

MBUYA PARENTS' SCHOOL

PRIMARY FIVE SCIENCE LESSON NOTES 2021/2022

TERM ONE

POULTRY KEEPING

Poultry refers to all kinds of domestic birds.

Poultry keeping is the rearing of domestic birds or fowls.

Types of poultry

- chicken
- ducks
- turkeys
- pigeons
- guinea fowls
- geese

Examples of poultry

Hen, cock, duckling, drake, chick, cockerel

Other terms use in poultry keeping

Hen: a mature female chicken.

Cock: a mature male chicken.

Chick: a young chicken/ the young one of a hen.

Cockerel: a young male chicken.

Pullet: a young female chicken.

Capon: a castrated male chicken.

Reasons why people keep poultry

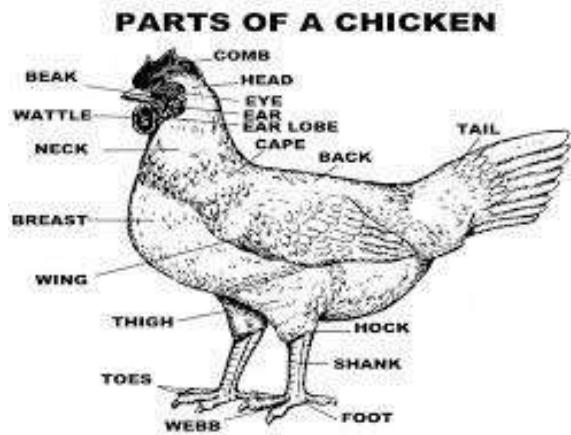
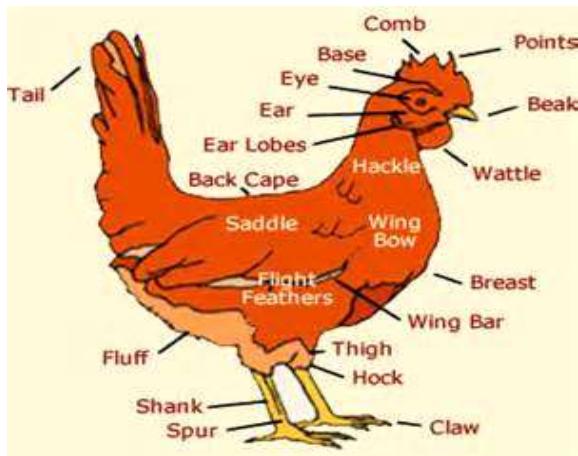
- ✓ To get meat.
- ✓ To get eggs.
- ✓ To sell and get income.

Other importance of poultry

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- Birds' droppings are used as manure (farm yard manure).
- Feathers from birds can be used for decorations, making pillows, cushions and dancing props.

The external parts of a domestic bird or fowl



Functions of the parts

a) Beak:

For picking food.

For protection.

For arranging feathers (preening)

b) Spur:

- For protection /defence.

c) Toe nails (claws):

- To scratch for food.
- For defence.

d) Comb and wattle:

- For identification.

e) Wings- For flying.

Feathers

Feathers cover most parts of the bird.

Uses of feathers to birds

- ❖ For flying in some birds.
- ❖ For identification (They give colour for easy identification)
- ❖ For courtship (attracting the hen for mating) in case of a cock.

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

NB: Cocks have bright feathers for courtship (Attracting hens for mating)

Parts of a feather



There are four types of feathers namely

- Quill feathers
- Body feathers (covert feathers)
- Down feathers
- Filoplume (hair feathers)

a) Quill feathers

- ❖ They are also called flight feathers.
- ❖ They are found on the tail and the wings.
- ❖ They are mainly used for flying.

Structure of the quill feather



b) Body feathers (covert feathers)

- ❖ They cover most parts of the bird's body.
- ❖ They provide most of the streamlining of the bird.
- ❖ They keep the bird warm.

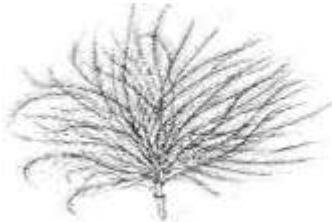
Structure of the body or covert feather



c) Down feathers

- ❖ They are the feathers a young bird is hatched with.
- ❖ They keep the young birds warm.

Structure of the down feather



d) Filoplume (hair feathers)

- ❖ They are the tiniest feathers on a bird's body.
- ❖ They are found closest to the body of the bird.
- ❖ They keep the bird warm.

Structure of the filoplume feather



Physical difference between a cock and a hen

- ❖ A cock has a large comb while a hen has a small comb.
- ❖ A cock has a long spur while a hen has a short spur.
- ❖ A cock has a big wattle while a hen has a small wattle.
- ❖ A cock has large earlobes while a hen has small earlobes.
- ❖ A cock has long claws while a hen has small claws.
- ❖ A cock has a large beak while a hen has a small beak.

Purpose of the above feathers:

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Quill feathers-They are used for flight

The body feathers-To keep the bird warm

Down feathers-They help in insulating the bird

Filoplume feathers-They keep the bird warm

Activity

1. What types of feathers are found on the wings and tail?
2. Give two uses of feathers to people.
3. Mention one importance of feathers to birds.
4. What is the difference between the primary and secondary feathers of a bird?
5. Which part of a feather resembles the midrib of a leaf?
6. What is the difference between a leaf and a feather?
7. Define the term moulting as applied in feather development.

BREEDS OF CHICKEN

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

Types of chicken breeds

There are three types of chicken breeds namely

1. Local or indigenous breeds
2. Exotic breeds
3. Cross breeds or hybrids

Local or indigenous breeds

These are breeds of chicken that have been kept in Uganda for a very long time.

Characteristics of local breeds of chicken

- ✓ They are more resistant to diseases and parasites.
- ✓ They can withstand harsh weather conditions.
- ✓ They have a slow growth rate
- ✓ They lay small and few eggs during each laying season.
- ✓ They incubate their eggs.
- ✓ They are multi-coloured.

Advantages of local breeds of chicken (indigenous)

- Local breeds are easy to manage.
- Local breeds are resistant to tropical diseases.
- Local breeds look for their own food.

- Local breeds incubate their own eggs.
- They brood their own chicks.

Disadvantages of keeping local breeds of chicken

- They grow very slowly
- They lay fewer eggs.

How to improve upon the local breeds of chicken

- Through cross-breeding.
Cross breeding is the mating of two different pure breeds e.g. local breeds with exotic breeds to get a hybrid or cross breed.
- Through selective breeding (choosing breeds of good quality).

NB: Cross breeding improves on the quality of the local breeds in terms of the number of eggs laid, growth rate and amount of meat produced.

Advantages of cross-breeding

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

Advantages of keeping cross breeds or hybrids

- ✓ They lay more eggs than the local breeds.
- ✓ They grow faster than the local breeds.
- ✓ They are more resistant to diseases and parasites than exotic breeds.
- ✓ They have better ability to withstand harsh weather than exotic breeds.

Exotic breeds

These are breeds of chicken which were imported into Uganda.

Examples of exotic breeds of chicken

- | | |
|--------------------|-----------------|
| • Rhode Island red | • Light Sussex |
| • New Hampshire | • White Leghorn |
| • Orpington | • Sykes |
| • Ancona | • Brown egger |
| • Minorca | • Kuroilers |

Characteristics of exotic breeds of chicken

- ✓ They are not resistant to diseases and parasites.
- ✓ They are usually of the same colour.
- ✓ They grow fast.
- ✓ They lay many eggs
- ✓ They do not incubate their eggs.

Advantages of keeping Exotic breeds of chicken

- Exotic breeds grow very fast.
- Exotic breeds lay many eggs.
- Exotic breeds produce more meat than local breeds.

Disadvantages of exotic breeds of chicken

- Exotic breeds are not resistant to diseases.
- They do not incubate their eggs.
- They cannot look for their own food.
- Exotic breeds are expensive and difficult to look after.
- They cannot brood their own chicks.
- They cannot withstand harsh weather conditions.

Advantages of local breeds over exotic breeds

- ✓ Local breeds are more resistant to diseases than exotic breeds.
- ✓ Local breeds have better ability to withstand harsh weather than exotic breeds.
- ✓ Local breeds can incubate their eggs while exotic breeds cannot.
- ✓ Local breeds can brood their young ones while exotic breeds cannot.

Advantages of exotic breeds over local breeds

- ✓ Exotic breeds grow faster than local breeds.
- ✓ Exotic breeds lay more eggs than local breeds.
- ✓ Exotic breeds produce more meat than local breeds.

Activity

1. How is poultry different from poultry keeping?

2. Why do farmers rear poultry?
3. In which way is poultry rearing useful to a crop farmer?
5. Give one importance of feathers to birds apart from being used for flight.
6. State one advantage of rearing local breeds of chicken over exotic ones.
7. What is a capon?
8. How are hybrid chicken obtained?
9. Why would you prefer to rear cross breed chicken to local breeds of chicken?
10. Name one part of a chicken used for protection.

Types of chicken

A type of chicken is a class of chicken kept for a specific purpose.

The purpose may be for mainly egg production, for mainly meat or for both meat and eggs.

There are three types of chicken namely:

- Layers
- Broilers
- Dual purpose

Broilers

These are chicken kept for mainly egg production.

They are also called table birds.

Examples of broilers or table birds

- ❖ Light Sussex
- ❖ Jersey black giant
- ❖ Orpington
- ❖ Cornish white

Layers

These are chicken which are kept for mainly egg production.

Examples of layers are;

- ❖ Brown egger
- ❖ Minorca

- ❖ Sykes
- ❖ White leghorn
- ❖ Ancona

Note: Layer chicken whose egg production have lowered or reduced are called **off-layers.**

Dual purpose chicken

These are chicken kept for both meat and egg production.

Examples of dual purpose chicken

- ❖ Rhode Island Red
- ❖ New Hampshire
- ❖ Black Australorp
- ❖ Araucana
- ❖ Plymouth rock

Activity

1. What is a type of chicken?
2. Why do farmers keep layer chicken?
3. Write any two examples of these types of chicken.
 - a) broilers
 - b) dual purpose
4. Which type of chicken can a farmer rear in order to supply a nearby supermarket with eggs?
5. How is a type of chicken different from a breed of chicken?

Spellings

broiler	mash	cornish white
purpose	growers	trough
Light Sussex	Orpington	

Systems of rearing poultry

There are four systems of rearing poultry. These are;

1. Free range system

2. Deep litter system
3. Fold pen system
4. Battery cage system

Free range system

Free range system is where birds are allowed to move (roam) to look for food but shelter is provided to them.

Advantages of free range system

- Birds get a variety of food.
- Birds get a balanced diet.
- Birds get enough physical exercise.
- Poultry vices such as cannibalism are not common.
- Free range system is cheap to maintain.
- Reduces labour to farmers.

Disadvantages of free range system

- ❖ Birds can easily get lost.
- ❖ The eggs can easily get lost and are difficult to collect.
- ❖ The birds can easily be eaten by wild animals like kites, eagles cats etc.
- ❖ Eggs become dirty easily.
- ❖ It is difficult to control diseases and pests or parasites.
- ❖ It requires a large piece of land.
- ❖ Birds can easily destroy crops.

NB:

1. Free range system is the cheapest system of rearing poultry.
2. Free range system can be improved by fencing a home.

Fold / Ark / pen system

- Fold system is where a limited number of birds are kept in a small movable house called a fold / pen / ark.
- Birds lay their eggs in the pens / folds/ arks.
- These folds are moved from one place to another every day.
- The fold is made of wood, wire mesh and sticks tied together.

Structure of a pen system



Advantages of fold / Ark system

- Birds are kept under close observation.
- Manure is easily distributed on the farm.
- The folds are easy to make.
- It is cheaper when holding a small number of birds.
- Birds are protected from wild animals.

Disadvantages of the pen system

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

Exercise

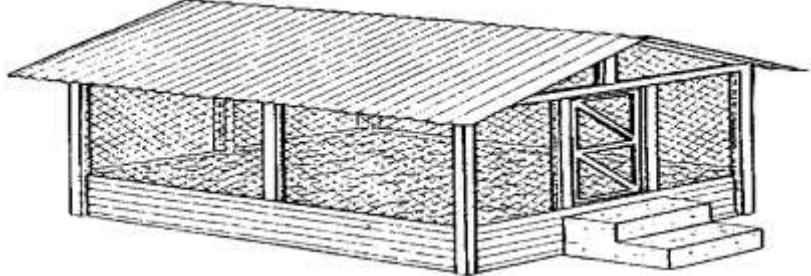
1. Identify two poultry systems.
2. Which is the commonest system of rearing poultry in the village?
3. State two advantages of free range system.
4. Why is free range system the cheapest system of rearing poultry?
5. Which system of rearing poultry allows birds to move freely?
6. Besides free range and fold or pen system, name one other system of rearing poultry.
7. How can farmers improve on the free range system?
8. Write two advantages of using the fold pen system of rearing poultry.

Deep litter system

- ✓ It is a system where the birds are kept in a house whose floor is covered with litter.

- The feeds and water are given to the birds inside the house.
- It is the best method for commercial purpose because many birds can be kept using this method.
- It is common in urban areas because it requires a small space.

Structure of a deep litter system

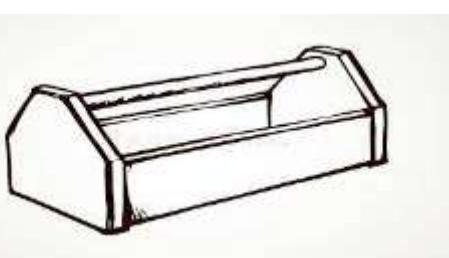


Things found in a deep litter system

- **Laying nests or boxes** for the birds to lay eggs.
- **Perches** for the birds to play and rest.



- **Feeding troughs** for placing poultry feeds.



- **Water troughs** for birds to drink water from.



- **Litter** on the floor



Litter

These are soft materials used to cover the floor of the poultry house.

Materials used as litter

- Sawdust
- Coffee husks
- Wood shavings
- Crushed maize cobs
- Rice husks



saw dust



wood shavings



coffee husks



rice husks

Importance of litter in a deep litter house

- To keep the poultry house dry and warm.
- To provide soft landing for eggs.
- It absorbs moisture from chicken droppings.

Advantages of deep litter system

- It is easy to collect manure.
- Eggs cannot get lost.
- Birds are protected from wild animals.
- Birds cannot easily get lost.
- It is easy to control diseases and parasites.

Disadvantages of deep litter system

- It encourages vices like egg eating, cannibalism.
- Litter can be a fire hazard.
- It is more expensive than free range system.
- The litter can keep pests and parasites.
- Culling birds is difficult.
- It requires much attention.
- Birds do not get enough physical exercise.

Battery cage system

- ✓ Cage system is a system where birds are kept in cages.



- In this system, birds are kept in separate cages.
- Cages can also be constructed in rows or one above the other.
- The cage should have good ventilation.

Advantages of battery system

- Diseased birds are easy to identify.
- Birds are very easy to control.
- Birds are protected from thieves and wild animals.
- Farmers can get manure easily.
- There are less poultry vices than in the deep litter system.
- Culling birds is easy.
- Clean eggs are collected.

Disadvantages of battery cage system

- It is very expensive to start.
- Birds do not eat whenever they need to.
- Birds need more attention.
- It requires skilled labour.
- Birds do not get enough physical exercises.
- It is very tiresome to feed the birds.

Exercise

Feeding chicken

Chicken are fed o special feeds called **mash**.

Reasons why we should feed chicken

- ✓ To keep them healthy.
- ✓ To promote growth.
- ✓ To make them fatten and form more flesh.
- ✓ To enable them lay many eggs especially layers.

Components of a chicken mash

common salt



cotton seed cakes



crushed egg shells



Bone meal



wheat bran



maize bran



sea shells



soya beans



white bait (mukene)



CHICKEN FEEDS

- The feeds given to poultry birds should be of a balanced diet containing:
 - **Proteins**- to promote growth
 - **Carbohydrates**- to provide energy
 - **Vitamins**- to keep birds healthy
 - **Mineral salts**- to strengthen bones and egg shells
 - **Fats**- to provide energy and keep birds warm

TYPES OF FEEDS

- ❖ Chick or starters' mash.
- ❖ Layers' mash.
- ❖ Growers' mash.
- ❖ Broilers' mash.

Chick or starters' mash

- This is fed to chicks between the ages of one day to eight weeks.
- It is rich in protein.

Growers' mash

- Chicks from 9 weeks are referred to as **growers**.
- Such chicks are fed on **growers' mash**.

Layers' mash

- ✓ This poultry feed is specially prepared for the birds that lay eggs.
- ✓ It is rich in calcium that helps to harden the egg shells.
- ✓ A layer lacking calcium usually lays eggs with soft shells.

Note:

Off-layers are fed on **broilers' mash** in order to form more flesh and make them ready for eating or sale.

Broilers' mash

- This is a special feed for broilers.
- It is highly rich in proteins that helps to promote rapid growth.

FEEDING EQUIPMENT

a) **Drinking trough/ water trough-** for providing water to birds.



b) **Feeding trough**-for providing feeds to birds.



DIGESTION IN BIRDS

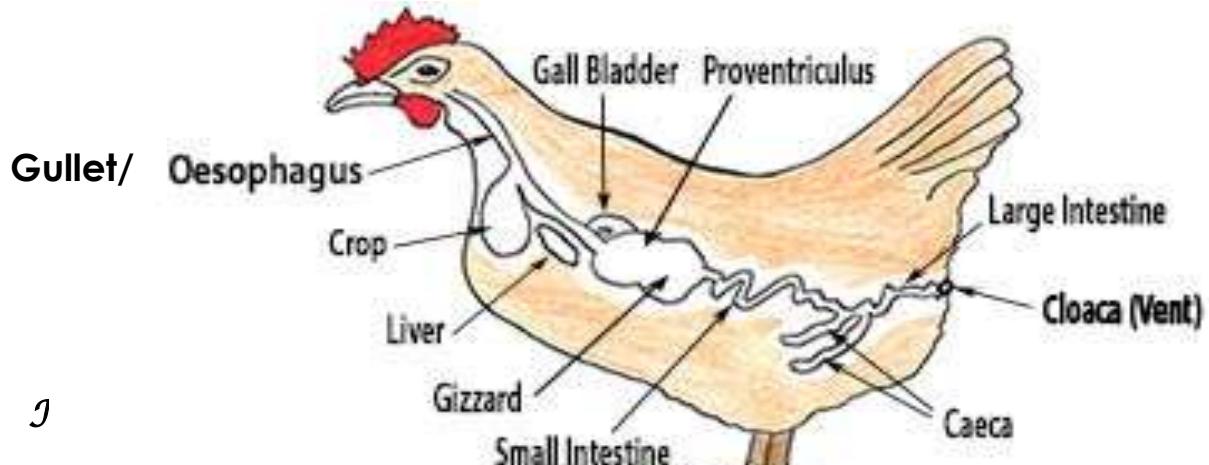
Digestion is the breaking down of food into smaller particles.

- Birds have no teeth.

- They have a horny beak.

- They swallow food wholly (food is swallowed as a whole).

The digestive system of a domestic fowl



Functions of different parts of the alimentary canal of a bird

a) Beak / bill:

- To pick food.
- To break food into smaller pieces.

b) Gullet (Esophagus):

- It is a passage of food from the beak to the crop.

c) Crop

- Softens and moistens food before it is passed into the stomach.

d) Stomach

- Secretes digestive enzymes that mix with food.

e) Gizzard

- It stores grits.
- Grits are small stones found in the gizzard.
- Grits help to crush food into small pieces.

f) Small intestine

- Final digestion of food takes place here.
- It is where absorption of food occurs.

g) Large intestine

- It is where absorption of water takes place.

h) Caeca

- It is where undigested food is stored as droppings.

Vent /cloaca

- It passes out droppings.

VICES IN POULTRY

Vices are bad habits in poultry.

Examples of poultry vices

- ❖ Egg eating
- ❖ Cannibalism
- ❖ Toe pecking
- ❖ Feather pecking

Causes of poultry vices

- Overcrowding of birds.
- Poor feeding (little or no food)

- Boredom.

Cannibalism

This is where birds kill and eat their fellow birds.

The main cause of cannibalism is **prolapse**.

Prolapse is a condition where the oviduct of a hen comes out through the vent or cloaca.

Signs of cannibalism

- Blood stains on the beaks.
- Chicken bleed at the vent.
- Fighting among birds.

Prevention of cannibalism

- ✓ Hang bundles of fresh vegetables to keep the birds busy.
- ✓ Debeaking should be done.
- ✓ Isolate the pecking birds and the pecked birds.
- ✓ Provide enough space for birds.
- ✓ Avoid bright light in the poultry house.

Egg eating

- This is where some layers eat their eggs.

Causes of egg eating

- ❖ Shortage of food.
- ❖ Failure to collect eggs in time.
- ❖ Boredom.
- ❖ Too much light around the nesting area.
- ❖ Lack of calcium birds' diet.

Signs of egg eating

Yellow stains on the birds' beaks

Presence of broken egg shells

Prevention of egg eating

- Debeak the birds.
- Provide laying boxes.
- Identify the egg eaters and remove them from the house.
- Keeping laying boxes in the dark.
- Provide enough feeds to the birds.
- Collect eggs regularly.
- Provide enough space to birds.
- Remove broken egg shells from the house.

Feather pecking

- ✓ It is the act where a bird pulls off feathers from other birds using its beaks.

Causes of feather pecking

- Over crowding
- Boredom
- Lack of enough space.
- Bright light in a poultry house.

- Lack of vitamins in the mash given to birds.

Signs of feather pecking

- Fewer feathers on the bird's body.
- Presence of feathers in a poultry house.

Ways of controlling feather pecking

- ✓ Provide birds with enough feeds.
- ✓ Isolate the pecked birds.
- ✓ Debeak birds
- ✓ Provide enough space for birds.
- ✓ Hang out vegetables in a poultry house.

Toe pecking

This is where birds peck the toes of fellow birds.

It is common among chicks.

Causes of toe pecking

Too much light in the poultry house.

Lack of feeds.

General ways of controlling poultry vices

- Debeaking birds to make the beaks blunt.
- Avoid overcrowding the birds.
- Give the poultry feeds rich in calcium.
- Cull or isolate the birds that practice vices and those that are pecked.
- Hang green vegetables in the poultry house to keep the birds busy.
- Provide proper nesting for the layers.
- Collect laid eggs regularly in time.
- Remove broken egg shells from the house.
- Provide enough feeds to the birds.
- Isolate pecked birds.
- Put laying boxes/nests in dark places
- Put perches in a deep litter house to keep birds busy. Perches enable birds to carryout physical exercise.

Debeaking

This is the shortening of a bird's beak.

Debeaking makes the bird's beak blunt and unable to break eggs and peck others.

Diagram showing a debeaked bird



ACTIVITY

1. What are poultry vices?
- 2.

Spellings

albumen	porous
chalaza	proteins
yolk	hatch
incubation	embryo
fertilization	membrane

Reproduction in poultry

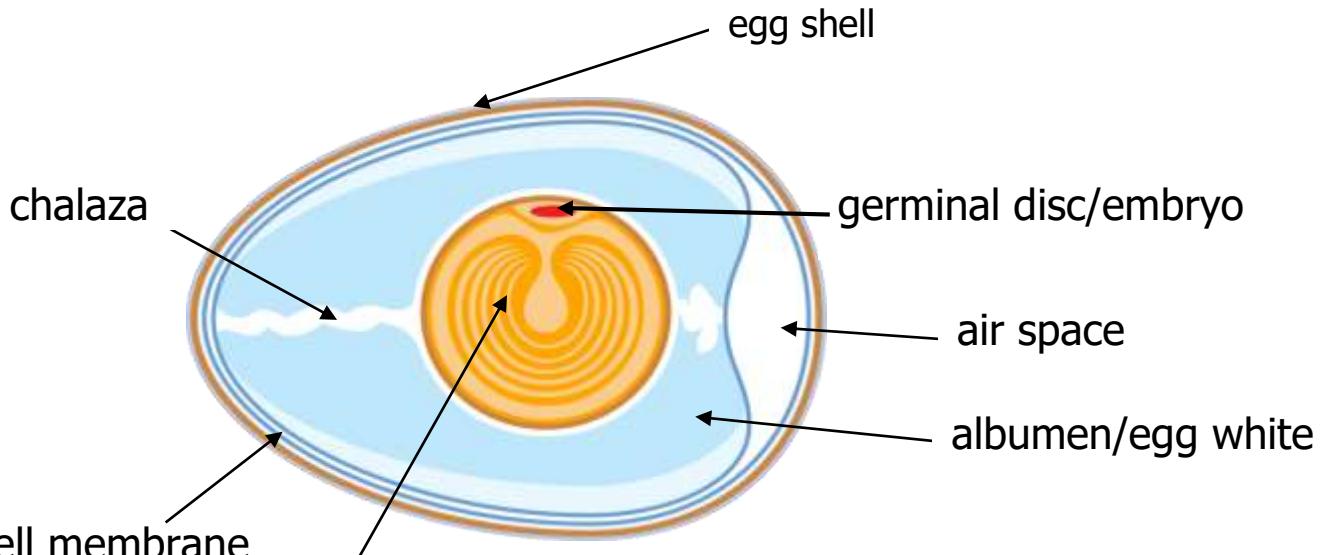
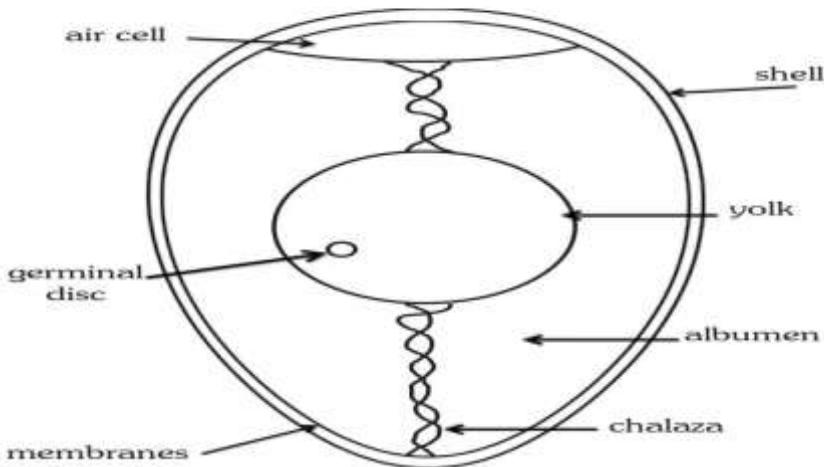
Poultry reproduce by laying fertilized eggs.

They undergo internal fertilization.

In chickens, a fertile egg takes 21 days to hatch out.

Structure of an egg

Parts of an Egg Diagram



MPS Science Le egg yolk

Functions of the parts of an egg

1. Egg shell:

- It protects the inner parts of an egg.
- An egg shell allows exchange of gases because it is porous.
- It is made up of mineral salt called calcium.
NB: Calcium makes the egg shell hard.

2. Embryo:

- It develops into a chick.

3. Germinal disc:

- It develops into an embryo after fertilization.

4. Air space:

- It keeps and provides air to the embryo.

5. Chalaza:

- It holds the egg yolk in one position.

6. Egg yolk:

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

7. Albumen (egg white):

- It supplies water and proteins to the growing embryo.

Abnormalities in poultry eggs

- Soft egg shells.
- When an egg has two yolks.
- Blood stains in the egg white.
- In case an egg has an abnormal shape
- When an egg is too small in size.

Favourable conditions for eggs to hatch

- Warmth
- Moisture
- Oxygen

Reasons why an egg may fail to hatch

- Cracked egg shell
- Dirty eggs
- Unfertilized egg
- Soft egg shell

Qn. How can a farmer detect defects in eggs?

- By egg candling.

What is egg candling?

- ✓ It is a method of studying the development of the embryo and checking for abnormalities in an egg using light.

Qualities of a good egg for hatching

- It should be of medium size.
- It should be fertilized.
- It should have one egg yolk.
- It should be clean.

Practical activity:

Making an egg candler from local materials for and using it in class.

Exercise

1. What food value do we get when we eat eggs?
2. Why is the shell of an egg porous?
3. How does dirt prevent an egg from hatching?
4. Name the part of an egg that develops into a chick after incubation.
5. Why is egg candling important when selecting eggs for incubation?
6. State one condition that favours the hatching of an egg.
7. Why do some hens lay eggs with soft shells?

Lesson _____

Spelling exercise

- | | |
|--------------|-----------------|
| • hatch | • pecking |
| • embryo | • artificial |
| • yolk | • natural |
| • porous | • germinal disc |
| • fertilized | • calcium |

INCUBATION

Incubation is the process by which a fertilized egg is given favourable conditions to hatch.

Incubation period is the time taken for a fertilized egg to hatch.

Incubation periods of some of domestic birds

- | | |
|----------------|-------------------|
| • Hen | 21 days (3 weeks) |
| • Duck | 28 days (4 weeks) |
| • Turkey | 28 days (4 weeks) |
| • Goose | 30 days (1 month) |
| • Guinea fowls | 28 days |

- Pigeon 14 days

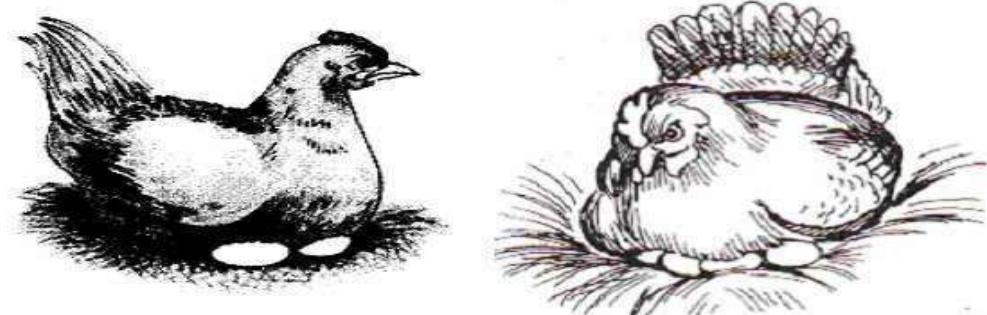
Types of incubation in chicken

- Natural incubation.
- Artificial incubation.

NATURAL INCUBATION IN CHICKEN

This is where by a mother bird sits on eggs to provide necessary conditions for hatching.

Illustration of natural incubation



Conditions needed for natural incubation

- The eggs must be fertilized.
- The nest should be clean, dry and comfortable.
- The place should have dim light.
- The place should be free from strong wind.
- The place should be free from vermins e.g. snakes and rats.

Advantages of natural incubation in chicken

- The incubating hen needs little attention.
- It is cheap and manageable.
- One does not bother with brooding the chicks.

Disadvantages of natural incubation in chicken

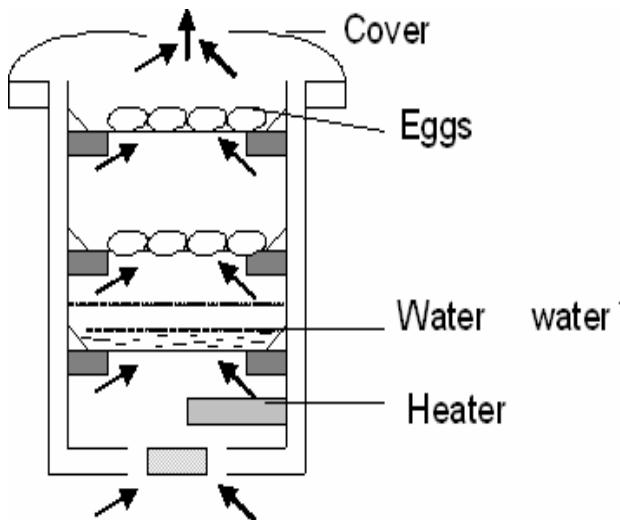
- Few eggs are incubated.
- Natural incubation cannot be used for commercial farming.
- The mother hen may not be good at incubating.
- The incubating hen can be attacked by vermins.

ARTIFICIAL INCUBATION IN CHICKEN

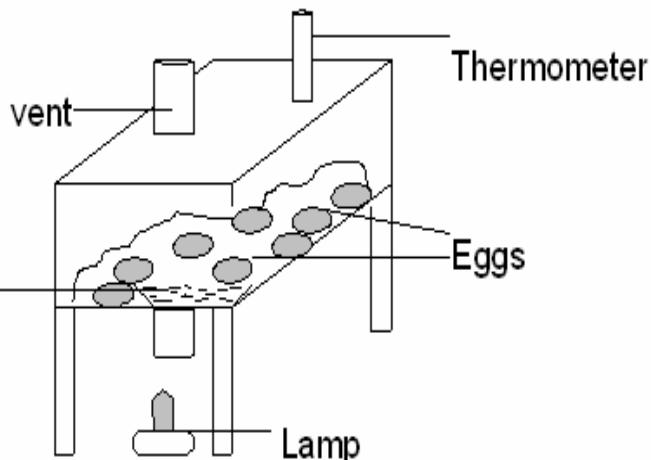
This is the method where a machine is used to incubate the eggs

An incubator is the machine used to incubate eggs.

An electric incubator



Local incubator



Uses of the parts

Water: provides moisture to the eggs.

Heat: provides warmth to the eggs.

Thermometer: measures temperature in the incubator.

Note: The arrows represent air circulation in the incubator.

Advantages of artificial incubation in chicken

- Many eggs are hatched once.
- It is used for commercial purposes.
- Eggs are free from vermin.

Disadvantages of artificial incubation in chicken

- It is expensive to buy an incubator.
- A lot of attention is needed.

PARASITES IN POULTRY

Parasites are living organisms that depend on other living organisms for food and shelter.

The living organism on which a parasite depends is known as a host, e.g. chicken, people, cattle, etc.

Types of parasites in poultry

- Ecto/external parasites
- Endo/internal parasites –.

Ecto parasites or external parasites:

These are parasites that live outside the body of the host.

Examples of ecto parasites in poultry

- lice
- red mites
- depluming mites
- fleas

Prevention and control of ecto-parasites:

- Dusting birds with powdered chemicals that kill parasites.
- Smearing the head of a bird with paraffin.
- Applying Vaseline on the spots with fleas.

Endo parasites or internal parasites

These are parasites that live inside the body of the host.

They usually attack the alimentary canal of the bird.

Examples of endo parasites or internal parasites

- tape worms
- round worms
- hair worms

Prevention and control of endo-parasites

- By regular deworming

Activity

DISEASES IN POULTRY

General causes of diseases in poultry:

1. Overcrowding of poultry.
2. Contaminated feeds and water.
3. Bad housing and poor hygiene.
4. Infection from other fowls/birds.

Examples of poultry diseases

Coccidiosis	Avian leucosis (bird flu)
Fowl typhoid	Gumboro
Fowl pox	Newcastle disease
Black head	Pneumonia

Diseases in poultry are caused by:

- Viruses
- Bacteria
- Protozoa

Examples of viral diseases in poultry

- ❖ New castle disease.
- ❖ Bird flu / avian leucosis
- ❖ Gumboro diseases
- ❖ Fowl pox

Examples of bacterial diseases

- Fowl typhoid
- Pneumonia

Examples of protozoan diseases in poultry

- Coccidiosis
- Black head

COCCIDIOSIS

- It is caused by protozoa.
- It attacks the lining of the small intestines and the liver.
- It is common to poultry and rabbits but can also attack other domestic animals.

Signs and symptoms of Coccidiosis

- Bloody diarrhoea
- Rough feathers.
- Loss of weight (emaciation)
- Loss of appetite.

Prevention and control of Coccidiosis

- ❖ Add coccidiostats in the feeds or water to prevent the disease.
- ❖ Cull the infected birds.
- ❖ Keep the feeding troughs clean.
- ❖ Keep the brooder dry and clean.

BLACK HEAD

It is caused by protozoa.

It affects the liver and caecum.

Signs and symptoms of black head.

- Sulphur coloured diarrhoea.
- Dark purple head.
- Loss of appetite
- Yellow green circular wounds. (lesions)

Prevention and control of black head

- ❖ Avoid overcrowding.

