

By using a separating funnel

Note

Dilution

This is the process of making a concentrated solution weak

When a substance is in its original form, **it is concentrated**

When water has been added to a substance, **it is diluted**

Examples of dilution

Adding water to milk

Adding water to an acid

Diffusion

This is movement of molecules from an area of high concentration to an area of low concentration

Examples of diffusion

- Smoke diffuses into air
- Milk diffuses into water
- Salt diffuses in water

ENERGY

Energy is the ability to do work.

Sources of energy

- Sun (it is the main source of energy)
- Fuels
- Plants
- Running water
- Uranium
- Electric cells

Forms of energy

- Mechanical energy
- Heat energy
- Sound energy
- Light energy
- Magnetism
- Electricity

Types of energy (mechanical energy)

Potential energy

Kinetic energy

Potential energy

This is a type of energy possessed by an object at rest (stationary object)

Examples of objects with potential energy

A stone resting on ground

A book placed on table

A car parking in a garage

A baby on the mother's back

Kinetic energy

This is a type of energy possessed by an object in motion (moving object)

Examples of objects with kinetic energy

A child running along the road

A stone thrown up in air

A car moving on the road

A leaf falling from a tree

Experiments about kinetic and potential energy

HEAT ENERGY

- Heat is the form of energy that increases the temperature of matter
- Heat is measured by an instrument called **calorimeter**
- Heat energy is measured in units called **Joules (J)**

SOURCES OF HEAT ENERGY

- These are objects which produce heat.

Types of sources of heat

- Natural sources of heat
- Artificial sources of heat

TYPES OF SOURCES OF HEAT	EXAMPLES
1. Natural sources of heat These are sources of heat created by God	▪ Sun (This is the main natural source of heat) ▪ Erupting volcanoes ▪ Lightning ▪ Natural gas ▪ Food during respiration
2. Artificial sources of heat These are sources of heat made by man	✓ Electricity ✓ Fire ✓ Burning charcoal ✓ Burning candle ✓ Biogas ✓ Friction ✓ Hot electric bulbs

USES OF HEAT IN OUR ENVIRONMENT

- It warms our bodies
- It kills germs (heat is a disinfectant)

Disinfectants are substances that kill germs

- It helps us to cook food
- It helps in food preservation (e.g sundrying and smoking)
- It helps us to iron clothes
- It helps us to weld metals

- It helps us to melt metals in factories
- It is used in science experiments
- Sun's heat helps to dry harvested crops
- Sun's heat helps to dry wet clothes
- Sun's heat helps in water cycle
- Heated objects produce light (e.g electric bulbs and candles)

DANGERS OF HEAT

- It causes fire accidents
- It causes burns (e.g sunburn)

EFFECTS OF HEAT ON MATTER

- It increases the temperature of matter
- It changes the state of matter
- It causes expansion of matter

What happens to a metal when heated?

(Effects of heating/heat gain on a metal)

- It expands
- Its temperature increases
- Its weight reduces
- Its volume increases
- Its density reduces

What happens to a metal when cooled?

(Effects of cooling/heat loss on a metal)

- It contracts
- Its temperature reduces
- Its volume decreases
- Its density increases

NOTE

- When an object is either heated or cooled, **its mass remains constant (does not change)**

WHAT HAPPENS TO THE FOLLOWING WHEN WATER IS FROZEN?

Mass: It remains constant (does not change)

Volume: It increases

Density: It reduces

EXPANSION

- This is the increase in size or length of matter when heated
- Expansion occurs in all the states of matter
- Gases have greatest expansion **because** their molecules move freely
- Solids have least expansion **because** their molecules are compact (closely packed together)

Application (importance) of expansion

- It helps in baking
- It helps in lighting fireworks
- It helps mercury to measure high temperature

Effects (dangers) of expansion

- It breaks bridges on hot days
- It bends timber dried under sunshine
- It causes cracks on buildings and furniture
- It bends railway lines on hot days
- It causes overflow of boiling milk
- It causes explosion of bombs
- It bursts inflated balloons
- It loosens fixed parts
- It makes electric and telephone wires sag on hot days
- It causes breaking of cold glass when exposed to very hot liquid

NOTE:

- Sagging electric live wires can cause electric shock

How to prevent dangers (effects) of expansion

- ❖ Leaving gaps between railway lines

To provide room for expansion on hot days

After expansion **Gaps to allow expansion on hot days**

- ❖ Making holes of rails oval shaped

To allow the railway line slip easily during expansion

- ❖ Leaving gaps between metal bars of bridges

To provide room for expansion on hot days

- ❖ Avoid leaving furniture in sunshine
- ❖ Avoid keeping soda bottles in a refrigerator for a long time
- ❖ Avoid pouring very hot liquid in glass containers
- ❖ Timber should be dried under shade to prevent bending (warping)

What happens to the gaps between railway lines during hot days?

- The gaps become narrow

During what type of weather do gaps of the railway line become narrow?

- Sunny weather

Why do gaps between railway lines become narrow on hot days?

- Due to expansion

What would happen to a bridge or railway line on hot days if gaps were not left during construction?

- The bridge or railway line would bend or break due to expansion

Why is a small space left on top when filling the soda bottles?

- To provide room for increase in volume of soda inside the bottle when frozen

An illustration of soda bottle

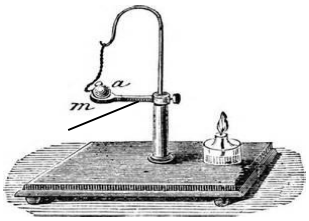
On cooling, the glass bottle contracts while the liquid inside expands

Experiment to show expansion in solids

Experiment I (metallic ball and ring experiment)

- When the metallic ball is cold, it passes through the ring
- When the metallic ball is heated, it cannot pass through the ring

Before heating **After heating**



What does the experiment shown above show?

- Expansion in metals (solids expand when heated)

Why did the metallic ball fail to pass through the ring after heating?

- The metallic ball had expanded (solids expand when heated)

Why does the metallic ball pass through the ring after being left to cool?

- The metallic ball contracts (due to contraction)

Experiment II (Using a bimetallic strip)

Bimetallic strip

- This is a strip made up of two metals that expand at different rates (e.g copper and iron)
- It works on the principle of **thermal expansion (metals expand at different rates)**

A diagram showing a bimetallic strip (made up of copper and iron)

Heating **cooling**

Why does copper curves over iron when the bimetallic strip is heated (Why does the bimetallic strip curve with copper on the outside on heating)?

- Copper expands faster than iron (copper expands more than iron)

Why does iron curves over copper when the bimetallic strip is cooled (Why does the bimetallic strip curve with iron on the outside on cooling)?

- Iron contracts faster than copper

Application (uses) of bimetallic strips

- They are used in fire alarms
- They are used in thermostats
- They are used in bimetallic thermometers

Thermostat

- This is an automatic device that turns on or off electric appliances due to temperature changes

Electric appliances that use thermostats (bimetallic strips)

- Flat irons
- Refrigerators
- Electric cookers
- Electric kettles (percolators)
- Air conditioner
- Electric ovens
- Electric incubators

EXPERIMENT TO SHOW EXPANSION IN GASES

EXPERIMENT I

Requirements

- Empty bottle
- Empty balloon
- Hot water

Diagrams

What does the experiment shown above show?

- Expansion in gases (gases expand when heated)

What will happen to the balloon when the bottle is placed in hot water?

- The balloon will swell (expand)

Why did the balloon swell when the bottle was placed in hot water?

- Due to expansion of air inside the bottle

What substance is contained in an empty bottle?

- Air

Why was the balloon tied with a thread on the bottle?

- To prevent air from escaping

What will happen to the balloon when the bottle is later removed from hot water?

- The balloon will become empty

Why does the balloon become empty when the bottle is removed from hot water?

- Due to contraction of air inside the bottle

EXPERIMENT II

- Put an inflated balloon under sunshine for some time

Diagram

What does the experiment shown above show?

- Expansion in gases (gases expand when heated)

What will happen to the balloon after some time?

- The balloon will burst

Why does an inflated balloon burst when placed under sunshine for some time?

- Due to expansion of air inside the bottle

Which property of air is shown by an inflated balloon?

- Air occupies space

Experiment to show expansion in liquids

Fill a flask with coloured water and fix a narrow tube in the stopper

Mark the level of water as it tries to rise up the tube

Place the flask in a beaker of hot water

Diagram

Observation

The water level in the tube falls and then rises after a few seconds.

Conclusion

Liquids expand when heated

CONTRACTION

- This is the decrease in size or length of matter when cooled
- Contraction occurs in all the states of matter

Application (importance) of contraction

- It helps in measuring lowest temperatures

Effects (dangers) of contraction

- It reduces air in tubes of tyres
- It breaks electric wires on cold days
- It breaks hot glasses when cold water is put in them
- It breaks electric bulbs when exposed to cold water

How to prevent dangers of contraction

- ❖ Making electric and telephone wires longer than the distance between poles (Fixing electric wires loose between poles)

To provide room for contraction on cold days

AN ILLUSTRATION SHOWING THE APPEARANCE OF ELECTRIC WIRES ON COLD DAYS

Why are electric wires fixed loosely between the poles?

- To provide room for contraction on cold days

How do electric wires appear on cold days?

- They appear tight

Why do electric wires appear tight on cold days?

- Due to contraction

What type of weather makes electric wires to appear tight?

- Rainy weather

AN ILLUSTRATION SHOWING THE APPEARANCE OF ELECTRIC WIRES ON HOT DAYS

How do electric wires appear on hot days?

- They appear loose (sagging)

Why do electric wires appear sagging (loose) on cold days?

- Due to expansion

What type of weather makes electric wires to appear loose (sagging)?

- Sunny weather

HEAT INSULATORS AND CONDUCTORS

Heat insulators (bad conductors of heat)

These are materials that do not allow heat to pass through them easily

Examples of heat insulators

- Dry wood
- Plastic
- Rubber
- Paper
- Blankets
- Cotton
- Wool
- Dry leaves
- Thick clothes
- Asbestos
- Feather
- Clay

Application (uses) of insulators in our daily life

- They are used to make handles of cooking utensils
- Thick clothes keep our body warm
- Feathers keep the bird's body warm
- They are used to cover electric wires
- They are used to lift hot objects
- Asbestos is used to make fire suits
- Asbestos is used to make roofing sheets
- Clay is used to make charcoal stoves

Note

Why do clay charcoal stoves use less charcoal?

- Clay keeps heat for a long time (clay reduces heat loss)

How do clay charcoal stoves conserve trees?

- They use less charcoal

Why are handles of kettles, frying pans and iron boxes made of insulators like wood?

- To prevent the hands of the user from getting burnt

Why are electric wires covered with insulators?

- To prevent electric shocks and burns
- To prevent short circuits

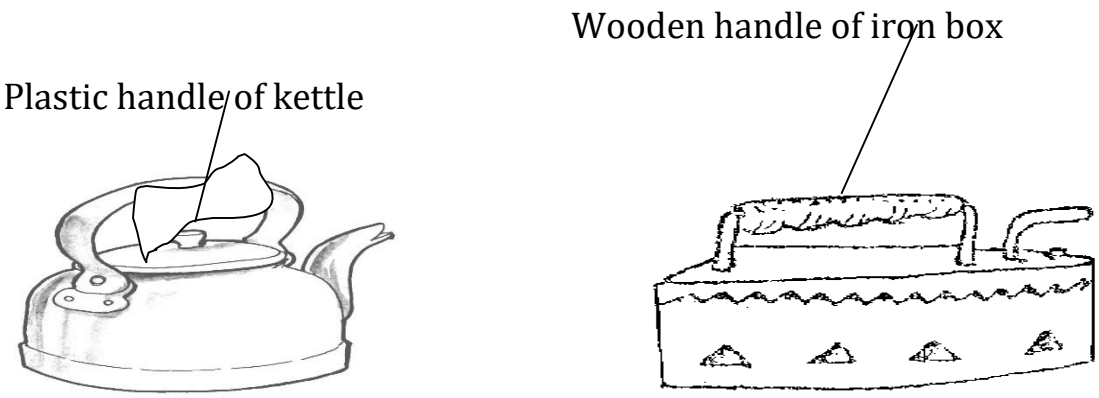
Why is wool regarded as a better insulator than cotton?

Wool has more tiny spaces than cotton

How do sweaters keep our body warm?

By preventing heat loss

Simple diagram to illustrate handles of iron box and kettle



Heat conductors (good conductors of heat)

These are materials that allow heat to pass through them easily

Examples of heat conductors (good conductors of heat)

- Silver 100%
- Copper 90%
- Aluminium 48%
- Brass 27%
- Zinc 26%
- Tin 12%
- Iron 12%
- Lead 9%
- Mercury

All metals are conductors of heat

Silver is the best heat conductor

Silver is not used to make cooking utensils because **it is very expensive**

Copper is the second best heat conductor

Copper is not commonly used because **it is very heavy**

Asbestos roofed houses is colder than iron sheets roofed houses on a hot day

Why?

Asbestos is a bad conductor of heat

Reasons why most utensils are made of aluminium

It is a good conductor of heat

It does not rust

It is cheap

It is light

Mercury is a liquid metal that conducts both heat and electricity

Water is the worst conductor of heat (0.01%)

Vacuum cannot conduct heat **because** it has no molecules

Application (uses) of good conductors of heat

- They are used to make cooking utensils (e.g aluminum)
- They are used to make electric wires (e.g copper and aluminum)
- They are used to make flat irons (e.g iron and aluminum)
- Mercury is used in thermometers

HEAT REFLECTORS AND ABSORBERS

1. HEAT REFLECTORS

- These are objects that send back (bounce) heat
- Heat reflectors are shiny

Examples of heat reflectors

- Silvered objects
- Brightly coloured objects (white objects)
- Aluminum painted objects
- Polished objects

Application of heat reflectors

- Refrigerators are painted white to reflect heat
- Petrol tanks are sprayed with silver paint to reflect sun's heat
- Most buildings are painted with bright colours to reflect sun's heat
- Cars are painted with bright colours to reflect sun's heat
- A Stevenson screen is painted white to reflect sun's heat
- People wear white clothes to reflect sun's heat on hot days
- Shoes are polished to reflect heat

2. HEAT ABSORBERS

- These are objects that retain (keep) heat
- All heat absorbers are **dull coloured**

Examples of heat absorbers

- Dull coloured objects (black objects)
- Unpolished objects

Application of heat absorbers

- People wear black clothes keep their bodies warm during cold days
- The bottom of cooking utensils is kept with black and rough to absorb more heat

NOTE

1. A person putting on a black shirt feels hot quicker than a person in white shirt

Why?