FOWL POX

It is an infectious disease caused by a **virus**.

The virus enters the body through wounds brought about by biting insects and pecking.

Signs and symptoms of fowl pox

- Ulcers in the mouth.
- Tiny wounds on the wattle comb and wings.
- Difficulty in breathing.
- Discharge from the nostril and eyes.
- Shedding feathers[moulting]
- Eyes go sleepy and stuck
- Sudden death of infected birds

Prevention and control of fowl pox

- ❖ Routine vaccination.
- ❖ Ensure proper hygiene in the poultry house.
- ❖ Cull and slaughter the infected birds.
- ❖ Disinfect the poultry house.

NOTE: Fowl pox has no treatment.

ACTIVITY

1. State one common factor that can lead to spread of poultry diseases.
2. Identify the germ that causes Coccidiosis.
3. Besides coccidiosis, mention one other poultry disease caused by the germ you have named above.
4. Identify one disease that attacks both rabbits and poultry birds.
5. Why is coccidiostats added in poultry feeds?
6. Mention one viral disease that affects poultry.
7. Why is vaccination important in the control of poultry diseases?
8. What causes fowl pox in birds?
9. State one sign of fowl pox.
10. Why should farmers cull and slaughter all infected birds?

NEWCASTLE DISEASE

- It is a highly infectious disease caused by a virus.

Signs and symptoms of New castle disease

- ✓ Thick mucus discharge from the mouth.
- ✓ Difficulty in breathing.
- ✓ Staggering with drooping wings and bending of the neck.
- ✓ Watery yellowish white diarrhoea.
- ✓ Reduction in egg production.

Prevention and control of New castle disease

- Vaccinate the birds regularly.
- Kill the whole flock and disinfect the house.
- Isolate the sick birds.

NOTE: Newcastle disease has no treatment.

FOWL TYPHOID

- ✓ This is a highly infectious disease in poultry caused by bacteria called salmonella typhoid.
- ✓ The disease is transmitted to chicks by carrier hens through eggs.
- ✓ Salmonella also affects human beings, so it is dangerous to eat raw eggs.

Signs and symptoms of fowl typhoid

- White yellowish or green yellowish diarrhoea.
- Dullness and sleepy eyes.
- Drooping wings.
- The comb or the wattle gets shrunken and pale yellow.

Prevention and control of fowl typhoid

- ❖ Kill and bury the infected birds.
- ❖ Keep the poultry house clean.
- ❖ Regular vaccination.
- ❖ Treat infected birds with antibiotics.

PNEUMONIA

- Pneumonia is a contagious disease.
- It is caused by bacteria.

Signs and symptoms of pneumonia

- ✓ Watery discharge from the mouth part and nostrils
- ✓ High temperature
- ✓ Coughing
- ✓ Difficulty in breathing
- ✓ Loss of appetite

Prevention and control of pneumonia

- Treat with antibiotics

- Keep the poultry house warm during cold seasons
- The poultry house should be well ventilated
- Isolate the sick ones

AVIAN LEUCOSIS

- ✓ It is caused by a virus.

Signs and symptoms

- Paralysis of legs and wings
- Swollen legs
- Reduced egg production
- Pale combs
- Dehydration
- Enlarged liver

Prevention and control

- ✓ Vaccinate all the birds.
- ✓ Keep the poultry house clean.
- ✓ Use disinfectant to clean equipment.
- ✓ Rear birds in isolation with adequate ventilation.

Culling

- Culling is the removal of sick and unproductive birds from the flock.

Reasons for culling

- To control the spread of poultry diseases.
- To control poultry parasites.
- To control poultry vices.

General methods of controlling poultry diseases

- Regular vaccination against diseases like New Castle, fowl pox, etc.
- Isolate the sick or infected birds.
- Culling of the infected birds.
- Disinfecting and maintenance of cleanliness of poultry houses.

ACTIVITY

1. Name one bacterial disease that attacks poultry.
2. Which type of drug is commonly used in the treatment of bacterial diseases in birds?
3. What causes fowl typhoid?
4. What term refers to the removal of sick and unproductive birds from the flock?
5. Why do farmers carry out the practice named above?
6. Which disease can lead to dehydration among birds?
7. Which poultry disease can be transmitted to chicks by carrier hens through the eggs?

8. How is vaccination of poultry birds important?
9. What is another name to mean "bird flu"?
10. Identify one sign of pneumonia among birds.

Effects of diseases & parasites to poultry:

- Leads to stunted growth.
- Low production of eggs.
- Leads to death of poultry.

Prevention and control of common diseases in poultry

- Keep poultry house clean.
- Regular vaccination.
- Culling
- Burn or bury dead birds.
- Avoid keeping too many birds in one place.

Exercise

1. Mention two viral disease that attack poultry.
2. Mention ant two bacterial diseases that attack poultry.
3. How can worm infection in poultry be controlled?
4. What is culling?
5. Identify two ways how you can prevent poultry diseases.
6. Which poultry disease shows signs like difficulty in breathing, coughing, and loss of appetite?
7. Mention the poultry disease that can also affect the rabbits.
8. What is deworming as use in disease prevention in poultry?

POULTRY MANAGEMENT PRACTICES

These are routine activities that a poultry farmer carries out to maintain good production and avoid losses.

These activities include;

- Debeaking
- Deworming and dusting
- Egg collection
- Culling
- Regular feeding
- Vaccination
- Record keeping

a) Debeaking

This is the cutting of the bird's beak short.

Farmers debeak to prevent egg eating, pecking and cannibalism.

Debaeking makes the bird's beak blunt.



b) Deworming and dusting

These are done to control endo and ecto parasites respectively.

c) Regular egg collection

Eggs should be collected at least 2 to 3 times a day to avoid the following;

- Breakage of the eggs
- Egg eating
- Eggs getting dirty

d) Culling

Culling is the removal of the unproductive and infected birds from the flock.

This can be done by selling or killing the infected birds.

Examples of

e) Regular feeding

A farmer should provide both commercial feeds and green vegetables to birds at regular times.

f) Vaccination

Birds should be regularly vaccinated to protect them from diseases (to boost their immunity)

FARM RECORD KEEPING

This is the keeping of information regarding the farm.

Types of farm records

- Production record
- Health record
- Sales and expense record
- Flock record
- Feed record

Production record

This shows the number of eggs collected daily.

Health records

These indicate the treatment given to birds e.g. vaccination or deworming.

Sales and expense records

These show the expenditure and income from feeds, eggs, labour etc.

Flock records

These indicate the total number of live, sold, killed or dead birds everyday.

Feed records

These show the type of feed, quantity of feed eaten and the quantity of spoilt feed.

Inventory records

These show the property owned by the farm.

Reasons for keeping farm records

- Records help the farmer to know if the farm is making profits or losses.
- Records help the farmer to identify areas that need improvement.
- Records help the farmer to budget for the farm.
- Records help the farmer to know the expenditure on the farm
- Records help the farmer to plan for the farm.
- Records help the farmer to avoid repeating mistakes.
- Records help the farmer to easily get loans from banks.
- Records help the farmer to be taxed fairly.

Activity

1. What is a farm record?
2. State one type of farm record you know.
3. Which farm record shows the number of eggs collected per day?
4. What term refers to the keeping of the information regarding the farm?
5. Why do we debeak birds?
6. How does debeaking control vices on a poultry farm?
7. Why do farmers keep records?
8. Which poultry management practice is done to control ecto parasites among birds?
9. Identify one other poultry management practice carried out by poultry farmers
apart from deworming.
10. Sate any one problem that may be faced by a poultry farmer who does not keep records.

BEE KEEPING

Bee keeping is also called **apiculture**.

Apiculture is the rearing and management of honey bees.

Common terms used in bee keeping

a) **Hive:**

A hive is a home of bees.

b) Colony:

A colony is a group of bees living and working together in a hive.

c) Apiary:

An apiary is a place where bee hives are set.

d) Swarm:

A swarm is a group of bees moving together in the same direction.

e) Swarming:

This is the massive movement of bees looking for a new hive.

f) Comb:

This is a group of cells.

g) Grub:

This is the larva stage of a bee.

h) Brood:

This is a group of young bees in a comb.

Kinds of bees

Some bees are **social** while others are **solitary**.

✓ **Social bees** are bees that live and work together.

Example

Honey bees

✓ **Solitary bees** are bees that live and work alone.

Example

Bumble bees

Carpenter bee

Other examples of social insects

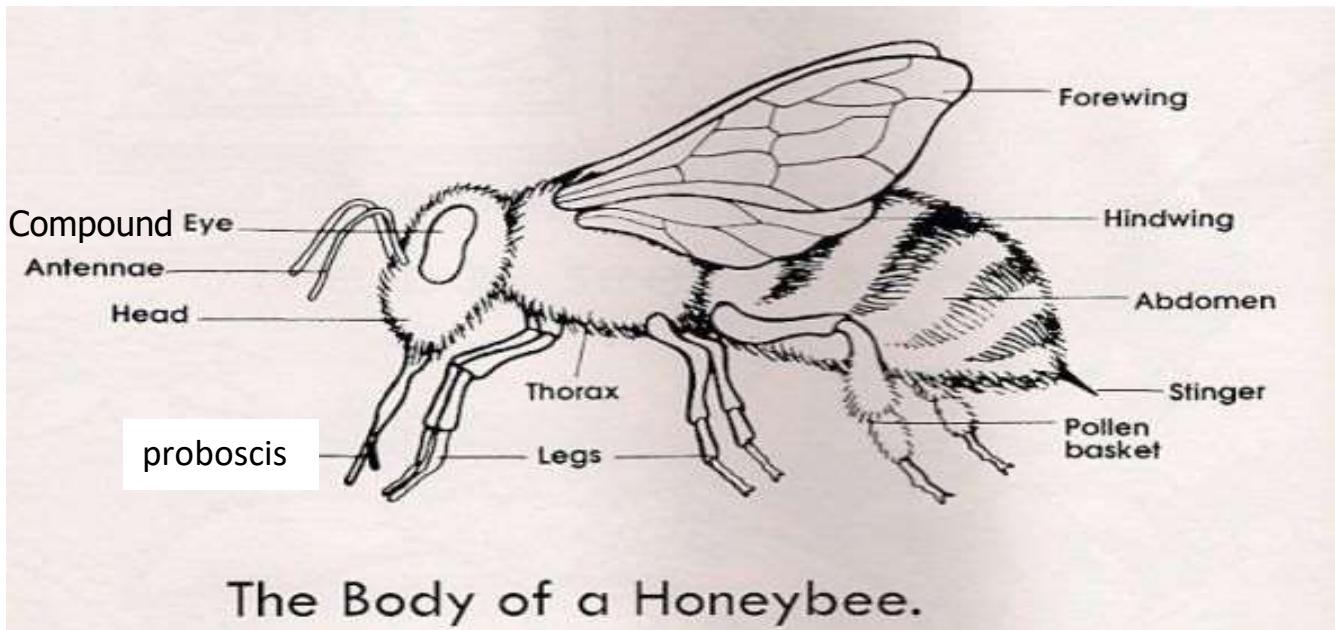
- Termites
- Red ants
- Wasps

Insects that do not live and work together are called solitary insects.

Examples of solitary insects

- Butterflies
- Houseflies
- Mosquitoes
- Crickets
- cockroaches

Main parts of a honey bee



The Body of a Honeybee.

Importance of each part

a) Stinger

For protection.

b) Ovipositor

For laying eggs (only found in female insects)

c) Pollen basket

For carrying pollen.

d) Wings

For flight.

e) Proboscis:

For sucking nectar and other fluids.

f) Abdomen:

It has the spiracles for breathing.

g) Halteres:

For balancing during flight.

ACTIVITY

1. What do we call a place where many beehives are set?
2. Why are honey bees regarded as social insects?
3. How is an ovipositor important to an insect?
4. In which way are the spiracles useful to a bee?
5. How are social insects different from solitary insects?
6. Name the larva stage of a bee.
7. What body part do bees use to collect nectar?

8. Why do bees sting people during honey harvesting?
9. How is a bee able to collect pollen from flowers?
10. Give one reason why farmers carry out apiculture.

Types of bees

There are three types of bees namely;

- Queen bee
- Drone bee
- Worker bee

Queen bee



- The main function of a queen bee is to lay eggs.
- A queen bee mates only once in its lifetime.
- It stores sperms in a sperm sac in the abdomen.
- Its wings are shorter compared to its body.
- It is larger than the drone and the worker bees.
- A queen bee is fed on a special food called **royal jelly**.

Components of royal jelly

- Sugar
- Water
- Pollen
- Nectar

Drone bee



- ✓ This is the male bee whose main function is to mate with the queen bee.
- ✓ A drone bee is more hairy than the worker bee.
- ✓ It has a blunt abdomen without a sting.
- ✓ A drone bee makes a buzzing sound when flying.

- ✓ A drone bee is not often found in the hive because it is killed after mating with the queen and its body is removed from the hive.

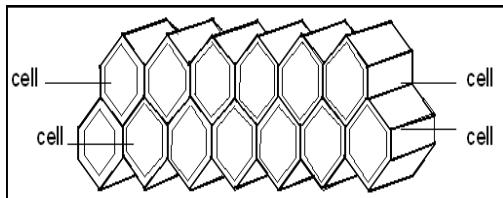
Worker bee



- The worker bees are sterile (barren) female bees.
- Worker bees are small in size but very many in numbers.

Duties of a worker bee

- Worker bees build the comb using wax. The comb is divided into small hexagonal apartments called cells.



- Worker bees feed the queen bee and the young ones in the brood (grub).
- Worker bees clean the hive.
- Worker bees guard and protect the hive.
- They look for nectar, water, pollen and propolis.

SWARMING

- Swarming is the massive movement of bees from one place to another looking for a hive.
- ✓ A swarm is a group of bees moving together in the same direction.

Reasons why bees swarm

- Overcrowding of bees in the hive.
- Excessive heat in the hive.
- Direct smoke into the hive.
- Too much noise in the area.
- Shortage of food and water near the hive.
- Leakage of the hive.
- Attack by enemies.
- Bad smell around or in the hive.
- When the brood cells are damaged.
- When a new queen is groomed.
- Dampness in the hive.

Ways of preventing swarming in bees

MPS Science Lesson Notes

- ✓ Placing the hive in a noise free place (quiet place).
- ✓ Feeding bees during the dry season.
- ✓ Placing the hive near a water source.
- ✓ Placing the hive in a shade.
- ✓ Placing the hive near flowering plants.

Activity

1. How is a swarm of bees different from a colony?
2. Write four factors that lead to swarming in bees.
3. How does noise affect bees?
4. Why should hives be protected from direct sunshine?
5. Name one substance that can be provided to bees during the dry season.

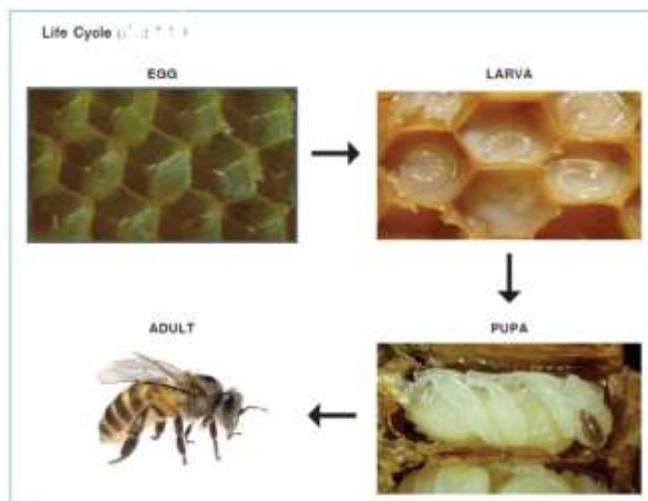
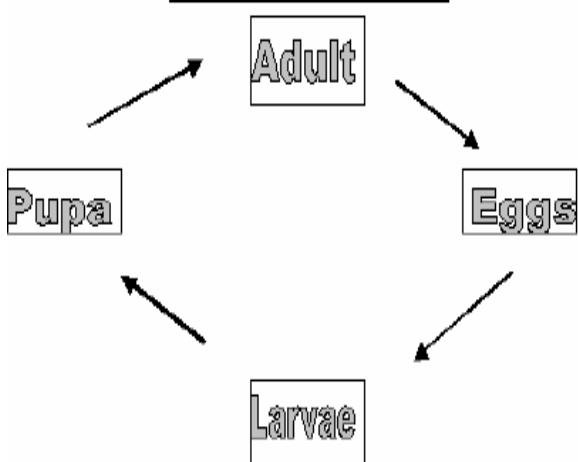
The lifecycle of bees

- ✓ Bees undergo a complete metamorphosis i.e,
- ❖ Eggs
- ❖ Larva
- ❖ Pupa
- ❖ Adult
- ✓ The queen bee lays eggs in the cells.
- ✓ The eggs hatch into the larvae (grub).
- ✓ The larvae are fed by the worker bees and sealed in the cells.
- ✓ The larvae develop into pupae.
- ✓ The pupae then develop into adult bees.

NOTE:

The grub is fed on honey.

The life cycle of a bee



Apiary:

MPS Science Lesson Notes

- ✓ This is a place where beehives are set.

Factors considered when setting up an apiary

- A place free from noise.
- A place near flower gardens.
- A place free from direct sunshine.
- A place near water source.
- A place far from home, roads, schools and factories.

ACTIVITY

1. What name is given to a group of bees moving together?
2. Which type of lifecycle does a honey bee undergo?
3. State one reason why bees swarm.
4. What name is given to a place where beehives are set?
5. What does a grub feed on?
6. State the second stage of a bee.
7. What is swarming?
8. Suggest one factor considered when setting up an apiary
9. What happens to the bees when there is too much noise around the hive?
10. Why are honey bees called social bees?

BEEHIVES

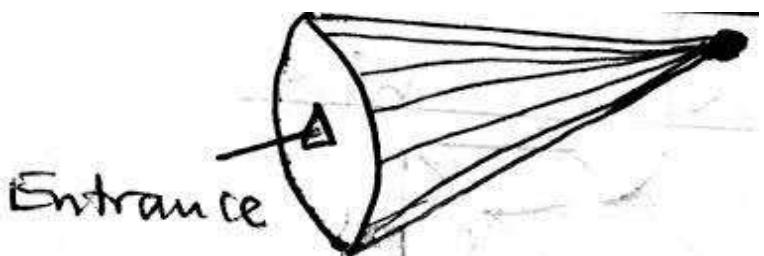
A hive is a home of bees.

Types of hives

- Traditional hives.
- Modern hives.
- Natural beehives

Examples of traditional hives:

- Kigezi hive.



- The dug out log hive.

Materials used to make local beehives

- | | |
|---|--|
| <ul style="list-style-type: none"> ➤ Logs ➤ Small sticks ➤ Dry grass | <ul style="list-style-type: none"> ➤ Mud ➤ Banana fibres |
|---|--|

Advantages of local or traditional beehives.

- They are easy to make.
- They are cheap to make.

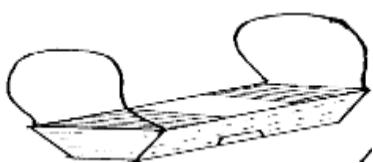
Disadvantages of local beehives

- They are easily destroyed.
- It's not easy to inspect the combs.
- It is not easy to harvest honey.
- Honey harvested may contain grubs.

Examples of modern hives

- Top bar hive
- Box hive
- Tin hive

top bar hive

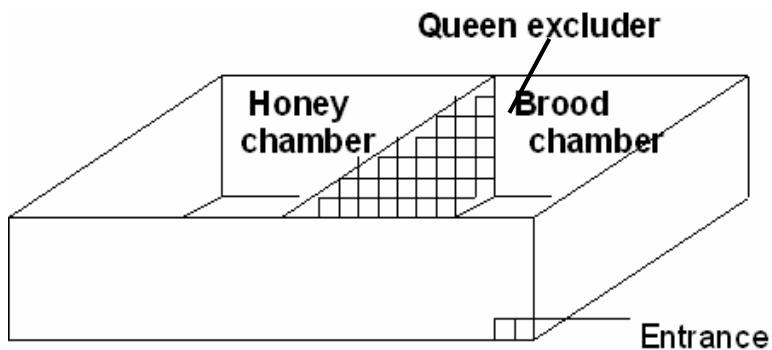


box hive



Advantages of top bar hive over other hives

- Honey collected is high quality.
- The bars can be removed individually for inspection.
- Harvesting of honey is easily done.
- It avoids wastage combs that are not ready.
- It is easy to control swarming.



A brood chamber contains the following:

- Eggs
- Larvae
- Pupa
- Young bees (grubs)

Importance of each part of a modern hive

a) The queen excluder

- It prevents the queen bee from laying eggs in the honey chamber.
- It separates the honey chamber from the brood chamber.

NB: The queen excluder is made-up of small wire mesh, which does not allow the queen to pass through but only the worker bees.

b) The honey chamber:

It is for storing honey.

c) The brood chamber:

- It is where the queen bee lays eggs.
- It is where the grubs develop from.

d) Entrance:

It is a hole where bees enter or come out from.

Natural beehives

- ✓ Natural bee hives are habitats of bees which are not made by people.

Examples of natural bee hives

- Caves
- Tree trunks
- Holes in rocks
- Holes in anthills

Advantages of modern beehives

- They are easy to inspect.
- They are durable.
- The colony develops undisturbed.
- Honey harvested is usually clean.
- It is easy to harvest honey.

Disadvantage of modern beehives

- They are expensive to make.

Exercise

1. Mention one type of beehives.
2. Why should a bee hive be set away from people?
3. Identify one example of a local beehive.
4. Give one material used for making traditional beehives.
5. Mention one advantage of local beehives over modern beehives.
6. State one disadvantage of local beehives.

7. Why is it difficult to prevent the mixing of honey with eggs in a traditional beehive?
8. How important is a queen excluder in a modern beehive?
9. Identify any one natural place where bees can live.
10. State one advantage of top bar hive over others.

Siting a hive

This means selecting a suitable place where to place a hive.

Factors to consider when siting a hive

- ❖ The hive should be near a water source.
- ❖ The hive should be near flowering plants.
- ❖ The hive should be in a noise free place (quiet place).
- ❖ The hive should be protected from direct sunshine.
- ❖ The hive should be sheltered from strong wind.
- ❖ The hive should be far from the road, school, factories, etc.
- ❖ The place should be

STOCKING A HIVE

- ❖ It is the way of encouraging bees to occupy an empty hive.

How is stocking done in apiculture?

- ❖ Using a swarm catcher box
- ❖ Using a swarm catching net
- ❖ By smearing wax in the hive

HARVESTING HONEY

- ✓ Honey harvesting is the removal of honey combs from a hive.
- ✓ Care should be taken when harvesting honey because bees can sting if they are disturbed.

Methods of harvesting honey

- ✓ Modern method using a smoker.
- ✓ Traditional method using fire to kill bees.

Disadvantages of using fire to harvest honey

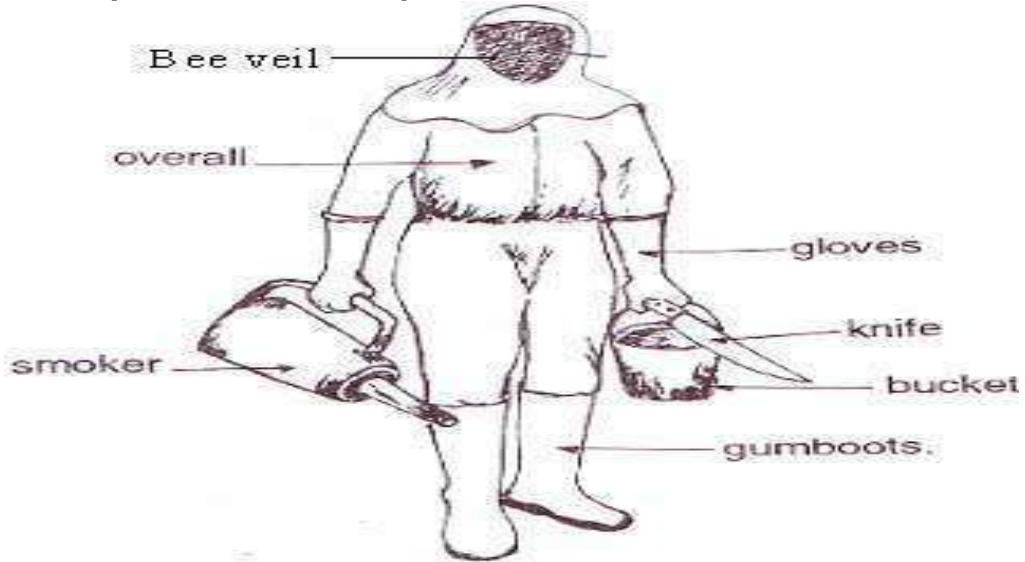
- It kills bees.
- It burns the hive.
- Fire causes bees to swarm.
- Fire melts honey combs.
- Spoils the quality of honey.

When harvesting honey, one should have the following:

- ❖ A bucket for collecting honey.
- ❖ A knife for cutting honey combs

- ❖ Overall for protecting the harvester from stings.
- ❖ Gloves for protecting the hands.
- ❖ Gum boots for protecting the feet.
- ❖ Bee veil for protecting the face from bee stings.
- ❖ Smoker for producing smoke that calms bees.

A person ready to harvest honey



Importance of each equipment

- a) **Bee veil** – to protect the head from bee stings.
- b) **Smoker** – for puffing smoke into the hive.
- c) **Knife** – for cutting the honey comb.
- d) **Bucket** – for carrying the honey combs.
- e) **Overall** – to protect other body parts from bee stings.
- f) **Gloves** – to protect the hands from bee stings.
- g) **Gumboots** – to protect the legs from bee stings.

Procedure for harvesting honey

- Blow the smoke into the hive through the entrance holes
- Lower the hive to the ground so that the combs are not broken or damaged.
- The bars should be lifted out one by one and inspected.
- Good quality honey is found in white combs
- Cut the comb away from the bar and put in a clean container.

Extraction of honey

This is the removal of honey from combs.

Methods of extracting honey

- Floating the wax method
- Pressing honey method

- Centrifuging method

Floating the wax method

- Golden yellow combs are removed and crushed and placed into the saucepan
- Another bigger saucepan is halfway filled with water and water is boiled.
- The saucepan with honey combs is placed on top of the boiling water. The wax and honey melts, the wax floats on top of honey.
- Honey is then placed in clean containers for storage.

Pressing honey method

- The combs are broken into small pieces.
- The broken honey combs are placed on the cloth tied.
- Allow honey to drip into a clean container.

Centrifuging method

- A centrifugal honey extractor is used to remove honey from honey combs.
- The wax that seals the combs is removed before they are put in a machine.
- The machine then turns the combs round at a high speed.
- The force that turns the combs around and forces honey to come out.
- The honey then settles at the bottom of the machine.
- The honey is then boiled and stored in clean containers.

An illustration showing a centrifugal honey extractor



1 Feeding bees

When to feed bees

- When they are new in the hive.
- When there is drought.

Reasons why bees should be fed

- To prevent swarming.
- To encourage multiplication of bees.

What to feed bees on

1. Water
2. Sugar mixed with water (syrup)

Note: Naturally bees feed on nectar, pollen and honey.

Products from bees

- Honey
- Bee wax

- Pollen
- Propolis
- Royal jelly
- Bee venom
- Brood

ACTIVITY

1. What does the term stocking a hive mean?
2. How is the use of fire dangerous to the bees during the harvesting of honey?
3. Why do farmers plant flowering plants near beehives?
4. State one method of harvesting honey.
5. What term refers to a selection of a suitable place to set up a hive?
6. Identify one product got from bees.
7. How are gloves important during the harvesting of honey?
8. Suggest one factor considered when siting a hive.
9. State one way farmers encourage bees to occupy an empty hive.
10. What do bees feed on?

Importance of honey to man

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

Industrial uses of honey

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

Note: Honey provides us with carbohydrates.

Importance of bee wax to man

- For making shoe polish.
- For making crayons.
- For making candle wax.
- For making lip balms.
- For making varnish for furniture.
- For making cosmetics like Vaseline.

- For making chewing gum.

Uses of propolis to bees

- It is used to repair the cracks in the hive.
- It is used to smooth the interior of a hive.
- It is used to waterproof the brood cells.

Note: worker bees feed on pollen.

Uses of Propolis to man

- ❖ It treats scabies.
- ❖ It can be sold to get money.
- ❖ It can be used to treat burns and scalds.
- ❖ For making antiseptics, antifungal and antiviral medicines.

ACTIVITY

1. Which food value do we obtain from eating honey?
2. Identify one importance of honey to man.
3. State one industrial use of honey.
4. Mention one importance of bee wax to people.
5. How important is propolis to bees?
6. How do we call a machine used to extract honey?
7. Give one method of extracting honey?
8. Which product of bees is used for making candles?
9. How is honey used in hospitals?
10. What does the term extraction of honey mean?

How to obtain bee wax

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

Importance of bees to people

- ❖ Bees provide bee wax.
- ❖ Bees provide honey.
- ❖ Bees help in pollination.
- ❖ They are sources of income.

How are bees important to plants?

- ❖ Bees pollinate flowers.

Examples of bee pests

- | | |
|---------------|-------------|
| ○ Wood ants | ○ Wasps |
| ○ Safari ants | ○ Wax moths |

- Sugar ants
- Pirate ants
- Honey badgers
- Hawk moth
- Hive beetles

Protection of bees from ants

- ❖ Hang the hive between poles.



How can we prevent enemies from destroying bees?

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

Ways of caring for honey bees

- ❖ Protect bees from direct sunlight, rain, pests and diseases.
- ❖ Remove weeds which grow below the hive.
- ❖ Siting an apiary in a quiet place.
- ❖ Provide bees with water and sugar during hot days

Diseases of bees

- ✓ American foul brood
- ✓ Stone brood
- ✓ European foul brood
- ✓ Nosema

ACTIVITY

1. How are bees important to crop growers?
2. State one example of pests that attack bees in a hive.
3. Identify one reason why people rear bees.
4. Why do farmers hang bee hives between poles?
5. State one way of caring for bees.
6. State one way of controlling pests that attack bees.
7. Mention any one disease that attacks bees.
8. Why do farmers put grease on the wires holding a hive?
9. Which type of bees help in the pollination of flowers?
10. How do farmers care for their bees during dry seasons?

THEME: MATTER AND ENERGY

TOPIC: MEASUREMENTS

The word **measure** means to find the size, amount, length, area and quantity of an object.

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

Terms used in measurement

a) Mass

Mass is the quantity of matter in an object.

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

NB: Its standard unit is **kilograms (kg)**.

b) Weight

Weight is the force of gravity acting on an object by the earth.

Weight is measured in **newtons (N)**.

c) Gravity

Gravity is the force of the earth that pulls down objects.

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

d) Force

Force is a pull or push exerted on an object.

e) Length

Length is the distance between two points.

f) Capacity

Capacity is the amount of liquid a container can hold.

Capacity is measured in **litres**.

Length

Length is the distance between two points.

Units for measuring length

- | | |
|-------------------|-------------------|
| ✓ Kilometre (Km) | ✓ Decimetre (dm) |
| ✓ Hectometre (Hm) | ✓ Centimetre (Cm) |
| ✓ Decametre (Dm) | ✓ Millimetre (mm) |
| ✓ Metres (M) | |

NOTE: The standard units for length is **metres (m)**.

Tools used to measure length

- Tape measures
- Metre rulers
- Foot rulers

How to measure length using body parts

- Using hand spans
- Using strides
- Using the feet
- Using arm length

Practical activity

Guide learners to measure length of different objects in and outside the classroom e.g. chalkboard, teacher's tables, desks, benches, notice board, exercise books, etc and record them.

Exercise

1. What is meant by the term measurement?
2. State the basic unit of weight.
3. In which way is mass different from weight?
4. What term is given to the force that pulls things down to the earth?
5. State the standard unit for measuring capacity.
6. What do we call the distance between two points?
7. Mention the standard unit for length.
8. State one instrument used to determine length.
9. Give one body part you can use to measure length.
10. Why do people measure their items at home?

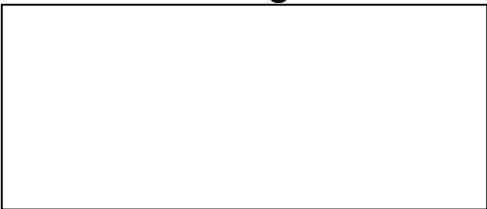
Area

Area is the total space covered by an object.

It is measured in **square units** i.e cm², m², dm², and km².

Finding area of different shapes and objects

a) Area of a rectangle

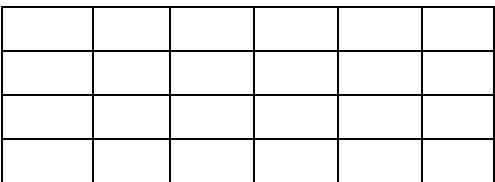


The width is shorter side of the rectangle.

The length is the longer side of the rectangle.

Area = Length x Width = sq. units

- ✓ By counting squares



$$\text{Area} = L \times W$$

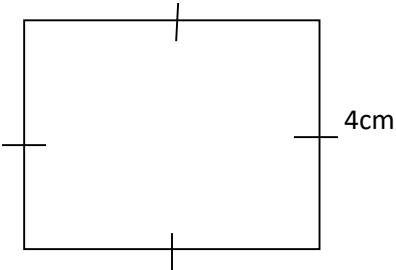
$$\text{Area} = 6\text{squares} \times 4\text{squares}$$

$$\text{Area} = 24\text{squares}.$$

NB: A rectangle has two opposite sides equal.

b) Area of a square

-A square has all its sides equal.



$$\text{Area} = \text{Side} \times \text{Side}$$

$$\text{Area} = 4\text{cm} \times 4\text{cm}$$

$$\text{Area} = 16\text{cm}^2$$

Practical activity

Guide learners to measure and calculate the area of different objects within and outside the classroom e.g. the top of the teacher's table, the notice board, their exercise books, etc.

CAPACITY AND VOLUME

CAPACITY

Capacity is the amount of liquid a container can hold.

Capacity of liquids is measured in **litres**.

Metric table for capacity of liquids

KL	HL	DL	L	dl	cl	ml
1	0	0	0	0	0	0
	1	0	0	0	0	0
		1	0	0	0	0
			1	0	0	0
				1	0	0
					1	0

VOLUME

Volume is the space occupied by a given object.

Volume is measured in cubic units like

- Cubic millimetres – mm^3
- Cubic metres – m^3
- Cubic centimetres- cm^3 or cc

The basic unit for measuring volume is **cubic metres (m^3)**.

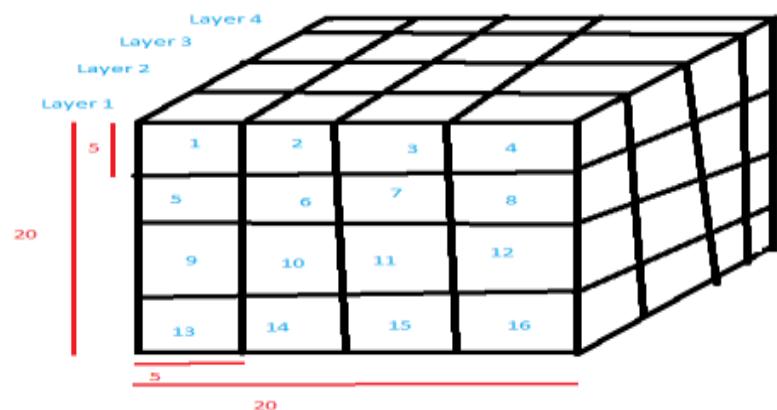
Finding volume of regular objects

Regular objects are objects which have definite shapes.

For example:

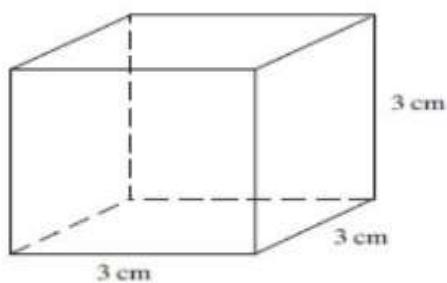
- | | |
|--|---|
| <ul style="list-style-type: none"> ✓ Cuboids ✓ Cubes ✓ Bricks | <ul style="list-style-type: none"> ✓ Blocks ✓ boxes |
|--|---|

Finding the volume of a cube or cuboid using cubes.