- Black absorbs heat while white reflects heat

2. A blue shirt dries faster than a white shirt of the same material on hot days

Why?

- Blue absorbs heat while white reflects heat

Which property of air enables clothes to dry?

- Air exerts pressure

Apart from sun's heat, what else enables wet clothes to dry?

- Wind

HEAT TRANSFER

This is the movement of heat from one point to another

Heat travels from a point of higher temperature to a point of lower temperature

Methods of heat transfer

Conduction

Convection

Radiation

Substance	**Method of heat transfer**
Solids	Conduction
Liquids	Convection
Gases	Convection
Vacuum	Radiation
Space	Radiation

Methods of heat transfer in the states of matter

Conduction

Convection

Vacuum

This is the space without matter

Heat travels through vacuum by **radiation**

Vacuum does not allow heat transfer by conduction and convection

Why?

It has no matter

Ways of managing heat in our daily life

- Wearing white clothes on hot days
- Using umbrellas on sunny days
- Painting houses with white colours
- Using ceilings in houses
- Painting some objects with bright colours

- Wearing sun glasses on sunny weather

CONVECTION

This is the process by which teat travels through fluids (liquids and gases)

This is the method of heat transfer in liquids and gases

Experiment to show convection in liquids

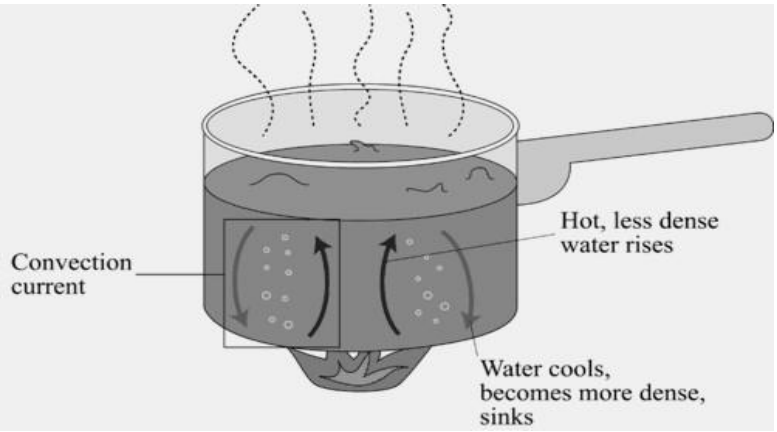
Materials needed

Water

Beaker (saucepan)

Source of heat (stove)

Convection currents in boiling water



Observation

Heated molecules become lighter and move downwards

Unheated molecules become denser and move upwards

This forms a circular movement known as **convection currents**

What causes convection currents?

Different densities of molecules

Conclusion

Heat travels through liquids by the process of convection

Note

Heat travels from stove to water (through the saucepan) by **conduction**

Heat travels in water by **convection**

Importance of convection of heat in the environment

- It enables air circulation in a house
- It helps in boiling of water
- It enables charcoal stoves to continue burning
- It enables hot water supply in a house
- It enables air circulation in a lantern lamp
- It enables air circulation in a kiln
- It drives out smoke through the chimney of a kitchen
- It helps in the formation of convectional rainfall
- Convection currents take away smoke from cigarettes
- Convection currents drive out bad smell in a VIP latrine through the vent pipe
- It enables charcoal iron box to continue burning

A diagram showing air circulation in a house

The continuous movement of air is termed as convectional current

Components of ventilation on a house

- Doors
- Windows
- Ventilators

Why should houses be properly ventilated?

- To allow free air circulation
- To allow fresh air into the house

Importance of doors and windows on a house

- They allow in fresh air
- They allow in light

Why are doors and windows put below the ventilators on a house?

- To allow in fresh air easily

Importance of ventilators on a house

- To let out stale air

Why are ventilators put above doors and windows (near the ceiling)?

To let out stale air easily

Why does stale air go up?

It is less dense than fresh air

Differences between fresh air and stale air

Fresh air is denser than stale air

Fresh air is cool while stale air is warm

Simple diagram of VIP latrine

Screen

It traps houseflies to death

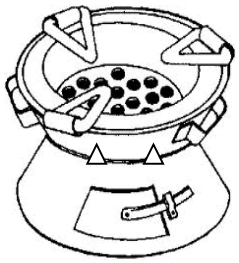
Vent pipe

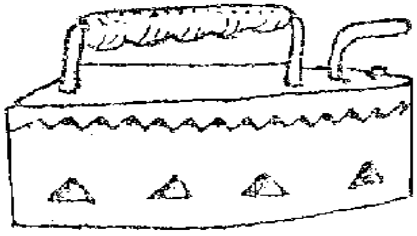
It drives out stale air

Entrance

It allow in fresh air

Convection currents in charcoal stove and iron box





The charcoal iron box is made with plastic or wooden handle

Why?

To prevent the user's hands from getting burnt

The ironing part of iron box is made of iron or aluminium

Why?

Aluminum /iron is a good conductor if heat

Charcoal stove and iron boxes have lining of clay

Why?

To prevent heat loss

Which fuel is used in charcoal stoves?

Charcoal

How is charcoal made?

When wood is burnt under limited supply of oxygen

What happens if wood is burnt in plenty of oxygen?

Wood turns into ash (complete combustion occurs)

Advantages of using clay charcoal stoves over metallic charcoal stoves

Clay charcoal stoves use less charcoal

Clay charcoal stoves keep heat for a long time

Dangers of using charcoal stoves and iron boxes

They pollute air

They increase deforestation for charcoal

How has the government helped to reduce deforestation for wood fuel?

Through rural electrification

What enables charcoal stoves and iron boxes to continue burning?

Free air circulation (fresh air supply)

BREEZE

- This is the movement of cool air from sea to land or land to sea.

Types of breeze

- Land breeze
- Sea breeze

Land breeze

- This is the movement of cool air from land to sea
- Land breeze occurs at night

Why?

The land cools faster than the sea

Diagram showing land breeze

Sea breeze

This is the movement of cool air from sea to land

Sea breeze helps to bring fresh air to the land

Sea breeze occurs during **day time**

Why?

The sea is cooler than land

Diagram showing sea breeze

Land warms faster than the sea

Warm air on the land becomes less dense and rises

Cool air on the sea becomes denser and moves towards the land

Cool air on sea moves to occupy the space created over land

Reasons why the sea is cool during day time

Water reflects some heat

Sun rays go deep in water since it is transparent

Water waves mix the warm water at the surface with cool water below it

Reasons why the land warms quickly during day time

Land absorbs heat

Heat doesn't go inside the land

CONDUCTION

This is the method of heat transfer in solids

This is the process by which heat travels through solids

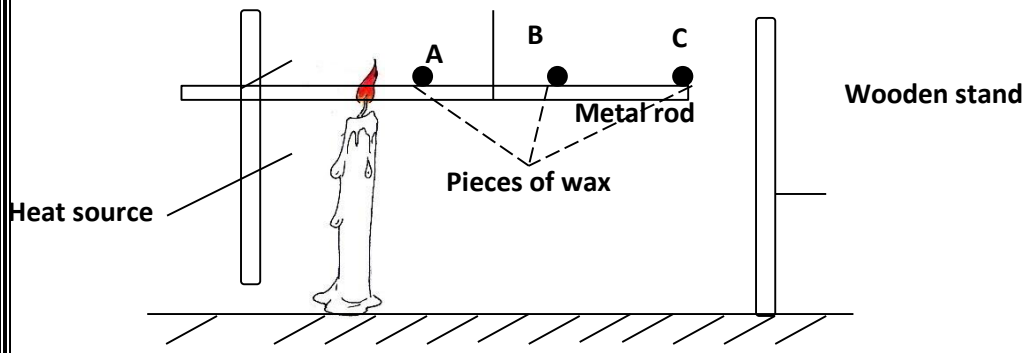
- Molecules in solids vibrate (shake) but do not move

Experiment to show heat transfer by conduction

Tie a metal rod on a wooden stand

Place the candle wax A, B and C on metal rod at intervals

Put one end of the metal rod on source of heat



Observation

- Wax A melts first because it is nearest the source of heat
- Wax C melts last because it is farthest from the source of heat

Conclusion

- Melting of wax shows that heat travels through solids

Experiment to show heat transfer in insulators and conductors of heat

Materials needed

Iron nail

Piece of wood

Plastic

Candle wax

Source of heat

An illustration

Observation

Wax on iron nail melts first

Wax on plastic melts second

Wax on wood melts last

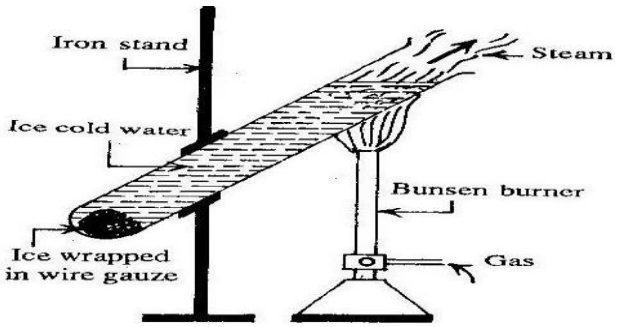
Conclusion

Iron is a good conductor of heat

Plastic is the poor conductor of heat

Wood is a poor conductor of heat

Experiment to show that water is a poor conductor of heat



Observation

Ice cubes don't melt yet water at the top is boiling

Conclusion

Water is a poor conductor of heat

Questions

Why does hot water remain on top of cold water as shown in the experiment?

Heated molecules are less dense than cold molecules

What shows that water is a poor conductor of heat?

Ice cubes don't melt yet water at the top is boiling

Application (importance) of conduction of heat in our daily life

It helps in ironing of clothes

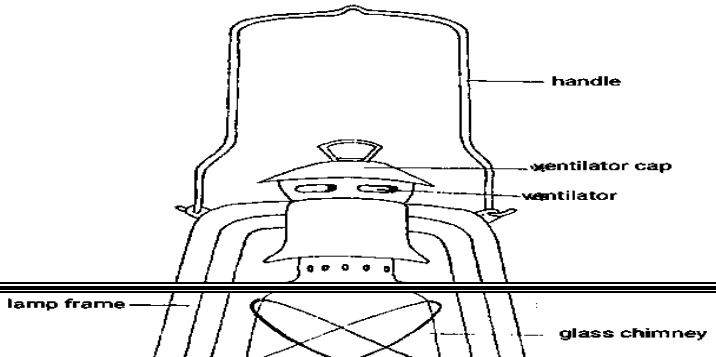
It enables us to cook food in saucepans

It helps in iron smelting

It helps in melting of ghee and butter

It enables us to roast meat on metal rods

Air circulation in a lantern lamp



Fuel tank

- It keeps paraffin (kerosene)

Glass chimney

- It protects the flame from being blown off.
- It directs soot and smoke to the ventilator.
- It allows out light.

Why is the glass chimney made transparent?

- To allow out light

Ventilator (ventilation hole)

- It lets out stale air (soot and smoke)

Inlet holes

- To allow in fresh air

Wick

- It burns to produce light

Regulator

- It regulates the size of the wick at user's will

Fuel tank cap

- It is opened to refill fuel in the tank

Lever

- It is turned to light the wick

How does kerosene move up the wick?

By capillarity (capillary action)

Which fuel is commonly used in lantern lamps?

Kerosene (paraffin)

Why is petrol not used in lantern lamps?

Petrol can catch fire easily

RADIATION

This is the method of heat transfer in vacuum and space

Radiation does not need any medium.

Radiant heat is the heat transferred by radiation

Similarity between radiant heat and light

Both travel in straight line

Both travel at the same speed

Importance of heat transfer by radiation (uses of radiant heat in the environment)

- ❖ It helps in drying wet clothes
- ❖ It helps in drying harvested crops
- It helps in sunbathing or basking
- It helps a person seated near fire to feel warm
- Radiant heat from the sun helps in water cycle

How does heat from the sun reach the earth to dry wet clothes?

By radiation

THE THERMOS FLASK (VACUUM FLASK)

This is a device used to keep hot things hot and cold things cold

This is a device that maintains the temperature of what is put inside it

A diagram showing vacuum flask

FUNCTIONS OF EACH PART

Cork (stopper)

It prevents the heat loss or gain by conduction

How is a cork able to prevent heat loss or gain by conduction?

It is an insulator

Materials used to make cork

Plastic

Wood

Rubber

Vacuum

It prevents heat loss or gain by conduction and convection

How is the vacuum able to prevent heat loss or gain by conduction and convection?

It has no molecules

Silvered walls

They prevent heat loss or gain by radiation

They reflect radiant heat

How are the double silvered walls able to reflect heat (to prevent heat loss or gain by radiation)?

They are shiny

Vacuum seal

It prevents matter from entering the vacuum

How is the vacuum seal able to prevent matter from entering the vacuum?

It is sealed

Cork base (pads or asbestos pads)

It absorbs shock

It protects the vacuum seal from damage

Plastic case

It protects the inner parts of the flask from damage

Cup

It is used to take what is inside the flask

Handle

It is used to hold (lift) the flask

Reasons why thermos flasks are not common in most homes

They are expensive to buy

They are delicate to handle

TEMPERATURE

- This is the degree of hotness or coldness of an object or place
- Temperature is measured by an instrument called **thermometer**
- The base unit (SI unit) for temperature is **kelvin**

Units for measuring temperature

- Kelvin
- Degree Celsius
- Degree Fahrenheit

Types of temperature scales

- Celsius scale
- Fahrenheit scale
- Kelvin scale

CELSIUS SCALE

- On this scale, the freezing point is 0^0C and the boiling point is 100^0C
- The space between the two fixed points is divided into 100 equal parts

FAHRENHEIT SCALE

- On this scale, the freezing point is 32^0C and the boiling point is 212^0C
- The space between the two fixed points is divided into 180 equal parts

KELVIN SCALE

- On this scale, the freezing point is 273.15 K and the boiling point is 373.15 K
- The space between the two fixed points is divided into 100 equal parts

FIXED POINT

- This is a standard degree of hotness or coldness

Name the two fixed points on temperature scales

- Freezing point/melting point (lower fixed point)
- Boiling point (upper fixed scale)

Freezing point is the temperature at which pure water changes to ice

Melting point is the temperature at which ice changes to water

Boiling point is the temperature at which pure water boils

Scale	Freezing point (melting point)	Boiling point
Celsius scale	0^0C	100^0C
Fahrenheit scale	32^0F	212^0F
Kelvin scale	273.15 K	373.15 K

THERMOMETER

- This is an instrument used to measure temperature

TYPES OF THERMOMETERS

CLINICAL THERMOMETER (DOCTOR'S THERMOMETER)

- It measures temperature of the human body (animal's body)

WALL THERMOMETER

- It is used to measure temperature in a room
- It uses mercury

LABORATORY THERMOMETER

- It is used to measure temperature in science experiments
- It is used to measure temperature in incubators
- It uses mercury

Disadvantage of using laboratory thermometers

- They don't have a kink to prevent the back flow of mercury

SIX'S (MAXIMUM AND MINIMUM) THERMOMETER

- It measures the highest and lowest temperature of the day

INFRARED THERMOMETER (TEMPERATURE GUN)

- It measures temperature without direct contact

How does an infrared thermometer (temperature gun) help in the control of COVID-19?

- It measures human body temperature without direct contact

Advantage of using infrared thermometers over other types of thermometers

- It measures temperature without direct contact while other thermometers involve direct contact

Disadvantage of using infrared thermometers over other types of thermometers

- It is more expensive than other thermometers

CLINICAL THERMOMETER

- This is an instrument used to measure human body temperature
- It is used by health workers to measure body temperature of patients
- The normal human body temperature is 37^0C or 98.4^0F.
- It either uses Celsius scale or Fahrenheit scale

Adaptations of the clinical thermometer

- It has a kink to prevent the back flow of mercury
- It has a narrow bore for easy expansion of mercury
- It has a curved glass to magnify the scale
- Its scale runs from 35^0c to 42^0c

Why does the temperature scale of a clinical thermometer start from 35^0C?

- The human body temperature normally does not go below 35^0C

Why does the temperature scale of a clinical thermometer stop at 42^0C?

- The human body temperature normally does not go above 42^0C

Why does the temperature scale of a clinical thermometer run from 35^0C to 42^0C?

- The human body temperature normally does not go below 35^0C or above 42^0c

Why is a clinical thermometer not disinfected (sterilized) using boiling water?

- Boiling water can break (burst) the thermometer

Name the liquid used to disinfect (sterilize) clinical thermometers.

- Alcohol

Why should a clinical thermometer be disinfected (sterilized) before use?

- To prevent the spread of germs

Why do health workers shake the clinical thermometer (give it jerks) before use?

- To reset the thermometer
- To make mercury go back to the bulb

How is the clinical thermometer reset?

- By shaking it

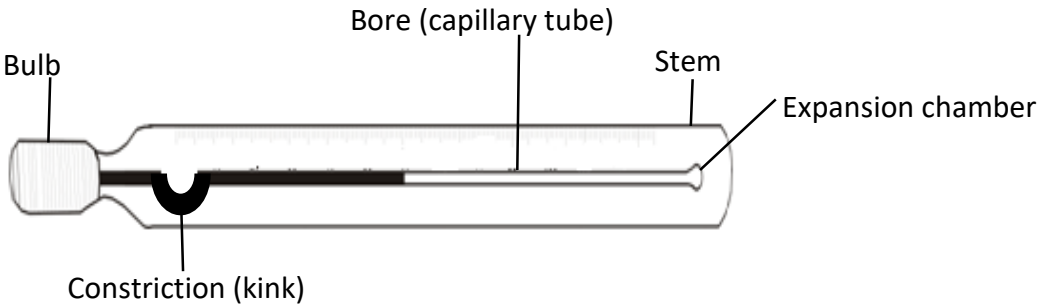
Why does a clinical thermometer has a curved glass?

- To magnify the scale

Give any two things that should be done on a clinical thermometer before use.

- A clinical thermometer is reset
- A clinical thermometer is sterilized (cleaned)

A diagram showing clinical thermometer



FUNCTIONS OF EACH PART OF A CLINICAL THERMOMETER

KINK (CONSTRICTION)

- It prevents back flow of mercury before readings are taken

How is a kink able to prevent the back flow of mercury?

- It has a bend (it is curved)

How is the function of a kink in clinical thermometer similar to that of valves in the heart and veins?

- Both prevent the back flow of liquids

STEM

- It contains the temperature scale
- It protects the bore

What makes it able to read temperature scale on the stem?

- The stem magnifies the mercury thread

Why is the stem made of transparent glass?

- To enable the doctor see the mercury level

BORE (GLASS TUBE)

- It allows expansion and contraction of mercury

Why is the bore narrow?

- For easy expansion of mercury (to make the thermometer more sensitive)

EXPANSION CHAMBER

- It is where air inside the bore collects as mercury expands

BULB

- It keeps mercury

Why is the bulb made with thin glass?

- To enable mercury conduct heat easily

MERCURY

- It is the liquid metal used to show temperature in the thermometer

Human body parts where a clinical thermometer can be placed

- In the armpits
- Under the tongue
- In the vagina
- In the anus
- Under the breasts

Why is the clinical thermometer put in the above parts?

- The temperature on those parts is almost the same as internal body temperature
- They cover the whole bulb and allow even expansion of mercury

Why is the clinical thermometer put under the tongue but not just in the mouth of a sick child?

- To prevent the sick child from biting the clinical thermometer

Differences between a clinical thermometer and a laboratory thermometer

- A clinical thermometer has a kink while a laboratory thermometer has no kink
- A clinical thermometer has a narrow temperature range (35^0c to 42^0c) while a laboratory thermometer has a wide temperature range (-10^0c to 110^0c)
- A clinical thermometer gives more accurate temperature readings than a laboratory thermometer

Advantages of using digital thermometers over mercury thermometers

- Digital thermometers are safer to use than mercury thermometers
- Digital thermometers are easier and faster to use than mercury thermometers
- Digital thermometers are more accurate than mercury thermometers

Disadvantage of digital thermometers compared to mercury thermometers

- They are more expensive than mercury thermometers

THERMOMETERIC LIQUIDS

- These are liquids used in thermometers

Examples of thermometric liquids

- Mercury
- Alcohol

Thermometers that use mercury

- Clinical thermometers
- Maximum thermometers
- Wall thermometers
- Laboratory thermometers

Thermometers that use both mercury and alcohol

- Six's thermometers
- Wall thermometers

Advantages of using mercury in thermometers

(Reasons why mercury is commonly used in thermometers)

- It is visible or easily seen (it is opaque)
- It expands uniformly
- It is a good conductor of heat
- It does not wet the glass tube
- It has a high boiling point (about 357^0 C)

Disadvantages of using mercury in thermometers

- It is very expensive
- It is poisonous
- It cannot measure very low temperatures

Reasons why alcohol is not commonly used in clinical thermometers

- It is not easily seen (it has a bright colour)
- It is a bad conductor of heat
- It wets the glass tube
- It does not expand uniformly (it expands more than mercury)

Reason why alcohol is used in minimum thermometers (to measure very low temperature)

- It doesn't solidify easily (it has a very low freezing point is -114^0C)

Advantage of using alcohol over mercury in thermometers

- Alcohol has lower freezing point (-114^0C) than mercury (-38.83^0C)

Disadvantages of using water in thermometers

- It wets the glass tube
- It needs a lot of heat to expand
- It is not easily seen (since it is colourless)
- It does not expand uniformly

THE SIX'S THERMOMETER

- This is also called maximum and minimum thermometer.
- It is used to measure the highest and lowest temperature of the day.
- It uses both alcohol and mercury for reading lowest alcohol and highest mercury

Diagram of the six's thermometer

How is the six's thermometer reset?

- By using a magnet to move the metal indices

Calculations

CHANGING FROM CENTIGRADE SCALE TO FAHRENHEIT SCALE

Formula: $^0F = (cx^9/_5) + 32$

Standard formula: 9C+160 = 5F

Examples

1. **Change 0^0C to Fahrenheit scale**

   $^0F = {}^9/_5\ C + 32$

   $^0F = {}^9/_5 \times 0 + 32$

   $^0F = {}^0/_5 + 32$

   $^0F = 0+32$

   $O^0C = 32\ ^0F$

2. **Change 100^0C to Fahrenheit scale**

   $= (C \times {}^9/_5) + 32$

   $= (100 \times {}^9/_5) + 32$

   $= (20x9) + 32$

   $= 180 + 32$

   $\underline{100^0C = 212^0F}$

   General formula (9c+160) =5F

   General formula 9c = (5F-160) or $^0F = {}^9/_5C + 32$

3. **Change the following Celsius to Fahrenheit scale**

   (a) 60^0C (c) 15^0C

   (b) 40^0C (d) 45^0C

CHANGING FROM FAHRENHEIT SCALE TO CENTIGRADE SCALE

To change from Fahrenheit to centigrade scale: Subtract 32 and then multiply by 5/9

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

Examples

- Change 32^0F to centigrade scale

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

  $= {}^5/_9\ (32 - 32)$

  $= {}^5/_9\ (0)$

  $= ({}^0/_9)$

$= 32F^0 = 0^0C$

Change 212^0F to centigrade scale

❖ $F^0 - C^0 = {}^5/_9 (F - 32)$

$= {}^5/_9 (212 - 32)$

$= {}^5/_9 (180)$

$= 5x20$

$212^0F = 100^0C$

6. Change the following Fahrenheit to centigrade scale

(b) 95^0F (d) 86^0F (f) 104^0F

(c) 59^0F (e) 113^0F

BURNING (COMBUSTION)

- This is a chemical reaction which uses oxygen to produce heat and light
- Burning is a **chemical change**

CONDITIONS NECESSARY FOR BURNING (COMBUSTION)

- Ignition temperature

This is the minimum temperature at which a fuel must be heated before it catches fire

- Oxygen
- Presence of a fuel (combustible substance)

Forms of energy produced during burning

- Heat energy
- Light energy

FUELS (COMBUSTIBLE SUBSTANCES)

- These are substances that are burnt to produce energy
- Fuels mainly produce heat energy

Characteristics of a good fuels (combustible substance)

- It should be cheap
- It should be readily available
- It should burn easily in air
- It should produce large amount of heat

GROUPS OF FUELS (CLASSIFICATION OF FUELS)

- Solid fuels
- Liquid fuels
- Gaseous fuels

Solid fuels

- These are solids that are burnt to produce energy

Examples of solid fuels

- Firewood
- Charcoal
- Sawdust
- Wood shaving
- Briquettes
- Coal
- Coke

Liquid fuels

- These are liquids that are burnt to produce energy

Examples of liquid fuels

- Kerosene (paraffin)
- Diesel
- Petrol
- Aviation fuel (Jet fuel)

Gaseous fuels

- These are gases that are burnt to produce energy

Examples of gaseous fuels

- Coal gas
- Natural gas
- Biogas

In which way is the function of food in the human body similar to that of petrol in a car?

- Both food and petrol are burnt to produce energy

FLAMMABLE (INFLAMMABLE) GASES

- These are gases that can catch fire easily

Examples of flammable gases

- Methane (biogas)
- Natural gas
- Butane
- Propane
- Coal gas

FLAME

- This is the visible and gaseous part of fire
- This is the glowing gas produced during burning

Regions (zones or parts) of a flame

BLUE ZONE (OUTER ZONE)

- It is the outermost region
- It is near the base (bottom) of a flame
- It is the hottest region

Why blue zone the hottest region of the flame?

- It is where complete burning (combustion) occurs

Why does complete combustion occur in the blue zone??

- It receives enough oxygen

YELLOW ZONE (MIDDLE ZONE)

- It is the brightest region
- It is moderately hot
- It gives out light

CENTRAL ZONE (UNBURNT GAS/DARK ZONE)

- This region is found deep inside the flame
- It surrounds the wick
- It is the coolest region of a flame
- It does not give out light

Give a reason why the dark zone does not give out any light. (why is dark region the coolest pat of a flame?)

- There is no burning in this zone

Why is there no burning in the dark zone?

- It does not receive any oxygen

Examples of gases that do not burn

- Carbon dioxide
- Nitrogen
- Xenon
- Argon
- Krypton
- Helium

EXPERIMENT TO SHOW THAT OXYGEN SUPPORTS BURNING

Why does the candle go off when covered for some time?

- Oxygen is used up
- Due to lack of oxygen supply

Which component of air supports burning of the candle shown above?

- Oxygen

Name the gas contained in the test tube when the candle goes off (stops burning)

- Carbon dioxide

EXPERIMENT TO SHOW THAT OXYGEN SUPPORTS BURNING

- Put some water in the beaker
- Fix a burning candle in the beaker
- Cover the candle with a test tube

Why does the candle continue burning for some time?

- It still has oxygen

Why does the candle finally go off (stop burning)?

- Oxygen is used up

Why does the water level rise as shown in diagram B?

- To occupy space for the used oxygen

WAYS OF PUTTING OUT FIRE

- Using fire extinguishers
- Using water for non-petrol fires
- Using sand
- Using thick blankets
- Rolling yourself on ground

Ways of putting out petrol fire

- Using fire extinguishers
- Using sand

Gases used in fire extinguishers

- Carbon dioxide
- Nitrogen

Why is carbon dioxide used in fire extinguishers?

- It does not support burning

Why is oxygen not used in fire extinguishers?

- Oxygen supports burning

Why are fire extinguishers painted with bright colours?

- For easy identification
- To easily be seen in case of fire accidents

STEPS TAKEN WHEN USING A FIRE EXTINGUISHER

- **P:** Pull the pin
- **A:** Aim the nozzle at base of fire
- **S:** Squeeze the handle
- **S:** Sweep nozzle side to side

Why is water not used to put out petrol fire?