Example 1

Find the volume of a cube whose side is 3cm.



$$\text{Volume} = \text{Side} \times \text{Side} \times \text{side}$$

$$\text{Volume} = 3\text{cm} \times 3\text{cm} \times 3\text{cm}$$

$$\boxed{\text{Volume} = 27\text{cm}^3}$$

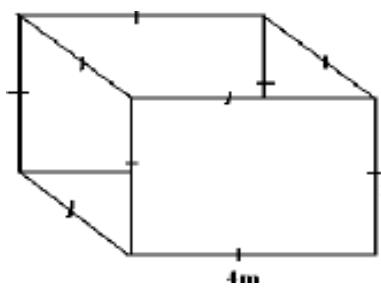
Example 2

Find the volume of a cube whose side is 4cm.

$$\text{Volume} = \text{Side} \times \text{Side} \times \text{side}$$

$$\text{Volume} = 4\text{cm} \times 4\text{cm} \times 4\text{cm}$$

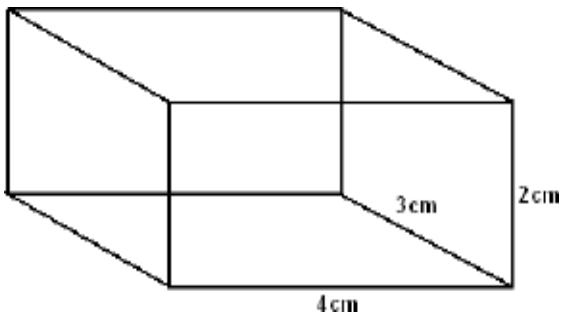
$$\boxed{\text{Volume} = 64\text{cm}^3}$$



Volume of a cuboid

Example 1

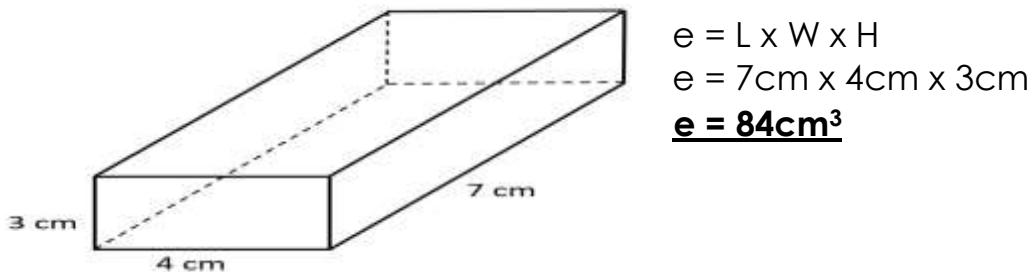
Find the volume of the cuboid below.



$$\begin{aligned}V &= L \times W \times H \\V &= 4\text{cm} \times 3\text{cm} \times 2\text{cm} \\V &= \underline{\underline{24\text{cm}^3}}\end{aligned}$$

Example 2

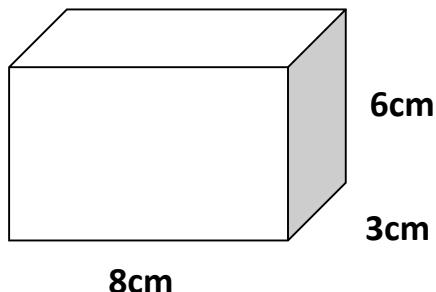
Calculate the volume of the cuboid below.



$$\begin{aligned}e &= L \times W \times H \\e &= 7\text{cm} \times 4\text{cm} \times 3\text{cm} \\e &= \underline{\underline{84\text{cm}^3}}\end{aligned}$$

Activity

1. State the basic unit for measuring volume.
 2. What are regular objects?
 3. Identify one example of a regular object.
 4. What term refers to the amount of matter a container can hold?
 5. What is the basic unit for measuring the capacity of liquids?
 6. Define the term volume as related to measurements.
 7. Name any two liquids at home whose capacity can be measured in litres.
 8. Find the volume of a cube of sides **6m**.
-
9. Calculate the volume of the figure below.



FINDING THE VOLUME OF IRREGULAR OBJECTS

MPS Science Lesson Notes

Irregular objects are objects that don't have definite shapes. e.g. stones, head, mango.

The volume of irregular objects is measured using displacement method.

It is called the displacement method because the irregular object displaces water.

When an irregular object is fully immersed in water, it displaces the amount of water equal to its volume.

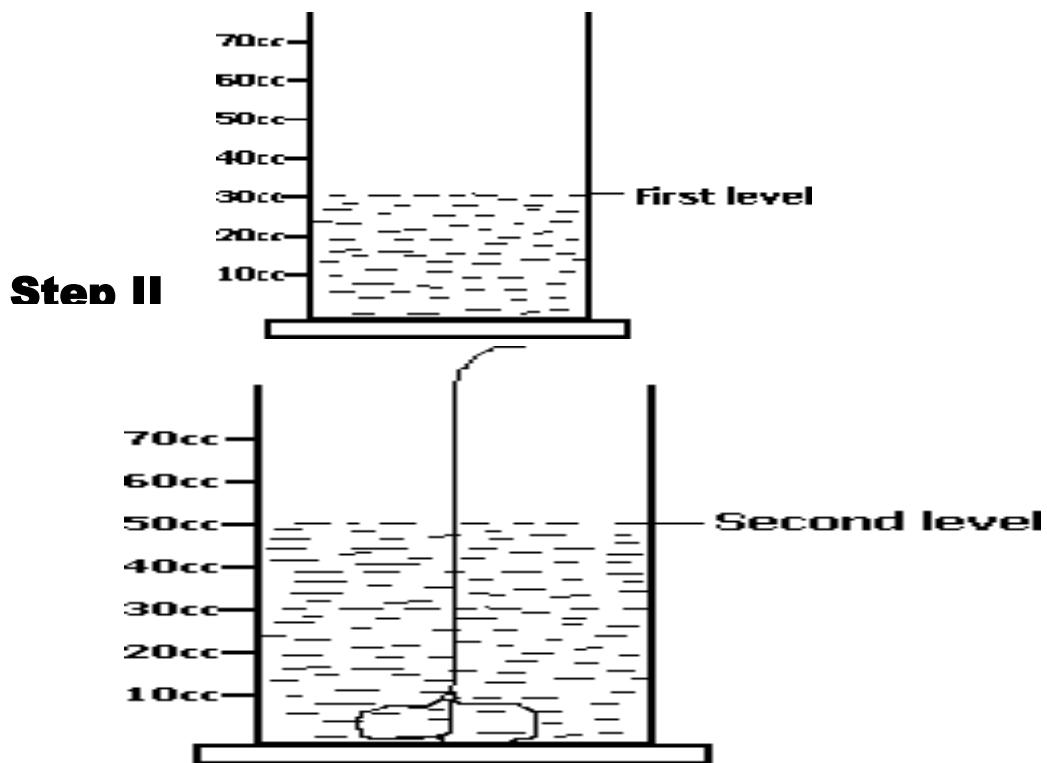
Things needed to help you find the volume of irregular objects

1. Measuring cylinder
2. Water
3. An irregular object e.g. a stone.
4. An over flow can or eureka can
5. String

Steps taken when finding the volume of an irregular object using a measuring cylinder.

Step I

1. Pour water into a measuring cylinder so that it is about half full
2. Record the first volume of water. Say 30cc.



Get object and tie it with a string.

Lower the object gently into the measuring cylinder so that the object is completely covered by water.

Record the volume of water again say 50 cc.

Volume of the stone will be equal to:

$$V = 2^{\text{nd}} \text{ level} - 1^{\text{st}} \text{ level}$$

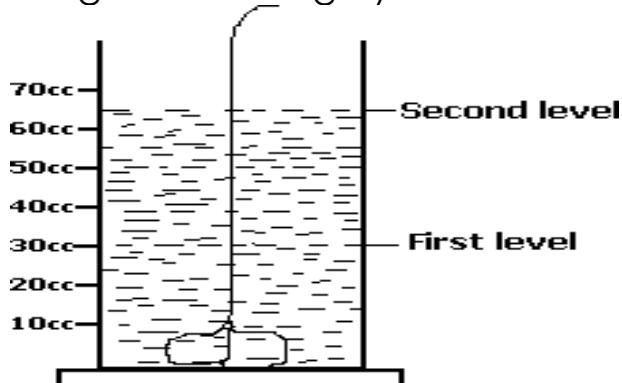
$$v = 50\text{cc} - 30\text{cc}$$

$$\mathbf{v = 20cc}$$

The volume of the stone is 20cc because when an object is lowered in water, it displaces an amount of water equal to its volume.

Example 1

An experiment was carried out by P.5 pupils to find the volume of a stone using a measuring cylinder as shown below.



a) Calculate the volume of the stone.

$$\text{Volume} = \text{Second level} - \text{First level}$$

$$V = 2^{\text{nd}} \text{ level} - 1^{\text{st}} \text{ level}$$

$$V = 60\text{CC} - 30\text{CC}$$

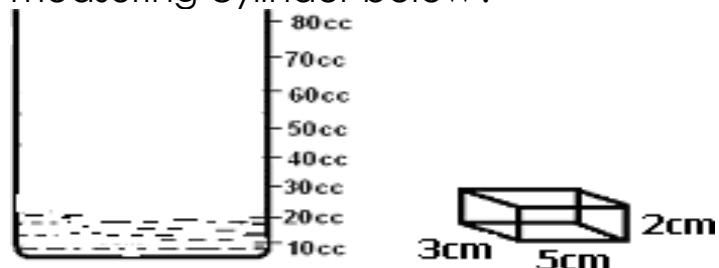
$$\mathbf{V = 30CC}$$

b) Why is the volume of the stone you have equal to that answer given?

An object displaces the amount of water equal to its volume.

Example 2

What will be the new level of water if the object shown is put into the measuring cylinder below?



Volume of the regular object

$$\text{Volume} = \text{Length} \times \text{Width} \times \text{Height}$$

$$V = 5\text{cm} \times 3\text{cm} \times 2\text{cm}$$

$$V = (5 \times 3 \times 2) \text{ cm}^3$$

$$\mathbf{V = 30\text{cm}^3}$$

Therefore the new level of water will be **50cc.**

Finding the volumes of irregular objects using an over flow can

Requirements

- over flow can (Eureka)
- String and Water
- Measuring cylinder
- Irregular object e.g stone

Step I

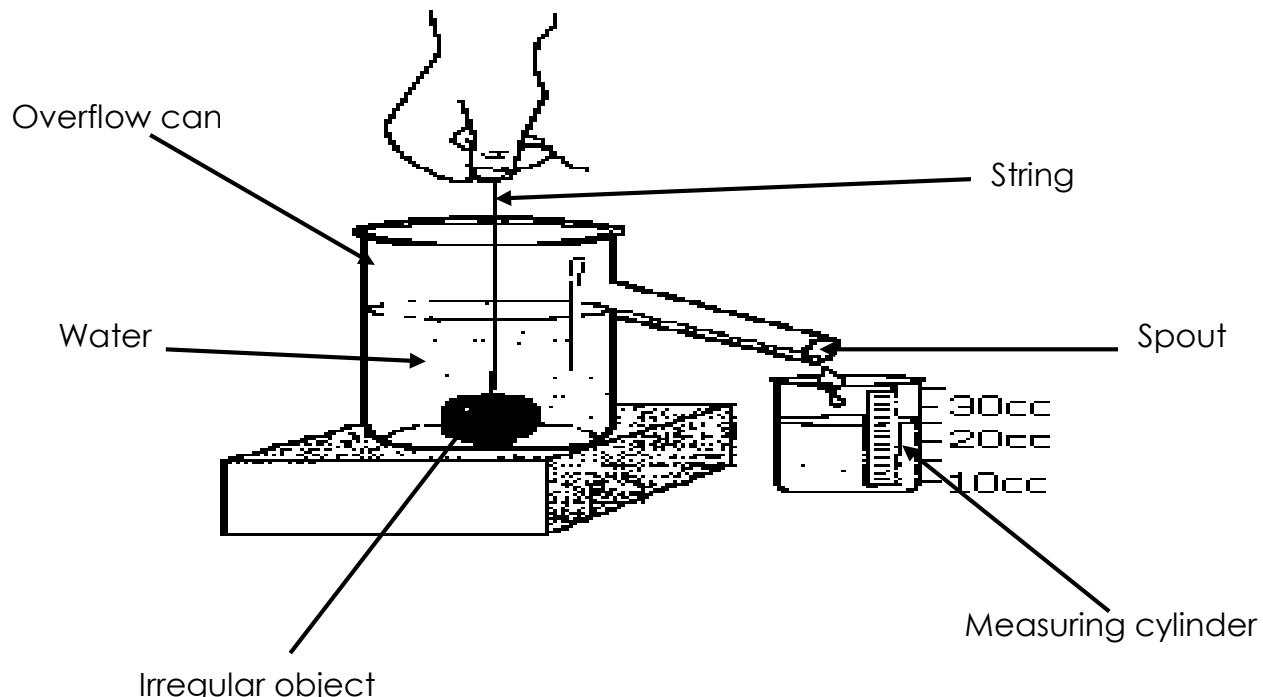
Fill the can with water so that the water pours out through the spout.
(i.e. until it over flows).

When no more water pours out, then the water is up to the level of the
hole / spout.

Step II

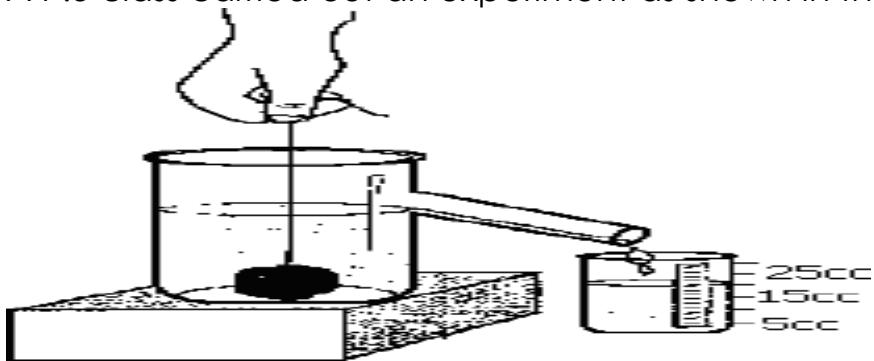
- Lower the object whose volume you want to measure gently into the can.
- The water will overflow and pour into the measuring cylinder.

Note: When an object is lowered in water, it displaces an amount of water equal to its volume.



Example

A P.5 class carried out an experiment as shown in the diagram.

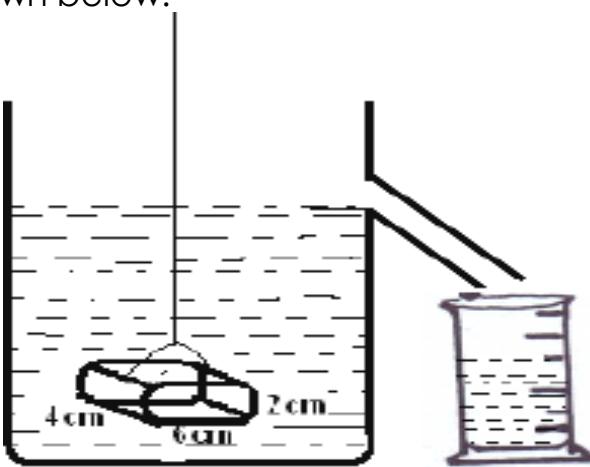


What was the volume of the stone?

$$\text{Volume} = \underline{\underline{20\text{cc}}}$$

Exercise

1. What are irregular objects?
2. Identify two examples of irregular objects.
3. Name the method used to find the volume of irregular objects.
4. Mention one item used when finding volume of irregular objects.
5. Why can't displacement method be used to find volume of a leaf?
6. Find the volume of water that will be displaced by the block as shown below.



7. What is the volume of the regular object immersed in water equal to?
8. Why should the object whose volume is being found be lowered gently into the measuring cylinder or overflow can?

Mass

- Mass is the amount of matter in an object.
- ✓ The basic unit of measuring mass is **kilograms (kg)**.

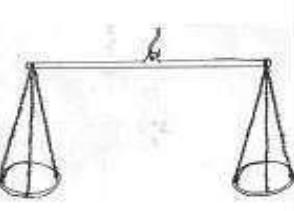
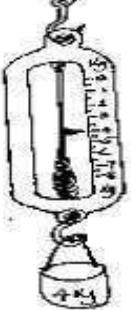
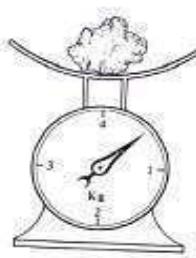
Tools used to measure mass

1. Scale balance
2. Set of scales
3. Beam balance
4. Lever balance

Weight

- Weight is the gravitational force acting on an object.
- ✓ Weight is measured in Newton (N).
- ✓ **Gravity** is the pull of the earth on objects towards its centre.
- ✓ **Force** is a push or pull, which makes objects stop or move.
- Force makes moving things move fast, slow down, stop or change direction.

Machines used to measure weight

A beam balance	A spring balance	scale balance
		

Factors that determine the weight of an object

- Size
- Material
- Gravity

DIFFERENCES BETWEEN WEIGHT AND MASS

Mass	Weight
Measured in kilogram	Measured in Newton (N)
Mass does not change	Weight changes
Mass is the amount of matter in a body.	Weight is the gravitational force acting on an object.

Density

Density is the mass of an object per unit volume.

Density is measured in g/cc.

Density is mass over volume. (Density = mass/volume)

FINDING MASS, VOLUME AND DENSITY OF OBJECTS

MASS

$$\text{Mass} = \text{Density} \times \text{Volume}$$

Examples

- Find the mass of an object whose volume is 5cc and density of 10g/cc.

$$\text{Volume} = 5\text{cc}$$

$$\text{Density} = 10\text{g/cc}$$

$$\text{Mass} = ? \text{ g}$$

$$\text{Mass} = \text{Density} \times \text{Volume}$$

$$\text{Mass} = 10 \times 5$$

$$\text{Mass} = 50\text{g}$$

- Find the mass of an object whose volume is 5cc and density of 3g/cc.

$$\text{Volume} = 5\text{cc}$$

$$\text{Density} = 3\text{g/cc}$$

$$\text{Mass} = \text{Density} \times \text{Volume}$$

$$\text{Mass} = 3 \times 5$$

$$\text{Mass} = 15\text{g}$$

DENSITY

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

Examples

- What is the density of an object whose mass is 14g and volume 7cc

$$\text{Mass} = 14\text{g}$$

$$\text{Volume} = 7\text{cc}$$

$$\text{Density} = ?\text{g/cc}$$

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$D = \frac{14}{7} 1$$
$$\underline{\mathbf{D = 2g/cc}} \quad$$

2. Find the density of an object whose mass is 20g and volume 5cc.

Mass = 20g

Volume = 5cc.

Density =? g/cc

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

$$\text{Density} = \frac{20}{5} 4$$

$$\underline{\mathbf{Density = 4g/cc}}$$

Activity

1. State the basic unit for measuring mass.
2. Name the force that makes the earth to pull objects towards its centre.
3. Suggest one machine used to measure weight.
4. Identify one difference between weight and mass.
5. What term refers to the mass per unit volume?

6. What is the density of an object whose mass is 20g and volume 5cc?

7. Find the mass of an object whose density is 10g/cc and volume 6cc.

FLOATING AND SINKING

FLOATING

Floating is when an object stays on top when put on a liquid.

Objects float because they are less dense than water/liquids in which they are put.

Note:

When an object floats on water, it displaces the amount of water equal to its weight.

Floating objects

These are objects that stay on top when placed in a liquid.

Examples of floating objects

- wood
- leaf
- paper
- polythene
- plastic
- cork
- rubber
- boats
- ships etc.

Sinking:

Sinking is when an object goes down to the bottom of the container of the liquid it is put in.

Sinking objects

These are objects that go down to the bottom of the container when placed on water or a liquid.

Objects sink because they are denser than water/liquid in which they are put.

Examples of sinking objects

- A nail
- A stone
- A coin
- Knife
- A key
- A button
- A padlock
- A pin
- sand
- glass
- bricks

1. When objects are dropped in water, there is always a force, which tends to push them upwards.
2. This force is called **up thrust or buoyancy force**.
3. Up thrust is the upward force in water which tends to push objects upwards.
4. Up thrust force makes objects weigh less in water than in air.

ACTIVITY

1. Give the meaning of the term volume.
2. Find the volume of a stone whose density is 5g/cc and its mass is 25g.
3. Why does a feather float on water?
4. Identify the force that keeps objects floating on water.
5. Mention one example of a floating object apart from feathers.
6. What are sinking objects?

7. State one example of a sinking object.
8. Why do some objects sink in water?

Artificial immunity:

This is the type of immunity got by immunizing people with vaccines.

Artificial immunity is got through immunization or vaccination.

VACCINES

Vaccines are medical substances which are introduced into the body to make it resistant to some diseases.

Vaccines take the form of dead or weakened bacteria or viruses that can still act as antigens.

ANTIBODIES

These are chemical substances produced by white blood cells to defend the body against diseases .

TYPES OF VACCINES

There are three types of vaccines

1. Toxoid vaccines
2. Attenuated vaccines
3. Killed vaccines

Toxoid vaccines

These are vaccines prepared from toxins produced by bacteria in the body.

Toxins are chemical substances produced by bacteria. They are made harmless and injected into the body.

Examples of toxoid vaccines

- Tetanus Toxoid vaccine
- DPT vaccine

Killed / Dead vaccines

These are vaccines made from killed bacteria or virus.

They are made harmless before being injected into a person

Examples of killed vaccines

- Cholera vaccine
- Salk polio vaccine.

Attenuated vaccines

These are vaccines which are made from weakened germs of a particular disease. The germs are made harmless so that they don't cause the disease but stimulate the body to produce antibodies against such a disease.

- BCG vaccine
- measles vaccine
- sabin polio vaccine
- yellow fever vaccine

Importance of immunity to our body

Protects us from being attacked by diseases.

IMMUNIZATION

Immunization is the introduction of vaccines into the body to make it resistant to some diseases.

It can also be called **vaccination** or **inoculation**.

Methods of immunization /vaccination

Oral method – Taking the vaccine through the mouth

Injection method – Taking the vaccine through the skin

Importance of immunization

- Immunization protects people against immunisable diseases
- It reduces infant mortality rates.
- It boosts the child's immunity.
- It reduces lameness among children.

Exercise

1. What is the difference between immunization and vaccination?
2. Mention two main types of immunity.
3. Identify two ways of acquiring natural immunity.
4. How does one acquire artificial immunity?

Spellings

Tuberculosis

Polio

Diphtheria

Administered

Tetanus

measles

THE CHILDHOOD IMMUNIZATION DISEASES

The childhood killer diseases attack children below the age of six years.

These are:

- Polio
- Diphtheria
- Whooping cough (Pertussis)
- Hepatitis B
- Haemophilus influenza type B
- Tetanus
- Tuberculosis
- Measles

DISEASES, CAUSE, SIGNS, SYMPTOMS, PREVENTION AND TREATMENT

a) Tuberculosis

It is caused by bacteria called mycobacterium tuberculosis.

It usually attacks the lungs and bones

How it is spread

Through air

Through drinking unboiled milk from an infected cow.

Through sharing cups and cutlery with an infected person.

Signs of tuberculosis (what is seen with our eyes)

- A lot of sweating especially at night
- Loss of weight
- Chronic cough
- Loss of skin colour
- Thick sputum

Note; Sputum is a thick liquid from the throat or lungs especially when it's coughed out because of a disease.

Symptoms of tuberculosis

- Mild fever
- Loss of appetite

- General body weakness
- Chest pain

Treatment

Use antibiotics

Prevention of tuberculosis

- Immunize with BCG vaccine.
- Avoid sharing cutlery, cups and plates with an infected person.
- Treating sick people in isolation.
- Drinking properly boiled milk

Measles

It is caused by virus.

Measles is spread by contact with the nose or throat secretions of infected people and in air borne droplets.

Signs of measles

- | | |
|---------------------|-------------|
| - Sore in the mouth | - Dry cough |
| - Runny nose | - Red eyes |
| - Skin rash | |

Symptoms of measles

- High temperature (fever)
- Itching skins
- Body weakness
- Loss of appetite

Prevention of measles

- Isolation of infected persons.
- Immunize with measles vaccine at 9 months.

Treatment

There is no proper treatment but we can control the symptoms

Whooping cough (pertussis)

It's a respiratory disease caused by bacteria.

It is spread through air or by droplet infection (coughing and sneezing)

Signs of whooping cough or pertussis

- Running nose
- Severe coughing with spells that end with whoops
- Watery discharge from eyes, sneezing.
- Quick deep breath /difficulty in breathing
- Mild fever

Symptoms of whooping cough or pertussis

Fever - A cold

Treatment

Treat with antibiotics

Diphtheria

It is caused by bacteria.

It attacks the respiratory system especially the lungs.

Signs of diphtheria

Swollen neck

- Sore throat

Prevention of diphtheria

- Immunize with D P T vaccine
- Isolation of infected persons.

Treatment of diphtheria

Use antibiotics

Tetanus

Caused by bacteria called Clostridium tetani.

It can spread through fresh wounds and cuts.

It can also be spread to a baby during birth when unsterilized instrument is used to cut the umbilical cord.

Signs of tetanus

- Stiff muscles all over the body.
- Spasm when touched (sudden contraction of muscles)
- Baby stops suckling
- Difficulty in swallowing.

Symptoms of tetanus

Fever

Prevention of tetanus

Immunize with DPT vaccine

Immunize with TT vaccine for females between 15 – 49 years

Poliomyelitis (polio)

It is caused by a virus.

It's spread through drinking or eating contaminated water and food

Signs of polio

- ▶ Paralysis in the limbs (legs / hands)

Symptoms of polio

- ▶ High fever
- ▶ Weakness of the body

Prevention of polio

- ▶ Drinking boiled water
- ▶ Proper disposal of faeces
- ▶ Immunize with polio vaccine

Hepatitis B

It is caused by a virus.

It usually attacks the liver.

How hepatitis B spreads

- Through body fluids of an infected person e.g. blood.
- Through unprotected sex with an infected person.
- From an infected mother to the unborn baby.
- It can also spread through contaminated syringes.

Signs of hepatitis B

- Eyes and skin turn yellow (jaundice).
- Dark urine.
- Vomiting.
- Pale faeces (clay coloured faeces)

Symptoms of hepatitis B

- Tiredness (fatigue)
- Loss of appetite
- Abdominal pain
- Fever
- Joint pain

Prevention of hepatitis B

- ✓ Immunization with Hep B vaccine.
- ✓ Avoid sharing syringes.
- ✓ Having protected sex.
- ✓ Avoid sharing sharp skin piercing objects.

- ✓ Sterilizing medical equipment before use.
- ✓ Screening blood before transfusion.

Haemophilus Influenza type B

It is caused by bacteria.

How it is spread

Through air.

Signs of haemophilus influenza type B

- Stiff neck.
- Swelling in the coverings of the brain and spinal cord.
- Fever
- vomiting

Prevention of haemophilus influenza type B

Immunization with Hib vaccine.

Activity

1. Identify the vaccines given to a baby at birth.
2. Name any two signs of measles.
3. How is polio spread?

	AGE	VACCINE	DISEASE	METHOD OF IMMUNIZATION
a	At birth	BCG &	Tuberculosis	Injection on the right upper arm
		Polio vaccine	Polio	Drops in the mouth
b	6 weeks	DPT vaccine	Diphtheria Pertussis Tetanus	Injection on the left upper thigh
		Hep B+Hib	Hepatitis B Haemophilus influenza type B	
		Polio vaccine	Polio	Drops in the mouth

c	10 weeks	DPT vaccine	Diphtheria Pertussis Tetanus	Injection on the left upper thigh
		Hep B+Hib	Hepatitis B Haemophilus influenza type B	
		polio	Polio	
d	14 weeks	DPT vaccine	Diphtheria Pertussis Tetanus	Injection on the left upper thigh
		Hep B+Hib	Hepatitis B Haemophilus influenza type B	
		Polio	Polio	
e	9 months (36 weeks)	Measles vaccine	Measles	Injection on the left upper arm.

Summary of the immunizable diseases, schedules and

Vaccine	Prevents	Time it is given
BCG	tuberculosis	At birth
polio	polio	At birth
DPT	Diphtheria, Pertussis (Whooping cough) & Tetanus	6 weeks, 10 weeks, 14 weeks
measles	measles	At 9 months
TT vaccine	Tetanus	
HepB + Hib	Hepatitis b Haemophilus Influenza type b	6 weeks, 10 weeks, 14 weeks

Other Immunisable diseases

- Cholera – bacteria

2. Typhoid – bacteria
3. Rabies – virus
4. Yellow fever – virus
5. Rubella (German measles) – virus
6. Meningitis – bacteria or virus

CHOLERA

Caused by bacteria called vibrio cholera.

How it spreads

- Through drinking contaminated water
- Through eating contaminated food

Signs of cholera

- severe diarrhea
- severe vomiting
- dehydration
- rapid heart rate

Treatment of cholera

- Give ORS
- Give fluids like juice, waters and milk.
- Take the patient to the health centre.
- Treat with antibiotics.

Prevention

- ✓ Drinking boiled water.
- ✓ Wash hands before handling food.
- ✓ Wash fruits and vegetables before eating.
- ✓ Ensure proper disposal of refuse.
- ✓ Ensure proper use of latrines.
- ✓ Cover all cooked food and leftovers.
- ✓ Prepare food in a clean place and eat it from a clean container.

- ✓ Observe general cleanliness of both body and environment.

Rabies

It is caused by a virus.

It is spread through bites of an infected or rabid dog, cats, bats and foxes.

Signs and symptoms of rabies

- Headache
- High fever
- Producing lots of saliva or froth in the mouth.
- Muscle pain and spasm.
- Paralysis and inability to move.

Yellow fever

It is caused by a virus.

It is spread by tiger or aedes mosquito.

Signs of yellow fever

- Yellowing of the eyes and the skin (jaundice)
- Bleeding from the nose, mouth and eyes.
- Liver failure
- Kidney failure

Symptoms of yellow fever

- Fever
- Headache and backache
- Nausea
- Muscle aches

Prevention of yellow fever

- Immunization using yellow fever vaccine.
- Sleeping under treated mosquito nets.
- Controlling mosquitoes in the area.

Pneumonia

- It is caused by bacteria or virus.
- It is spread through air (droplets from an infected person)
- It attacks the lungs.

Signs and symptoms of pneumonia

- Fever
- Chills and shaking
- Chest pain when breathing
- Shortness of breath (difficulty in breathing)
- Coughing
- Blood stained sputum

Prevention/ control of pneumonia

- ✓ Immunization using pneumococcal vaccine.
- ✓ Avoid dusty places.
- ✓ Living in well ventilated clean house.

IMMUNIZATION SITES

Activity

- 1. Name the two types of immunity**
- 2. How does a baby acquire natural immunity**
- 3. Name the types of vaccines**
- 4. How is polio vaccine administered to a baby?**
- 5. On which site is BCG vaccine applied?**
- 6. Why is DPT vaccine known as a triple vaccine**

IMMUNIZATION CARD (CHC) CHILD HEALTH CARD

This is a card that shows information about the health of a child.

It contains information about the growth and immunization records of a child.

Information found on the child Health Card

1. Date of birth (D.O.B)
2. Date of next visit for immunization
3. Vaccine received and date
4. Birth weight of the child
5. Child's name
6. Parent's name,
7. Place of residence,
8. Parent's occupation.
9. Birth order
10. Doctor's advice to health growth and nutrition of the child.

Importance of the child health card to the parent

1. Helps to remind the parent of the next date of immunization
2. Helps the parent to monitor the child's growth.

Importance of the child health card to the doctor

Helps both the doctor to know which vaccine was already given and which one is remaining.

Importance of the child health card to a teacher

It helps the teacher to know if a child was fully immunized.

Roles of individual families and communities in immunization

a) Individuals

- Helping to take children or siblings for immunization.
- Informing other family members and neighbors on immunization dates and venue.
- Learning how to immunize so that they can help the health workers.
- Help to accept and convince other people to accept immunization as an important programme.

- Encourage others to take their children for immunization.
- Assisting health workers in arranging the places selected for immunization

b) Family

- Sharing information about immunization.
- Making sure that all children and pregnant women are immunized.
- Bigger children should take younger ones for immunization.

c) Community

- Sensitizing people about immunization.
- Building immunization centres.
- Organizing seminars, workshops, plays and concerts to educate community members about immunization.
- Organizing immunization centres.
- Encouraging members to take their children for immunization.
- Sensitizing community members about the importance of immunization.
- Schools can perform plays and concerts about immunization on open days and speech days.

NOTE: The common immunization centers in our communities include; hospital, clinics, dispensaries, health centers etc.

Bodies involved in immunization

UNEPI – Uganda National Expanded programme on Immunization

WHO – World Health Organization

Roles of UNEPI

Organizing National Immunization Days (NIDs)

Distributing vaccines

Sensitizing people on the importance of immunization.

Exercise

1. Mention any two immunisable diseases that are caused by virus.
2. Identify three immunisable diseases that are caused by bacteria.
3. Name any two of the immunisable diseases that are spread through water droplets

4. Mention the immunisable diseases that is associated with the following sign and symptom; runny nose, rashes all over the body, red eyes, appetite loss and high fever.
5. How is polio vaccine administered to a person?
6. At what age is measles vaccine given to a child?
7. Identify the immunisable disease that affects the skeletal system.
8. Write BCG in full.
9. Why is DPT vaccine referred to as a triple vaccine?

Spellings

Card
Parents
Monitor
Rubella
Growth

Activity

(The resourceful person like school nurse shall be invited to give more information about immunization)

TOPICAL TEST

1. What is immunization?
2. Name any one group of people who carry out immunization in our community.
3. Name the disease that is prevented using BCG vaccine.
4. How does a child gets artificial immunity?
5. What are antibodies?
6. Name any one type of vaccines.
7. Identify any one effect of immunisable diseases
8. Why do parents take their children for immunization?
9. Mention any one method of administering vaccines for immunization.
10. Why is DPT called a triple vaccine?
11. Name the vaccine given to accident victims against tetanus.
12. At what age is measles vaccine administered to children?
13. What scientific name is given drugs used in immunization?
14. What is a child health card?
15. Write NIDS in full.
16. Which living organism is used to make vaccines?
17. Why are pregnant women given TT vaccine?
18. Which immunisable disease affects the skeleton?
19. State any one role of parents during immunization.
20. Why do doctors measure the weight of a child during immunization

Spellings

- Digestion

- Absorption
- Egestion
- Metabolism
- Enzymes
- Nature
- chemical

DIGESTIVE SYSTEM

The digestive system is a body system which deals with the breaking down of food into simple soluble particles.

The digestive system is a group of organs that work together to break down food in the body.

Terms used

- a) **Ingestion** – this is the act of taking food into the alimentary canal through the mouth.
- b) **Digestion** is the breakdown of large food particles into soluble particles that can be absorbed by the body.
- c) **Absorption** – this is the process by which digested food is taken into the blood stream
- d) **Assimilation** – this is the process by which absorbed food is transported to every cell in the body for use.
- e) **Metabolism**. The process by which the body cells make use of the absorbed food e.g. for growth.
- f) **Egestion** - This is the act of removing undigested food through the anus as faeces.

Types of digestion

There are two types of digestion namely;

- a. **Mechanical digestion**
- b. **Chemical digestion**

Mechanical digestion

This is the breakdown of large food particles into smaller particles.

Mechanical digestion is mainly carried out by the teeth.

Chemical digestion

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

ENZYMES

Enzymes are chemical substances that speed up the rate of digestion.

Properties/characteristics of enzymes

- Enzymes are proteins in nature.
- Enzymes can be destroyed by heating.