- Petrol floats on water and burning continues

How does sand put out fire?

- It cuts off oxygen supply

How does water put out fire?

- Water reduces the temperature of fuel below its ignition temperature

RUSTING

- This is the chemical change in some metals that needs moisture and oxygen to take place
- Metals turn **reddish brown** on rusting
- Rusting is a **chemical change**

Why is rusting regarded as a chemical change?

- It is a new permanent substance
- It is irreversible

Examples of metals that can rust

- Iron
- Steel

Examples of metals that do not rust

- Copper
- Silver
- Brass
- Aluminum
- Stainless steel
- Bronze

Conditions necessary for rusting

- Oxygen
- Moisture

What is the role of moisture (water) in iron rusting?

- It speeds up oxidation of iron

Importance of rusting

- It adds iron in the soil

Disadvantages of rusting

- It makes metals weak
- It spoils the colour of metals
- It makes sharp metals blunt
- It makes keys fail to fit in padlocks
- It makes bolts and nuts hard to drive (unscrew)
- It makes water in rusty containers is poisonous

Ways of preventing and rusting and corrosion

- By keeping iron metals in clean dry places
- By painting some metals
- By galvanizing (coating iron with zinc)
- By enameling (coating iron with enamel)
- By greasing or oiling some metals
- By making alloys

How does painting prevent rusting?

- Paint cuts off oxygen supply
- Paint prevents moisture and oxygen from reaching the metal

EXPERIMENT TO SHOW RUSTING

- Put iron nails in a test tube and wet them with tap water
- Invert the test tube and place it in a beaker of water
- Leave them for at least a week

Observations

- The iron nails will rust (will turn reddish brown)
- The water level in the beaker will rise

Conclusion

- The water level rises to occupy space for the used oxygen

<u>EXPERIMENT TO SHOW RUSTING</u>

- Put an iron nail in each test tube: A, B and C
- Put tap water in test tube A and cork it

Tap water has oxygen

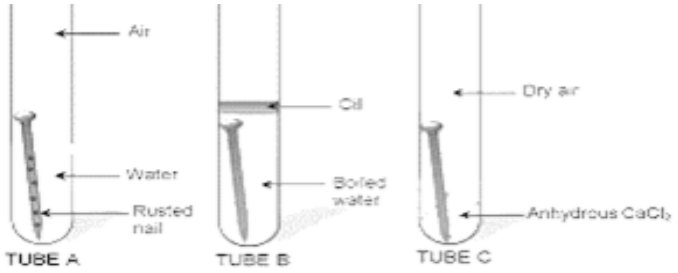
- Put boiled water and oil in test tube B

Boiling removes oxygen from water

Oil cuts off oxygen supply

- Put Calcium chloride in test tube C and cork it

Calcium chloride helps to dry air (remove water from air)



Observation

The iron nail in test tube A rusted

- Due to presence of moisture and oxygen
- It has all necessary conditions for rusting

The iron nail in test tube B did not rust

- Oil cuts off oxygen supply

The iron nail in test tube C did not rust

- It lacks moisture (water)

GROWING TUBER CROPS

Tuber crops

These are crops with swollen underground stems or roots that store food

Groups (types) of tuber crops

- Root tubers
- Stem tubers

Root tubers

- These are swollen underground roots that store food

Examples of root tubers

- Cassava
- Sweet potatoes
- Carrots
- Turnips
- Parsnips
- Swede
- Dahlia
- Beetroot (beet)

Propagation (growing) of some root tubers

- Carrots by means of **seeds**
- Cassava by means of **stem cuttings**
- Sweet potatoes by means of **vines or stem cuttings**

Carrots are first planted in a nursery bed (seed bed) and later transplanted

Carrots are rich in Vitamins (Vitamin A) which helps in good night vision

Stem tubers

These are swollen underground stems with stored food

Examples of common stem tubers

- Irish potato
- White yams

Propagation (growing) of stem tubers

Irish potatoes and white yams are propagated by means of **stem tubers**

Methods of planting tuber crops

- **Broadcasting method**

This is when crops are scattered randomly in the garden

- **Row planting (row cropping)**

This is when crops are grown in lines with proper spacing

Qualities of good crops to be grown

- They should be resistant to diseases
- They should be resistant to bad weather
- They should have great market value
- They should be good yielding

Ways of caring for tuber crops

- Weeding
- Spraying with pesticides
- Pruning
- Watering
- Thinning
- Earthing up

PESTS FOR TUBER CROPS

- Weevils
- Squirrels
- Caterpillars
- Rats
- Grass hoppers (variegated grasshoppers)
- Millipedes
- Wild pigs
- Moles
- White fly
- Green cassava mites
- Aphids
- Army worm

Signs of tuber crops attacked by pests

- Wilting of the crop
- Damaged roots and stems
- Black patches on the leaves
- Holes on leaves

Effect of pests and disease on tuber crops

- They destroy leaves
- They eat and destroy tubers
- They make tubers rot
- They eat and destroy the stems

DISEASES OF TUBER CROPS

- Cassava Mosaic
- Brown streak
- Bacterial blight
- Bacterial wilt

Signs of diseased crops

- Stunted growth
- Poor quality of yields
- Yellowing of leaves
- Black patches on the leaves

Controlling pests and diseases of tuber crops

- Spraying using pesticides
- Planting disease resistant varieties
- Regular weeding
- Pruning
- Use of scare crows
- Crop rotation
- Remove and burn infected plants
- Fencing the garden
- Poisoning them

- Use of traps

CHARACTERISTICS OF PESTS FOR TUBER CROPS

- They have sharp claws to dig out tubers from the soil
- They have sharp incisors to bite tubers
- Some have fingers for uprooting the tubers

METHODS OF HARVESTING TUBER CROPS

- Digging out (e.g. sweet potatoes and Irish potatoes)
- Uprooting (e.g. cassava)

SCIENCE ORIENTED CLUBS

- These are clubs that are formed on science basis

Objectives of science oriented clubs

- To enable children acquire science skills
- To make children pick interest in science subjects
- To enable children discover science facts

Examples of science oriented clubs

- Young farmers' club
- Wildlife club
- Environmental protection clubs
- Science and technology clubs

Young farmers' club

- This is a group of young people in a community who have interest in farming

Roles of young farmers' club at school

- They grow food crops in the school garden
- They organize study tours to farm schools
- They teach better farming methods to their fellow school
- They teach school children how to grow and care for crops

CO-OPERATIVE SOCIETIES

- These are groups of people who join together to do a business that they cannot do successfully as individuals.

Functions of co-operative societies

- They provide loans to farmers
- They provide farm machinery for hire
- They find market for the farmers' produce
- They have better storage facilities for farmers' produce
- They teach better farming methods to the farmers

BACTERIA AND FUNGI

BACTERIA

- These are tiny organisms with one cell (single celled microbes)
- They are under **kingdom monera (Bacteria kingdom)**
- A group of bacteria is called a **colony**

Characteristics of bacteria

- They are single celled/unicellular organisms
- They have a cell wall
- They lack a nucleus
- They are microscopic organisms (microorganisms/microbes)
- They have improper shape
- They have flagella

Why are bacteria called unicellular organisms?

- They have one cell

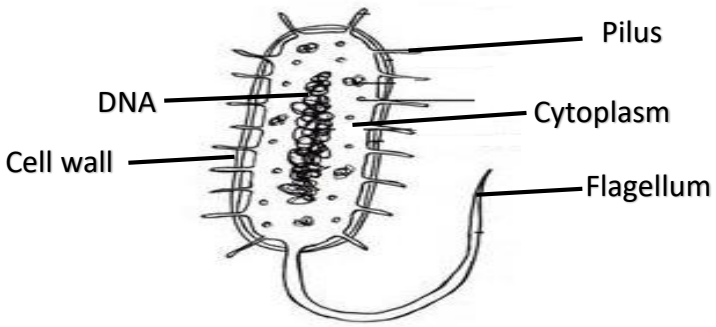
Why are bacteria called microbes/microorganisms/microscopic organisms?

- They are too small to be seen with the naked eyes
- They can only be seen with a microscope

How does a microscope help a doctor to see bacteria?

- It magnifies bacteria (it makes bacteria to appear bigger)

Structure of a bacterium



Cell wall

- For protecting bacteria (for protection)

Flagella

- These are tail-like structures on some bacteria
- A bacterium can be with a single flagellum or numerous flagella

- They help bacteria to move (for movement)

How do bacteria move (locomote)?

- By using their flagella

Pilus

- For attachment to the source of food

How are bacteria able to survive harsh environmental and chemical conditions?

- By forming endospores

Feeding in bacteria (how bacteria feed)

- Some bacteria feed on dead organic matter (they are saprophytes)
- Some bacteria make their own food (they are autotrophs)

Places (habitats) where bacteria breed from and live

- Soil
- Latrines
- Septic tanks
- Rubbish pits
- Dirty water
- Dirty food
- Rotting matter
- On plants
- On bodies of animals
- Infected blood
- Nasal mucus
- Root nodules

Conditions needed by bacteria to reproduce (breed)

- Food
- Moisture (water)
- Warmth
- Oxygen

Reproduction/breeding in bacteria (how do bacteria reproduce?)

- By binary fission

BINARY FISSION

- This is the form of asexual reproduction where a parent cell divides into two identical daughter cells

Single celled organisms that reproduce by cell division (binary fission)

- Bacteria
- Amoeba
- Virus
- Paramecium
- Euglena

Diagram to show binary fission

Why is the mode of reproduction shown above called asexual reproduction?

- It does not involve the union of gametes

How are bacteria are named?

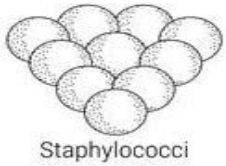
- According to their shapes

TYPES/GROUPS OF BACTERIA (ACCORDING TO THE SHAPES)

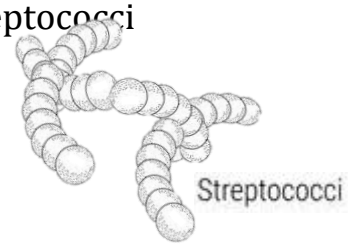
- Spherical bacteria (cocci)
- Spiral shaped bacteria (spirilla)
- Rod shaped (cylindrical) bacteria (bacilli)
- Comma shaped bacteria (vibrios)
- Corkscrew shaped bacteria (Spirochaetes)

Spherical bacteria

- These are called **cocci**
- They can be monococcus (single), diplococcus (in pairs), tetracoccus (in fours) and staphylococcus (in clusters)
- These cause boils, sore throat and pneumonia

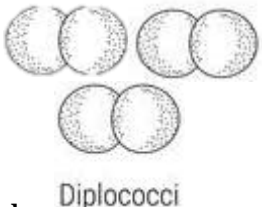


Streptococci



(Cause sore throat)

Staphylococci (causes boils)



Diplococci (cause pneumonia)

Rod shaped bacteria (cylindrical bacteria)

They are called **Bacilli**

Bacillus anthracis causes **anthrax**

Salmonella typhi causes **typhoid**

Spiral shaped bacteria

- These are called **spirilla**

Treponema causes **syphilis**

Comma shaped bacteria

- These are called **vibrios**
- They have flagella at one end
- Vibrio cholerae causes **cholera**

Respiration of bacteria

- Some bacteria need oxygen for respiration
- These are called **aerobic bacteria**
- Other bacteria don't need oxygen
- These are called **anaerobic bacteria**

How do bacteria enter in our bodies?

- Through inhaling contaminated air
- Through drinking contaminated water
- Through eating contaminated food
- Through dirty wounds
- Through playing unprotected sex with an infected person

Nature of bacteria

- Useful bacteria (harmless bacteria)
- Harmful bacteria (useless bacteria)

Useful bacteria

- These are bacteria that are important in the environment

Examples of useful bacteria

- **Putrefying bacteria**: help in decomposition of organic matter to form humus
- **Anaerobic bacteria:** ferment waste in biogas digester to produce biogas
- **Nitrogen fixing bacteria (rhizobia):** fix nitrogen into the soil
- Nitrifying bacteria

Importance of bacteria (ways in which bacteria are useful)

- Some bacteria help to fix nitrogen in the soil e.g nitrogen fixing bacteria /rhizobia
- Some bacteria help in decomposition of organic matter e.g putrefying bacteria
- Some bacteria help to reduce the volume of faeces in latrines and sewage tanks
- Bacteria help to break down complex sugars in the digestive system (some bacteria help in food digestion)
- Some bacteria help in production of vinegar

Vinegar is used to preserve meat

- Some bacteria help in biogas production e.g anaerobic bacteria
- Some bacteria help in making of some vaccines
- Some bacteria help in making cheese, butter and yoghurt
- Bacteria help in genetic engineering

Why is it bad to pour kerosene and oil in latrines?

- Oil kills bacteria and maggots that would reduce volume of faeces

How does oil kill bacteria and maggots in latrines?

- Oil cuts off oxygen supply to bacteria and maggots

Examples of processes which need bacteria to take place

- Decomposition
- Fermentation of milk (production of cheese, butter and yogurt)

- Production of drugs (vaccines and antibiotics)
- Production of vinegar
- Anaerobic fermentation (biogas production)
- Fixation of nitrogen in the soil

HARMFUL BACTERIA

- These are bacteria that are dangerous in the environment

Examples of harmful bacteria

- **Clostridium tetani:** causes tetanus
- **Vibrio cholerae:** causes cholera
- **Salmonella typhi:** causes typhoid
- **Treponema pallidum:** causes syphilis
- **Mycobacterium:** causes leprosy and tuberculosis

Dangers of bacteria (how bacteria are harmful/nuisance)

- Some bacteria cause bacterial diseases (they are pathogens)
- Some bacteria spoil milk (make food go bad)
- Some bacteria make wounds septic
- Some bacteria cause ripening of premature fruits

Which hormone in plants is responsible for ripening of mature fruits?

- Ethylene hormone

Pathogens are tiny organisms that cause diseases

How do bacteria protect themselves against the host's immune system?