- Enzymes have the same end product.
- They act on one kind of food substance.
- Enzymes work under specific temperature.

Examples of enzymes

Pepsin, rennin, salivary amylase, trypsin, lipase, etc.

Exercise

1. What is food?
2. Why do we eat food?
3. Mention seven classes of food that make up a balanced diet.
4. What is a balanced diet?
5. What is the main importance of teeth in the mouth during digestion?
6. Identify four types of teeth.
7. How many teeth does an adult person have?
8. Write down two sets of teeth.

Spellings

- | | |
|---|--|
| <ul style="list-style-type: none"> • System • Gullet • Stomach • Tongue | <ul style="list-style-type: none"> • Duodenum • Intestine • Digestive • Absorption |
|---|--|

The alimentary canal/digestive tract/gut

This is a muscular tube that runs from the mouth to the anus.

Major parts of the digestive system include

- | | |
|--|--|
| <ul style="list-style-type: none"> • mouth • gullet • stomach • duodenum | <ul style="list-style-type: none"> • ileum • colon • rectum |
|--|--|

Structure of the digestive system

Digestion in the mouth

Digestion of food begins in the mouth.

In the mouth, there is both mechanical and chemical digestion of food.

The mouth contains the following;

teeth

saliva

tongue

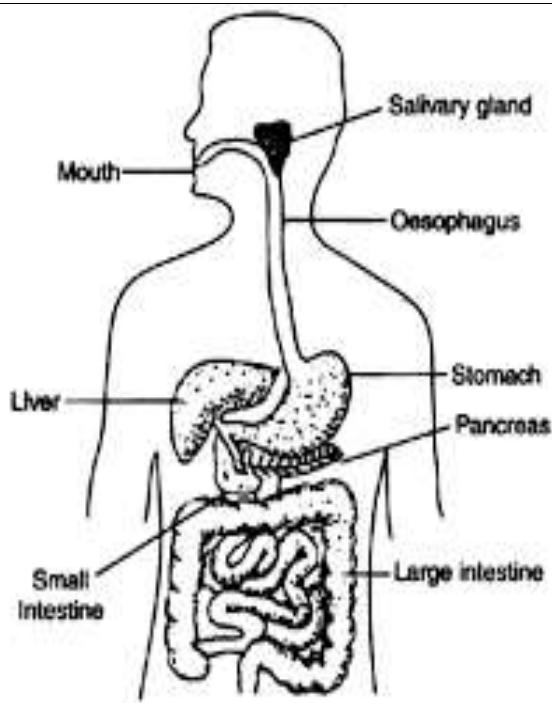
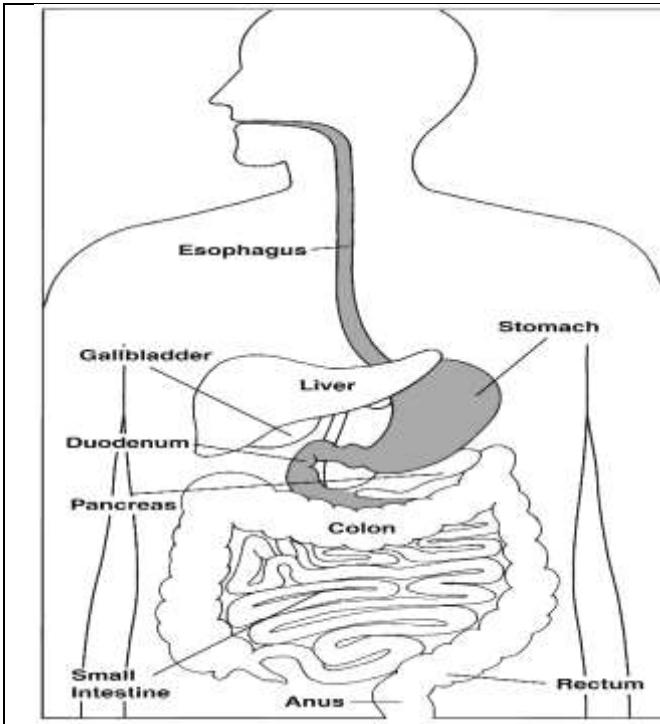
Role of the teeth in digestion

The teeth help to chew food. This is called mechanical digestion.

Chewing food properly increases the surface area for enzymes to act on food and prevents indigestion.

Saliva

Saliva is produced by the salivary glands



Saliva is made up of water, mucus salts and an enzyme called salivary amylase or ptyalin.

Importance of saliva

- It softens food.
- It lubricates the mouth.
- It cools food.
- It contains salivary amylase that breaks down cooked starch (carbohydrates) into maltose.

The tongue

The tongue rolls food into a bolus.

A bolus is a small ball of food made by the tongue for easy swallowing.

NB: During swallowing, the epiglottis closes over the trachea to prevent food from entering the trachea to avoid choking.

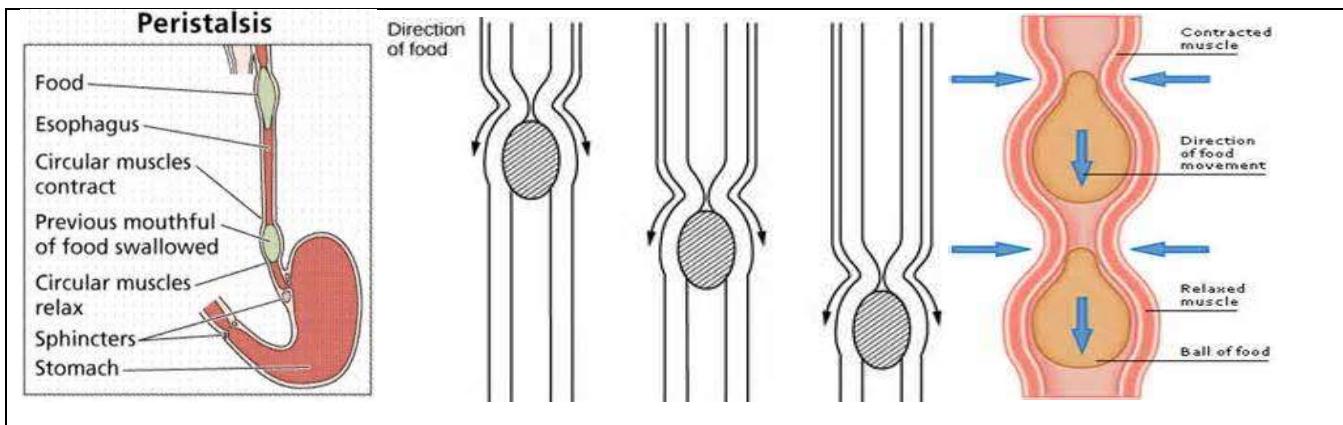
Food in the gullet (Oesophagus)

The gullet passes food from the mouth to the stomach

The food moves in a wave-like contraction called peristalsis.

Peristalsis is the wave-like movement of food along the alimentary canal.

Diagram showing peristalsis in the gullet



Food in the stomach:

The stomach is a muscular sac that stores food temporarily.

The stomach churns food into a semi-liquid called **chyme**.

It is where digestion of proteins begins.

The walls of the stomach produce a digestive juice called **gastric juice**.

Gastric juice contains two enzymes called **pepsin** and **rennin** and an acid called **hydrochloric acid**.

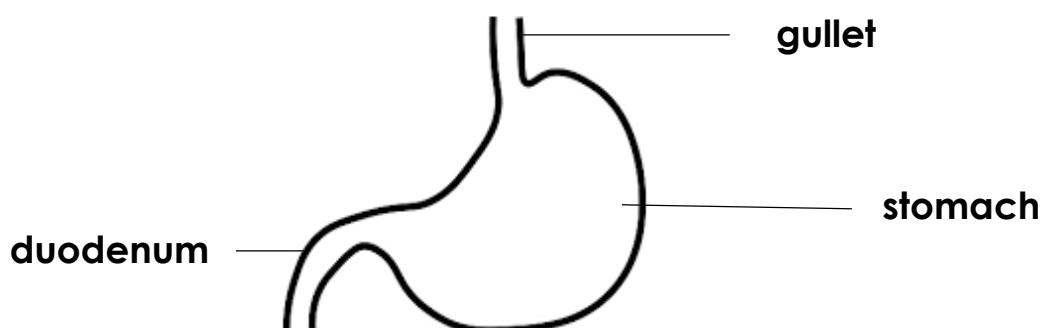
- Pepsin begins the digestion of proteins especially in adults changing it to peptides.
- Rennin clots the protein in milk separating it from fats. It is common in babies.

Importance of hydrochloric acid

- ✓ It kills germs that enter the stomach with food.
- ✓ It activates pepsin and rennin.

NB: Absorption of alcohol and simple sugars take place in the stomach.

A diagram showing the stomach



Small intestine:

The small intestine is divided into two parts that is:

1. Duodenum.
2. Ileum

The duodenum

This is the first part of the small intestines.

The duodenum receives two digestive juice i.e. bile juice from the liver and pancreatic juice from the pancreas.

The liver

The liver produces bile which is stored in the gall bladder and released to the duodenum through the bile duct.

Bile contains bile salts

Importance of bile

- ✓ It emulsifies fats (break fats into tiny droplets for easy digestion).
- ✓ It deactivates the acid in chyme.

The pancreas

It produces pancreatic juice which is released into the duodenum through the pancreatic duct.

Pancreatic juice has three enzymes;

- amylase
- lipase
- trypsin.

Trypsin acts on peptides and changes it into amino acids.

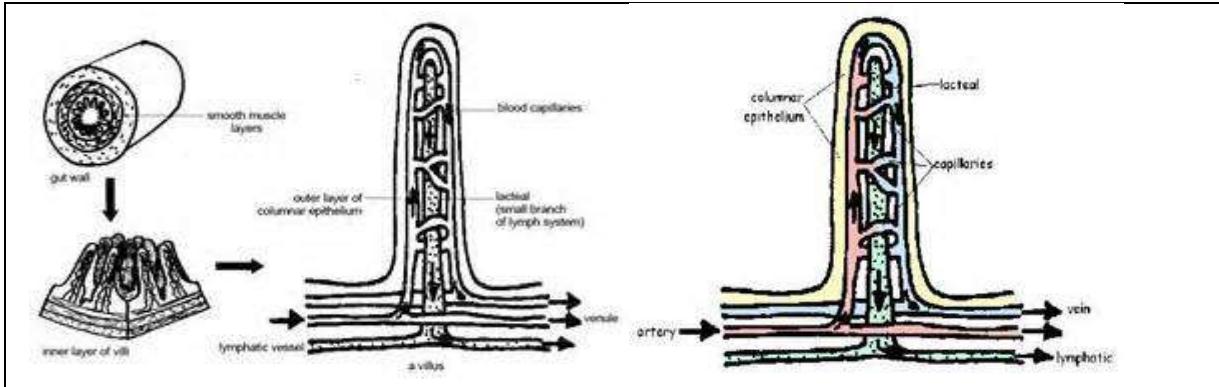
Lipase acts on emulsified fats and changes them to fatty acids and glycerol.

Amylase works on uncooked starch and changes them into maltose.

The ileum

- This is the second part of the small intestines.
- It is where digestion ends and absorption of food takes place.
- The walls of the ileum produce an intestinal juice called **succus entericus**. It has four enzymes.
 - o **Maltase** which acts on maltose to glucose
 - o **Lactase** which acts on lactose to glucose
 - o **Erepsin** which breaks down peptides to amino acids
 - o **Sucrase** which acts on sucrose to glucose.

A diagram showing the villus



Adaptations of the ileum

- It is fairly long to increase surface area for food absorption.
- It has villi that absorb food.

Adaptations of the villi to food absorption

- They are many to increase surface area for food absorption.
- They have thin and moist walls for easy diffusion of food.
- They have many blood capillaries that carry the absorbed food.

NB: Digested food from the ileum is transported to the liver by a blood vessel called **hepatic portal vein**.

NB:

1. The end product of carbohydrates or starch is **glucose**
2. The end product of fats is **fatty acids and glycerol**
3. The end product of proteins is **amino acids**
4. **Vitamins and mineral salts are absorbed directly into the body without being digested. This is because they are already soluble.**

Large intestine:

The large intestine is divided into two parts:

- The colon
- The rectum

The colon is where absorption of water takes place.

The rectum is where faeces are temporarily stored before being expelled out.

Anus:

The anus is the opening where undigested food residues (faeces) are passed out of the body.

A summary of the digestive processes

part	gland	Digestive juice	enzymes	Changes in food

mouth	Salivary glands	saliva	Salivary amylase or ptyalin	Starch to maltose
stomach	Gastric glands	Gastric juice	pepsin	Proteins to peptides
			Rennin	Clots proteins in milk
duodenum	liver	bile	No enzymes	Emulsifies fats Neutralizes acid in chyme
	pancreas	Pancreatic juice	amylase	Starch to maltose
			trypsin	Proteins to peptides
			lipase	Fats to fatty acids and glycerol
ileum	Walls of the ileum	Succus entericus	maltase	Maltose to glucose
			lactase	Lactose to glucose
			sucrase	Sucrose to glucose
			peptidase	Peptides to amino acids
colon	-	-	-	Absorption of water

Exercise

1. Give a reason why water, mineral salts and simple sugars are not digested.

Diseases of the digestive system

- Cholera
- Ulcers
- Typhoid
- Appendicitis
- Diarrhoea

Disorders of the digestive system

- Indigestion – This is the pain felt due eating too much food or when food is not well chewed.
- Constipation- in ability to pass out faeces. Can be controlled by eating roughages.

- Diarrhoea
- Vomiting
- heart burn

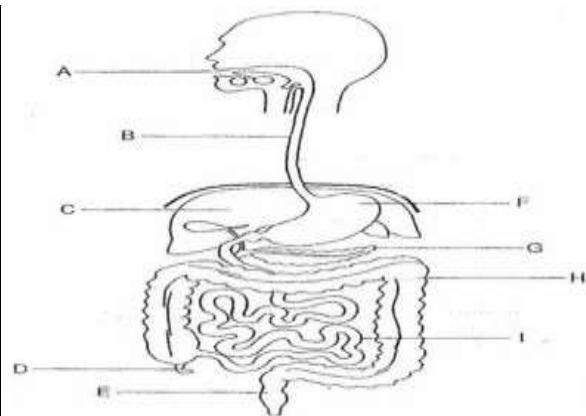
How to maintain proper working of the digestive system

- ✓ Eat properly cooked and clean food.
- ✓ Wash fruits and vegetables well before eating them raw.
- ✓ Wash hands before eating food.
- ✓ Always chew food properly before swallowing.

Do not eat food that contains stones.

Exercise

1. Name any two diseases that affect the human digestive system.
2. State two disorders of the digestive system
3. How can we prevent constipation?
4. Mention any two classes of food which are not digested
5. State the reason to support your answer above
6. Identify the parts in the digestive system where proteins are first digested?
7. Why does digestion of food end in the ileum?
8. Give the major reason why digestion of food does not take place in the colon?



TERM TWO

THEME: THE ENVIRONMENT

TOPIC: SOIL

It is a top layer that covers the earth's surface.

Soil is the top layer that covers the earth's surface.

Common terms used in soil

a) Soil structure

It is the arrangement of soil particles

b) Soil texture

This is the roughness or smoothness of soil particles.

It also refers to the different sizes of soil particles.

c) Soil profile:

This is the vertical arrangement of soil layers.

It also refers to the arrangement of soil layers from top to bottom.

d) Soil drainage:

This is the downward movement of water through the soil particles.

e) Soil capillarity:

This is the upward movement of water in the soil.

f) Soil sampling

This is the taking of soil samples from different parts of the garden to the laboratory for an analysis.

g) Land reclamation:

This refers to bringing back waste land into use.

Formation of soil**There are two methods of soil formation;**

- ▶ Weathering of rocks
- ▶ Decomposition of organic matter

Weathering of rocks

This is the breakdown of rocks to form soil.

Factors that lead to weathering of rocks

(To be researched)

Decomposition

This is the rotting of dead organic matter to form humus.

Organic matter includes plant and animal matter.

Decomposition is mainly carried out by bacteria and fungi.

Components of soil

These are things that make up soil.

They include;

- Air
- Water
- Humus
- Mineral salts
- Living organisms
- Rock particles (inorganic matter)

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

Dry lump of soil

Water

Clear container or glass

Procedure/steps

- 1. Pour water in a clear container.**
- 2. Drop the lump of soil in the water and observe.**

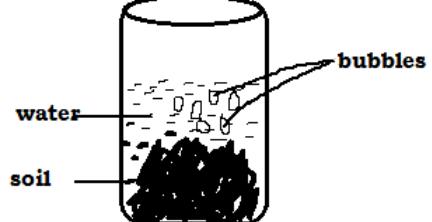
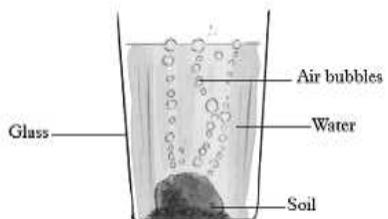
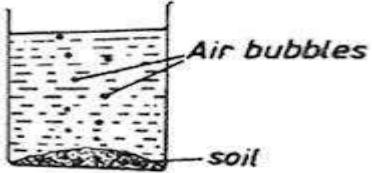


Fig. 2.12: Finding out presence of air in soil

Observation:

Bubbles are seen coming out from the dry soil.
This confirms that there is air in soil.

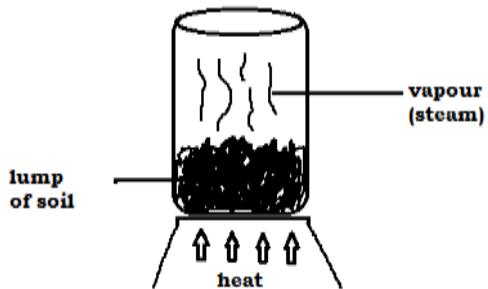
Importance of air in the soil

- It is used by the soil organisms for respiration.
- Air is used for seed germination.

Experiment to show that soil contains moisture / water

Collect soil in a container

Heat the soil while it is covered.



Observation

Water droplets are formed on the lid or cover.

This proves that soil contains water.

MPS Science Lesson Notes

Importance of water in the soil

- Water softens the soil for easy ploughing or digging.
- Water helps in seed germination.
- Water from the soil is used by plants for photosynthesis.
- Water dissolves mineral salts in the soil for easy absorption by plants.
- Water cools the plants through transpiration.

Ways through which water is lost from the soil

- ✓ Through evaporation.
- ✓ Through transpiration.

Humus

Humus is a component of soil formed from anything that once lived.

Humus is formed by decomposition of organic matter.

Decomposition or rotting is caused by bacteria and fungi.

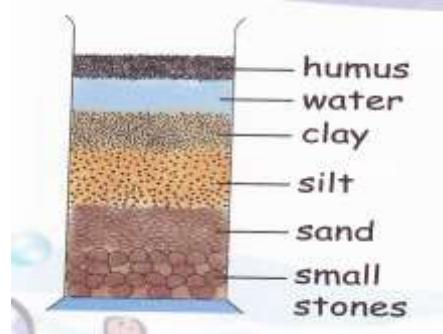
Examples of organic matter

Plant materials e.g. leaves, fruits, roots, stems, etc.

Animal materials e.g. cow dung, droppings and dead animals

Experiment to show that soil contains humus

1. Collect soil samples and put them half way in a clear container e.g. a bottle.
2. Add water in the soil sample and shake vigorously.
3. Allow the mixture to settle as shown below.



Observation

Different layers are formed as seen above.

The floating matter on top is humus.

Conclusion

This proves that soil contains humus.

Importance of humus

- ✓ It provides nutrients to plants.
- ✓ It improves on the soil texture.
- ✓ It improves on the water holding capacity of the soil.

Rock particles

Rock particles are formed through weathering of rocks.

Importance of rock particles

They contain mineral salts needed for proper plant growth.

Rock particles provide space for circulation of air in the soil (aeration)

Living organisms

Examples of living organisms in soil

- Bacteria
- Earthworms
- Millipedes
- Fungi
- Moles
- Nematodes
- Ants
- Termites
- Rats
- squirrels

Importance of living organisms in the soil

- ✓ Some living organisms like earthworms help in soil aeration. This is done by creating tunnels that allow entry of air in the soil.
- ✓ Some living organisms cause rotting of organic matter to form humus.
- ✓ Some bacteria help to fix nitrogen in the soil.

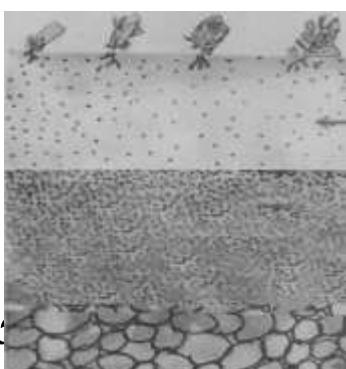
Soil profile

Soil profile is the vertical arrangement of soil layers.

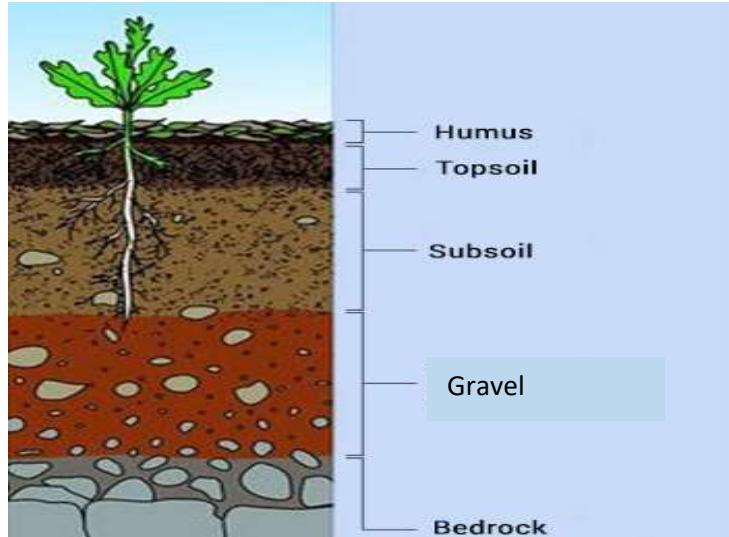
OR: soil profile is the arrangement of soil layers from top to bottom.

Layers of the soil profile

- ▶ Top soil
- ▶ Subsoil
- ▶ Gravel
- ▶ Parent rock/bed rock



Notes



Importance of some layers

Top soil:

- ✓ It has most of the plant nutrients that support plant growth.

Gravel:

- ✓ It is used for construction of murram roads.

Parent rocks:

- ✓ They help in formation of other soil layers through weathering.
- ✓ They contain minerals.

Note: Top soil is usually dark in colour because it contains a lot of humus.

Areas where soil profile can be seen

- In a trench.
- In a pit latrine
- When constructing a road in a hilly area

Types of soil.

- Loam soil
- Clay soil
- Sand soil

Loam soil

It has uniform mixture of sand, clay and humus.

Characteristics of loam soil

- It has a lot of humus
- It is dark in colour
- It is well aerated
- It has moderate capillarity
- It has moderately packed particles.
- It has moderate water retention capacity.

- It has moderate drainage.

Why is loam soil considered to be the best soil for growing crops?

- It has a lot of humus
- It is well aerated
- It is well drained

Importance of loam soil

- Loam soil is used for growing crops
- Loam soil is used for making bricks

Clay soil

Characteristics of clay soil

- It has smooth fine particles.
- It is sticky when wet.
- It is hard when dry.
- It has small and closely packed particles.
- It has the highest rate of capillarity.
- It has high water retention.
- It has the poor drainage.
- It is difficult to plough.

Uses of clay soil

- It is used for pottery
- It is used for making bricks
- It is used for making tiles
- It is used in making cups, plates and kettles.
- It is used to make charcoal stoves.
- It is used to make flower vases.

Note:

Clay soil is not good for crop growing because of the following reasons;

- ▶ It retains a lot of water which makes plant roots to rot
- ▶ It is heavy and difficult to plough.
- ▶ It has less humus.

Sand soil

Characteristics of sand soil

- It has large particles
- It is rough.
- It has the highest drainage.
- It has large air spaces.
- It has the lowest rate of capillarity.
- It has less humus.
- It has poor water retention capacity.

Uses of sand soil

- It is used in building houses.
- It is used for making glasses.
- It is used in making concrete blocks.
- It is used in making sand paper.
- It is used to put out fire.
- It is locally used to scrub utensils e.g. sauce pans.

Note: Sand soil is not good for crop growing because;

- ▶ It has less humus.
- ▶ It has poor water retention.

Uses of soil to plants

- Soil provides nutrients to plants.
- Soil holds plant roots firmly in the ground.

Uses of soil to animals

Soil is a habitat to some animals.

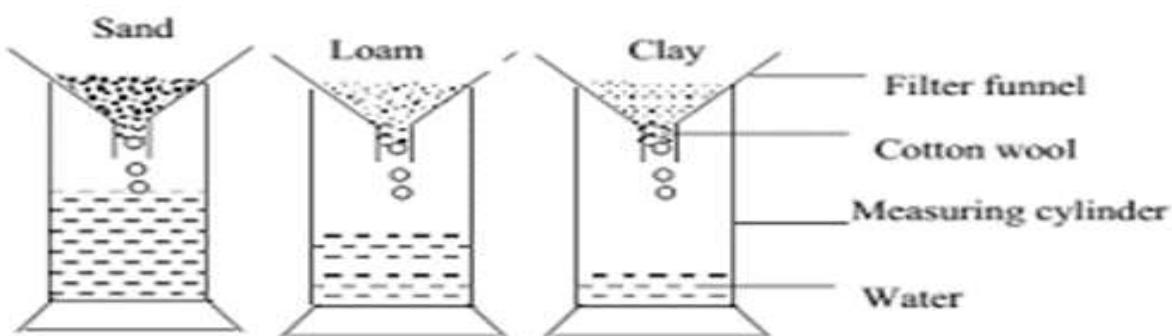
Some living organisms get food from soil

Soil drainage

Soil drainage is the downward movement of water through the soil particles

It can also be defined as the ability of the soil to allow water to pass through it.

Comparing drainage in the different types of soil (An experiment)



Observation

- The highest amount of water was collected in the measuring cylinder containing sand, followed by loam while the least amount of water was collected in the container having clay.
- Sand soil is more permeable than any other type of soil.

Conclusion:

- ✓ Sand soil has the highest drainage.

- ✓ Loam soil has moderate drainage.
- ✓ Clay soil has the lowest drainage.

Note:

- Water drains quickly through sand soil because it has large air spaces.
- Water drains slowly through clay soil because it has small air spaces and closely packed particles.

Soil capillarity

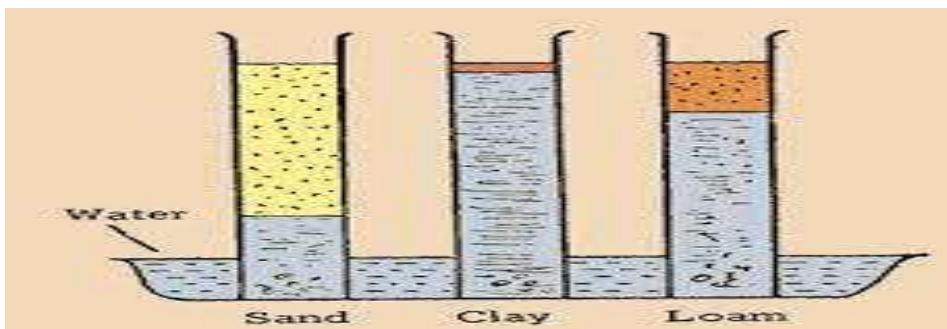
This is the upward movement of water through the soil particles.

This is the tendency of water to rise through small narrow spaces.

Comparing capillarity in the different types of soil (An experiment)

Requirement

- Sand
- Clay
- Loam
- Glass tubes (open at both ends)
- Beaker wool to plug one end of each glass



Estimated time

10 minutes to set up the apparatus

1-2 days to carry out the observation

Procedure

1. Plug one end of the tubes using glass wool.
2. Pack 3 long glass tubes tightly with dry sand, clay and loam each.
3. Fill the beaker with water.
4. Immerse the tubes vertically in the beaker with plugged ends toward the base.

Observation

At first, water rises fastest in sand followed by loam and clay.

However, after a day or two, water fails to rise any more in a tube with sand but rises fastest in clay followed by loam until it reaches the top of the tubes.

Conclusion

- Clay has the highest capillarity
- Loam has moderate drainage.
- Sand has the lowest capillarity.

Note:

Clay soil allows water to rise through it more quickly because its particles are closely packed.

Importance of soil capillarity

It enables plants to obtain water from the deeper layers of soil.

Soil erosion

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

Agents of soil erosion

Agents of erosion are forces that carry away top soil.

They include;

- Strong wind
- Fast flowing water
- Moving animals

Causes of soil erosion

These are activities that enables top soil to be taken away.

Examples

- deforestation
- overgrazing
- bush burning
- over cultivation
- monocropping
- over stocking

a) Deforestation:

This is the massive cutting of trees in an area.

It leaves the soil bare and exposed to erosion agents.

Overgrazing:

This means grazing too many animals in a small grazing area.

It leaves the soil bare and exposed to erosion agents.

Overstocking:

This is the keeping of too many animals in a small space.

It leaves the soil bare and exposed to erosion agents.

Monocropping:

This is the growing of one type of crop on the same piece of land season after season.

The crops use up the nutrients in the soil leading to poor vegetation cover of the soil. This exposes the soil to erosion agents.

Over cultivation:

This refers to the use of farm land without allowing it to rest.

The crops use up the nutrients in the soil leading to poor vegetation cover of the soil. This exposes the soil to erosion agents.

Bush burning:

When the vegetation covering the soil is burnt, the soil remains bare and exposed to the agents of soil erosion.

Types of soil erosion

1. Sheet erosion:

This is the type of erosion in which a thin layer of top soil is uniformly removed by either wind or flowing water.

It occurs on a gentle slope or a flat land.

2. Rill erosion:

This is where a narrow shallow channel is created in the soil by flowing water.

It is commonly seen on gentle slopes.

3. Gully erosion:

This is where deep narrow channels called gullies are created by fast flowing water.

Gully erosion develops from uncontrolled rill erosion.

This is due to increased speed and volume of flowing water carrying large amounts of soil passing through the rills forming gullies

4. Splash erosion/rain drop erosion.

This occurs when heavy raindrops hit loose bare soil.

The force of the rain drops displace the loose soil particles.

5. River banks erosion:

This takes place along river banks .The sides of a river are called banks. A lot of top soil from the banks is eroded into the river causing silting which makes the river shallower.

6. Wind erosion:

This takes place when top soil is left bare and dry so that it can be blown away by wind to form dust.

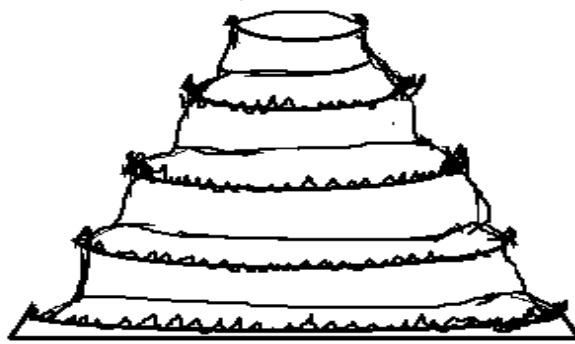
Effects of soil erosion

- It leads to soil exhaustion.
- It affects soil texture.
- It leads to siltation of water bodies.

Ways of controlling soil erosion

- **By terracing.** This is when a slope is cut into steps [terraces].

This helps to reduce the speed of flowing water on hilly or mountainous areas.



- **By strip cropping.**

This is when crops are grown and strips or bands of grass are left between the spaces of the tilled soil.

This helps to reduce the speed of flowing water.

- **By cover cropping:**

This is the planting of crops which cover the soil like beans, cow peas, pumpkins, cabbage, sweet potatoes .It helps to reduce the speed of wind and flowing water.

- **By bush fallowing:**

It gives land time to grow bush and soil regains its fertility.

- **By planting of trees:**

They act as windbreaks.

The roots of trees also hold soil particles together making it difficult for flowing water to carry away soil.

- **By contour ploughing:**

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

- **By intercropping or mixed cropping:**

This is when two or more crops are grown on the same piece of land for example beans and maize, coffee and beans

- **By mulching:**

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

Mulches cover the soil and reduce the speed of wind and flowing water

- By planting short grass in compounds.

- By using pavers in the compounds.

- **By constructing gabions/ridges.** A gabion is a wall made of piled up stones held together by a wire framework or cement. The gabions slow down the movement of water and allow only water to pass through but any soil that has been carried away is held back.

Soil exhaustion

This is the loss of soil fertility.

Causes of soil exhaustion

- Soil erosion
- Leaching
- Monocropping
- Over cultivation

Leaching is the sinking of soil nutrients deeper in the soil where plant roots cannot reach.

It is mainly caused by floods.

How to control soil exhaustion

- ✓ By mulching.
- ✓ By applying fertilizers.
- ✓ By bush fallowing.
- ✓ By controlling soil erosion.

Exercise

1. Define soil erosion.
2. List down three agents of soil erosion.
3. Apart from deforestation, give two other causes of soil erosion.
4. Name any two types of soil erosion.
5. Give two ways of controlling soil erosion in hilly areas.

Soil conservation

Soil conservation is the maintaining of soil fertility.

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

Methods of soil conservation

- Practicing crop rotation
- Mulching
- Controlled grazing

- Cover cropping
- Avoiding bush burning
- Planting trees
- Filling up gullies with soil
- Cover cropping
- Mixed farming
- By practicing bush fallowing
- By applying fertilizers

Importance of soil

a) To people:

- For crop growing.
- For modelling /pottery.
- Sand soil is used to make glass.
- Clay soil is used to
- It is where plants grow.
- A habitat for some living organisms like mice, rats, squirrels ,ants ,termites, earthworms ,moles
- It is used for pottery and modeling

It is used for construction of buildings and roads

Soil is a breeding place for some animals

Soil contains air needed for respiration

Exercise

1. What is soil profile?
2. Draw a well labelled diagram of soil profile?
3. Name three types of soil.
4. Identify the type of soil with rough and large particles.
5. How is the soil named in No. 4 above useful?
6. State two characteristics of each of the following soils.
 a) Sand
 b) Clay
 c) Loam
7. Why is loam soil suitable for plant growth?
8. Give two examples of living organisms that are found in the soil.
9. How are earth worms important to soil?
10. Which type of soil is used for pottery?

1. Define soil erosion.
2. List down three agents of soil erosion.
3. Apart from deforestation, give two other causes of soil erosion.
4. Name any two types of soil erosion.
5. Give two ways of controlling soil erosion in hilly areas.

Mulching

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

The dry plant materials are called mulches.

Examples of mulches

coffee husks, wood shavings, dry leaves, saw dust, maize stalks, etc.



Advantages of mulching

- Mulches control soil erosion
- Mulches keep moisture in the soil.
- Mulching improves soil fertility i.e. mulches decay and form humus.
- Mulches control the growth of weeds.

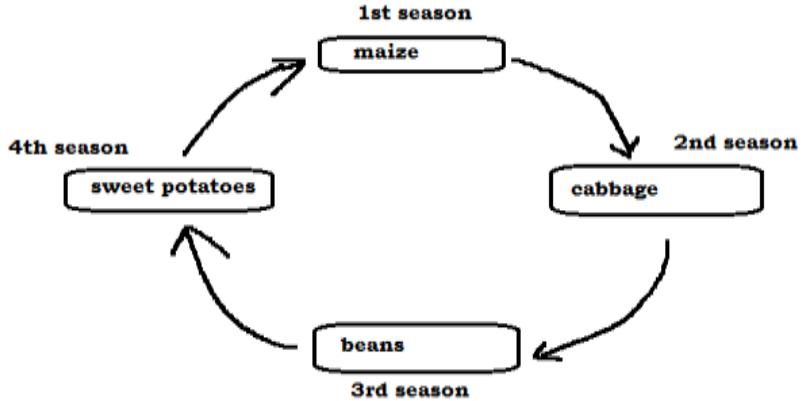
Disadvantages of mulching

- Mulches can be a fire hazard (can easily catch fire)
- Mulches are tiresome to apply.
- Mulches can hide crop pests
- Some mulches can turn into weeds.