- By forming a protective capsule (layer of slime) on its cell wall

A table showing bacterial diseases in people, livestock and plants

In people	In livestock	In poultry	In plants
▪ Cholera ▪ Tetanus ▪ Typhoid ▪ Syphilis ▪ Bacillary dysentery ▪ Pneumonia	▪ Anaplasmosis ▪ Mastitis ▪ Black quarter ▪ Pneumonia ▪ Tuberculosis ▪ Anthrax ▪ Brucellosis	▪ Fowl cholera ▪ Fowl typhoid ▪ Pneumonia	Bacterial Wilt Fire blight Bacterial spot

▪ Gonorrhoea ▪ Diphtheria ▪ Tuberculosis ▪ Leprosy ▪ Lyme disease	▪ Foot rot		

PREVENTION OF DANGERS CAUSED BY HARMFUL BACTERIA

- Immunize against bacterial diseases
- Reheat leftover food before eaten
- Always cover leftover food
- By preserving food
- Wash hands after visiting latrine
- Always drink safe water
- Use of antibiotic drugs to treat bacterial infections
- Use of antiseptic drugs to kill bacteria
- Sterilize medical equipment before use
- Abstain from sex
- Keep cuts and wounds clean
- Use clean hands to handle food
- Proper use of latrines and toilets
- Use of disinfectants to clean latrines

ANTISEPTICS

- These are substances used to kill germs on the human body
- They prevent wounds from becoming septic

Examples of antiseptics (antiseptic drugs)

- Dettol
- **Iodine:** It is used to kill germs on cuts
- Carbolic acid
- Hydrogen peroxide
- **Alcohol:** It is used in hand sanitizers

ANTIBIOTICS

- These are drugs that treat bacterial infections

Examples of antibiotics (antibiotic drugs)

- Penicillin

- Septrin

DISINFECTATNTS

- These are chemicals that kill germs on non-living surfaces

Examples of disinfectants

- Jik
- Jeyz
- Chlorine (bleach)

FUNGI

- These are organisms that lack chlorophyll and cannot make their own food
- Fungi belong to **Kingdom fungi**
- They can either be unicellular or multicellular organisms
- Fungi are found in **moist places**
- Fungi lack proper roots but they have threadlike structures called **hyphae**
- A group of hyphae is called **mycelium**
- Fungi cannot make their own food
- Most fungi are saprophytes

Why are fungi unable to make their own food?

- They lack chlorophyll

Why are fungi called saprophytes?

- They feed on dead organic matter

Why are fungi very common in wet season/moist places?

- There is a lot of rotting matter on which fungi feed
- There is enough water to support growth of fungi

REPRODUCTION IN FUNGI

- Most fungi reproduce by means of spores
- Yeast reproduces by budding

Feeding in fungi

- Most fungi feed saprophytically (feed on dead organic matter)
- Some fungi feed parasitically (get food from their host)

Characteristic of fungi

- They lack chlorophyll
- They have a nucleus
- Fungi have a cell wall

- Most fungi are filamentous
- Most fungi reproduce by means of spores and budding in yeast
- Most fungi feed saprophytically

Conditions necessary for growth of fungi

- Moisture
- Warmth

Examples of fungi

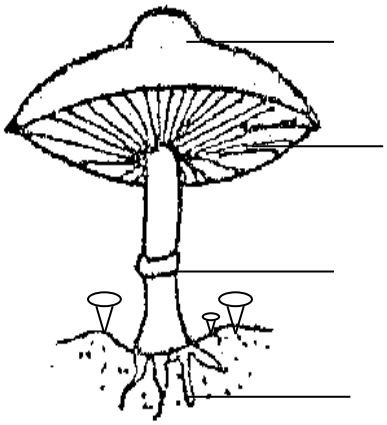
- Yeast
- Moulds (penicillium moulds, rhizopus and mucor)
- Mushrooms
- Toad stools
- Puff balls
- Bracket fungi

Bracket fungi always grow on tree trunks

MUSHROOM

- It reproduces by means of spores
- It is propagated by means of spores
- It feeds saprophytically (feeds on dead organic matter)
- Some mushrooms are edible while others are poisonous

A diagram showing a mushroom



Cap (pileus)

Gills

Ring (annulus)

Hyphae

How are mushrooms grown (propagated/reproduce)?

- By means of spores

The part of a mushroom visible above the ground is called **fruiting body (sporophore)**

The part of a mushroom below the ground is called **mycelium**

Functions of each part

Cap (pileus)

- It protects the gills

Gills

- They produce and store spores

Stalk/stem/stipe

- It holds the cap and gills

Ring

- It protect the mushroom when it is still young

Hyphae

- They absorb food (nutrients) from dead matter

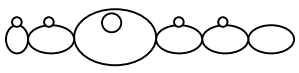
Why is a mushroom not called a plant?

- A mushroom has no chlorophyll while plants have chlorophyll
- A mushroom cannot make its own food while a plant makes its own food

YEAST

- Yeast contains an enzyme called **zymase**
- Yeast speeds up fermentation of alcohol
- Yeast reproduces by **budding**

A diagram to show budding in yeast



Toadstools

- They grow on decaying organic matter
- Toadstools resemble mushrooms
- They are poisonous

Moulds

- These are furry tiny fungi that grow on rotten organic matter (rotten cassava, breads and sweet potato)

Examples of moulds

- Penicillium
- Rhizopus
- Mucor

Rhizopus causes rotting of fruits and vegetables

Mucor spoils breads and cakes

Penicillium is used to make penicillin and cheese

Importance of fungi (useful fungi)

- Some fungi are eaten as food e.g some mushrooms, morels and truffles

(Some fungi are sources of proteins/fungal proteins)

- Mushrooms are sold for income
- Yeast helps in brewing/making alcohol/fermentation of alcohol

It speeds up fermentation

- Yeast helps in baking

It leavens breads/rise the dough

- Yeast extracts are a source of Vitamin B
- Penicillium are used to make penicillin (antibiotic drug)
- Penicillium is used in making cheese
- Fungi help in decomposition (break down organic matter)

Dangers of fungi (how fungi are harmful/nuisance)

- Some fungi make food go bad e.g moulds
- Some fungi destroy wood
- Toadstools are poisonous when eaten
- Some fungi cause fungal diseases

Fungal diseases in plants and animals

In people

- Ringworm
- Candidiasis
- Athlete's foot
- Barber's itch
- Jock itch

In plants

- Black spot
- Tomato blight
- Potato blight
- Maize rust
- Powdery mildew
- Corn smut

Prevention and control of fungal diseases

- Regular bathing
- Avoid sharing dirty clothing with infected person
- Spray using fungicides
- Do not eat any mushroom that you don't understand
- Preserving food
- Using essential drugs
- Do not eat uncovered smelly food
- Store food in cool dry places

Similarities between fungi and bacteria

- Both can cause diseases
- Both feed on dead matter
- Both have a cell wall
- Both help in decomposition
- Both fungal and bacterial diseases can be treated

Differences between bacteria and fungi

- Bacteria reproduce by binary fission (cell division) while fungi reproduce by means of spores or budding
- Some bacteria make their own food while fungi don't make their own food
- Most bacteria have one cell while most fungi have many cells
- Bacterial diseases are immunisable while fungal disease are not immunisable

THE GREAT SCIENTISTS

Sir Isaac Newton

- He discovered Newton's laws of motion

Edward Jenner (1749 – 1895)

- He made vaccine for smallpox.

Louis Pasteur (1822 – 1895)

- He discovered pasteurization of milk
- He discovered bacteria make milk go bad

Sir Ronald Ross (1857 – 1982)

- He discovered the cause of malaria

Sir Alexander Fleming (1886 - 1985)

- He discovered penicillin

Joseph Lister (1827 – 1912)

- He discovered the antiseptic to prevent wounds from becoming septic

Robert Koch (1843 – 1910)

- He discovered the bacteria that cause tuberculosis, anthrax and cholera

Sir William Harvey (1578 – 1657)

- He discovered blood circulation in the human body.

TERM THREE

TOPIC: <u>CHANGES IN THE ENVIRONMENT</u>

<u>ENVIRONMENT</u>

- These are things that surround an organism

<u>Types of changes in our environment</u>

- Biological changes
- Chemical changes
- Physical changes

<u>BIOLOGICAL CHANGES</u>

- These are changes that occur in the life of living things

<u>Characteristics of biological changes</u>

- They are irreversible (cannot be reversed)
- The take place in life of living things

<u>Examples of biological changes</u>

- Moulting
- Growth
- Reproduction
- Germination
- Fertilization
- Ovulation
- Flowering
- Fruiting

Advantages of biological changes

- Moulting helps some organisms to increase in size
- Reproduction prevents extinction of living things
- Reproduction increases population of living things

CHEMICAL CHANGES

- These are changes that form a new permanent substance

Characteristics of chemical changes

- They are irreversible (cannot be reversed)
- They form a new permanent substance
- They either absorb or give off heat
- The weight an object changes

Examples of chemical changes

- Burning
- Rusting
- Decomposition
- Fermentation
- Respiration
- Chemical digestion
- Photosynthesis

Advantages of chemical changes

- Burning produces heat for cooking
- Rusting adds mineral salts (e.g iron) to the soil
- Decomposition helps in soil formation
- Fermentation helps in making of alcohol and yogurt
- Respiration helps the body to get energy
- Chemical digestion eases absorption of food
- Photosynthesis helps plants to get food
- Photosynthesis provides oxygen to animals
- Photosynthesis helps to purify air

Disadvantages of chemical changes

- Rusting weakens metals
- Rusting spoils the colour of metals
- Burning pollutes the environment
- Burning causes fire accidents

PHYSICAL CHANGES

- These are changes that do not form a new permanent substance

Characteristics of physical changes

- They do not form a new permanent substance

- They are reversible
- They neither absorb nor give off heat

Examples of physical changes

- Evaporation
- Condensation
- Freezing
- Melting
- Sublimation
- Deposition
- Expansion
- Contraction
- Breaking of an egg

Advantages of physical changes

- Evaporation helps us to obtain salt from salt solution
- Evaporation helps to concentrate liquid foods e.g noodles
- Evaporation and condensation help in water cycle/rain formation
- Evaporation of sweat cools our bodies
- Freezing helps in making of ice cubes
- Freezing helps in food preservation e.g ice cream, juice and tomatoes
- Melting helps us to butter in cooking
- Melting helps in making of alloys
- Sublimation helps us to wear perfumes

Disadvantages of physical changes

- Freezing makes water transport difficult
- Expansion causes cracks on buildings and furniture
- Expansion breaks bridges on hot days
- Expansion bends wet timber dried under sunshine
- Contraction reduces air pressure in the tubes of tyres
- Contraction causes breaking of hot glass when cold water is put in it
- Contraction causes breaking of electric bulbs when exposed to cold water
- Some cause weather changes in the atmosphere

NATURAL AND PEOPLE MADE CHANGES

Natural changes

- These are changes that occur in nature

Examples of natural changes

- Floods
- Earth quake
- Lightning
- Wind movement
- Change in seasons

Man made Changes

- These are changes that are caused by man

Examples of man made changes

- Afforestation
- Deforestation
- Bush burning

- House construction
- Road construction
- Industrialization
- Cross breeding
- Artificial insemination
- Vegetative propagation
- Mulching

ADVANTAGES AND DISADVANTAGES OF MANMADE CHANGES

MANMADE CHANGE	ADVANTAGES	DISADVANTAGES
Mulching	It keeps water in the soil It improves soil fertility Controls weeds	Mulches hide pest Wet mulches grow into weeds Mulching is tiring
Road construction	It eases transport It eases communication	It leads to destruction of vegetation Poor roads cause accidents

MANMADE CHANGE	ADVANTAGES
House construction	Houses protect from bad weather Houses protect from thieves Houses protect from wild animals
Afforestation	Trees control soil erosion Trees help in rain formation Trees provide wood fuel Trees provide herbal medicine Trees provide timber
MANMADE CHANGE	**EFFECTS**
Deforestation	It causes soil erosion It causes drought It destroys wild life It leads to global warming
Bush burning	It causes soil erosion It leads to soil infertility

TOPIC: KEEPING GOATS, SHEEP AND PIGS

COMMON TERMS USED IN KEEPING GOATS

- **A nanny goat (doe):** This is an adult female goat

- **A Billy goat (buck):** This is an adult male goat
- **Wether:** This is a castrated billy goat
- **Kid:** This is a young goat
- **Kidding:** This is the act of giving birth to kids (act of giving birth in goats)
- **Browsing:** This is the act of feeding on leaves and soft shoots of plants
- **Weaning:** This is the gradual introduction of other foods to a baby to supplement breast milk
- **Gestation period:** This is the time taken from conception to birth
- **Lactation:** This is production of milk by the mother's mammary glands after birth

Why farmers keep goats and sheep?

- For milk production
- For meat production
- For income after sale
- For mohair

Importance (uses) of goats to people

- They provide milk
- They provide meat
- They are sold for money
- Angora goats provide mohair
- They are used as dowry
- They are used as sacrifices
- Their droppings and urine are used as farm yard manure
- Their skins are used to make leather products and dance costumes

Examples of leather (products made from animal skins)

- Leather shoes
- Leather bags
- Leather belts
- Leather jackets

EXTERNAL PARTS OF A GOAT

TYPES OF GOATS

- A type of goats is a group of goats kept for a specific purpose

TYPES OF GOATS

- Dairy breeds (milk goats)
- Meat goats
- Mohair goats

BREEDS OF GOATS

- A breed of goats is a group (family) of goats with the similar characteristics (features)

Types of breeds of goats

- Local breeds (indigenous/native breeds)
- Exotic breeds
- Cross breeds

LOCAL BREEDS

- These are breeds of goats that have been in Uganda for a long time
- Local breeds of goats are mainly kept for **meat**

Characteristics of local breeds of goats

- They are small in size
- They are resistant to diseases
- They are resistant to bad weather
- They mature slowly
- They need less care and attention
- They have good quality products
- They produce less products

Examples of local breeds of goats

- Mubende goats
- Small East African goats
- Kigezi goats
- Sebei goats
- Karamoja goats

Advantages of local breeds

- They are resistant to diseases
- They are resistant to bad weather
- They need less care and attention
- They produce less milk and meat
- They have good quality products

Disadvantages of local breeds

- They mature slowly
- They produce less milk and meat
- They have hard meat

EXOTIC BREEDS OF GOATS

- These are breeds of goats that were imported from other countries

Characteristics of exotic breeds of goats

- They are big in size
- They are vulnerable to diseases
- They are vulnerable to bad weather
- They need much care and attention
- They mature quickly
- They produce a lot of meat and milk

EXAMPLES OF EXOTIC BREEDS OF GOAT	REASON FOR KEEPING THEM
▪ Boer goats ▪ Savanna goats ▪ Kalahari Red goats ▪ Somali goats (Galla goats) ▪ Galla goats (Somali goats) ▪ Kiko goats	For meat production
❖ Saanen goats ❖ Toggenburg goats ❖ Alpine goats ❖ Anglo-Nubian goats ❖ Golden Guernsey goats	For milk production
✓ Angora goats	For mohair production

Advantages of exotic breeds of goats

- They mature quickly
- They produce a lot of meat and milk
- They have soft meat

Disadvantages of exotic breeds of goats

- They are not resistant to diseases
- They are not resistant to bad weather
- They need much care and attention

BREEDING IN GOATS

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

How often do goats breed in a year?