Crop rotation

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

Illustration of crop rotation



Legumes must be planted in one of the seasons because they contain root nodules which have nitrogen fixing bacteria. NFB trap nitrogen and fixes it in soil as nitrates.

Beans, peas, soya beans, ground nuts, etc., are examples of leguminous plants.

Factors to consider when carrying out crop rotation

- Crops with deep roots should be alternated with those with shallow roots.
- Legumes should be included in the rotation.
- Crops of the same family should not follow each other e.g. maize, millet, sorghum and rice.
- Bush fallowing should be included in the rotation. Bush fallowing is the resting period of land. This allows the soil to regain its fertility.

Importance of crop rotation

- It improves soil fertility.
- It controls pests and diseases
- It controls soil erosion.
- It improves on crop yields.

Exercise

1. How does crop rotation control pests?
2. How does terracing control soil erosion?
3. State three methods of improving soil fertility.
4. What is the importance of including legumes during crop rotation?
5. State two disadvantages of mulching.

Soil fertility

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

Ways of improving on soil fertility

- Adding fertilizers.
- Practising crop rotation.

- Mulching the garden.
- Carrying out bush fallowing.

Fertilizers

A fertilizer is any substance added to the soil to increase its fertility.

Types of fertilizers

- Natural fertilizers (organic manure)
- Artificial fertilizers (inorganic manure)

Types of organic fertilizers (manures)

1. **Compost manure:** This is made by mixing plant residues and animal wastes. The mixture is put in the pit that is about one metre deep. Water is added to the compost to make decomposition faster/to speed up rotting.

Illustration



2. **Green manure** refers to crops which have been cut and buried under the soil. Leguminous crops are good for green manure.
3. **Farm yard Manure** is prepared basically using cow dung, urine and bird droppings

Advantages of using natural manure

- It is readily available/cheap to get
- It is easy to apply
- It improves on soil texture and structure
- They make soil to hold water
- The nutrients from organic manure last longer in the soil than artificial fertilizers.

Disadvantages of natural manure

- It produces bad smell
- It is tiresome to prepare

- They release the nutrients slowly in soil
- They are bulky i.e. they are not easily stored and transported

Artificial fertilizers

These are fertilizers which are made from factories.

There are two classes of artificial fertilizers. i.e.

- Straight fertilizers
- Compound fertilizers

Straight fertilizers contain one type of mineral salt e.g. SSP (single supper phosphate), nitrate (N), phosphorus (P) and potassium (K)

Compound fertilizers contain more than one mineral salt. E.g. NPK (Nitrogen, Phosphorus and Potassium) fertilizers. Calcium Ammonium Nitrate (CAN), Ammonium sulphate, Ammonium nitrate

Artificial fertilizers are manufactured in factories and are sold ready-made.

NB

Nitrogenous fertilizers contain nitrates.

Phosphorous fertilizers contain phosphates.

Potash fertilizers contain potassium.

Advantages of artificial fertilizers

They can easily dissolve in water in soil, this enables them to be used by plants as soon as they are applied

- They are easy to carry and store
- They have high nutrient content that promote healthy growth of plants

Disadvantages

- They are expensive to buy
- One has to be trained on how to use them
- They stay in the soil for a shorter time
- They are dangerous to living organisms in the soil
- They can pollute water when washed into it.

Harmful materials in soil

They make it lose its fertility.

Examples of harmful substance in the soil:

- used oil
- polythene
- Pesticides
- Scrap metals
- Used plastics

- Glass

NB

- Materials that decompose are called biodegradable materials. E.g. plants and animals.
- Materials that do no decompose are called non-biodegradable materials. E.g. Plastic, polythene, glass.
- Non-biodegradable materials can be recycled.

Effects of harmful materials in the soil

- Oil kills the organisms which stay in the soil.
- Polythene papers don't allow water to penetrate to the soil, so it becomes hard and infertile.
- Chemicals also fall on ground and kill organisms in the soil.
- Throwing old machine parts in the soil. Prevents plant roots from going deep in the soil

Exercise

1. What is the difference between biodegradable materials and non-biodegradable materials?
2. Give two examples of non-biodegradable materials.
3. List down two examples of non-biodegradable materials.
4. Write 5Rs in full as used in waste control.
5. Give two effects of non-biodegradable materials to the soil.
6. Give three examples of organic manure (natural fertilizers)

MATTER AND ENERGY

SPELLINGS

Molecules

Occupies

Exert pressure

Indivisible

Cohesion

Adhesion

Attraction

Definite

indivisible

condensation

MATTER AND ENERGY

Matter is anything that occupies space and has weight.

Matter is anything that has mass and volume.

Matter is made up of molecules.

Molecules are small particles that form matter.

The smallest indivisible particle of matter is called an **atom**.

NB -Molecules are held together by intermolecular forces (cohesion or adhesion forces).

-**Cohesion** is the force of attraction between molecules of the same substance.

E.g. water molecules attracting other water molecules.

-**Adhesion** is the force of attraction between molecules of different substance.

E.g. water molecules getting attracted to the molecules of glass (water droplets sticking on the walls of the glass)

Activity 1:

Get water and pour it on the window glass, droplets will be seen stuck on the glass.

This shows adhesion between the glass and the water molecules.

Activity 2:

Ask learners to give examples of matter around them; in the classroom, in the compound, etc.

Other terms used in matter and energy

a) Energy:

This is the ability to do work.

b) Force:

Force is a push or pull exerted on an object.

c) Cohesion:

This is the force of attraction between molecules of the same substance.

d) Adhesion:

This is the force of attraction between molecules of different substances.

Properties of matter

- Matter occupies space
- Matter has weight.
- Matter exerts pressure.

States of matter

There are three states of matter namely;

- Solid state
- Liquid state
- Gas state

Solids

Properties of solids

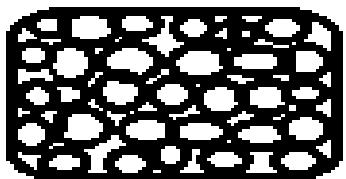
Solids have closely packed molecules.

Solids have high cohesion force.

Solids have definite shapes.

Solids have volume.

Arrangement of molecules in solids



Examples of solid matter

Stone, glass, plastic, wood, metals, etc.

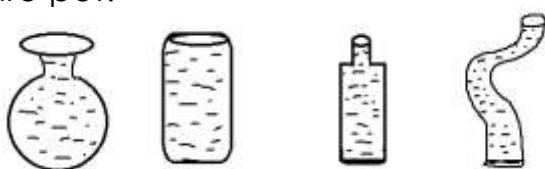
Activity

Ask learners to give other examples of solids in their classroom.

Liquids

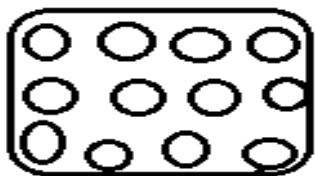
Properties of liquids

- They have loosely packed molecules.
- Liquids have no definite shape. They take the shape of the container in which they are put.



- Liquids have volume.
- Their molecules move about but less rapidly.

Arrangement of molecules in liquids



Examples of liquids

Water, oil, paraffin, juice, soda, blood, alcohol, urine, mercury, etc.

Gases

Properties of gases

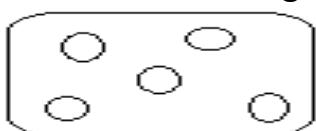
Have no definite shape. Gases take the shape of the container in which they are put.

Their molecules are far apart.

Their molecules move rapidly.

Gases have volume.

Arrangement of molecules in gases



Examples of gases

oxygen, nitrogen, smoke, carbon dioxide, rare gases (argon, neon, xenon, helium, krypton), etc.

Changes in states of matter:

Change of matter from one state to another is caused by a slight change in temperature.

Changes that occur when matter gains heat

- ✓ Melting
- ✓ Evaporation
- ✓ Sublimation

Changes that occur when matter loses heat

- ✓ Condensation
- ✓ Deposition or desublimation

Melting – The process by which a solid changes into liquid. Examples of substances that melt are; ice, fats, plastic, candle wax, etc.

Evaporation – The process by which a liquid changes into a gas.

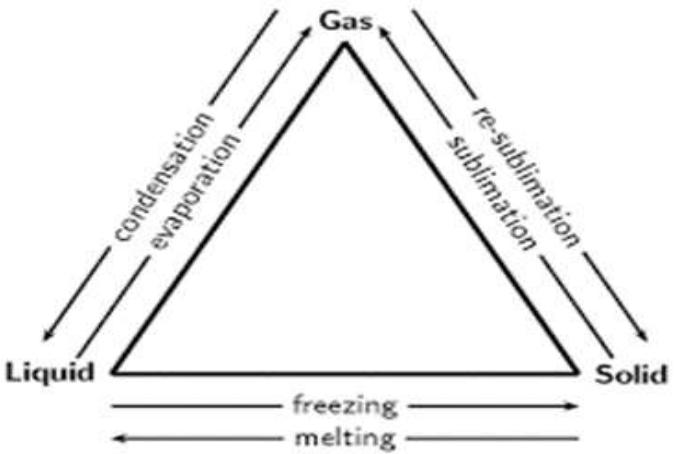
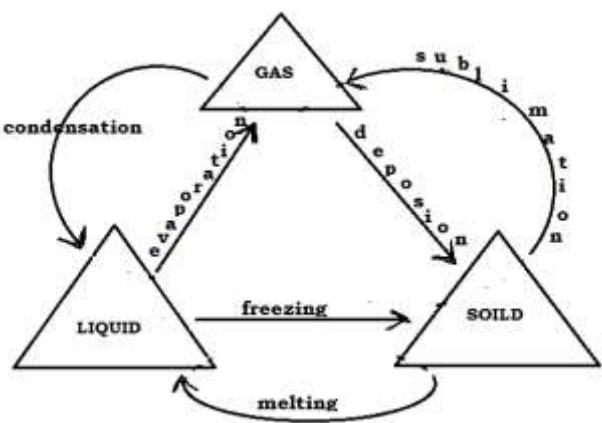
Condensation – The process by which a gas changes into a liquid.

Sublimation – The process by which a solid changes directly to a gas. Naphthalene and iodine crystals are examples of substances that sublime.

Deposition or desublimation. The process by which a gas changes directly into a solid is. For example, water vapour in sub-freezing air can transform into ice without going through the liquid phase. This is how snow and frost are formed.

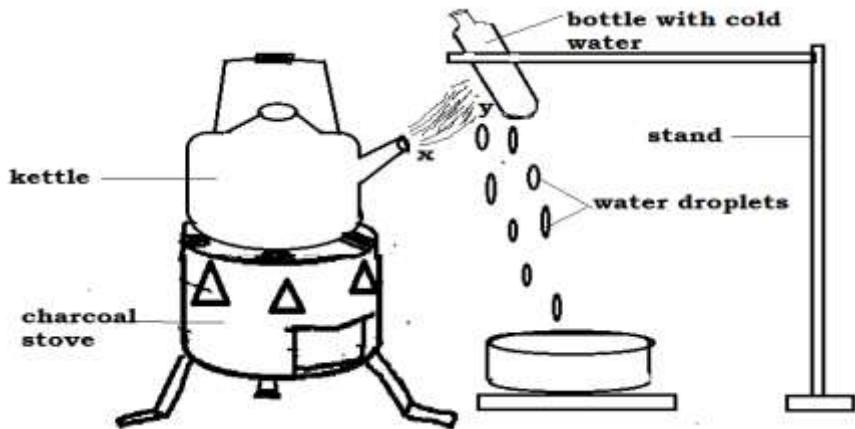
NB Water is a substance that can exist in all the three states of matter.

Summary of changes in states of matter



Exercise

1. Name the substance that can exist in all the three states of matter.
2. What is the difference between cohesion and adhesion?
3. What happens to ice when heated?
4. Study the diagram below and answer the questions about it.



- a) What process is taking place at part X?
- b) What process is taking place at point Y?
- c) Identify the process in nature that is similar to the illustration above.

MIXTURES

A mixture is a combination two or more substances physically combined.

Dissolving substances:

These are substances that disappear when put in water or any liquid.

When a substance is put in water or a liquid and it disappears after stirring, we say it has dissolved. Such substances are called solutes.

A solute is a substance that dissolves in a solvent.

Examples of solutes

- salt,
- sugar,

- glucose
- detergent e.g. omo, nomi, etc.

Note: solutes dissolve because they are **soluble**.

Solvent:

This is a liquid in which a solute dissolves.

Examples of solvents

Water, methylated spirit, petrol, diesel, paraffin, oil, etc.

Note: Water is a universal solvent because it dissolves almost all solutes.

Substances that do not dissolve in a solvent are called **insoluble substances** e.g. stone, sand, maize flour.

Solution:

This is a uniform mixture of two or more substances.

Examples of solutions

- salt solution
- sugar solution
- Salt Sugar Solution (SSS)
- Oral rehydration solution (ORS), etc.

Suspension:

This is a solution that contains small particles of solid spread through it and settles on standing.

Saturated solution is a solution that cannot dissolve anymore solute.

Note: A saturated solution can be made to dissolve more solutes by heating it.

Super saturated solution:

This is a solution that cannot dissolve any more solute even after heating.

Unsaturated solution is a solution that can still dissolve more solutes.

Methods of separating mixtures:

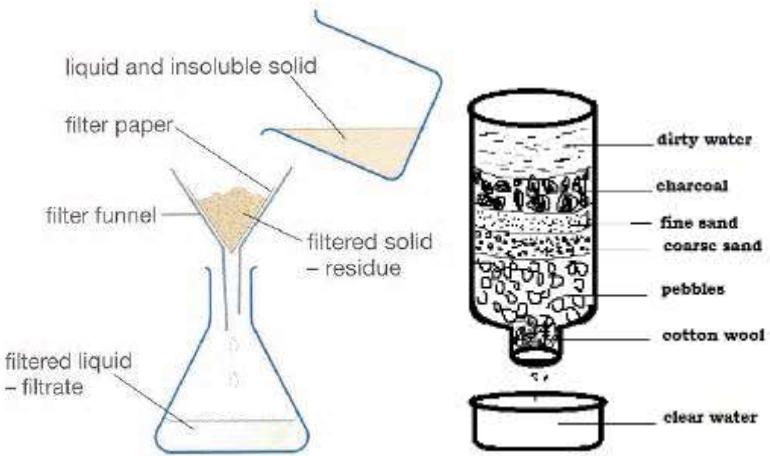
Separating mixtures of solids

- By sorting(hand picking)
- By use of a magnet
- By sieving

Separating mixtures of solids and liquids

By filtration:

This is the method of separating a mixture of solids and liquids using a filter paper, or cloth.



The solid particles are called the **residue** while the clear liquid collected is called the **filtrate**.

Local materials used in filtration

- Charcoal
- Sand
- Grass
- Cotton wool

Application of filtration

- ✓ It is used to separate seeds from juice.
- ✓ It can be used to separate tea leaves from tea solution.
- ✓ It can be used to obtain clean water from dirty or muddy water.

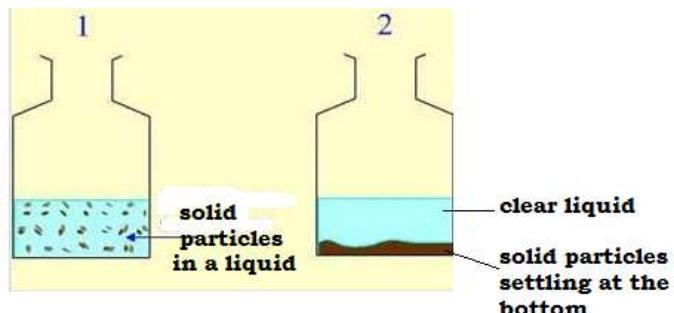
Note:

Water got by filtration is not good for drinking because filtration does not kill germs and neither does it remove germs.

By decantation:

This is a method where the solid particles in a liquid are left to settle at the bottom of a container and the clear liquid is carefully poured into another container

Illustration

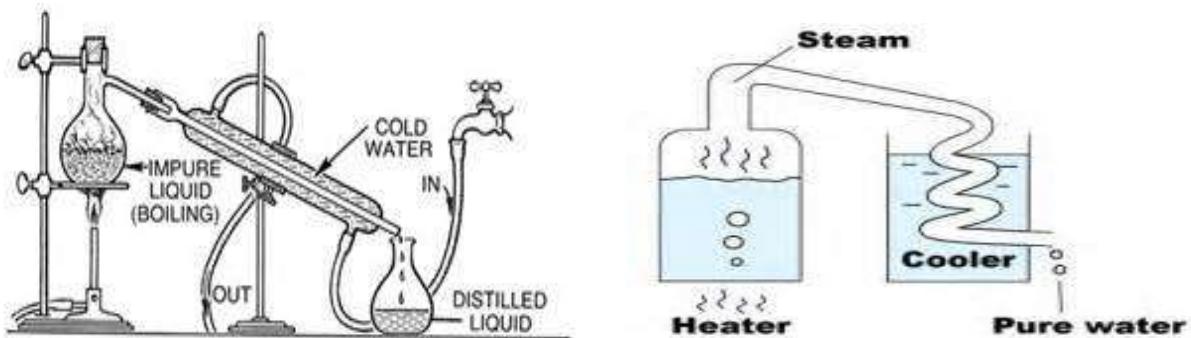


By distillation:

This is a method where a liquid with impurities is boiled in a container where a delivery tube is passed through cold water that condenses the vapour.

The liquid obtained after distillation is called a **distillate**.

Illustration



Importance of distillation

- ✓ It is used to get clean water from dirty or muddy water.
- ✓ It is used to get pure alcohol from crude alcohol.

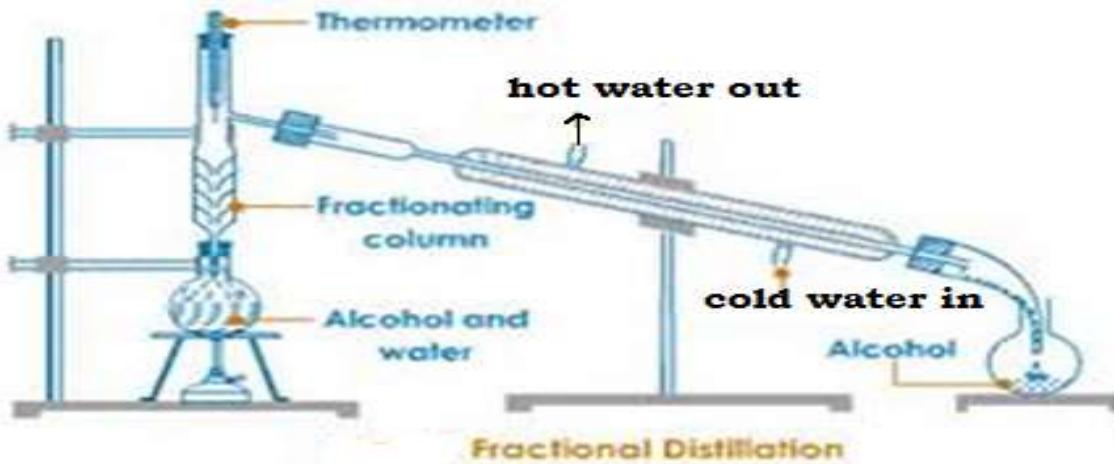
Note:

Water got by distillation is not good for drinking because it lacks mineral salts.

Separating mixtures of liquids

By fractional distillation: It is used to separate liquids with same density but evaporate at different temperature e.g. water and alcohol, alcohol evaporates first and crude oil or petroleum.

The liquids above evaporate at different times because they have different boiling points.



Using a separating funnel:

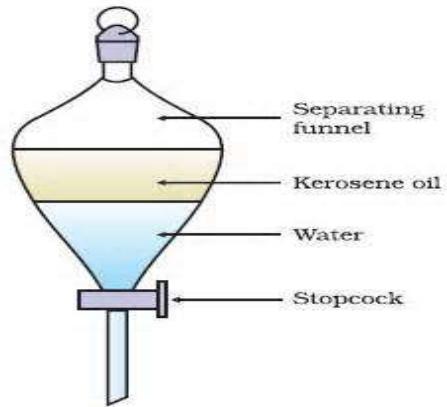
This is a method used to separate a mixture of liquids with different densities.

Such liquids do not mix to form a uniform solution. They are called **immiscible liquids**.

Examples of immiscible liquids

- Oil and water
- Petrol and water
- Paraffin and water
- Mercury and water

Illustration to show use of a separating funnel



Note:

Liquids that mix uniformly are known as **miscible liquids**.

Such liquids have the same density e.g. water and milk, water and juice, etc.

Evaporation to dryness method (Crystallization)

A solid in a liquid can be separated from the liquid by boiling off or evaporating the liquid away. The solid is left behind

Illustration of evaporation to dryness

Application of evaporation to dryness

It is used to recover salt from a salt solution.

It can be used to recover salt poured in sand.

The mixture is boiled until all the water evaporates leaving salt crystals at the bottom of the sauce pan. This is because salt does not evaporate.

Practical activity

Items needed

Salt, sand, water, sauce pan, source of heat

Steps:

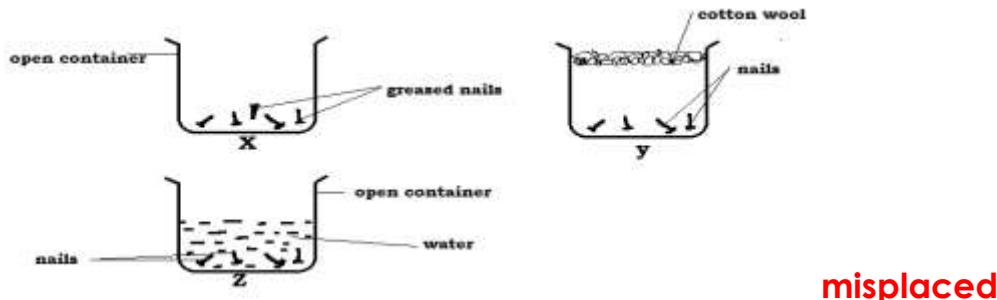
1. Mix salt with sand in a container and add water.
2. Stir the mixture to dissolve the salt.
3. Filter out the salt solution or decant to separate the salt from sand.
4. Pour the salt solution in a sauce pan and place it on the source of heat. Allow it to boil until all the water evaporates.

Observation:

The salt crystals remain at the bottom of the sauce pan.

Exercise

An illustration showing how rusting takes place



Exercise

1. a) In which container did the nails rust?
b) Give a reason to support your answer above.
2. a) In which containers didn't the nail rust?
b) Give a reason to support the answer above
3. Give two conditions necessary for rusting to take place.
4. State two methods of preventing rusting
5. What is an alloy?
6. How does painting prevent rusting?
7. Define galvanization

ENERGY

Energy is the ability to do work.

Forms of energy

- Heat energy
- Electrical energy
- Light energy
- Sound energy

- Solar energy
- Chemical energy
- Nuclear energy
- Mechanical energy
- Magnetic energy

Characteristics of energy

- ▶ All forms of energy make work to be done.
- ▶ Energy can be changed from one form to another.
- ▶ Energy can neither be created nor destroyed.

Types of energy

There are two types of energy namely;

1. Kinetic energy
2. Potential energy

Potential energy

This is the energy possessed by a body at rest.

Examples

A parked car, a sleeping baby, a book placed on a table, etc.

Kinetic energy

This is the energy possessed by a body in motion.

Examples

A rolling stone, flowing water, moving car, etc.

Activity:

Ask learners to cite out other examples of objects with potential energy in their classroom and the school compound.

Ask learners to cite out other examples of objects with kinetic energy in their classroom and the school compound.

Demonstrate and ask learners to demonstrate kinetic energy.

Heat energy

Heat is a form of energy that increases the temperature of an object or matter.

Standard units for measuring heat.

- Calories

Instrument used to measure heat.

- Calorimeter

Source of heat

A source of heat is any object that produces heat.

Types of sources of heat

- (i) Natural sources of heat
- (ii) Artificial sources of heat

Natural sources of heat

Natural sources of heat are provided by nature.

Examples

- The sun
- food
- erupting volcanoes
- hot springs
- decaying matter

NB: The sun is the main natural source of heat.

Artificial sources

These are sources of heat made by people.

Examples of artificial sources of heat

- lamps
- electricity
- candles
- fuels e.g. firewood, charcoal
- friction

Uses of heat

- Heat is used for cooking food.
- It is used for ironing clothes.
- It dries our harvested crops/preserves food.
- Heat kills germs.
- The sun's heat enables our skins to make vitamin D.

Heat transfer

This is the flow of heat from the source to other points.

Methods of heat transfer

Heat can move through different states of matter.

There are three methods of heat transfer.

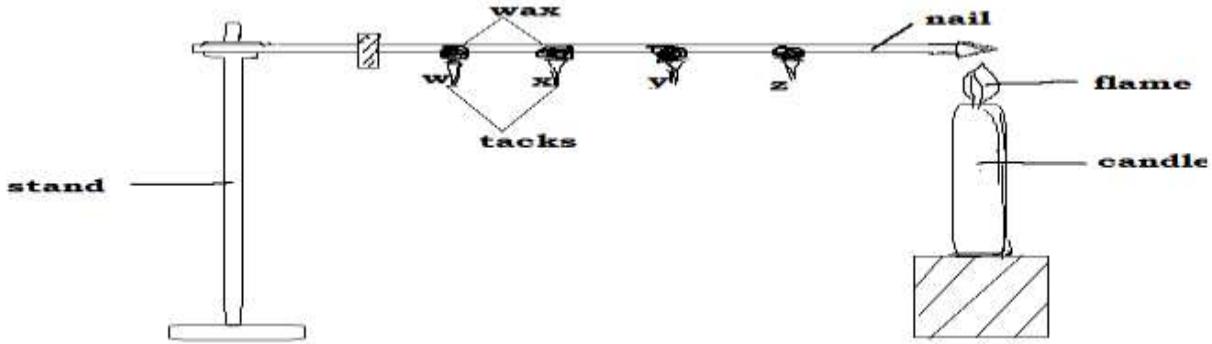
- Conduction
- Convection
- Radiation

Conduction

This is the process by which heat travels through solids.

Activity to show conduction in metals

Clamp one end of a copper rod and attach small tacks to it at equal intervals using drops of wax. Heat the end of the rod in a flame. As heat is conducted along the rod from the hotter end to the colder end, the rod becomes hotter and hotter. The nails fall off one by one as wax melts.



Pin Z will fall off first because it is nearest to the source of heat.

Application of conduction in daily life

- ✓ It is used in cooking.
- ✓ It is used in ironing clothes.
- ✓ It is used in roasting seeds like groundnuts, soya, simsim, etc.

Radiation:

This is the transfer of heat through vacuum and space.

A vacuum is a space without matter.

Heat transfer by radiation takes place without the help of molecules of matter.

Heat from the sun reaches us by means of radiation. The space above the atmosphere is a vacuum.

Importance of heat transfer by radiation in our environment

- It helps us to get warmth from the fire place or the sun.
- It helps to dry our harvested crops.
- It helps in drying our wet clothes.
- It helps in the formation of rain.

Convection

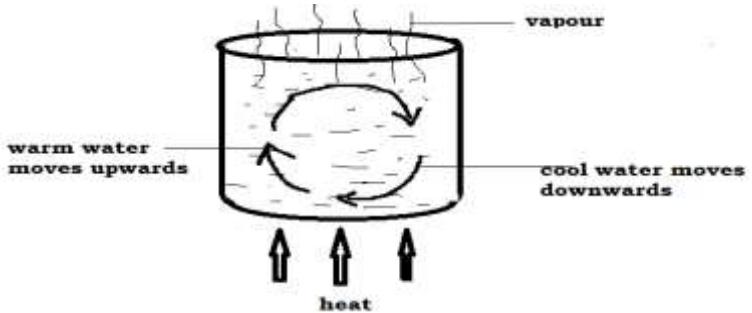
This is the process by which heat travels through gases and liquids.

It involves the actual movement of molecules within the liquid or gas.

Application of convection in our daily life

- It helps to drive smoke out of the kitchen or factory through the chimney.
- It helps to drive bad smell out of the VIP latrine through the vent pipe.
- It helps in boiling of water and other liquids.
- It helps in circulation of air in a house.
- It enables a cigarette to burn when lit.

Illustration of convection in water



NOTE:

-Holes left in a charcoal stove, flat iron, lantern lamp, etc. help in air circulation.

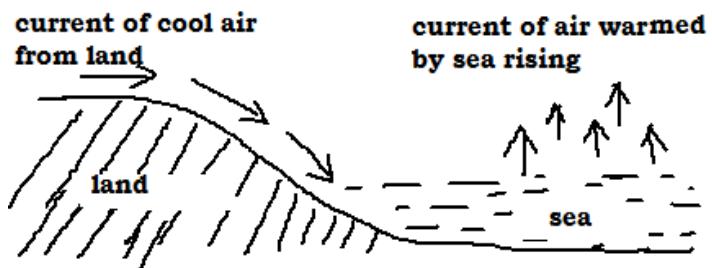


-Wind movement, ocean currents, land breeze and sea breeze are convectional current on a large scale.

-Land breeze is the movement of cool wind from land to sea.

It occurs at night. At night, the land loses heat faster than the water bodies. The air over the water body rises and cool air from the land blows towards the water body to replace the warm rising air.

Illustration



-Sea breeze is the movement of cool wind from the sea to the land.

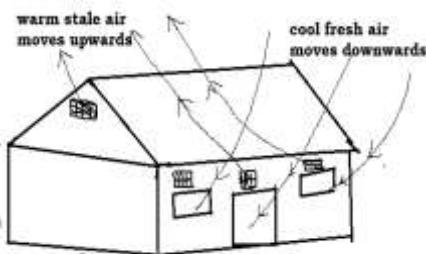
It occurs during the day time.

During day time, the air over land gets heated faster than that over the water body. Air over land rises and the cool air from the sea moves to replace the warm rising air over the land.

Illustration



-Ventilation in a house – doors, windows and ventilators help in air circulation.



NB: All cases of convection, warm currents move upward and cold currents move downward. This is because warm currents are less dense while cold currents are denser.

Comparison of heat transfer

Heat travels fastest in gases, faster in liquids and fast in solids.

Conductors and insulators

Conductors

Conductors are substances which allow heat to pass through them easily.

Examples of conductors

iron, silver, copper, aluminium, and steel.

NB: Silver is the best conductor of heat but it is very expensive. This is why it is not commonly used to make cooking utensils.

Uses of conductors

- ✓ They are used to make cooking utensils.
- ✓ They are used to iron clothes.

Insulators:

Insulators are substances that don't allow heat to pass through them easily.

They are also called **poor conductors of heat**.

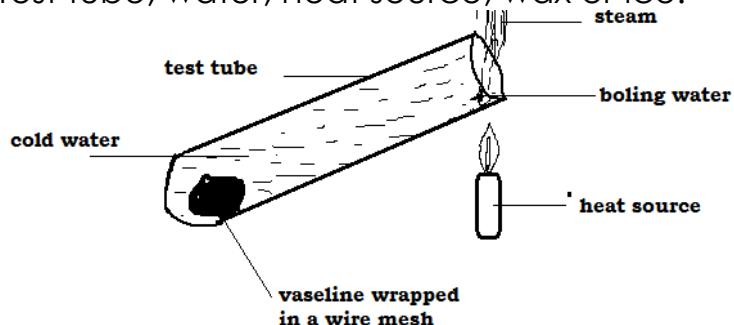
Examples of insulators

plastic, wood, rubber, wool, water, asbestos, cloth, leaves, feathers, etc.

An experiment to prove that water is a poor conductor of heat

Requirements

Test tube, water, heat source, wax or ice.



The water at the surface of the test tube will boil but the Vaseline or ice will not melt showing that water is a bad conductor of heat.

Vaseline is wrapped in wire mesh to keep it at the bottom of the test tube since wire mesh is denser than water.

Application of insulators

-They are used on handles of saucepans, frying pans, flat irons, electric kettles using plastic or wood to prevent hands from getting burnt.

Illustrations



- Woolen clothes are used to keep our bodies warm in cold weather. They help to prevent heat from escaping from the body.
- Asbestos suits are worn by firemen to protect them from excess heat.
- We cover ourselves with blankets to prevent heat loss.
- Feathers of birds act as insulators.
- We use banana leaves to cover food so as to prevent heat loss.
- We use paper or cloth to carry hot objects to prevent burns on the hands.

Heat absorbers and reflectors

Heat absorbers are materials that receive and keep heat.

Heat reflectors are materials that bounce back heat.

- When heat falls on a shiny surface, it's reflected.
- When it falls on a dull surface, it's absorbed.
- Black bodies are good absorbers while shiny polished surfaces reflect most heat.
- Refrigerators and Stevenson screens are painted white to reflect most heat so that they remain cool inside.
- Storage tanks containing oil are painted white to reflect most heat and keep cool inside.
- Most buildings, e.g. hospitals, hotels, domestic houses are painted white to keep cool inside by reflecting most of the heat.
- A person putting on a blue shirt on a hot day will feel hotter quickly than a person putting on white shirt because white is a good reflector of heat while blue is a good absorber of heat.

Exercise

1. Explain why a black piece of cloth dries faster than a white one when they are washed and displayed on the wire at the same time
2. What is the difference between an insulator and a conductor?
3. Give two examples of
 - a) Conductors
 - b) Insulators
4. Why a Stevenson screen is painted white?
5. State one application of insulators.

General effects of heat on matter

- Heat causes expansion of matter.
- Heat causes increase in temperature of matter.
- Heat causes changes in states of matter.

Sea breeze and land breeze

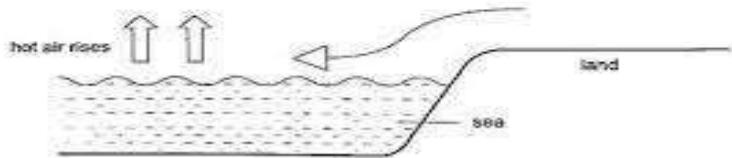
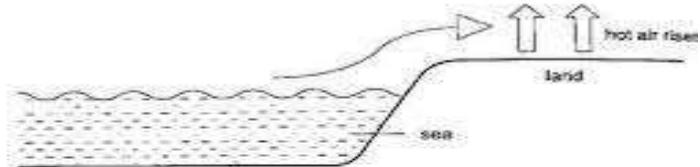
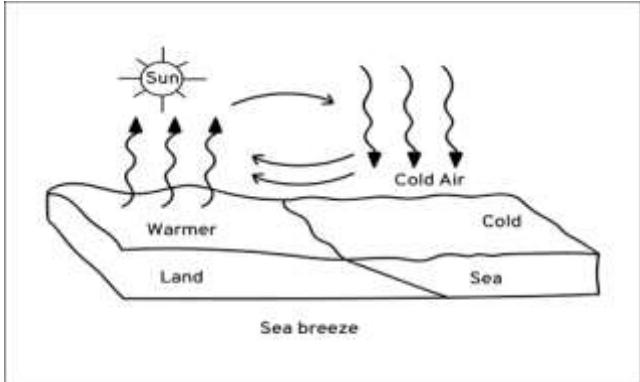
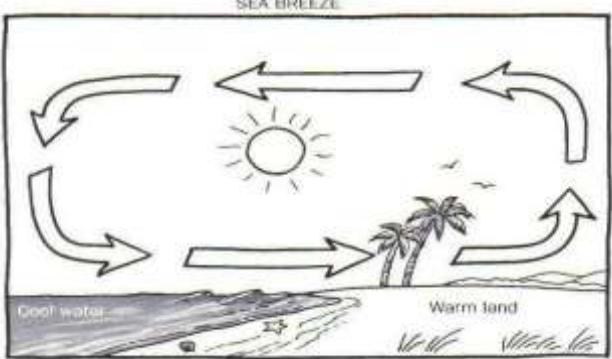
Sea breeze

This is the movement of wind from the sea to land.

It occurs due to differences in air pressure created by the differing heat capacities of water and dry land.

It usually occurs at day time.