- Goats breed once in a year.

GESTATION PERIOD OF A GOAT

- **Gestation period** is the time taken from conception to birth
- The gestation period of a nanny goat is **5 months (150 days)**

HEAT PERIOD IN GOATS

- This is the time when the nanny goat is ready to mate with a billy goat

Signs of a nanny goat on heat

- It becomes restless
- It mounts other goats
- It stands still when mounted
- It urinates frequently
- It makes a lot of noise
- Loss of appetite
- The vulva swells and turns red
- Mucus discharge from the vulva

CARING FOR A PREGNANT GOAT

7. A pregnant goat needs special care.

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

Signs of a good milk breed

i. It has a large under and teats.

ii. Have large milk veins which appear below the belly.

iii. Have strong and well placed hind legs.

iv. Have strong back muscles.

MANAGEMENT (ROUTINE) PRACTICES IN GOAT KEEPING

(Ways of caring for farm animals)

- Numbering
- Dehorning/Disbudding
- Hoof trimming
- Castration
- Deworming
- Dehorning
- Spraying
- Dipping
- Dusting
- Culling
- Feeding
- Housing

NUMBERING (IDENTIFICATION OF ANIMALS)

- This is the putting of a mark or label on the body of animals.

Importance of numbering (livestock identification)

- It helps a farmer to easily find his lost animals
- It helps a farmer to keep proper farm records

HOOF TRIMMING

- This is cutting of overgrown hooves from the animal
- It reduces the risk of foot rot disease

DEHORNING/DISBUDDING

- **Dehorning** is the removal of horn buds from the animal
- **Disbudding** is the removal of horn buds from the animal
- It increases space in the barn/byre

CASTRATION

- This is the removal or inactivation of testicles of a male animal

Methods of castration

- Open castration
- Closed castration
- Loop castration (band castration)

OPEN CASTRATION (SURGICAL CASTRATION)

- This is when the scrotum is cut to remove the testicles

Instruments used in open castration

- Sharp knife
- Razorblade
- Scalpel

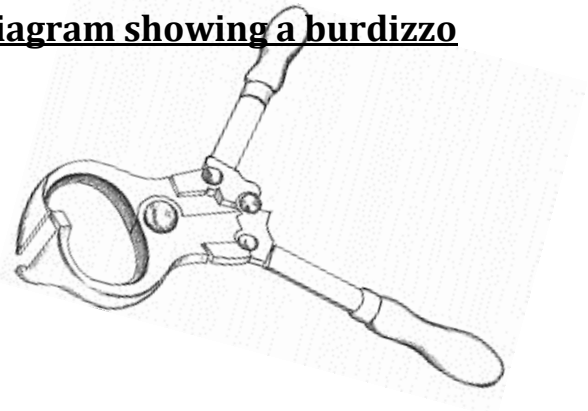
CLOSED CASTRATION

- This is the use of burdizzo to crush the sperm ducts and blood vessels

Instrument used in closed castration

- Burdizzo

A diagram showing a burdizzo



How is a burdizzo useful on cattle farm?

- It is used in closed castration

How is a burdizzo adapted to its function?

- It has blunt pincers

LOOP CASTRATION (BAND CASTRATION)

- This is the use of a rubber band to squeeze and break the sperm ducts and blood vessel

Instruments used in loop castration

- Rubber band
- Elastrator

An elastrator is used to apply rubber band around the scrotum during band castration

Why is loop castration impossible in pigs (boars)?

- They don't have sagging testicles

Advantages of castration

- It prevents inbreeding
- It prevents random mating
- It makes the animal humble (docile)
- It makes the animal grow big and fat
- It reduces bad smell in male animals
- It prevents unwanted pregnancies

Disadvantages of castration

- It is painful
- It needs a skilled person
- It increases the risk of infections
- It denies the male animal its right of reproduction

DEWORMING

- This is the giving of medicine through the mouth to kill worms (endoparasites) in animals

Why farmers deworm their animals? (Importance of deworming)

- To kill endoparasites (worms)

METHODS OF DEWORMING

- Drenching
- Dosing

i) Dosing

- This is the giving of solid medicine through the mouth to kill worms in animals

ii) Drenching

- This is the giving of liquid medicine through the mouth to kill worms in animals.

Farm tools used for drenching

- Drenching gun
- Syringe
- Bottle

DIAGRAM OF A DRENCHING GUN

How is a drenching gun important on a livestock farm?

- It is used for drenching

State the importance of spraying, dipping and dusting livestock with acaricides

- To kill ticks and mites
- To prevent tick-borne diseases

How is a knapsack sprayer important on a goat farm?

- It is used for spraying acaricides

HOUSING GOATS

- This is the constructing of a house for goats

Qualities of a good house for goats

- It should be well ventilated
- It should have a slanting floor
- It should have a strong roof

Importance of a house to goats

- To protect goats from bad weather
- To protect goats from thieves
- To protect goats from predators

Dangers of sharing a house with domestic animals

- It leads to bad smell in the house
- It leads to parasites in the house
- It leads to competition for oxygen

- It leads to easy spread of diseases to people
- It leads to destruction of household property

SYSTEMS (METHODS) OF GRAZING GOATS

- Free range grazing or Herding
- Tethering
- Paddock grazing
- Zero grazing
- Strip grazing

Mention three methods of rotational grazing

- Tethering
- Paddock grazing
- Strip grazing

HERDING

- This is when a herdsman looks after animals as they graze
- It is also called **free range grazing** because animals move on their own looking for food

Advantages of herding

- Animals get a balanced diet
- Animals make enough body exercise
- Less attention is needed
- It is cheap to manage

Disadvantages of herding

- It leads to easy spread of diseases
- Animals can destroy crops
- Animals can get lost
- It needs a big piece of land
- It can lead to overgrazing

PADDOCK GRAZING

- This is the method of grazing in which a pastureland divided into small fenced plots
- **Paddocks** are small fenced plots on pastureland

An illustration showing paddock grazing

Advantages of paddock grazing

- It allows proper use of pasture
- It gives pasture time to grow
- Manure is evenly distributed on the farm
- It controls over grazing
- It controls tickborne diseases

How does paddock grazing control ectoparasites and diseases in livestock?

- It starves ticks to death (it breaks the feeding cycle of ticks)

DISADVANTAGES OF PADDOCK GRAZING

- It is expensive to manage
- It needs a big piece of land
- Animals do not make enough body exercises

STRIP GRAZING

- This is the grazing of animals on a pastureland divided into strips using electric wires.

Advantages of strip grazing

- There is proper use of pasture.
- It controls diseases and parasites
- It prevents over grazing
- Animals do not destroy crops

Disadvantages of strip grazing

- It is expensive to maintain
- Few animals are kept
- Animals do not make enough body exercises
- It can only be used in areas with electricity

TETHERING

- This is the method of grazing where a farmer ties the animal on a peg or tree using a rope
- The animals tethered is moved to a new place when necessary

An illustration showing tethering

Advantages of tethering

- There is no need for fencing
- It is easy to start
- It is cheap to manage
- It needs a small piece of land
- Animals may not destroy crops
- The farmer gets time to do other work

Disadvantages of tethering

- Animals do not get balanced diet
- Few animals are kept
- Animals can easily be stolen
- Animals can easily be killed by predators
- The rope can easily strangle the animal
- Animals do not make enough body exercises

ZERO GRAZING

- This is the keeping of animals in stalls where water and food are provided.
- It is also be called **stall grazing**

An illustration showing zero grazing

Advantages of zero grazing

- Many animals are kept in a small area

- It prevents wastage of feeds
- It needs a small piece of land
- It protects animals from bad weather
- It is easy to collect manure
- It is easy to cull sick animals
- Animals produce a lot of milk

Why? There is no wastage of energy

- It controls the spread of diseases and parasites

Disadvantages of zero grazing

- It is expensive to manage
- Animals lack body exercises
- It needs a lot of labour

SHEEP REARING

TERMS USED IN SHEEP REARING

Ram:

- This is a mature male sheep.

Ewe:

- This is a mature female sheep.

Lamb:

- This is the young of a sheep.

Lambing:

- This is the act of giving birth in sheep.

Mutton:

- This is the meat of sheep.

Shearing:

- This is the removal of wool from a sheep.

Docking:

- This is the cutting of the lamb's tail short

Gestation period:

- This is the period between conception and birth.

REASONS FOR DOCKING

Importance of docking sheep

- It makes mating easy
- It promotes hygiene of a sheep

REASONS FOR KEEPING SHEEP

Why do farmers keep (rear) sheep?

- For meat (mutton) production
- For income after sale
- For wool production

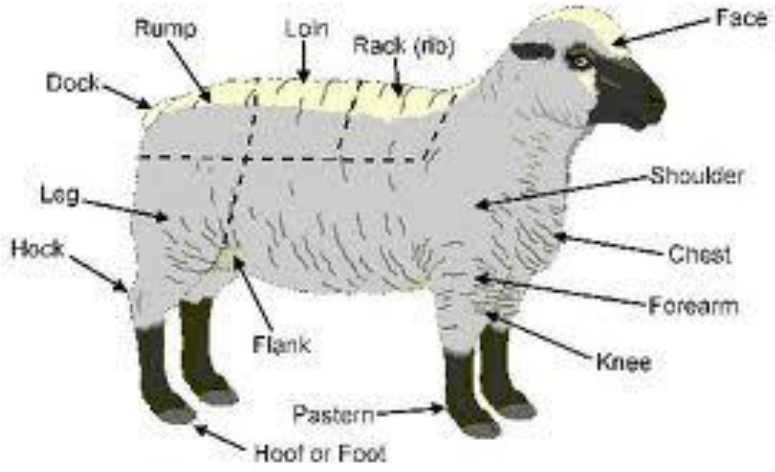
IMPORTANCE OF KEEPING SHEEP

- It is a source of meat (mutton)
- It provides wool (fleece)
- It provides skins to make leather products
- Its droppings are used as farm yard manure
- Its horns and hooves are used to make buttons and glue
- It is used as sacrifice on cultural ceremonies

Products from goats and sheep

- Mutton (meat)
- Skins
- Horns and hooves
- Wool (fleece)
- Sheep droppings

EXTERNAL PARTS OF A SHEEP



GROUPS OF SHEEP KEPT IN UGANDA

LOCAL (INDIGENOUS/NATIVE) BREEDS OF SHEEP

All local breeds of sheep are kept for mutton production

- Black-headed Persian
- Somali sheep
- Red Maasai
- Dorper

EXOTIC BREEDS OF SHEEPS

- Suffolk
- Dorset
- Southdown
- Cheviot
- Texel
- Hampshire
- Merino
- Rambouillet
- Bluefaced Leicester
- Romney marsh

Exotic breeds of sheep kept for meat (mutton) production/mutton breeds of sheep

- Suffolk
- Dorset
- Southdown
- Cheviot
- Texel
- Hampshire

Exotic breeds of sheep kept for wool (fleece) production/wool breeds of sheep

- Merino
- Rambouillet
- Bluefaced Leicester
- Romney sheep

Exotic breeds of sheep kept for both mutton and wool production/dual purpose breeds of sheep

- Corriedale
- Romney sheep (previously called **Romney marsh sheep**)

BREEDING IN SHEEP

- A ewe should be served at the age of 16 -18 months
- The gestation period of sheep is **5 months (150 days)**.

FLUSHING

- This is the providing of extra nutritious feeds to a ewe before mating

Importance of flushing

- It stimulates ovulation (increases the rate of ovulation)
- It increases the chances of multiple births

STEAMING UP

- This is the practice of feeding a pregnant animal on food rich in proteins

Importance of steaming up

- It lengthens the next lactation period
- It increases colostrum
- It prevents low birth weight
- It enables the foetus to grow well

- It enables the pregnant animal to get strength for giving birth

WEANING

- This is the gradual introduction of other foods to a baby to supplement breast milk
- Weaning in sheep is done between 3 – 4 weeks.

SHEARING:

- This is the removal of wool (fleece) from a sheep
- It is done using **electric shears** or **hand shears**
- Electric shears remove wool faster than hand shears
- Weaning sheep should be sheared at 8 months
- A mature sheep should be sheared once a year

Why is shearing done in summer season?

- The sheep can survive without its protective coat of hair

Why is shearing not done in winter season?

- To prevent coldness that can kill the sheep

FACTORS CONSIDERED WHEN CHOOSING A GOOD SHEEP (EWE/RAM).

- It should be humble/docile/calm
- It should have well developed udder and teats
- It should be healthy (free from diseases)
- Its mother should have a multiple birth

PARASITES (PESTS) IN FARM ANIMALS.

- **A parasite** is an organism that depends on a host for food and shelter
- **A host** is an organism on which a parasite depends for food.

How do parasites benefit from their host for survival?