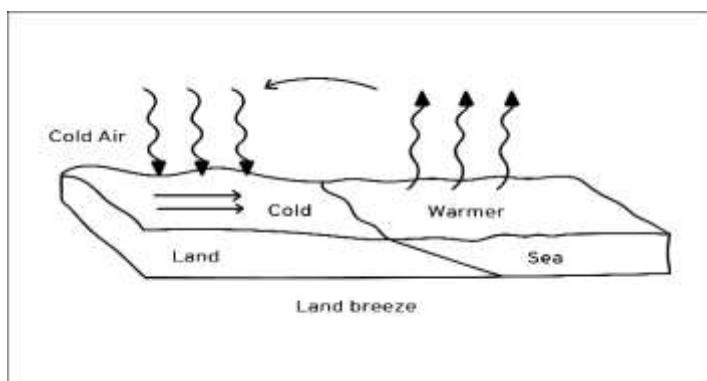
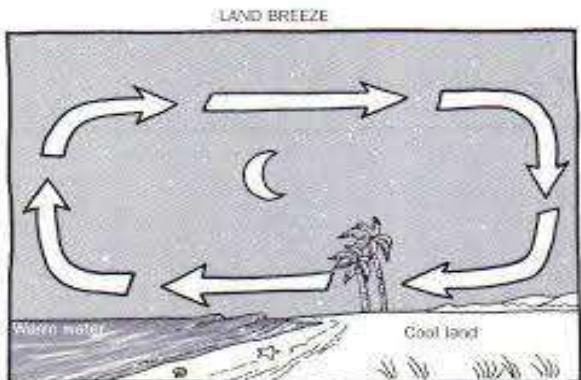
Illustration



Land breeze

This is the movement of wind from land to the sea.
It occurs at night.

Illustration



Expansion and contraction

Expansion is the increase in size of a substance when heated.

Expansion occurs when matter gains heat.

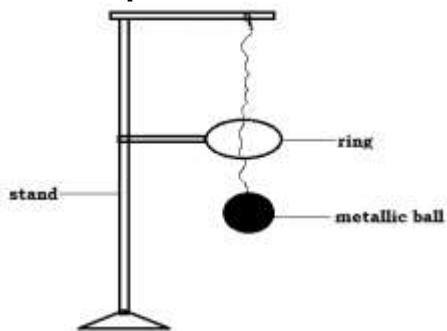
Contraction is the decrease in size of a substance when cooled.

Contraction in matter occurs due to heat loss.

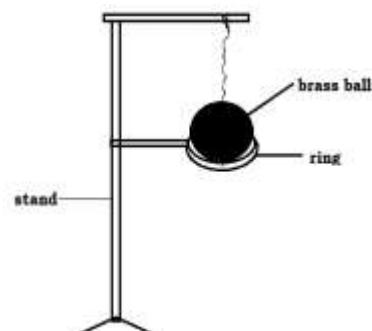
NB. Solids, liquids and gases expand and contract at different rates. Gases expand fastest/greatest followed by liquids and solids expand the least of all.

Gases expand greatest because their molecules are far apart and free to move.

An experiment to show expansion in solids using: copper and brass ball – bimetallic strip.



Before heating the brass



after heating the brass ball

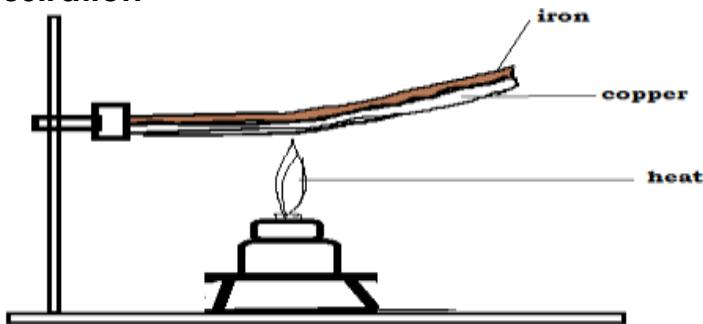
The metallic ball failed to pass through the ring because it expanded after being heated.

Metals become bigger or expand in hot weather and become shorter or contract in cold weather.

Bimetallic strip

A bimetallic strip is a strip that consists of two metals with different expansion rates.

Illustration



When such metals are heated, the metal with a higher expansion rate will bend over the one with low expansion rate.

Bimetallic strips are used in thermostats.

A thermostat is a device that switches electric appliances on and off automatically.

Examples of appliances that use thermostats

- Car indicators
- electric flat irons
- some refrigerators
- air conditioners

Expansion in gases

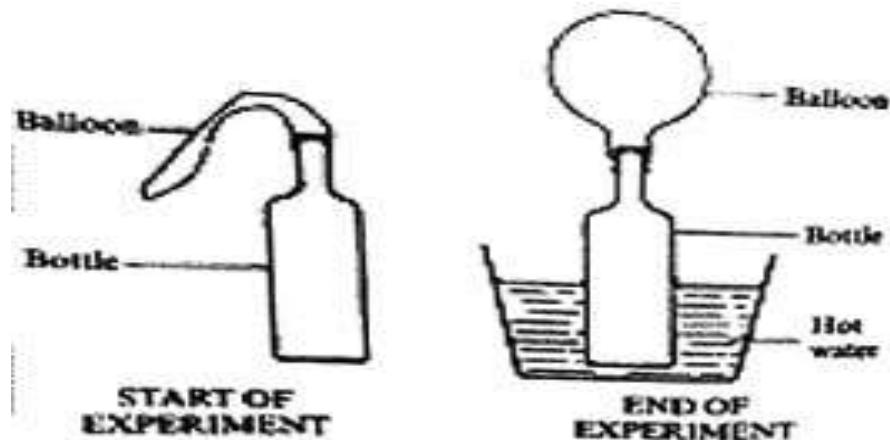
- When gases are heated, they expand.
- Gases have the greatest expansion rate of the three states of matter. This is because their molecules are far apart and move freely.

Experiments to show expansion in gases

Experiment 1

Requirements

Bottle, balloon, heat source

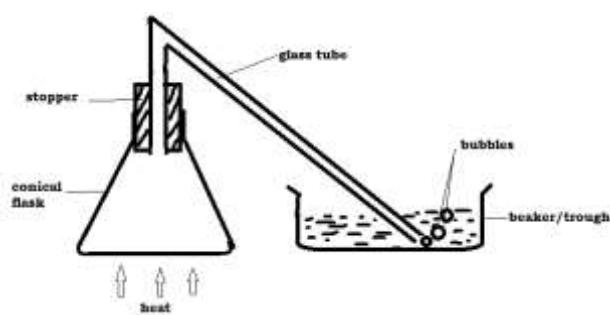


On heating the balloon starts swelling.

This is because the air inside the bottle is expanding. This shows that air expands when heated.

Experiment 2

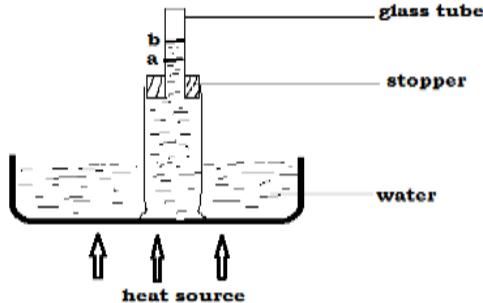
Requirements; conical flask, glass tube, beaker



Experiment 3

Expansion in liquids

Requirements; water, glass tube, stopper, test tube and heat source



On heating, the water level rose from point a to point b. This shows that water in the glass tube expanded on heating.

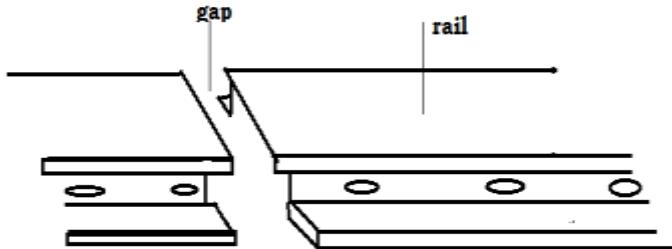
Effects of expansion and contraction

- They can lead to development of cracks in walls.
- Watches / clocks controlled by balanced wheels and hair springs, often lose minutes when temperature rises and the radius of its wheel balance increases.
- When hot tea is poured into a glass, it cracks because of uneven expansion (when the inner layer expands before the outer layer).
- When you pour cold water on hot glass/bulb/lantern, it cracks because of sudden quick contraction of only the hot part of the glass without other parts.
- Expansion can cause bending of railway lines. This can lead to railway train accidents.
- Expansion causes sagging of electric and telephone wires.
- Contraction can cause breaking of electric or telephone wires if they are tightly fixed on poles.
- Balloons inflated and exposed to sunshine burst due to expansion of air inside them when heated.

How to control effects of expansion and contraction

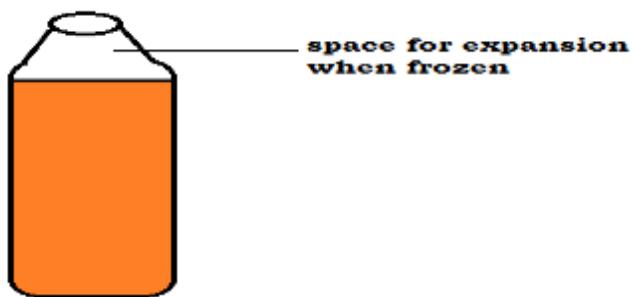
a) How to control the effects of expansion

- ✓ By leaving gaps between railway lines.
- ✓ By leaving space in bottled drinks e.g. soda bottles.
- ✓ By making corrugated iron sheets.
- ✓ By making bicycle frames hollow.
- ✓ Builders leave gaps between the wall fence to leave room for expansion.



Note:

1. The gaps left between railway lines create room for expansion during hot weather.
2. Most substances expand when heated and contract when cooled but water is an exception to this rule. Water expands when cooled below 0°C . At 0°C ice is formed. Ice is less dense than water and it can therefore float on water. That is why space is left in bottled liquids.



The space is left in bottled liquids to leave room for expansion when frozen or to leave room for increase I volume of the liquid when frozen.

Note:

When water freezes to form ice, the following happen;

- ✓ Its volume increases
- ✓ Its density decreases
- ✓ Its mass remains the same (constant)

When ice is melted, the following happen;

- ✓ Its volume decreases
- ✓ Its density increases
- ✓ Its mass remains the same (constant)

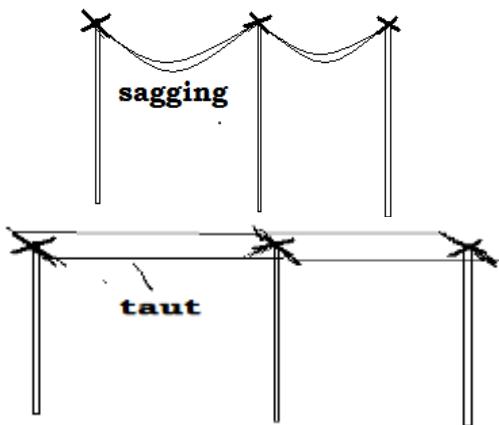
b) How to control the effects of contraction

- By fixing electric wires and telephone wires loosely on poles during installation.

Note:

1. Telephone and electricity wires are left loose on poles to leave room for contraction during cold weather.
2. Wires sag on hot days due to expansion and become taut or tight on cold days due to contraction.

Illustration:



Hot weather condition
condition

Cold weather

Activity

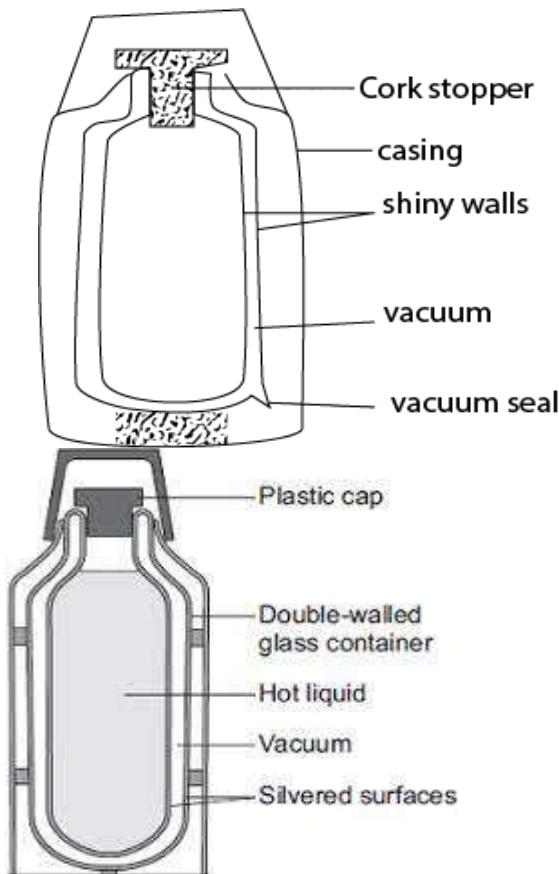
Let pupils inflate balloons and place them under sunshine for a long time and later observe what will happen.

Thermos flask/vacuum flask

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

The main function of a thermos flask is to keep hot things hot and cold things cold.

The internal parts of a thermos flask



Uses of some parts

Metal or plastic case - protects the double walled glass.

Cup – for taking the drink put in the flask.

Cork: prevents heat loss or gain by conduction.

Vacuum: prevents heat loss or gain by conduction and convection. This is because it does not have any matter to act as a medium for heat transfer.

Vacuum seal: place where air was taken out to make a vacuum. It prevents any form of matter from entering the vacuum.

Note: The flask stops its normal functioning once the vacuum seal breaks.

Double silvered glass walls: Prevents heat loss or gain by radiation. This is because silver is shiny therefore it reflects most heat.

Note: The inner silvered surface reflects heat back into the flask or drink while the outer silvered surface reflects heat away from the flask.

Disadvantages of vacuum or thermos flasks:

- They are expensive to buy.
- It is delicate/ fragile and hence difficult to handle (those with double glass walls).

Temperature

Thermometer

Mercury
Alcohol
Centigrade
Celsius
Fahrenheit
Ordinary
Clinical
Constriction

TEMPERATURE

Temperature is the degree hotness or coldness of an object.

Temperature is measured using thermometers.

Temperature is measured in units called degrees (o).

Temperature scales:

- Centigrade / Celsius scale (C)
- Fahrenheit scale (F)
- Kelvin scale (K)

Freezing point of pure water

Freezing point is also called lower fixed point while boiling point is also called upper fixed point.

Freezing point is the temperature at which all of a liquid changes into a solid.

Boiling points the temperature at which all of a liquid changes into a gas or vapour.

Different liquids have different boiling points and freezing points

Liquid	Boiling point	Freezing point
water	100°C or 212°F	0°C or 32°F
Alcohol	78°C	-114°C
Mercury	357°C or 674°F	-39°F

Thermometer

A thermometer is an instrument used to measure temperature.

Liquids used in thermometers

- Alcohol
- Mercury (it is a liquid metal at room temperature)

Types of thermometers:

Ordinary scientific thermometer

- For scientific experiments and use in incubators.

Wall thermometer

- It is hung in our houses/offices
- It measures temperature of air in that room.

- Its bulb can be filled either with mercury or coloured alcohol.
- The scale stops at 60°C because it is unlikely that the temperature of air would rise above this except in case of fire.

Clinical thermometer

- It is used for measuring the human body temperature.

Maximum and minimum (six's) thermometer

- It is used for measuring the maximum and minimum temperature of the day (air)

The clinical thermometer

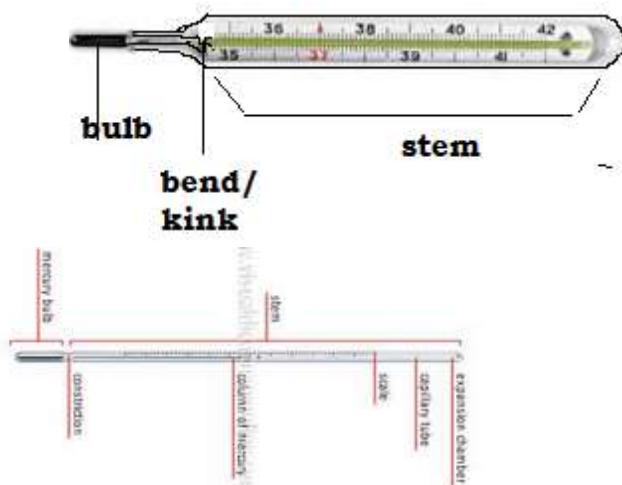
- The Clinical thermometer uses mercury
- The normal body temperature is 37°C / 98.6°F .
- The clinical thermometer is marked from 34°C because the human body temperature does not fall below 34°C when a person is still alive.
- It is marked up to 42°C because the human body temperature does not rise beyond 42°C when still alive.

Parts of the body where the clinical thermometer is put when measuring body temperature

- In the mouth
- under the armpits
- in anus
- in the vagina (in babies)

Before a doctor uses it for another person, he often shakes it to force mercury to go back to the bulb to get the right body temperature of another person.

Structure of a clinical thermometer



Uses of the parts

Bulb: it holds and stores mercury.

Kink/bend/constriction: it prevents the backflow of mercury before the temperature is read.

Stem: it protects the bore.

NB:

- ▶ The stem acts as the magnifying glass.
- ▶ Do not use boiling water to disinfect the thermometer, it will burst. Just use alcohol or methylated spirit.
- ▶ Alcohol is used in clinical thermometers in cold countries because alcohol does not solidify easily.

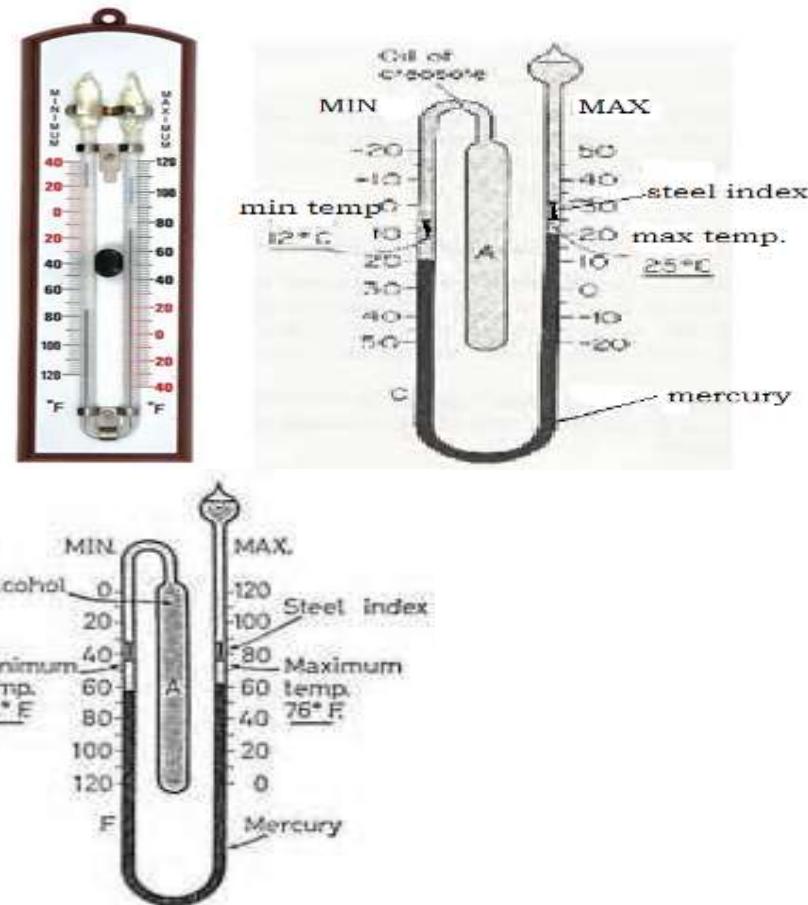
This thermometer is reset by,

1. Shaking it after use.
2. Putting it in ice after use.

The six's thermometer

- The six's (maximum and minimum) thermometer records both the highest and lowest temperature of the day.
- It was named after James Six, the scientist who invented it.
- It is used at weather stations and at some farms.
- It uses the indices.
- The readings are taken at the lower part of an index.
- Indices are reset using a magnet.
- It uses both **mercury** and **alcohol**.
- Mercury is used to measure maximum temperature because it has a high boiling point while alcohol is used to measure the minimum temperature because it has the lowest freezing point.

Illustration



Note: The above thermometer is reset using a magnet because it has a steel index.

Advantages of using mercury over alcohol:

- Mercury is opaque and easily seen while alcohol is colourless.
- Mercury doesn't wet the glass while alcohol sticks on the glass.
- Mercury is a good conductor of heat.
- Mercury doesn't boil easily (357°C) while alcohol boils easily at 78°C .
- Mercury has an even and regular expansion/contraction while alcohol doesn't.
- Mercury does not evaporate inside the tube.

Advantages of alcohol over mercury

- Alcohol doesn't solidify easily, its freezing point is -114°C while mercury solidifies easily at -39°C . This is why mercury is used to measure the highest temperature and alcohol the lowest temperature.
- Alcohol expands 6 times more than mercury.

Reasons why water is not used in thermometers

- ▶ Water sticks on the glass wall.
- ▶ Water cannot be seen easily because it is colourless.
- ▶ Water does not expand evenly.
- ▶ Water is not a good conductor of heat.

Temperature conversion

Changing from Fahrenheit to Centigrade:

$$^{\circ}\text{C} = \frac{100}{180} \times (\text{F}-32)$$

$$^{\circ}\text{C} = \frac{5}{9}(\text{F}-32)$$

NB 100 comes from the 100 parts on a centigrade scale while 180 come from 180 parts on a centigrade scale.

Example: change 212°F to Centigrade

$$^{\circ}\text{C} = (212^{\circ} - 32^{\circ}) \times \frac{5}{9}$$

$$^{\circ}\text{C} = 180 \times \frac{5}{9}$$

$$^{\circ}\text{C} = 20 \times 5$$

$$100^{\circ}\text{C}$$

Therefore 212°F is equal to 100°C

Exercise

Change the following from Fahrenheit to Celsius: 68°F , 59°F and 95°F

Changing from Celsius to Fahrenheit,

We use the formula

$$^{\circ}\text{F} = \left(\text{C} \times \frac{180}{100} \right) + 32$$

$$^{\circ}\text{F} = \left(\text{C} \times \frac{9}{5} \right) + 32$$

Example: Change 100°C to $^{\circ}\text{F}$

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

$$^{\circ}\text{F} = (20 \times 9) + 32$$

$$^{\circ}\text{F} = 180 + 32$$

$$= 212^{\circ}\text{F}$$

Exercise

Change the following from Celsius to Fahrenheit: 70°C , 20°C , 15°C and 40°C

Chemical

Reaction
Combustion
Oxygen
Carbon dioxide
Extinguisher
Galvanizing
Transparent
Alloy
Brass

Burning

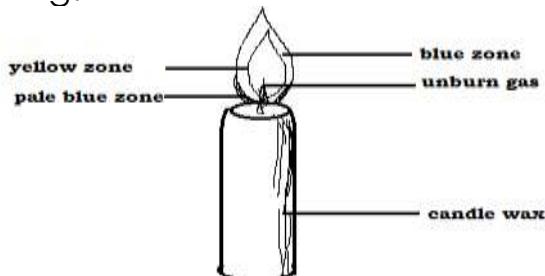
Burning is a Chemical reaction in which heat and light are produced.

The process of burning is called combustion

Burning/combustion does not use dissolved oxygen

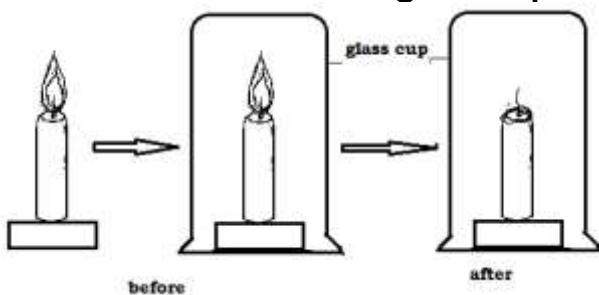
Flame

A flame consists of a glowing gas produced by combustion or burning.



- Pale blue zone is at the bottom and very hot
- Blue zone is the outermost part of the flame where combustion takes place. It receives good supply of air. It is difficult to use.
- Yellow zone is the brightest part of the flame.
- Unburnt gas doesn't give any light. It does not burn because air cannot reach it since it is deep inside the flame.

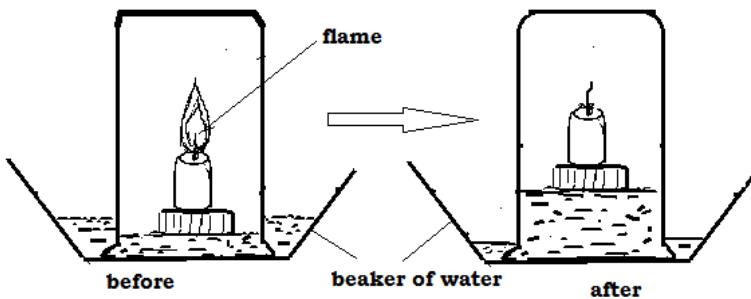
Experiment to show that burning uses up air (oxygen)



NB: The flame went off because oxygen that supports burning was used up. Or the supply of oxygen was cut off.

Experiment 2: Take a bowl and half fill it with water. Fix a small piece of candle to a wooden block and float the block on the water. Light the candle and place a transparent jar over it. The flame goes out after a short while because it has used all the oxygen in the jar.

You will notice that the water has risen in the jar and occupies about one-fifth of the total space in it. This space was formally occupied by oxygen.



NB: The flame went off because oxygen that supports burning was used up.

The water level increased to replace the space of the used up air(oxygen)

Ways of Putting out fire:-

- Using fire extinguishers – they contain compressed carbon dioxide.
- By pouring water - can be used to stop any other fire besides petrol fires because water is denser than oil/petrol, so petrol or oil will float on top and continue burning.
- By pouring sand soil
- Small fires can be put out by covering with a thick material like a blanket. E.g. when your clothes have caught fire, wrap yourself with a thick blanket. The blanket cuts off oxygen supply to the fire.

Fire extinguisher

It is a device used to put out fire.

It contains compressed carbon dioxide.

Activity:

Name places where the fire extinguisher is found.

Diagram of a fire extinguisher

MPS Science Lesson Notes



Note:

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

The fire extinguisher is usually painted with bright colours for easy identification.

A school should have a fire extinguisher in order to be able to put out fire in case of an outbreak.

Rusting

Rusting is a reaction of water and oxygen on iron metals.

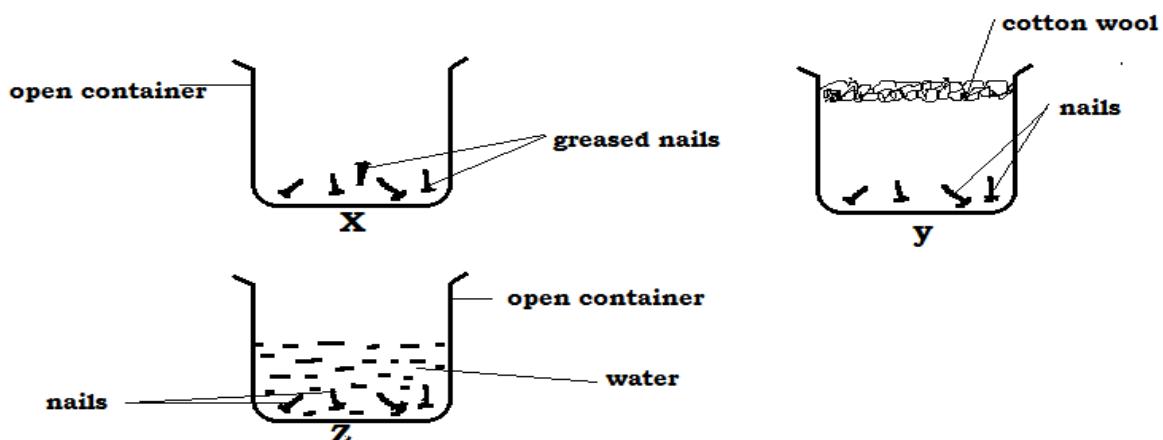
When an iron metal rusts, it changes the colour to reddish brown.

Rusting like burning uses up oxygen.

Condition for rusting

- Presence of oxygen.
- Presence of Water/moisture.
- Presence of iron metal.

An illustration showing how rusting takes place



Exercise

1. a) In which container did the nails rust?
b) Give a reason to support your answer above.
2. a) In which containers didn't the nail rust?
b) Give a reason to support the answer above

3. Give two conditions necessary for rusting to take place.
4. State two methods of preventing rusting
5. What is an alloy?
6. How does painting prevent rusting?
7. Define galvanization

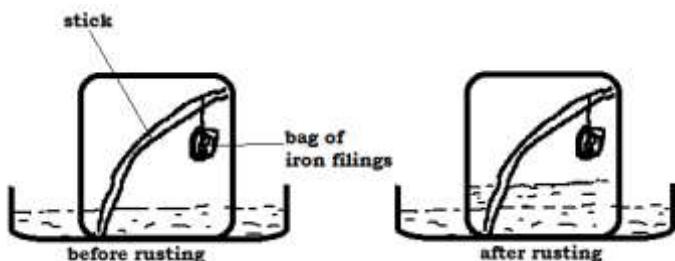
LESSON TWENTY NINE

An experiment to find out that oxygen is used up during rusting

Requirement; iron filings, net bag, jar, stick and a container with water.

Steps

- Moist the iron filings and put them in a net-bag.
- Tie the net-bag on a stick and place it in the jar.
- Invert the jar in the container with water.



Observation

After a few days, the iron filings turned brown.
The water level in the glass jar rose.

Conclusion: The water level rose in the jar to replace oxygen that was used up during rusting.

Note. Only iron and steel metals rust.

Advantages of rusting

- It helps to reduce the volume of metal scraps in the environment.

Disadvantages of rusting

- Wears out iron metal.
- Keys fail to fit in padlocks after they have rusted.
- Destroys the colour of iron tools.
- Makes iron metals weak.

Ways of preventing rusting.

- By application of oil on metals
- Keeping metals dry and in a dry place
- By making alloys.

An alloy is mixture of two or more metals. e.g. iron + carbon = steel, copper + zinc = brass, copper + tin = bronze.

THEME: THE WORLD OF LIVING THINGS

TOPIC: BACTERIA AND FUNGI

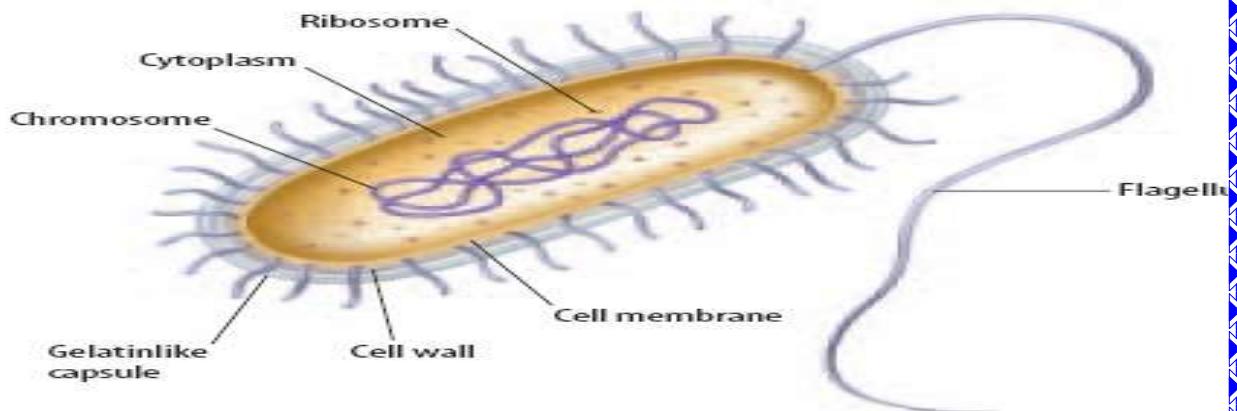
BACTERIA

Bacteria (singular-bacterium)

Bacteria are tiny living organisms made up of one cell (unicellular organisms).

Bacteria are called microscopic organisms because they can only be seen using a microscope.

The structure of a bacterium



Functions of some parts

Flagellum: for movement

Where are bacteria found?

Bacteria can be found almost everywhere; in water, in air, in soil, in decaying matter and in bodies of other living organisms.

Bacteriologists use a microscope to see bacteria.

Bacteria move by the use of its flagellum/flagella

Characteristics of bacteria

- They are single celled organisms.
- They don't have uniform shape and size.
- They can only be seen using a microscope
- Bacterial need food, moisture and warmth to breed and grow well.
- Bacteria are neither animals nor plants; they fall under Monera kingdom (Prokaryote).
- They reproduce by binary fission or cell division.

Breeding of bacteria

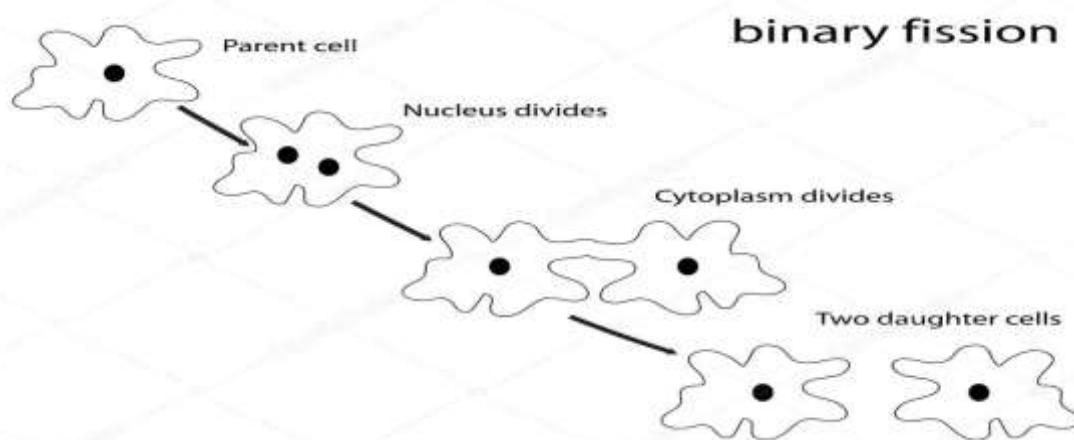
Bacteria multiply very quickly under the following conditions;

- ▶ food
- ▶ warmth
- ▶ moisture
- ▶ oxygen

Bacteria reproduce by means of **binary fission/cell division**.

Temperature affects the life of bacteria, both at high temperature and very low temperature. They do not reproduce below 1°C and above 65°C.

Illustration of binary fission



Types of bacteria

Bacteria are grouped according to their shapes.

1. Coccis (Spherical shaped bacteria)

Examples are;

- staphylococcus which causes boils
- Streptococcus which causes sore throat.

2. Bacilli (rod shaped or cylindrical bacteria)

Examples are;

- Salmonella typhi- which cause typhoid fever. Salmonella also causes food poisoning.
- Bacillus anthracis which cause anthrax.

3. The spirilla and the spirochaete

.The spirilla do not move while the spirochaetes move for example Treponema pallidum which cause syphilis.

4. Vibrio (comma shaped bacteria)

An example is vibrio cholerae which cause cholera

Illustration of types and shapes of bacteria



Nature of bacteria

Some bacteria are useful while others are harmful.

Useful bacteria

They are also called harmless bacteria.

Examples of useful bacteria

- ▶ Nitrifying bacteria
- ▶ Putrefying bacteria
- ▶ Lactobacillus

Importance of useful bacteria:

- Some bacteria are used in making vaccines
- Bacteria help in making vitamin B12 and vitamin K
- Bacteria help in fermentation when making beer, ghee, yoghurts and cheese.
- Anaerobic bacteria help to produce biogas.
- Bacteria help in decomposition of dead plants and animals to form humus.
- Bacteria found in pit latrines help to decompose faeces to prevent latrines from filling up quickly. That is why it is bad to pour dangerous chemicals into the latrines.
- Bacteria found in root nodules of leguminous crops trap and change atmospheric nitrogen into soil nitrates, which improves soil fertility.