- They get food
- They get shelter

Groups (types or classes) of parasites

- External Parasites (ectoparasites)
- Internal Parasites (endoparasites)

EXTERNAL PARASITES

- These are parasites that live outside the body of host

Examples of ectoparasites (external Parasites)

- Ticks
- Tsetse flies
- Mites

Control of ectoparasites

- Spraying with acaricides
- By dusting with acaricides
- Dipping in acaricides
- By paddock grazing

- By deticking
- Clearing bushes around livestock farms (to control tsetse flies)
- Use tsetse fly traps to control tsetse flies

INTERNAL PARASITES

- These are parasites that live inside the body of the host.
- They live in muscles, intestines and liver

Examples of endoparasites (internal Parasites)

- Tape worms
- Hook worms
- Thread worms
- Liver flukes
- Ascaris worm

Control of endoparasites

- By deworming
- Giving animals clean feeds
- Regular cleaning of the houses for animals
- Regular cleaning of the feeding equipment for animals
- Grazing in well drained areas (to control liver flukes)

EFFECTS OF PARASITES (PESTS) OF CATTLE

- Some parasites suck blood which leads to anaemia
- Some parasites spread diseases to animals
- Some parasites damage the skins of animals
- Some parasites cause discomfort to animals

Diseases of goats and sheep

- Foot rot
- Heart water
- Pneumonia
- Coccidiosis
- Anthrax
- Nairobi diseases
- Nangana
- Mastitis
- Lamb dysentery
- East coast fever
- Rift valley disease
- Foot and mouth disease
- Blue tongue disease
- Red water

PIGGERY

- This is the practice of keeping pigs.

TERMS IN RELATION TO PIGGERY

Boar: is a male pig.

Sow: is a female pig.

Gilt: is a young female pig

Piglet: is a young one of a pig.

Fallowing: is the act of giving birth in pigs.

Pork: is the meat from pigs.

Lard: fats from pigs.

Sty: house for pigs.

Hog: is a castrated pig.

A group of young ones produce at the same time by the same mother is called **litter**

The smallest and the weakest animals among the litter is called **Runt**

External parts of a pig

BREEDS OF PIGS

Pigs have different types of breeding

>local breeds

>exotic breeds

>wild pigs (warthog)

Examples of local breeds of pigs.

>black pigs

>old spotted pigs

Exotics breeds of pigs.

Landrace

Large white (Yorkshire)

Hampshire

Duroc

Middle white

Poland China

Wessex saddle back

Tamworth

Camborough

Factors considered when selecting a good pig for rearing.

>heredity: it should be from a good ancestral family.

>it should be free from sickness.

>the piglet should have 12 teats.

NB

- The gestation period of a pig (sow) is **3 months, 3 weeks and 3 days**

SYSTEMS OF KEEPING PIGS

- Intensive system
- Extensive system

CHARACTERISTICS OF A GOOD PIGSTY

- It should have a slanting floor

For easy cleaning

For easy drainage of waste

- It should be well ventilated

To allow free air circulation

- It should be cleaned dry
- It should have farrowing pens
- It should not be slippery
- It should be leak proof
- It should have guard rails

To prevent the mother from crushing the piglets.

Types of feeds in pigs.

The creep food

- For piglets between 1 day to 8 weeks

Sow and weaner meal

- For weaning piglets
- It is introduced to piglets at 8 weeks up to 50kgs

The fattener (finisher) meal.

- For pig ready for sale
- It helps to fatten the pigs

NB

>Piglets are given red soil to provide iron.

TEETH-CLIPPING

- This is the cutting of pointed teeth of piglets
- It should be done in the first day after birth.

- It can be done when the piglet is 15 minutes old
- It is done using **tooth clippers** or **forceps**

REASON FOR TEETH CLIPPING (IMPORTANCE OF TEETH CLIPPING)

- To prevent injuries to the sow's udder and teats
- To prevent injuries to the littermates (other piglets)

Why should the sow be tied or put in a separate pen (pig sty) during tooth clipping?

- To prevent injuries as the sow tries to protect its young

DISADVANTAGE OF TEETH CLIPPING

- It can cause damage to the gums
- It can lead to infections

COLOSTRUM

- This is the first milk got from a mother animal after giving birth

Importance of colostrum

- It opens up the digestive system of a baby
- It boosts the immunity of a baby (it contains a lot of antibodies)
- It is easy to digest
- It has a lot of nutrients (it provides a balanced diet to a baby)

DISEASES IN PIGS

Viral diseases

- **Swine fever**
  1. African swine fever
  2. Classical swine fever (hog cholera)
- Swine influenza (swine flu)

Bacterial diseases

- Swine dysentery
- Mastitis
- Foot rot
- Pneumonia
- Greasy pig disease
- Anthrax

Protozoan disease

- Coccidiosis
- Nagana (trypanosomiasis)

Malnutritional disease

- Piglet anaemia

Examples of ectoparasites (external Parasites) in pigs

- Jiggers
- Lice
- Ticks
- Mange
- Fleas
- Mites

Examples of endoparasites (internal Parasites) in pigs

- Tape worms
- Thread worms
- Ascaris worm
- Hook worms
- Liver flukes
- Lungworm

WAYS OF CONTROLLING ANIMAL DISEASES

- Regular vaccination
- By culling
- By paddock grazing
- Isolate and treat sick animals
- Applying quarantine
- Proper feeding
- Use a strip cup to detect mastitis in milk
- Regular cleaning of the animal houses
- Spraying with acaricides to control tickborne diseases
- Use artificial insemination to avoid mating infection

RECORD KEEPING

- This is the writing of information about different activities done on a farm

FARM RECORDS

- These are written information about different activities done on a farm.

TYPES (EXAMPLES) OF FARM RECORDS

- Production records
- Health records
- Labour records
- Sales and expenses records
- Inventory records
- Feeding records
- Breeding records

Reasons for keeping farm records (Importance of record keeping)

- It enables a farmer to know the profits or losses
- It enables a farmer to be taxed fairly
- It enables a farmer to get loans easily
- It enables a farmer to know the farm history
- It enables a farmer to plan for the farm
- It enables a farmer to make proper decisions

FACTORS TO CONSIDER BEFORE STARTING A LIVESTOCK FARM

- Land
- Capital
- Labour
- Market
- Management

TOPIC: FOOD AND NUTRITION

- **Food** is something good to eat or drink
- **Nutrition** is the study of food and how it is used in the body
- **Feeding** is the act of taking food into the body

Importance of food in the body

- It keeps the body healthy
- It gives the body energy
- It builds the body (helps in body growth)
- It keeps the body warm
- It repairs the worn out body tissues

BREASTFEEDING

- This is the feeding of a baby on breast milk produced by the mother's mammary glands
- Babies should feed only on breast milk for 6 months without any other food
- At 6 months, babies should be weaned

Exclusive BREASTFEEDING

- This is act of feeding a baby on breast milk alone for the first six months

ADVANTAGES OF BREASTFEEDING TO THE;

Baby

- It boosts the baby's immunity
- Breast milk is always ready
- Breast milk is at the right temperature
- Breast milk is easy to digest
- Breast milk has a balanced diet for a new born baby

Mother

- It is cheap
- It saves time
- Prolonged breastfeeding delays the next pregnancy
- It improves the mother's health since she feeds well to produce more breast milk

Family

- It promotes saving in the family
- It improves the health of family members

DISADVANTAGES OF BREASTFEEDING TO THE;

Baby

- The baby can be underfed in case the mother has little breast milk
- The baby does not feed in case the mother is absent
- It leads to easy spread of AIDS from an infected mother to the baby

Mother

- It is difficult to practise when the mother is sick
- It can dehydrate the mother

Bottle feeding

- This is the feeding of babies on animal's milk using bottle

Conditions that can lead to bottle feeding

- When the mother is HIV positive (has AIDS)
- When the mother dies
- When the mother is very sick
- When the mother produces little or no breast milk
- When the mother has breast cancer
- When the mother stays away for a long time

Disadvantages of bottle feeding

- It is expensive to manage
- It encourages early pregnancy
- Animal's milk is not easy to digest
- Milk in dirty bottles can lead to diarrhoeal diseases
- Animal's milk does not contain a balanced diet for human baby
- It wastes time (needs a lot of time to prepare milk)

WEANING

- This is the gradual introduction of other foods to a baby to supplement breast milk
- Babies should be weaned at **6 months**
- Weaning babies need mashed (soft) food because **they have no teeth**
- Hard food during weaning **leads to indigestion**
- Weaning babies are fed frequently because **they have small stomach which allows little food (they eat little food at a time)**

REASONS FOR WEANING AT 6 MONTHS

- To provide iron to the baby
- To prevent marasmus and kwashiorkor
- Breast milk alone is not enough for the baby

Food for weaning babies

- Mashed potato
- Mashed egg yolk
- Porridge
- Mashed fruits
- Meat soup

VULNERABLE GROUPS OF PEOPLE

- These are people whose health can easily be harmed by poor feeding
- These are people whose health can easily be harmed without special care and diet

Examples of vulnerable groups of people

- Pregnant women (expectant mothers)
- The sick people
- Breastfeeding mothers (lactating mothers)
- Babies (breastfeeding and weaning babies)
- The elderly people

FOOD VALUES FOR VULNERABLE PEOPLE

FOOD FOR PREGNANT WOMEN

- They should eat more food **because** they share food with the embryo/foetus in the womb

FOOD VALUES	**FUNCTION**
Proteins	▪ To build up body tissues of the foetus (for proper growth of the foetus) ▪ To repair the worn out body tissues of a mother
Carbohydrates	▪ To provide energy to the mother's body
Vitamins	▪ To keep their body healthy ▪ To boost the mother's immunity
Roughage	▪ To prevent constipation
Fats and oils (lipids)	▪ To provide energy and warmth ▪ To keep their skins smooth and healthy
Mineral salts	
Iron	▪ To make blood ▪ To prevent anaemia
Calcium	▪ To strengthen bones

FOOD FOR BREASTFEEDING MOTHERS

i) Water (fluids)
- To produce more breast milk

ii) Carbohydrates
- To provide energy to the body

iii) Calcium
- To replace calcium lost through breast milk

FOOD FOR BABIES

i) Proteins
- To build the body tissues
- To make enzymes

ii) Vitamins

- To protect babies from diseases (to boost their immunity)

iii) <u>Carbohydrates</u>

- To provide energy to the body

iv) <u>Fats and oils (lipids)</u>

- To provide energy and warmth
- To keep their skins smooth and healthy

<u>FOOD FOR BREASTFEEDING BABIES (NEW BORN BABIES)</u>

i) <u>Breast milk</u>

- It has a balanced diet for a baby (it has all food values apart from iron)
- It boosts the baby's immunity (it has a lot of antibodies)
- It is always ready
- It is at the right temperature
- It is easy to digest

<u>THE SICK PEOPLE</u>

- Sick people can be invalid or convalescents

<u>An invalid</u>

- This is a person who is totally sick

<u>A convalescent</u>

- This is a person who is recovering from sickness

<u>FOOD FOR THE SICK PEOPLE</u>

i) <u>Proteins</u>

- To repair the worn out body tissues

ii) <u>Vitamins and mineral salts</u>

- To boost their immunity

iii) <u>Fluids</u>

- For rehydration

<u>FOOD FOR THE ELDERLY PEOPLE</u>

- The elderly people need mashed (soft) food because **<u>they have no teeth (due to loss of teeth)</u>**
- Feeding on hard food **<u>leads to indigestion</u>**
- The elderly people eat frequently because **<u>they eat little food at a time</u>**

i) <u>Carbohydrates</u>

- To provide energy to the body

ii) <u>Proteins</u>

- To repair the worn out body tissues

iii) <u>Vitamins and mineral salts</u>

- To boost their immunity

iv) Fats and oils (lipids)

- To keep their skin healthy
- To provide energy and warmth

MALNUTRITION AND MALNUTRITIONAL (DEFICIENCY) DISEASES

MALNUTRITION

- This is the condition when the body lacks some food values
- This is the lack of some food values in the body
- Malnutrition is sometimes called **poor feeding** or **poor nourishment**

Causes of malnutrition

- Poverty
- Shortage of food
- Ignorance about balanced diet
- Food taboos
- Inadequate breastfeeding

Signs of malnutrition in children

- Swollen belly
- Reduced night vision
- Swollen moon face
- Stunted growth
- Swollen legs
- Poor healing of wounds
- Swollen moon face
- Little brown hair
- Bleeding gums
- Poor growth of teeth
- Too much sleeping

Symptoms of malnutrition in adults

- Tiredness/fatigue
- Loss of interest in work
- Low concentration at work

Prevention of deficiency diseases

- By feeding on a balanced diet

Effect of malnutrition

- It leads to deficiency diseases

MALNUTRITIONAL (DEFICIENCY) DISEASES

- These are diseases caused by lack of some food values in the body
- **Deficiency** means lack of

CAUSES OF MALNUTRITIONAL (DEFICIENCY) DISEASES

- Poverty
- Shortage of food
- Ignorance about balanced diet
- Food taboos
- Inadequate breastfeeding

EXAMPLES OF MALNUTRITIONAL (DEFICIENCY) DISEASES

- These are diseases caused by lack of some food values in the diet

EXAMPLES OF DEFICIENCY DISEASES

Deficiency disease	**Deficiency (lack of)/food value lacked**
Marasmus	Carbohydrates
Kwashiorkor	Proteins
Vitamin deficiency diseases	
Night blindness	Vitamin A
Beriberi	Vitamin B_1
Pellagra	Vitamin B_3
Scurvy	Vitamin C
Rickets/osteoporosis	Vitamin D
Infertility/Sterility	Vitamin E
Hemorrhagic disease/Vitamin K deficiency bleeding	Vitamin K
Mineral salt deficiency diseases	
Anemia	Iron
Rickets/Osteoporosis	Calcium
Goitre	Iodine

KWASHIORKOR

- It is caused by lack of proteins in the diet

Signs of kwashiorkor in children

- Little brown hair
- Swollen moon face
- Swollen belly full of air
- Edema (swollen feet)

A drawing showing a baby suffering from kwashiorkor

Prevention of kwashiorkor

- Feeding on food rich in proteins

Examples of food sources of proteins

- Eggs
- Meat
- Milk
- Beans
- Groundnuts
- Cow peas
- Grasshoppers
- Mushroom
- Soya beans

MARASMUS

- It is caused by lack of marasmus in the diet
- Marasmus is also said to be starvation disease

Signs of marasmus in children

- Pot belly
- Elderly face (little old man's face)
- Underweight
- Very thin body

A drawing showing a baby suffering from marasmus

Prevention of marasmus

- Feeding on food rich in carbohydrates

Examples of food sources of carbohydrates

- Maize
- Sweet potato
- Rice
- Cassava
- Irish potato
- Wheat

- Millet
- Bread

BERIBERI

- It is caused by lack of vitamin B_1 (thiamine) in the diet
- It affects muscles, nerves and heart

Signs of beriberi in children

- Vomiting
- Muscle weakness
- Loss of muscle function in the legs
- Paralysis
- Mental confusion

Prevention of beriberi

- Feeding on food rich in vitamin B_1

Examples of food sources of vitamin B_1

- Yeast
- Beef
- Whole grains
- Cauliflower
- Liver
- Pork

PELLAGRA

- It is caused by lack of vitamin B_3 (niacin) in the diet
- It affects the skin

Signs of pellagra in children

- Sores on the skin
- Loss of body weight
- Mental confusion

Prevention of pellagra

- Feeding on food rich in vitamin B_3

Examples of food sources of vitamin B_3

- Yeast
- Meat
- Cereals
- Liver
- Coffee **or** tea
- Milk

SCURVY

- It is caused by lack of vitamin C in the diet
- It affects the skin

Signs of scurvy in children

- Bleeding of gums
- Poor healing of wounds
- Sores on the mouth
- Retarded growth

Prevention of scurvy

- Feeding on food rich in vitamin C

Examples of food sources of vitamin C

Vitamin C is found in fresh fruits mainly

- Mango
- Orange
- Lemon
- Guava
- Pawpaw
- Jackfruit
- Pineapple
- Fruit juice

Why is vitamin C not found in cooked fruits?