Harmful bacteria or useless bacteria

Examples of harmful bacteria

- ▶ Vibrio cholerae
- ▶ Salmonella typhi
- ▶ Clostridium tetani
- ▶ Bacillus anthracis

Most harmful bacteria are germs or pathogens.

Dangers of harmful bacteria

- They cause diseases in people, plants and animals. Bacteria spread from one person to another through air, water, food and physical contacts.
- Bacteria cause food poisoning
- Bacteria make food to go bad.
- Bacteria make milk to go sour.
- Bacteria make wounds and cuts become septic

Examples of diseases caused by harmful bacteria

- a) In people: cholera. Tuberculosis dysentery, meningitis, diphtheria whooping cough, typhoid tetanus, syphilis, gonorrhea.
- b) In animals mastitis, fowl typhoid, and foot rot.
- c) In plants: tomato blight potato blight and which causes wilting.

LESSON THIRTY NINE.

Ways of fighting/controlling harmful bacteria

- Use of antibiotics: Antibiotics are chemical substances used to kill bacteria in our bodies. They are prepared in four ways –tablets –capsules. Syrups and injectables. Penicillin was the first antibiotic to be discovered by Alexander Fleming. He found out that the fungus penicillium didn't allow bacteria to grow.(1881-1955)
- Edward Jenner (1749-1823) the first English doctor to discover the vaccine against small pox. Louis Pasteur (1822-1895) discovered a method of preserving milk (pasteurization) Other antibiotics include: Tetracycline, seprine, streptomycin, chloramphenical, ampicillin
- Use of antiseptics: Antiseptics are chemicals used to kill germs found on cuts and wounds. Salt solution is the cheapest antiseptic. Others include Hydrogen peroxide, salvon and iodine.
- Use of disinfectants: Disinfectants are chemicals used to clean latrines and floors of houses. Examples are Vim, Jayez, Dettol.
- Sterilization: This is the process of killing bacteria/germs using heat or chemicals. Medical instruments are sterilized to prevent spread of disease.
- Practice proper hygiene.
- Good feeding (eat a balanced diet)

- Food preservation: Food should be protected against bacteria so that it can be kept for a long time.

Methods of food preservation

Smoking, salting, sun drying, canning or tinning, refrigeration, pasteurization (method of preserving milk)

Exercise

1. State two characteristics of bacteria.
2. Name the instrument that is used to detect bacteria.
3. Name two conditions that favour multiplication of bacteria.
4. How do bacteria reproduce?
5. Name two places where bacteria are found.
6. State one way in which bacteria is dangerous.
7. Name two examples of bacterial diseases that attack people.

Fungi

Fungi exist both as single celled (unicellular) organisms or multicellular organisms.

They live on other living things as parasites or on dead decaying matter as saprophytes.

Characteristics of fungi

- They don't make their own food because they don't have chlorophyll.
- They feed saprophytically or parasitically.
- Fungi reproduce by means of spores or budding.
- They have thread like structures called mycelia.

Groups of fungi

- yeast
- moulds
- mushrooms
- toadstools
- puffballs

Mushrooms

Mushrooms grow during rainy seasons on pieces of wood, around cow dung, on brew-refuse and other dead organic matter.

They feed saprophytically or parasitically.

Mushrooms have a cap which contains gills.

The gills produce and store spores.

Some mushrooms are edible while others are poisonous.
Some are used in the production of medicine.

Diagram showing parts of a mushroom.

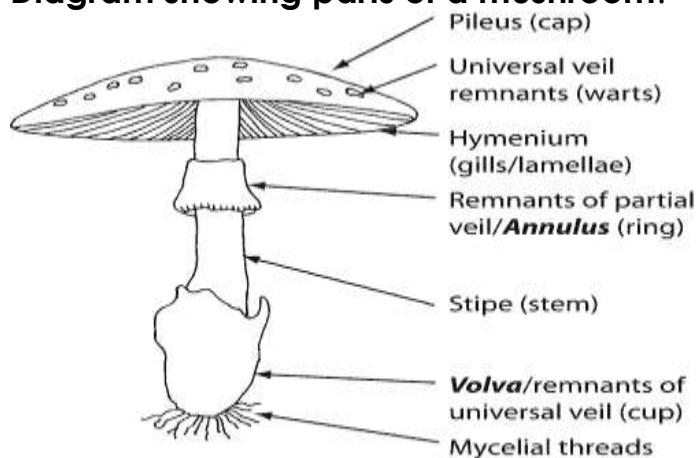
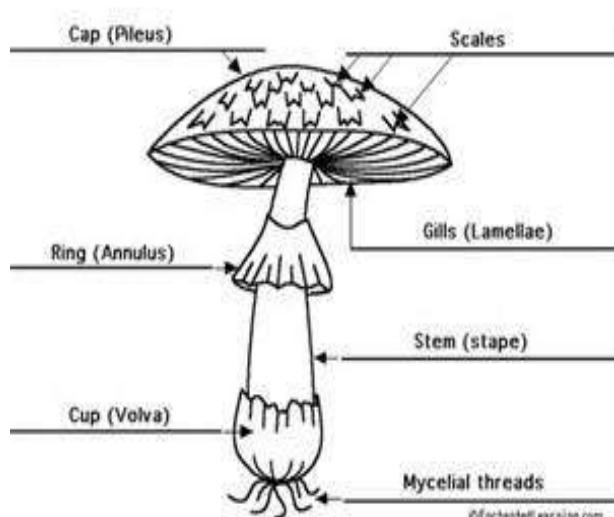


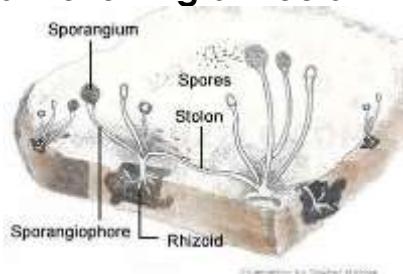
Fig. 1A



Moulds

Moulds are thread-like and grow on moist and fermenting or rotting fruits, bread and vegetables.

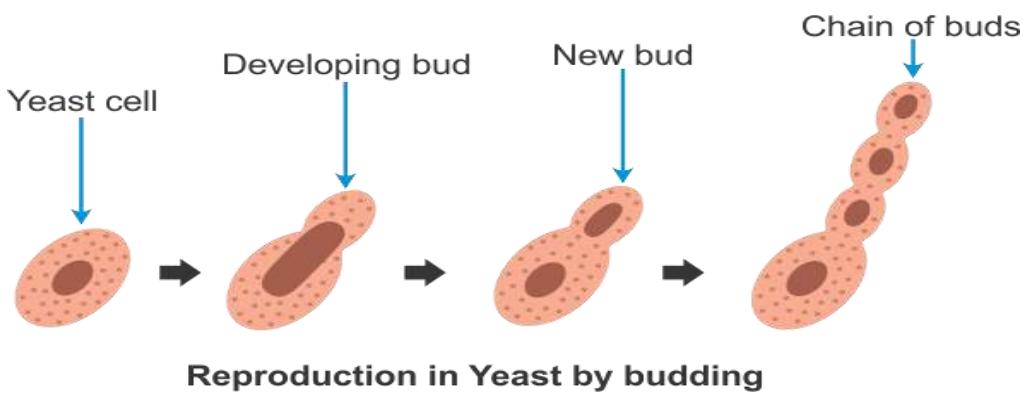
Diagram showing a mould



Yeast

Yeast are the only single celled (unicellular) fungi.
Yeast reproduces by budding.

Illustration



Yeast is used in fermentation alcohol.

Yeast is added to a sugar solution and it absorbs some of the sugar into its cells. It then uses this sugar in respiration, which converts the sugar to ethanol and carbon dioxide. Alcoholic drinks such as beer and wine are prepared in this way.

In bakery, yeast is used in making bread. Yeast is mixed with wheat flour and water to form dough. When yeast respires, it gives off carbon dioxide which is trapped in the dough. The carbon dioxide trapped in the dough makes it to rise. The flour contains starch and proteins. Yeast uses starch as its source of energy

Toadstool:

They resemble mushrooms but are poisonous when eaten.

They feed saprophytically

They reproduce by means of spores.



Puffball

They feed saprophytically

They reproduce by means of spores.



NATURE OF FUNGI

Some fungi are useful while others are harmless.

Examples of useful fungi

Mushrooms

Yeast

Penicillium

USES OF FUNGI

- ▶ Some fungi are eaten as food like mushrooms
- ▶ Yeast is used to flavor cheese
- ▶ Yeast is used for baking bread and brewing beer
- ▶ Some fungi cause decay of dead plants and animals to form humus
- ▶ Some fungi like moulds are used for making drugs (penicillium which is used to make penicillin an antibiotic).
- Penicillin was discovered by a scientist called Alexander Fleming.

Dangers of fungi

- Some fungi make food go bad.
- Some fungi cause food poisoning e.g. moulds which grow on bread and other types of food.
- Some fungi are poisonous when eaten.
- Some fungi cause diseases to people, plants and animals.

Examples of fungal diseases;

In plants:

rust fungus affects leaves and stems of maize, wheat and other cereals. - Root rot in tea plants – coffee berry disease in coffee fruits.

In people

Ringworm it makes patches on the skin.

- Athlete's foot. It attacks the skin in between the toes. - Thrush. It is caused by Candida. It causes white patches in the mouth and on the tongue. It also causes infections in the vagina and the penis. - Finger nails deformation. These diseases are called fungal infections.

Prevention and control of fungi

- Avoiding warm temperatures and moisture conditions in food material. Cold dry conditions prevent fungi and bacteria.
- Drying foods e.g. cassava, groundnuts, maize, fish, and meat makes the moisture evaporate and prevent fungal attacks.
- Boiling milk (pasteurization) boiling drinking water- reheating cold food before eating it.

- Salting This is putting of vegetable and other foods in an edible acid e.g. vinegar. This preserves food and vegetables.
- Avoid eating cold uncovered food.
- Fungal diseases in plants should be sprayed with fungicides.

Similarities between bacteria and fungi

- They both respire by taking in oxygen and giving off carbon dioxide.
- They have two ways of feeding, i.e. parasitically or saprophytically
- Some cause diseases while others are useful.
- They feed on both living and dead organic matter.
- Some fungi and bacteria are single celled while others are multicellular.
- They do not make their own food.

TERM THREE

TYPE OF CHANGES IN THE ENVIRONMENT

To change means to become different.

Environment: These are people and their surroundings.

Types of changes in our environment

- | | |
|----------------------|-------------------------|
| i. Physical changes | iii. Biological changes |
| ii. Chemical changes | iv. Atmospheric change |

Biological changes:

These are changes that take place in living things.

They take place in body cells and affect growth.

Examples of biological changes in plants

Growth	Ripening of fruits
Germination	Flowering
Fertilization	Fruiting etc.

Examples of biological changes in animals

- Growth
- Moultling
- Camouflaging
- Weight loss/gain
- fertilization

Characteristics of biological changes

- They are irreversible.
- New organisms come into being e.g. young ones of animals, seedlings in plants.
- Young ones grow old.
- Increase in number of off springs
- Increase in harvest/yields.

Importance of biological changes

- They cause increase in the number of offsprings.
- They prevent extinction of plants and animals.
- They enable us to get food from plants and animals.

Chemical changes

These are irreversible changes where new substances are formed.

Characteristics of chemical changes

- A new substance is formed
- They are irreversible
- Heat or light is sometimes given off or absorbed
- The amount size and weight of the object changes.

Examples of chemical changes

- | | |
|---|--|
| <ul style="list-style-type: none"> • Burning of materials to ash • Rusting of metals • Respiration • Fermentation | <ul style="list-style-type: none"> • Digestion • decomposition |
|---|--|

Advantages of chemical changes

- Burning produces heat for warming ourselves during cold weather, cooking, ironing, etc.
- Respiration helps in production of energy in the body.
- Decomposition helps in formation of humus.
- Fermentation helps in production of alcohol.

Disadvantages of chemical changes

- Rusting destroys metals.
- Burning causes air pollution.
- Decomposition leads to spoilage of our food.

Physical changes

Physical changes are reversible changes where no new substances are formed.

Examples of physical changes

- | | |
|---|---|
| <ul style="list-style-type: none"> • Evaporation • Condensation • Freezing | <ul style="list-style-type: none"> • Dissolving of salt in water • Melting of candle wax • Breaking of glass |
|---|---|

- Melting

- Sublimation

Characteristics of physical changes

- They are reversible.
- No new substance is formed.
- No heat or light is given off or absorbed.

Note: Some physical changes are irreversible e.g. breaking of glass, breaking of glass, splitting of wood, etc.

Advantages of physical changes

- They help in formation of rain.
- They help in formation of ice cubes.
- They help in production of alcohol and pure water by distillation.

Weather changes in the atmosphere (atmospheric changes)

These are changes that take place in the atmosphere,
The atmosphere is the space above the earth.

Examples of atmospheric changes

Formation of rain (rain cycle)

Wind movement

Storms

Weather changes

Natural and man-made changes

Natural changes

These are changes that occur on their own without man's influence.

Examples of natural changes

- Growth
- Wind movement
- Rain cycle
- Floods
- Earth quakes
- Landslides
- Change in seasons

ACTIVITY

Classify the natural changes into good and bad changes.

People made changes

These are changes caused by people.

Examples of people made changes

- ❖ Planting trees
- ❖ Growing crops
- ❖ Deforestation
- ❖ Construction of roads
- ❖ Construction of houses
- ❖ Making machines
- ❖ Swamp drainage
- ❖ Bush burning

Activity

Group the people made changes into good and bad changes

Effects of people made changes

- ❖ Tree planting helps in rain cycle.
- ❖ Growing of crops helps in production of food.
- ❖ Road construction improves on transport.
- ❖ Construction of houses improves on shelter.
- ❖ Deforestation leads to reduction in rainfall received.
- ❖ Swamp drainage destroys habitats of aquatic animals and leads to floods
- ❖ Bush burning leads to destruction of animal habitats, air pollution, etc.

Activity

1. In one sentence give the meaning of the word environment.
2. Point out any two importance of people made changes in the environment.
3. Mention any two types of changes in the environment.
4. What are physical changes?
5. Give any two examples of physical changes.
6. Of what advantage are physical changes to man?
7. Suggest one characteristic of a chemical change.

Effects of different changes in the environment to plants and people

- a. **Mulching**
 - Control the growth of weeds
 - Preserves moisture in the soil

b. Tree cutting

Effects:

- Destroys the environment
- Leads to soil erosion
- Reduces the amount of rainfall

c. Bush burning

Effects

- Causes Soil erosion.
- Leads to loss of soil fertility
- Destroys habitats of animals
- Leads to air pollution

d. Building houses

Effects

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

d. Effect of road construction

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

e. Pollution

Pollution is when toxic substances are released into the environment.

Pollutants are the materials which pollute the environment.

Examples of pollutants

- Plastics
- Polythene papers
- Oil
- Scraps
- Chemical
- Fumes from industries
- Fumes from cars

GENERAL EFFECTS OF POLLUTION TO THE ENVIRONMENT

- Pollution lowers the quality of the environment
- Pollution leads to respiratory diseases
- Pollution leads to environmental degradation
- Pollution leads to mental retardation.
- Pollution leads to death of organisms in the soil, air and water.
- Pollution leads to death of aquatic animals.
- Pollution destroys the rain cycle

THEME: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATION

GOAT KEEPING

Goat keeping is the rearing and management of goats.

Common terms used in goat keeping

1. **A nanny goat** is a mature female goat.
2. **A Billy goat** is a mature male goat.
3. **A kid** is any young goat.
4. **Kidding** is the act of giving birth in goats.
5. **Browsing** means feeding on the soft parts of a plant.

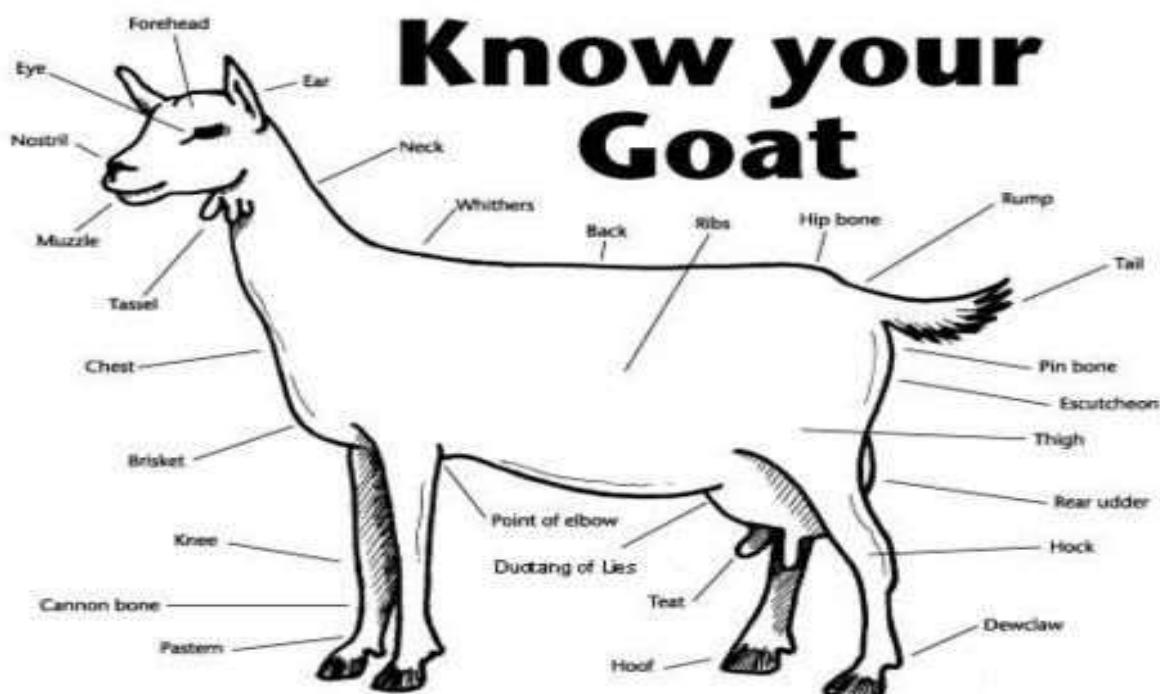
Reasons why people keep goats

1. For milk production.
2. For meat production.
3. For income after sale (To sell and get money)

Other uses of goats to people

- ✓ Skins from goats are used to make leather products like shoes, straps for watches, belts, drum tops, bags and costumes for dancing among others.
- ✓ Droppings from goats is used to make farmyard manure.
- ✓ Goats are used to pay dowry / bride price.

EXTERNAL PARTS OF A GOAT



Mouth – for feeding.

Ears – for hearing.

Tail – for chasing away flies.

Udder – produces and stores milk.

Teats – lets out milk.

Legs – for movement.

Eyes – for seeing.

Hooves – protect the feet from harm.

ACTIVITY

BREEDS OF GOATS

A breed of goats is a family of goats with similar characteristics.

Groups or types of breeds of goats

There are two main groups of breeds of goats namely;

- 1) Local breeds (indigenous or native breed)
2. Exotic breeds

Local breeds or indigenous breeds

These are breeds that have been kept in the Uganda for a long time.

Local breeds are mainly kept for meat.

Characteristics of local breeds of goats

- They are resistant to tropical diseases.
- They can survive on little pasture and water.
- They can withstand harsh weather conditions.
- They take long to mature.

Examples of local breeds of goats

- i) Mubende goats
- ii) The Somali (galla) goat
- iii) Turkana
- iv) Sambaru goats

Advantages of local breeds

- i. Local breeds are more resistant to tropical diseases.
- ii. Local breeds can withstand harsh weather conditions.
- iii. Local breeds are easy to manage as they feed by browsing.

Disadvantages of local breeds

- i) They take long to mature
- ii) They provide hard meat.
- iii) They provide less meat and milk.

Activity

1. Identify any two advantages of rearing local breeds of goats.
2. State any one disadvantage of rearing local breeds of goats.

EXOTIC BREEDS OF GOATS

Exotic breeds are breeds which were imported into Uganda from other countries.

Characteristics of exotic breeds of goats

- They are less resistant to tropical diseases.
- They cannot survive on little water and pasture.
- They produce soft meat.
- They produce a lot of milk.
- They mature fast.

Examples of exotic breed of goats

- i. Toggenburg
- ii. Angora goats
- iii. Saanen goats
- iv. Boer goats
- vii Alpine goats
- v) Anglo-Nubian

Advantages of local breeds

- They produce soft or tender meat.
- They produce a lot of milk and meat.
- They grow and mature fast.
- They fetch a lot of money when sold.

Disadvantages of local breeds

- They cannot survive on little water and pasture.
- They are expensive to keep.
- They are not resistant to worms and diseases.
- They cannot withstand harsh weather.
- They need special feeds to produce better products.

Cross breeds

-These are goats got after cross breeding.

-Cross breeding is the mating of two different pure breeds e.g. a local breed with an exotic breed.

-Cross breeding helps to improve on the quality of local breeds.

Example of cross breed goat

Somali goats

Types of goats

A type of goats is a class of goats kept for a specific purpose.

There are two types of goats namely;

1. Milk goats/meat breeds
2. Meat goats/milk breeds

Meat breeds

These are goats kept for mainly meat.

Examples

- i. Boar goat
- ii. Galla goats
- iii. Mubende
- iv. The Somali goats.

Milk breeds

These are goats kept for mainly milk production.

Examples

- i. Saanen goats
- ii. Toggenburg
- iii. Alpine goats

- ▶ It has a large udder and teats.
- ▶ Have large milk veins which appear below the belly.
- ▶ Have strong and well placed hind legs.

Wool breeds

These are goats kept for mainly mohair.

Example

Angora goats

ACTIVITY

1. Identify any two breeds of goats kept for milk production.
2. Mention two breeds of goats kept for meat .
3. Give any two reasons why people keep goats.
4. What is the gestation period of a nanny goat.

ACTIVITY

1. What is a breed?
2. Mention two main breeds of goats in Uganda.
3. State any two signs of heat period in goats.
4. What is lactation period?

BREEDING IN GOATS

Breeding is the process of mating and producing young ones in animals.

Types of breeding

- ▶ **Inbreeding**- the mating of very closely related animals like brother and sister, mother and son.
Note: Inbreeding has the following disadvantages;
 - It can maintain a poor breed.
 - It slows down the growth rate of offsprings.
 - It may lead to production of offsprings with reduced resistance to disease.
- ▶ **Line breeding** – mating of animals of the same breed but of different ancestors.
- ▶ **Cross breeding** – the mating of two different pure breeds. E.g. local breed and exotic breeds.

Cross breeding improves on the quality of local breeds by;

- promoting faster growth rate.

Note: A female goat allows to be mated only during heat period.

HEAT PERIOD IN GOATS

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

Signs of heat in a nanny goat

- The nanny goat becomes restless (unsettled)
- The vulva swells and becomes reddish.
- Mucus discharge from the vulva.
- Mounting other goats.
- Standing still when mounted.
- Loss of appetite.

Reproduction

Reproduction is the process by which living things give rise to offspring.

Goats undergo internal fertilization.

Goats reproduce by giving birth to live young ones.

The act of giving birth in goats is called **kidding**.

Gestation period of a goat

Gestation period is the period of pregnancy in animals.

OR

Gestation period is the period between conception and birth.

Gestation period is the time taken from fertilization to birth in animals.

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

CARING FOR A PREGNANT GOAT

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

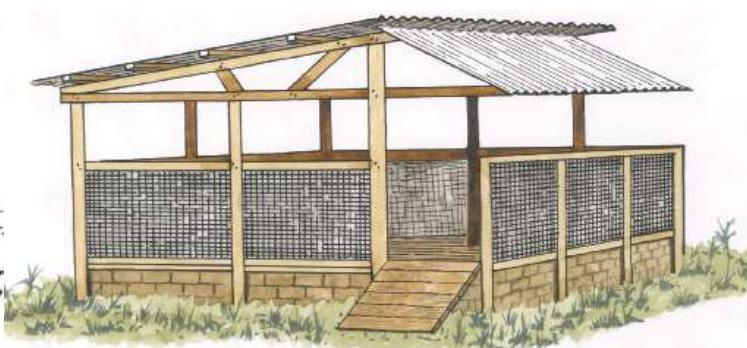
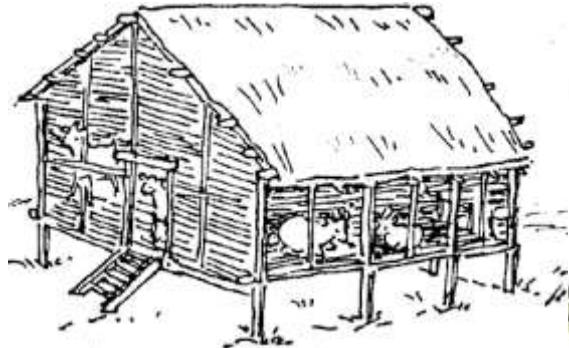
Housing of goats

Housing means providing shelter to animals.

Reasons for housing goats

- ✓ To protect them from bad weather.
- ✓ To protect them from predators.
- ✓ To protect them from thieves.

Structure of a goat house (pen)



GRAZING GOATS

Grazing is the feeding of animals on pasture.

There are many methods of grazing animal, namely:

Goats like feeding by browsing.

Browsing is the feeding on the soft parts of a plant by goats.

Methods of grazing goats

- a) Free range grazing
- b) Zero grazing
- c) Rotational grazing

Free range grazing (herding)

This is where the animals are left to roam and gaze freely.

Sometimes the animals are guided by the herdsman as they graze.

Advantages of free range grazing

- It is cheap in terms of feeding.
- The animals feed on variety of feeds.
- The animals get plenty of exercises.

Disadvantages of free range grazing

- Animals can easily get lost.
- Animals can easily be stolen by thieves.
- Animals can stray and spoil crops.

Zero grazing (stall feeding)

This is a method where animals are kept and fed indoors.

An illustration of zero grazing



Advantages of zero grazing

- It is easy to feed the animals in one place.
- Many animals can be kept in a small place.
- It is easy to collect manure.
- Goats are protected from harsh weather conditions as they are kept indoors all the time.

Disadvantages of zero grazing

- It is expensive to start and manage.
- It is tiresome to feed the goats and provide water.
- It needs a lot of attention and labour.
- In case of a disease outbreak, there can be easy spread since the goats are in close contact most of the time

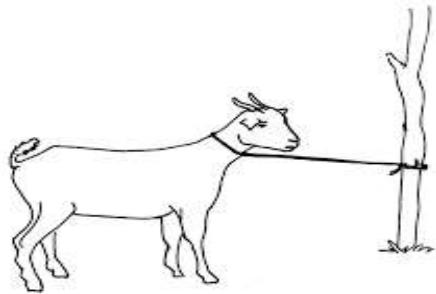
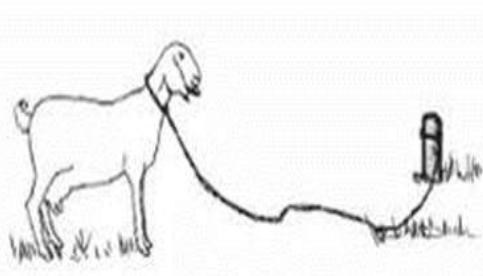
Rotational grazing

This method is divided into three, namely;

- i) Tethering
- ii) Strip grazing
- iii) Paddock grazing

Tethering:

This is where an animal is tied with a rope onto a peg or tree to graze around.



Advantages of tethering

- It ensures efficient use of pasture
- It enables the growth of pasture in other areas.
- It Controls soil erosion as over grazing is avoided.
- It Controls spread of parasites and diseases.

Disadvantages tethering grazing

- Animals cannot get enough food (pasture).
- It is tiresome to keep on changing the animals.
- The rope can cause injuries to the animal.
- It is tiresome to keep on changing the animals.
- The ropes used can sometimes strangle the animal to death.
- Only few goats can be reared in a small space.

ROUTINE ACTIVITIES IN GOAT MANAGEMENT

What are routine activities?

Routine activities are any good management practices carried out on any livestock farm to improve production and avoid losses.

Examples of routine activities on a livestock farm.

Castration	Drenching
Disbudding	Spraying or dusting
Dipping	Dosing
Hoof trimming	Feeding

ACTIVITY

1. What are routine jobs?
2. Mention any three routine jobs in goat management.
3. What is castration?
4. Give any two methods of castration.

Castration

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

Methods of castration

Open castration

Closed castration

Use of a loop

Open castration

This is where the scrotum is cut open using a sharp object and the testes removed.

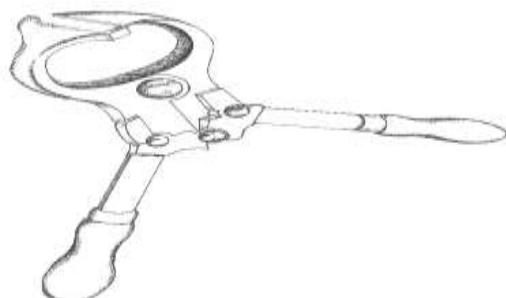
Tools used in open castration

Knife, razorblade, surgical blade

Closed castration

This is a method where a burdizzo is used to crush the sperm duct and blood vessels.

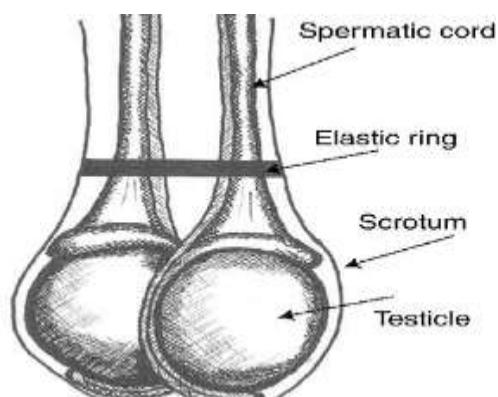
Diagram of a burdizzo



Use of a loop

In this method, an elastic rubber band is used to squeeze the sperm duct.

When the sperm duct and the blood vessel are broken, the testes shrink and die.



Advantages of castration.

- ✓ It makes animal grows fatter and faster.

- ✓ It prevents the spread of venereal diseases (VDs)
- ✓ It helps to make the male animal calm (docile) and easy to handle (tame)
- ✓ Castration helps to improve on the quality of meat.

Disadvantages of castration

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

Dehorning or disbudding

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

Methods of dehorning or disbudding

- Use of a spoon dehorner
- Use of chemicals
- Use of dehorning iron

Advantages of disbudding

- ✓ It prevents animals from injuring themselves and the farmer.
- ✓ It creates more space on the farm.

Disadvantages of disbudding

- ✓ The animal feels a lot of pain.
- ✓ The wounds created may become septic.

Other farm management practices

a) **Hoof trimming:** Is the cutting off of over grown hooves.

It is normally done in sheep. A trimming knife or hoof trimming shears are used.

Importance:

- It prevents injuries.
- It prevents foot rot infection.

b) **Dipping:** Is the bathing of livestock in acaricides in a dip tank.

Importance:

- It helps to kill ecto-parasites e.g ticks.

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

Drenching is done using a drenching gun or bottle.

d) **Spraying:** Is when a fumigator or knap sack sprayer is used to spray chemical

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

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

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

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

SHEEP KEEPING

This is the rearing and management of sheep.

Terms used in sheep rearing

a) **Ram:** a mature male sheep.

b) **Ewe:** a mature female sheep.

c) **Lamb:** a young one of a sheep.

d) **Lambing:** Is the act of giving birth in sheep.

e) **Mutton:** Is the meat of sheep.

f) **Shearing:** Is the removal of over grown wool from the sheep.

g) **Docking:** Cutting short of lamb's tail.

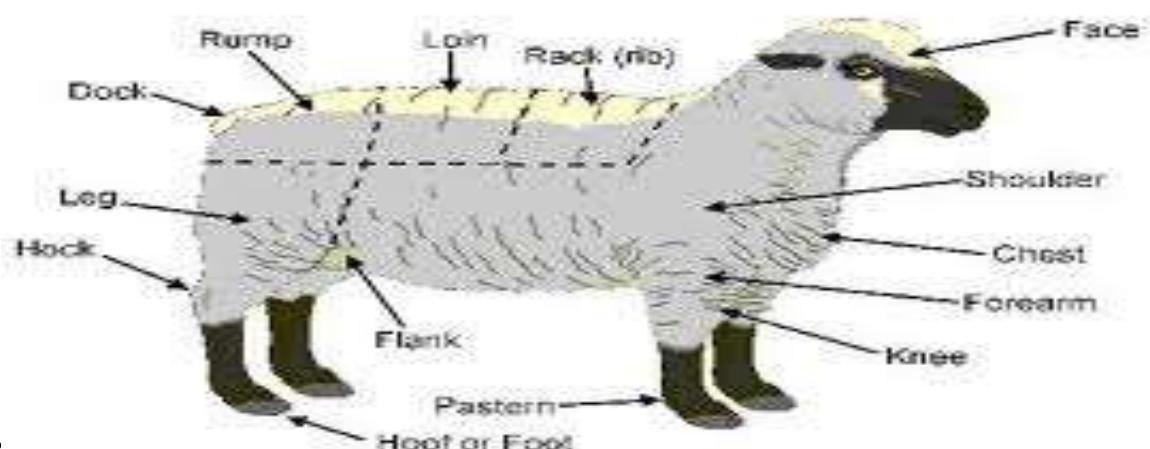
Reasons why people keep sheep

- To get mutton (meat).
- To get income after sale.
- To get wool.

Other importance of sheep

- Their droppings are used as manure.
- Skin from sheep are used to make leather products like bags, wallets, etc.

External parts of a sheep



Breeds of sheep

A breed of sheep is a group of sheep with similar characteristics.

Groups of breeds of sheep

1. Local breeds (indigenous breeds)
2. Exotic breeds

Local breeds (indigenous breeds)

These are breeds that have been kept in Uganda for a very long time.

They are mainly kept for mutton.

Characteristics of local breeds of sheep

- They are resistant to tropical diseases.
- They can survive on little water and pasture.
- They take long to mature.

Examples of local breeds of sheep

- Somali sheep
- Maasai sheep
- Black-head Persian sheep

ACTIVITY

1. EXPLAIN THE MEANING OF THE FOLLOWING TERMS
 - Lamb
 - Mutton
 - Shearing
 - Docking
2. Give the importance of docking a female sheep.
3. Why do farmers keep sheep?

Exotic breeds of sheep

These breeds that were imported into Uganda.

They are kept for both mutton and wool.

Characteristics of exotic breeds of sheep

- They grow very fast.
- They are not resistant to diseases.

Examples of exotic breeds of sheep

- Merino sheep
- Romney marsh

- Dorper sheep.
- Corriedale
- Ramboulet

Types of sheep

This is a class of sheep kept for a specific purpose.

These include;

- Mutton breeds
- Wool breeds

Mutton breeds

These are breeds kept for mutton.

All local breeds are reared for mutton e.g

- Black headed Persian.
- The Somali
- The maasai sheep

Exotic meat breeds kept for mutton

- Hampshire
- Dorper
- Chirot
- Sufflock
- Dorset

Wool breeds

These are sheep kept for mainly wool production.

Examples of wool breeds of sheep

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

Dual purpose sheep

Dual purpose sheep are the sheep kept for both mutton and wool production.

Examples of dual purpose sheep

- Romney marsh
- Corriedale sheep

Importance of docking sheep

To allow easy mating

- i) The skin used to make feather, product like belts, bags, shoes, e.t.c
- ii) Horns and hooves used for making office glue, buttons or decorations.
 - For cultural purposes e.g sacrifice, rituals, pay dowry or bride wealth.

BREEDING IN SHEEP

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

Sheep undergo internal fertilization and reproduce by giving birth to live young ones.

The young one of a sheep is called a **lamb**.

The act of giving birth in sheep is called **lambing**.

Gestation period in sheep

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

ACTIVITY

1. Mention two examples of exotic breed of sheep.
2. Which exotic breed of sheep is well known for wool?
3. What is the gestation period of the sheep?
4. How do call a male sheep?
5. Mention any one sheep keep for meat.