- Vitamin C is destroyed by heat

NIGHT BLINDNESS

- It is caused by lack of vitamin A in the diet
- It affects the eyes

Signs of night blindness in children

- Reduced vision at night
- Sores in the eyes
- Skin becomes dry and scaly
- Reduced resistance to diseases

Prevention of night blindness

- Feeding on food rich in vitamin A

Examples of food sources of vitamin A

- Carrot
- Red pepper
- Spinach
- Liver

RICKETS

- It is caused by lack of vitamin A in the diet
- Lack of calcium and phosphorus in the diet
- It affects the bones

Signs of rickets

- Bowlegs or knock-knee legs
- Oddly shaped skull
- Poor teeth formation
- Delayed tooth formation
- Common fractures

Symptom of rickets

- Weak bones of the legs

Prevention of rickets

- Feeding on food rich in vitamin D, calcium and phosphorus
- Sunbathing in early morning

Examples of food sources of vitamin D

- Liver
- Red meat
- Oily fish
- Mushroom

TRADITIONAL FOOOD CUSTOMS, BRIEFS AND TABOOS

FOOD CUSTOMS

- These are established practices which are accepted in a community about food

Examples of food customs

- A neighbor who helps during harvesting should be given a basket of food
- A family which gets an early harvest should send some food to the neighbour
- A woman should kneel while peeling or serving food
- You should give food to a visitor if found eating

Advantages of food customs

- It promotes friendship in the community
- It promotes sharing in the community
- It promotes cooperation in the community
- It conserves culture
- It promotes food security

FOOD BRIEFS

- These are feelings taken to be true about food by a group of people

Examples of food briefs

- Women were not allowed to eat chicken because they would lead to infertility
- Men were not allowed to eat oil nuts because they would become impotent
- Children with measles were not allowed to eat meat because it would worsen the disease
- Babies were not allowed to eat eggs because they would defecate on bed

Dangers of food belief

- They lead to deficiency diseases
- They lead to malnutrition

FOOD TABOOS

- These are cultural or religious customs that forbid people to eat some kinds of food

EXAMPLES OF FOOD TABOOS

Religious food taboos

- Muslims and SDA do not eat pork

- Muslims do not eat meat slaughtered by a non-Muslim
- Catholics do not eat meat on Good Friday (Fridays during lent period)

Cultural food taboo

- Clan members are not allowed to eat their totems

ADVANTAGES OF FOOD TABOOS

- Food taboos help to conserve plants and animals
- People who are not affected by taboos get a lot of food
- Food taboos promote respect for food hence good handling of our totems

DANGERS OF FOOD TABOOS

- They lead to deficiency diseases
- They lead to malnutrition

Food consumption

Factors that determine the good food eaten by people in a given area.

Availability of food.

Environment.

Cultural attachment to some food chain.

Examples of food consumption patterns.

People around water bodies are likely to have fish but vegetables, cereals, root crops.

People near forests have plenty of fruits and vegetables but lack fish.

People on villages have fresh foods unlike those in towns.

Staple food

>These are main food stuffs in one's diet.

NB

>Carbohydrates are mainly called staple foods because they are more in one's diet than any other food values.

Examples of staple foods.

>Buganda-----banana.

>Ankole-------millet.

>Boarding school-------posho.

TOPIC: PRIMARY HEALTH CARE

HEALTH

- This is the state of physical, emotional, social and spiritual wellbeing of an individual

Aspects of health

- Physical health
- Emotional health
- Social health
- Spiritual health

PRIMARY HEALTH CARE (P.H.C)

- This is the essential health care where individuals, families and communities work together to solve their health problems

PRINCIPLES OF P.H.C

These are basic rules followed when carrying out Primary Health Care

- Everyone must benefit (total health for all people)
- Everyone must participate
- P.H.C activities must be affordable
- P.H.C activities must be acceptable by culture or religion
- It must be organized according to priorities

ELEMENTS OF P.H.C

- These are health programmes that protect and maintain good health

Elements of P.H.C

- First aid
- Immunization
- Family planning
- Water and sanitation

- Personal hygiene
- Food and nutrition
- Oral and dental health
- Control of Communicable Diseases (CCD)
- Control of Diarrhoeal Diseases (CDD)
- Maternal and child health
- Health education

IMPORTANCE OF THE ELEMENTS OF P.H.C

Health education

- It helps people to address health concerns
- It helps people to know the value of good health
- It reduces poor traditional beliefs about diseases

Ways of providing health education

- Through health songs
- Through health debates and quiz
- Through health programmes on media
- Through forming health clubs

Immunization

- It prevents immunisable diseases among people
- It reduces infant mortality rate

Food and nutrition

It is promoted by feeding on a **balanced diet**

- It protects people from poor feeding and deficiency diseases

Maternal and child health care

It is promoted by getting **antenatal care (prenatal care)**

- It improves the health of pregnant women and their unborn babies

Water and sanitation

- It promotes clean and safe water supply
- It prevents multiplication of insect vectors

Oral and dental health care

It is promoted by brushing teeth and dental flossing

- It prevents teeth diseases and disorders

Family planning

- It controls rapid population growth in a country

- It promotes saving in a family
- It promotes child spacing
- It enables a child to get enough basic needs

First aid

- It saves life
- It reduces pain
- It promotes quick recovery
- It stops external bleeding
- It prevents further injuries

Control of communicable diseases (CCD)

It is promoted by;

- Abstaining from sex
- Avoiding sharing sharp objects with an infected person
- Using condoms when playing sex
- Being faithful to your sexual partner

Communicable diseases

- These are diseases that can spread from one person to another
- They are caused by germs
- They are also called **infectious diseases**

How do communicable diseases spread?

- Through insect bites
- Through animal bites
- Through body contact with an infected person
- Through playing unprotected sex with an infected person
- Through inhaling contaminated air
- Through open cuts and dirty wounds

RESPONSIBILITIES OF AN INDIVIDUAL, FAMILY AND COMMUNITY IN PROMOTION OF PHC

Activities done by an individual to promote P.H.C

- Participating in general cleaning sessions
- Feeding on a balanced diet
- Bathing daily
- Brushing teeth every after a meal
- Washing hands with clean water and soap after visiting latrines
- Cutting fingernails and toenails short

- Washing clothes and beddings regularly
- Grooming hair
- Going for immunization
- Making O.R.S

Activities done by a family to promote P.H.C

- Constructing a latrine at home

For proper disposal of human wastes

- Digging a rubbish pit at home

For proper disposal of rubbish

- Boiling water for drinking

To prevent diarrhoeal diseases

- Setting up a plate rack at home

To prevent washed utensils from getting contaminated with dust

- Taking children for immunization
- Observing good food hygiene at home
- Preparing a balanced diet for members

To prevent deficiency diseases

- Having clean and safe water at home
- Destroying breeding places for insect vectors near the home
- Sharing health information among family members
- Avoiding drug abuse among family members

Activities done by the community to promote P.H.C

- Constructing public latrines
- Constructing public water sources (wells and bore holes)
- Protecting water sources
- Repairing damaged roads
- Organizing community health days
- Distributing public garbage containers
- Organizing general cleaning sessions
- Organizing public fumigation to kill insect vectors
- Establishing rehabilitation centres for the disabled
- Announcing any outbreak of a disease in the community

Examples of community groups that promote PHC

- Self-help groups

- Religious groups
- Village health committees
- Cooperative groups
- Social welfare groups
- Youth groups

HEALTHY LIFESTYLES THAT PROMOTE GOOD HEALTHY

- Feeding on a balanced diet
- Doing regular body exercises
- Getting enough rest and sleep to refresh the brain
- Avoid drug abuse e.g alcoholism and smoking
- Reading books in enough light
- Maintaining good body posture
- Washing clothes to remove germs
- Ironing clothes to kill germs and parasites
- Abstaining from sex to prevent contacting STDs
- Trimming finger nails to remove hiding places for germs

Importance of getting enough rest and sleep

- It refreshes the brain
- It breaks fatigue

Importance of good posture

- It prevents deformation of bones
- It prevents back and chest pain
- It prevents dislocation
- It helps in proper working of body organs

Importance of performing physical exercises

- It reduces body weight
- It makes the joints flexible
- It prevents heart attack
- It makes the heart muscles grow stronger
- It breaks fatigue (body weakness)
- It makes food digestion easy
- It prevents sprains and strains
- It helps the heart to pump more blood to the muscles

UNHEALTHY LIFESTYLES AND BAD SOCIAL HABITS

- Tobacco smoking
- Alcoholism
- Playing unprotected sex with an infected person
- Drug abuse

Good health practices in schools

- Conducting health parades
- Having a school health committee

SCHOOL (HEALTH CLUB) COMMITTEE

- This is a group of people in a school who work together to promote good health

Members of the school health committee

- School nurse
- Sanitary prefects
- Science teachers
- Senior man and woman
- School cleaners
- Food mess

Activities/roles/duties of a school health committee

- Organizing health parades
- Organizing class health meetings
- Organizing general cleaning activities
- Organizing health education seminars
- Reporting any disease outbreak
- Discouraging anti-social behaviour
- Designing health rules
- Identifying school children who are not immunised
- Inviting health workers to discuss health issues with school children

HEALTH PARADES

- This is an assembly done at school to check on children's hygiene

People who conduct health parades in schools

- Health prefect
- Sanitary prefects
- Science teachers
- Teachers on duty

Activities carried out at a health parades

- Checking children with unbrushed teeth
- Checking children with long fingernails
- Checking children with dirty uniforms
- Checking children with uncombed hair
- Checking children with jiggers

Why are health parades done? (Importance/reasons for carrying out health parades)

- To promote personal hygiene among school children
- To promote good health among school children
- They promote child to child programme

CHILD TO CHILD PROGRAMME

- This is a health programme where older children help the young ones to promote good health

A symbol showing child to child programme (approach)

Activities done in child to child programme

- Older children teach young ones how to use a latrine
- Older children teach young ones how to brush their teeth

- Older children teach young ones to wash hands before meals
- Older children teach young ones to wash hands after visiting latrines
- Older children take young ones for immunization

Importance of child to child programme

- It prevents the spread of some communicable diseases among children
- It promotes good healthy lifestyles among children
- It improves health among children

PEOPLE WITH SPECIAL NEEDS IN THE COMMUNITY

- These are people whose some body parts do not work well
- They are also called **people with disabilities (PWDs)**
- **PWDs** may either be physically or mentally affected

Types of disabilities

- Physical disability
- Sensory disability

Physical disability

- This is when a person's limbs (arms or legs) are crippled

Sensory disability

- This is when a person's senses do not work well

Groups of people with disabilities (PWDs)

- Crippled/lame people
- Blind
- Deaf
- Dumb
- Mentally disturbed people

CARE FOR DISABLED/PEOPLE WITH DISABILITIES (PWDS)/PEOPLE WITH SPECIAL NEEDS

Crippled/lame people

- Providing them with wheel chairs
- Providing them with crutches
- Providing them with a walking stick
- Providing them with artificial legs and arms
- Providing them with special shoes
- Helping them to wear clothes

Some equipment for helping the disabled/people with disabilities (PWDs) in movement

- Wheel chair
- Crutches
- Artificial leg
- Artificial arm

Why should the crippled people be provided with wheel chairs?

- To help them in movement

Blind people

- Providing them with a white cane/sonar stick

To enable them locate places

To enable them dodge obstacles

- Bathing them
- Washing their clothes and beddings

Deaf people

- Providing special hearing devices
- Use of sign language while communicating with them
- Use of typed conversations while communicating with them

Mentally disturbed people

- Taking them to rehabilitation centres
- Helping them to go to latrines
- Bathing them
- Washing their clothes

SOME ABBREVIATIONS USED IN PRIMARY HEALTH CARE

- **P.H.C:** Primary Health Care
- **M.C.H.C:** Maternal and Child Health Care
- **CHWs:** Community Health Workers
- **SYFA:** Safeguard youth from AIDS
- **TBAs:** Traditional Birth Attendants
- **PWDs:** People with disabilities
- **SNP:** Special Needs People
- **CDD:** Control of Diarrhoeal Diseases
- **CCD:** Control of Communicable Diseases

- **P.M.T.C.T:** Prevention of mother to child transmission of HIV
- **E.M.T.C.T:** Elimination of mother to child transmission of HIV
- **HIV:** human immunodeficiency virus