Note: Heat period and systems of grazing in sheep are the same as in goats

Management practices in sheep

- Shearing
- Docking
- Castration
- Hoof trimming
- Deworming (dozing and drenching)

Shearing

This is the removal of wool from sheep.

Shearing is done using a tool called shears.

Shearing is usually done in the dry season.

Reason why shearing is done only in the dry season

There is enough heat to keep the sheep warm without wool on their bodies.

Reason why shearing is done in sheep

To get wool

Docking

It is usually done in ewes.

Reasons for docking in sheep

- To make mating easy.
- To prevent dung from covering the tail.
- For even distribution of fats all over the sheep's body.

Note: Docking helps to ease mating by exposing the vulva.

Products from sheep

- Mutton
- Wool
- Skins

Products from wool

- Blankets
- Sweaters
- Scarfs
- Woolen carpets

Diseases of sheep and goats

Diseases in goats and sheep are caused by bacteria, viruses and protozoa.

Disease	Cause and spread	Signs and symptoms	Control
Heart Water	Caused by bacteria called Rickettsia. Spread by ticks to goats.	Convulsions.	Tick control Treat the sick animals.
Anthrax	Caused by bacteria. Affects pigs, goats, sheep.	High fever.	Vaccination. Early treatment. Burn the carcasses or bury them more than 3 metres deep.
Foot rot	Caused by bacteria, attacks hooves of animals	Lameness. Hooves contain pus.	Treat with antibiotics. Trimming regularly and removing affected parts.
Brucellosis	Caused by bacteria, attacks goats and sheep.	Female animals abort. Milk from infected animals cause Malta fever in humans.	Vaccination. Treat with antibiotics.
Black water	Caused by clostridium	Increased temperature.	Vaccination. Treat with antibiotics.

	soil.	Dullness. Death.	
Nairobi sheep disease	Caused by a virus localized in Eastern Africa.	Blood stained diarrhoea. Discharge from the mouth and nose plus difficulty in breathing. Abortion	Vaccination
Lamb dysentery	Caused by a bacterium. Affects sheep and goats.	Blown up stomach Dullness and sudden death in lambs. Brownish diarrhoea. Staring eyes and staggering.	Regular deworming and drenching. Keep in warm, clean and ventilated buildings. Vaccination.
Mastitis	Caused by bacteria. It is contagious in sheep and goats.	Pus and blood in milk. Swollen udder.	Use strip cup to detect it in milk Treat using antibiotics.
Foot and mouth disease	Caused by a virus. Affects goats, sheep and pigs.	Lameness Blisters on the tongue, mouth, feet and other parts of the skin.	Vaccinate every six months. Treat in isolation.
Pneumonia	Caused by a virus or bacteria. Affects goats and pigs.	Difficulty breathing. Coughing.	Treat with antibiotics. Keep animals in warm shelter

Parasites in sheep and goats

A parasite is a living thing that depends on another living thing for food and shelter.

Parasites can be grouped into two:

2. Internal parasites (endo parasites)

External parasites (ecto parasites)

These are parasites that live outside on the body of the host.

Examples of ecto parasites in sheep and goats

Ticks, mites, fleas, tsetse flies

Ways of controlling ecto or external parasites in goats and sheep

- ✓ Spraying with acaricides
- ✓ Dipping the animals in acaricides
- ✓ Carrying out paddock grazing

Endo or internal parasites

These are parasites that live inside the body of the host.

Examples of endo or internal parasites in sheep and goats

- ✚ Round worms
- ✚ Liver fluke
- ✚ Tape worms

Ways of controlling endo parasites in sheep and goats

By deworming

Avoid grazing animals in areas with stagnant water (to control liver flukes)

Deworming

This is the giving of animals medicine to eliminate internal parasites or worms.

Note:

Deworming is divided into two methods i.e. dozing and drenching.

Dozing is the giving of animals solid medicine to control internal parasites.

Drenching is the giving of animals liquid medicine through the mouth.

Drenching is done using a tool called **drenching gun**.

PIGGERY (KEEPING OF PIGS)

Piggery is the rearing and management of pigs.

TERMS USED IN PIGGERY

A sow	-Is a mature female pig
Boar	-A mature uncastrated male pig
Piglet	-Is any young pig
Gilt	-Is a female young pig
Sty	-Housing structure for pigs.
Hog	-A castrated male pig
Farrowing	-Is the act of giving birth in pigs
Litter	-Is a group of piglets born in the same birth by the same sow.
Pork	-Fresh meat from pigs
Bacon	-Meat from the back and sides of pigs.
Lard	-Fats from pork.
Ham	-Dry processed meat of pigs.

Reasons why farmers keep pigs

- a) To sell and get income.

Other importance of pigs

- Their droppings can be used as manure and biogas production.
- They are sources of employment to farm workers.
- Their hair can be used to make bristles of brushes.

ACTIVITY

1. Explain the following term in piggery.

- a sow
- a gilt.
- Sty.
- Farrowing.

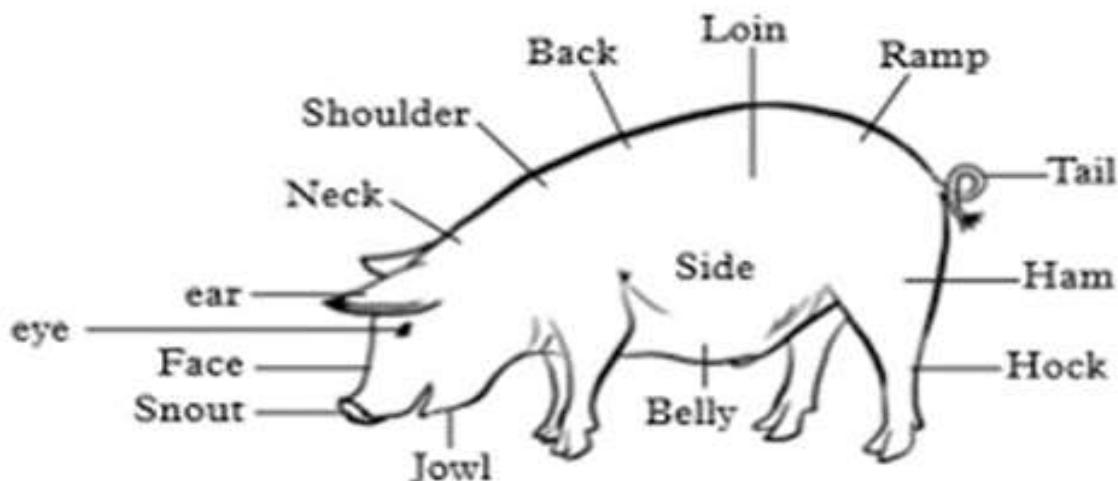
2. Give two reasons why farmers keep pigs.

3. State any one characteristic of local breeds of pigs.

Advantages of piggery

- a) Piggery is very profitable if managed well.
- b) Need little to begin.
- c) Requires a small piece of land to start the piggery farm.
- d) Creates employment to farmers and other people in the community.
- e) Profits can be realized in short period.
- f) Pigs are easy and cheap to manage as they feed on all types of food.

EXTERNAL STRUCTURE OF A PIG.



Uses of some parts

Snout – for digging the ground to get food.

Legs – for movement.

Teats – to let out milk

ACTIVITY

BREEDS OF PIGS

A breed of pigs is a family of pigs with similar characteristics.

There are two main groups of breeds of pigs kept in Uganda namely:

1. Local breeds (Indigenous breeds)
2. Exotic breeds (Foreign breeds)

LOCAL BREEDS

Example of breeds of pigs:

Black pigs

Spotted pigs

CHARACTERISTICS OF LOCAL BREEDS OF PIGS

- Local breeds grow slowly.
- Local breeds produce low quantities of pork.
- They are small in size.
- They are not easily attacked by diseases.

EXOTIC BREEDS

Are breeds that were imported from other countries.

Examples of exotic breeds

- Large white or Yorkshire
- Land race
- Poland China.
- Hampshire
- Middle white
- Saddle back
- Berkshire

Characteristics of exotic breeds

- Have the same ancestor
- Have the same ability to produce pork, bacon and ham.
- Have the same ability to grow fat and mature quickly.
- They mainly have the same colour.
- They have the ability to farrow the same number of litter.

WILD PIGS

These are pigs that live entirely in the bush.

Examples:

- Wart hogs
- Bush logs
- Hedge hogs.

Cross – breeds (hybrids)

- Cross-breeds (hybrids)

These are a result of mating two different pure breeds.

Characteristics of hybrid

- Produce better quality products compared to local breeds.
- They are more resistant to diseases than the local breeds.

•

ACTIVITY

1. What is piggery?

- A sow
- Gilt
- Boar
- Farrowing

3. Why do farmers keep pigs?
4. Mention one characteristic of local breed of pigs.
5. Give one example of exotic breed of pigs.
6. Suggest one reason for keeping exotic breed of pigs.

LESSON 12

1. Draw a pig and name the external parts

Advantages of keeping exotic breeds of pigs

- Produce high quality of pork and bacon.
- Mature fast and early.
- Can grow to a large size.

SYSTEMS OF KEEPING PIGS

The are two systems of rearing pigs namely;

- Extensive system
- Intensive system

Extensive system

This s where the pigs are left to roam about looking for food. Sometimes they are tethered.

Advantages of extensive system

- It is cheap to maintain.
- Pigs get to eat a variety of food.
- Extensive system requires less labour.
- Pigs get plenty of exercise as they move.

Disadvantages of extensive system

- Pigs can stray and destroy farmer's crops.
- The pigs can easily be stolen by thieves.
- Pigs are easily infected with diseases.
- Pigs can easily be killed by wild animals.
- The pigs can turn wild.
- Pigs can easily get worms and other parasites.

Intensive system

This is where pigs are kept and fed indoors (in a sty).

Advantages of the intensive system

MPS Science Lesson Notes

- Pigs are in most cases healthy (free from diseases)
- The death rate is low.
- Pigs receive maximum care and attention.
- It is easy to monitor individual pigs.
- Pigs grow and mature quickly.
- Pigs are not wild but rather friendly.
- Pigs are protected from bad weather.
- Pigs are protected from thieves.

Disadvantages of intensive system

- It is expensive to start and manage.
- It is tire-some as it requires a lot of labour.

Activity

1. Mention systems of rearing pigs.
2. Give the advantages of free range system.
3. Mention one disadvantage of free range system of keeping pigs.
4. Of what advantage is intensive system over extensive system?

Housing of pigs

A house for a pig is called a sty.

Reasons why pigs should be housed

- To protect them from bad weather e.g. too much sunshine.
- To protect them from thieves.

Factors considered when choosing a good site for a sty

- Well drained land (area).
- Nearness to the water source.
- Cool environment.

Characteristics of a good sty

- Strong and well build to prevent the pigs from escaping.
- The floor should be slanting to allow easy cleaning and flow of urine and faeces. Good drainage system inside and outside the sty to allow easy flow to wastes.
- Well ventilated to allow free circulation of air.
- Enough space for storage of feeds, water and farm equipment.
- Should have a farrowing pen for farrowing.
- Guard rails to prevent the sow from injuring the piglets while suckling.

REPRODUCTION IN PIGS

Pigs reproduce by giving birth to live young ones.

Pigs undergo internal fertilization.

The act of giving birth in pigs is called **farrowing**.

Young pigs are known as **piglets**.

Heat period

This is the period when a sow is ready to be mated.

A sow first comes on heat at 6 months.

- Restlessness
- The sow mounts other pigs.
- The sow stands still when mounted.
- The vulva swells and becomes reddish.
- Mucus discharge from the vulva.
- Loss of appetite.

Gestation period of a sow

Gestation period is the time from conception to birth.

The gestation period of a sow is **3 months, 3 weeks, and 3 days**

Steaming up

Steaming up is the feeding of female animals on special feeds.

When steaming should up be done in pigs.

At least 1½ months (45 days to farrowing)

Advantages of steaming up

- It increases milk production.
- It prevents low birth weights.
- It enables the foetus to grow well.
- It builds up the animal's body to prepare for farrowing.
- It prevents still birth.

FEEDING PIGS

Reasons why pigs should be properly fed

- To promote rapid growth.
- To keep them healthy.
- To produce high yields (more pork)

Types of feeds given to pigs

Pigs feed on variety of feeds like leaves, maize bran, cassava, sweet potatoes, etc. However, they can be fed on the following special types of feeds.

1. Creep feeds (given to piglets)

► It has high protein content to promote growth.

2. Sow and weaner meal (given to all breeding stock like boars, gilts, weaners, etc.)

3. Fattener or finisher meal (given to make pigs fatten and prepare them for sale or eating)

Note:

- ❖ Pigs are omnivorous i.e. they feed on both flesh and plants (vegetation)
- ❖ Pigs do not eat a lot of grass because they have a simple digestive system
- ❖ Pigs need a lot of water on hot days in order to keep cool.
- ❖ Pigs roll themselves in mud during hot days so as to cool themselves.
- ❖ Pigs eat a lot on cold days in order to maintain their body temperature.

Diseases and parasites of pigs.

There are many diseases and parasites that attack pigs for example:

- b) Pneumonia
- c) Anthrax
- d) Nagana (trypanosomiasis)
- e) Anaemia (piglet anaemia)
- f) Heart water
- g) Foot rot

DISEASE	CAUSE	SIGNS	SYMPTOMS	CONTROL / PREVENTION
Swine fever (Hog cholera)	Virus	Bloody diarrhea Difficulty in breathing Sore eyes Dullness Loss of appetite	High fever	Isolation of infected animals. Keep the house, water and equipment clean. Quarantine Kill, burn and bury infected animals. Vaccination at 6-7 weeks of age.
Pneumonia	Bacteria	Difficulty in breathing Coughing Discharge from the nose Loss of appetite		Treat with antibiotics Isolate the infected pigs.
Foot and mouth	Virus	Signs Sharp rising temperature Swelling of the mouth and feet. Loss of appetite Limping Reduction in milk		Vaccination Applying Quarantine in the infected areas Isolate the infected animals. Otherwise, there is no treatment.
Intestinal worms e.g. tape worms, round worms.		Swollen pot belly Loss of appetite		Regular deworming Drenching or closing the animals regularly Keep the feeds clean
Mastitis	bacteria	Inflamed teats Lack of milk The sow stops breast feeding the piglets	fever	Treatment with antibiotics

worms, Round worm and Ecto-parasites like ticks, red mites, depluming.

Note: Methods of controlling parasites in pigs are the same as in goats and sheep

Other practices carried out on a piggery

Castration

Tooth clipping

Record keeping

Hoof trimming (as in goats and sheep)

Tooth clipping

This is the cutting of sharp teeth of piglets.

It is done to prevent piglets from injuring the teats of the sow when suckling.

Castration

(As discussed in goats and sheep)

Note: The loop method of castration is not possible in pigs because their testes are firmly attached to the skin and not hanging.

KEEPING FARM RECORDS

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

Types of records kept on a piggery

- Litter records
- Farrowing records
- Feed records.
- Operation records.

Litter records:

It contains the number of piglets born together, piglet weaned in each round and the number of times a pig produces every year.

Farrowing records:

It is where we record the date of mating, the expected date of farrowing or delivery and the actual date of farrowing.

Feed records:

It is where we record the amount of feed given to the pigs daily.

Operation records.

This includes the weaning date, and the dates weighing, vaccination and drenching.

Reasons for keeping records

- For fair taxation.
- Records help the farmer to plan for the farm.
- Records help the farmer to know the income and expenditure of the farm.
- Records help the farmer to know if he is operating at a loss or profit.
- Records tell the history of the farm.
- Records enable the farmer to get loans easily.

Starting pigs, goats and sheep projects

(Factors to consider)

- ❖ Land
- ❖ Market
- ❖ Management
- ❖ Labour

ACTIVITY

1. Identify any two diseases of pigs.
2. State two signs of swine fever in a pig
3. What are farm records?
4. Mention any three types of records kept in piggery.

THEME: HUMAN HEALTH

TOPIC: PHC

PHC stands for **Primary Health Care**.

What is Primary Health Care?

This is the essential health care where individuals, families and communities come together to solve their health problems.

Health:

This is the state of physical, mental, social and spiritual well-being of a person.

Principles of PHC

These are basic rules that explain how PHC should be carried out in a community.

They include:

- ✓ Total health for all.
- ✓ Activities of the community must be organized according to priorities.
- ✓ All members must be involved and must participate in all activities.
- ✓ Many approaches must be used while carrying out P.H.C activities.

Elements of PHC

- Water and sanitation
- Immunization
- Family planning
- First aid
- Personal hygiene
- Control of communicable diseases
- Maternal and child health care
- Oral and dental health care

 Food and nutrition

 Healthy life styles

Water and sanitation

This element ensures the following:

- Provision of safe water
- Proper use of latrines or toilets
- Maintaining clean homes and clean environment.

Activities carried out under water and sanitation

- ✓ Protecting water sources from contamination.
- ✓ Cleaning water sources.
- ✓ Clearing bushes around the community.
- ✓ Draining stagnant water in the homes or community.
- ✓ Proper disposal of wastes in the environment, etc.

Food and nutrition

This element involves the following:

- ✓ Providing a balanced diet to family members.
- ✓ Teaching mothers about locally available foods and their values.
- ✓ Teaching about proper ways of handling food.

Health education

Health education is the way of making people aware of issues that affect their health.

It can also mean provision of information about health.

Ways through which people get health education

- Through story telling.
- Through songs e.g. songs about **covid-19, HIV/AIDS**, etc.
- Through newspapers and magazines.
- Through plays/drama.
- Through posters and billboards.
- Through social media e.g. WhatsApp, face book, etc.
- Through radios and televisions.

It helps to create awareness about diseases and how to prevent or control them.

Maternal and child health care

Services under this element include:

- ▶ Immunization of children.
- ▶ Control of diarrhoeal diseases (CDD) especially in children.
- ▶ Nutrition education for mothers.
- ▶ Antenatal and post natal care for mothers. Ante - means before, post - means after while natal means birth.
- ▶ Family planning services for mothers.

Roles of an individual in promoting PHC

- Bathing at least twice a day.
- Brushing teeth daily.
- Washing hands before handling food and after visiting a latrine.
- Washing clothes and beddings regularly.
- Cutting fingernails and toe nails short.
- Trimming hair.
- Practising proper waste disposal.

Roles of the family in promoting PHC

- Providing a balanced diet to family members.
- Constructing latrines for proper disposal of human wastes.
- Ensuring proper disposal of rubbish.
- Boiling water for drinking.
- Clearing bushes near the home.
- Sharing information about health.
- Avoiding drug abuse.
- Maintaining good food hygiene.
- Ensuring that family members are immunized.

Roles of the community in promoting PHC

- Cleaning water sources.

- Constructing public latrines in public places like bus parks, markets, etc.
- Providing public garbage containers for proper disposal of rubbish.
- Constructing public health centres.
- Maintaining the existing health centres.
- Organizing communal cleaning sessions.
- Organizing immunization programmes.
- Constructing rehabilitation centres for disabled people and people with mental problems.
- Organizing health parades in schools.

Healthy lifestyles

These are practices that promote good health.

They include:

- ✓ Having regular physical exercises.
- ✓ Eating a balanced diet.
- ✓ Having enough rest and sleep.
- ✓ Avoiding alcoholism and smoking.
- ✓ Abstaining from sex until marriage.
- ✓ Promoting proper personal hygiene.
- ✓ Going for regular medical check-ups.

Poor health lifestyles

These are activities that lead to poor health.

Examples of poor health lifestyles

- Alcoholism
- Smoking
- Drug abuse
- Lack of physical exercises.
- Lack of enough rest and sleep.
- Poor personal hygiene.

Health parade

This is an assembly organized to check on students' hygiene.

- ✓ Checking the cleanliness of children's uniform.
- ✓ Checking the cleanliness of children's shoes.
- ✓ Checking the cleanliness of children's hair.
- ✓ Checking children's uniform nails.
- ✓ Educating children on promotion of personal hygiene.
- ✓ Checking if children bathe.
- ✓ Checking if children brush their teeth.

Importance of regular physical exercises

- ✓ They promote physical fitness.
- ✓ They reduce the risks of heart diseases,
- ✓ They reduce excess fats in the body/prevent overweight (obesity).
- ✓ They make ligaments and tendons stronger.

People with special needs

These are people who need special care and help.

Examples

- The sick
- The disabled
- The young

Care for people with special needs

a) The sick

- ✓ Feeding them on a balanced diet.
- ✓ Washing their clothes and beddings.
- ✓ Taking them to health centres for treatment.
- ✓ Reminding them to take their medication.

b) The elderly

- ✓ Feeding them on a balanced diet.
- ✓ Washing their clothes and beddings.
- ✓ Helping them to cross the road.
- ✓ Helping them with house chores e.g. cooking, fetching water, collecting firewood, etc.

- ✓ Providing them with a balanced diet.
- ✓ Protecting them from harm.
- ✓ Washing their clothes and beddings.
- ✓ Taking them for immunization.

d) The disabled

These are people who are unable to use part of their bodies easily or completely.

Disabilities may be caused by physical birth defects, illnesses or injuries.

Examples of disabled people

- The blind
- The lame
- The deaf
- The dumb

Ways of caring for the disabled

- ✓ Helping the blind to cross the road.
- ✓ Helping the blind to find their way.
- ✓ Providing the lame with equipment that aid movement e.g. wheel chairs and crutches.
- ✓ Teaching the deaf and the dumb sign languages.

Theme: Human health

Topic: Alcohol, smoking and drugs in society

Alcohol in society

What is alcohol?

Alcohol is a drink which makes people drunk when much of it is taken.

Alcoholic condition

It is a condition where a person has a very strong desire of taking alcohol.

An alcoholic is a person who is addicted to taking alcohol.

Addiction

Addiction is a condition where a person has a strong desire for something.

Alcoholism

What is alcoholism?

Alcoholism is a condition of getting addicted to alcohol.

Factors that lead to alcoholism:

1. Being idle/idleness

When people have nothing to do, they might resort to taking alcohol to spend their leisure time.

2. Frustration

When people are disappointed, they may end up taking alcohol to get sleep.

3. Peer group influence

-Peers are people of the same age group and motives.

Peer friends that abuse alcohol always attract others.

4. Family background

Children from families that brew, sell or drink alcohol can easily end up becoming alcoholics.

5. Social environment

Children living in places with many bars get so much exposed to alcohol and end up becoming alcoholics.

Types of alcohol

1. Ethyl alcohol or ethanol.
2. Methyl alcohol or methanol.

Ethanol

Ethanol is a poisonous and addictive type of alcohol found mostly in alcoholic drinks or beverages.

-Ethanol is found in all alcoholic drinks or beverages that are consumed.

NB

Methanol

Methanol is a toxic, colourless, volatile flammable liquid alcohol.

-Methanol can lead to death or blindness if taken.

Uses of methanol or methyl alcohol

- It is mainly used as fuel.
- It is used to sterilize medical tools.
- It is used as a solvent in creating inks, dyes, etc.

Exercise

1. Name any two drinks containing alcohol.
2. What do we call a condition of being dependent on alcohol?
3. Name any two factors that can lead to alcoholism.
4. Name the type of alcohol that is commonly found in most alcoholic drinks.
5. Why is it very dangerous for people to drink methanol?
6. Write one useful way how people can use ethanol.
7. How is methyl alcohol useful to a medical doctor?
8. Write one thing produced in industries using methanol alcohol.

Alcohol production

Alcohol production is the way or process by which alcohol is made.

Common alcoholic drinks are made from juices of the following:

Bananas, pineapples, sugarcanes, maize, millet, cassava, rice, sorghum, etc. -

Methods of producing alcohol:

1. Fermentation method.
2. Distillation method.

Fermentation

It is the process of turning sugar in juice into alcohol with the help of yeast.

-Fermented fruit juices make wine while fermented starch mixture from grains or cereals make crude beer.

- a) Crude beer is produced.
- b) Yeast is used as a catalyst.
- c) Carbon dioxide is produced.

Yeast

Yeast is a fungus that speeds up the fermentation process.

Examples of fermented beer made in Uganda:

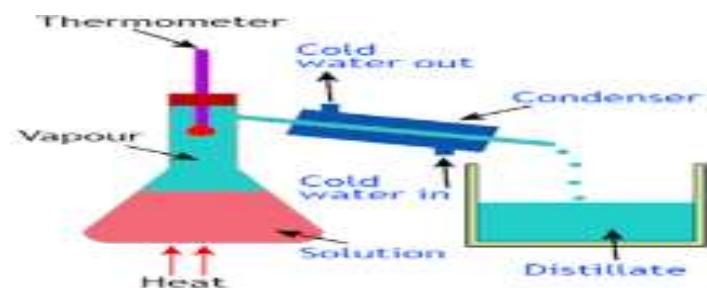
1. Tonto from bananas
2. Kwete from maize
3. Malwa from millet and sorghum
4. Munanansi from pineapples
5. Omuramba from sorghum
6. Beer from oats and barley

Distillation method

This is the process of turning fermented alcohol into pure alcohol.

- The alcohol in the fermented juice is heated and it evaporates.
- The alcohol vapour is condensed and collected.
- The collected liquid is called a **distillate**.

A diagram illustrating distillation process



NB:

- Heat is for heating crude beer to cause evaporation.
- Cold water is for condensing the vapour into a liquid.
- The liquid got through distillation is called a distillate.
- The delivery tube is usually coiled to increase the surface area for condensation.
- Distilled alcohol contains 30-50% of alcohol while fermented alcohol contains 2-12%.

- There is constant supply of cold water.

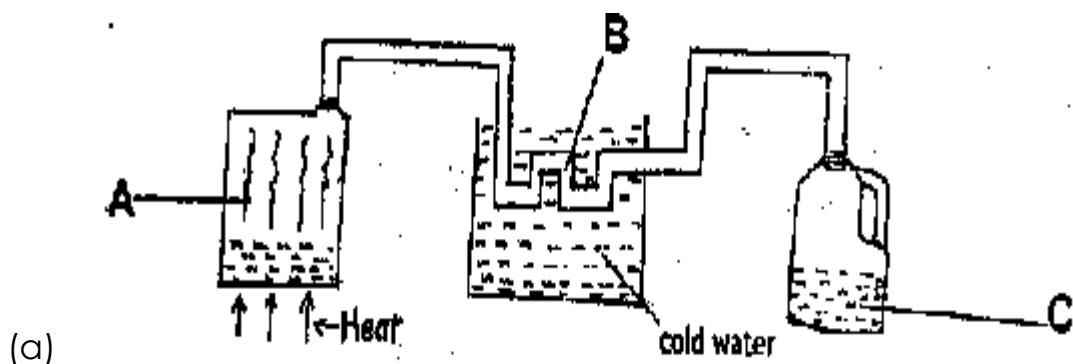
Examples of distilled alcohol:

- Waragi, whiskey, vodka, Gin, etc.

Exercise

1. By what process is sugary juice turned into alcohol?
2. List two examples of local fermented drinks in Uganda.
3. How is yeast useful during fermentation process?
4. By what process is crude beer turned into pure alcohol?
5. Name the form of energy that turns fermented beer into distilled alcohol.
6. **The diagram below shows a method of making alcohol.**

Use it to answer questions that follow.



(b) Name the process taking place at the parts marked:

i) A _____ ii) B _____

(c) State the importance of cold water in the above process.

(d) What scientific name is given to the liquid marked C?

7. Why is the delivery tube coiled at point B?

8. Give any other activity where the process above can be used apart from making alcohol.

Sub Topic: Effects of alcoholism

- a) To overcome their inability like shyness.
- b) To forget their problems.
- c) To pass time with friends.
- d) To celebrate their achievements.
- e) To socialise with friends who drink.

Effects of drinking alcohol:

Effects are the bad things caused as a result of an act.

- Alcoholism has many harmful effects on the drunkards' health, family, community, etc.

Immediate effects of alcohol to individuals:

- a) It makes a drunkard to vomit.
- b) Loss of body balance (moving while staggering).
- c) Loss of respect for law.
- d) It slows down communication between the eyes and brain.
- e) The person becomes forgetful.

Long term effects to an individual:

- a) Alcohol causes loss of appetite.
- b) Alcohol causes liver diseases.
- c) Alcohol causes peptic ulcers.

Body organs affected by alcohol:

- | | |
|------------|------------|
| a) Liver | b) Kidneys |
| c) Stomach | d) Brain |

Effects of alcoholism to the family of an alcoholic:

- a) It causes family neglect.
 - Alcoholics may only buy alcohol instead of family basic needs.
- c) Alcohol causes family violence.
- d) Family children may learn the habit of drinking alcohol.

Effects of alcohol to the society or community:

- a) It increases crimes in societies.
 - Alcoholics commit a lot of crimes under the alcohol influence.

d) Loss of very important people.

e) Low levels of development.

Ways how to avoid alcoholism:

- a) Get to know dangers of alcohol.
- b) Avoiding habitual drunkards.
- c) Do not believe in advertisements praising alcohol as a good drink.
- d) Engaging in useful activities to spend leisure time properly.
- e) Take your parents' and teachers' good advice seriously.
- f) Adults should avoid exposing children to alcohol.

Ugandan laws and penalties that govern alcohol:

1. Children should not drink alcohol.

-A child doing it is arrested and taken to probation courts.

2. Driving while drunk is prohibited.

-A person got is penalized with some fee or imprisonment.

Breathalyzer

Alcohol prescribed limit is detected using a breathalyzer.

It shows the content of alcohol one has taken.

3. Home distillation of alcohol is forbidden.

4. Transporting or selling home distilled alcohol is forbidden.

5. Public places selling alcoholic drinks should operate up to a limited time.

Exercise

1. Name the human body organ majorly affected by alcohol.

2. Apart from the organ you have given above, write other two organs that can be damaged due to alcoholism.

a) _____ b) _____

3. How does alcohol affect the family of an alcoholic?

4. Write two problems usually faced by people living in a community with many alcoholics.

(ii) _____

5. What does the law state about children and alcohol?

6. Suggest any two life skills one can use to guard against alcoholism.

a) _____

b) _____

7. What advice would you give to a P.6 child who has started drinking alcohol?

8. Write any one use of alcohol to people in Uganda.

Smoking Tobacco

Tobacco smoking is the inhaling of tobacco smoke.

Types of smoking:

1. Active smoking
2. Passive smoking

1. Active smoking

It is the inhaling of tobacco smoke directly from a tobacco pipe or cigarette.

Active smoker

An active smoker is a person who sucks tobacco smoke from a tobacco pipe or cigarette.

2. Passive smoking

It is the inhaling of smoke from the active smoker's cigarette.

A passive smoker

A passive smoker is a person who inhales smoke from the active smoker's cigarette.

Ways of taking tobacco:

- a) Smoking the tobacco
- b) Sniffing it through the nostrils.

Chemicals found in tobacco:

- a) Nicotine b) Tar c) Carbon monoxide

NB: Nicotine and tar are dangerous chemicals in tobacco.

- Carbon monoxide is the poisonous gas in tobacco smoke.
- Nicotine is addictive (once one takes it, he will want to take more all the time).
- Tar is a sticky poisonous substance that causes lung cancer.

Reasons why some people smoke:

- a) To relax and feel at ease.
- b) To concentrate on their work.
- c) To fit in peer groups.
- d) They admire smokers.
- e) To pass time.
- f) To look mature and attractive.

Effects of smoking on the body:

- a) It makes the smoker's teeth yellowish.
- b) It damages the smoker's sense of taste.
-This is because it damages taste buds on the tongue.
- c) Smoking causes stomach ulcers.
- d) Smoking causes mouth and throat cancer.
- e) Smoking causes heart attack.
- f) Smoking leads to some respiratory diseases.
- g) Smoking shortens the smoker's life expectancy.
- h) Child smokers develop more coughs, colds and shortness of breath.
- i) Smoking causes bad breath.

Effects of smoking to pregnant women:

- a) Pre-mature births.
- b) Under weight babies.
- c) Still births.

Diseases caused by smoking:

1. Lung cancer
2. Emphysema
3. Bronchitis

Effects of smoking to the family:

1. Smoking causes family neglect.
2. Fire outbreak at home resulting into loss of property and lives.
3. Poverty due to loss of income by buying cigarettes.
4. Family members become passive smokers.
5. Shortage of basic needs.

Effects of smoking to the community:

- a) Communities get weak and sick citizens who may not work to develop it.
- b) Death of community members.

Life skills to safeguard against smoking:

- Never be convinced to start smoking.
- Never believe in advertisements praising smoking.
- Be away from habitual smokers.
- Report children learning to smoke to elders or teachers.
- Engage in useful activities during your free time.
- Strengthening the NO smoking campaign to the public.

Exercise

1. What do we call the breathing in of smoke from burning tobacco?

2. How do the following chemicals from tobacco affect the smokers?

a) Nicotine. _____

b) Tar. _____

3. Name the body organ majorly affected by smoking

4. Name the two diseases caused due to smoking tobacco.

a) _____ b) _____

5. Write one problem faced by a child whose parents smoke tobacco.

6. Why is it bad for a pregnant mother to smoke?

7. Suggest any two life skills that can help in safeguarding against smoking.

a) _____

b) _____

DRUGS IN THE SOCIETY

What is a drug?

A drug is a chemical which affects the way one's mind and body works.

Types of drugs:

- a). Essential or medical drugs.
- b). Narcotics or drugs of dependence.

1. Essential drugs or medical drugs

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

Characteristics of essential drugs

- They cure diseases.
- They prevent diseases.
- They reduce signs and symptoms.
- They are effective

Qualities of essential drugs or qualities of good medicines:

- They should be affordable.
- They should be accessible and readily available.
- They should be very effective.
- They should be safe if the correct dosage is used.
- They should have a satisfactory value for money.

Examples of essential drugs:

- | | | | |
|----------------|----------------|------------|------------|
| 1. Panadol | 2. Fansider | 3. Coartem | 4. Quinine |
| 5. Amoxicillin | 6. Chloroquine | 7. Aspirin | |

Uses of essential drugs:

1. Vaccines.

For preventing diseases.

2. Curative drugs.

Kill germs and cure diseases.

3. Pain killers.

4. Contraceptives.

For preventing unwanted pregnancies

Types of essential drugs:

- a) Laboratory manufactured drugs.
- b) Traditional or local drugs.

Laboratory made drugs

They are drugs made and tested in laboratories.

Examples:

panadol, fansider, coartem, quinine

Characteristics of laboratory made drugs:

- a) They are carefully made and tested.
- b) Their strength, stability and purity is known.
- c) They are the same for each quantity.
- d) Their effects on human health is known.
- e) They are packaged and properly protected.
- f) They are well labelled.
- g) They have expiry and manufactured dates.

2. Traditional drugs

- a) They are drugs made locally from raw materials.

Examples of traditional drugs:

1. Kigagi 2.Bombo 3. Omululuza 4. Kabuuti

Characteristics of traditional drugs

- a) Their effects on human health is not well known.
- b) Their strength, purity and strength changes.
- c) They are not well packaged.
- d) They are made of raw plants and animals.

Exercise

1. What do we call a substance that changes the way the body and mind works?

a) _____ b) _____

3. What do we call medicines that satisfy the priority health care needs of the population?

4. How are essential drugs useful to the people in the community?

5. Give any two uses of medical drugs.

a) _____

b) _____

6. Give two advantages of laboratory made drugs over local ones.

a) _____

b) _____

7. Write any one example of essential drug commonly used in your community.

Drug or medical prescriptions

It is the health worker's advice on how to use a medical drug.

For example;

Interpretation

-**2x3** is a prescription

-It means **take two tablets or spoons of a drug times a day.**

Factors doctors considered when prescribing drugs:

- a) The age of the patient.
- b) Duration of treatment.
- c) Weight of the patient.

Advantages of drug prescriptions:

- a) They prevent taking overdose.
- b) They enable the patient to take correct dose.
- c) They prevent taking underdose.
- d) Patients get right instructions for using the drug.

If the drug is taken without drug prescription, the patient may either take under or over dose.

Drug overdose

- It is the taking of more medicine than the required dose.
- Taking overdose is dangerous to the body because it can lead to poisoning or death.

Drug underdose

- It is the taking of less medicine or drugs than what is required.
- Taking underdose is dangerous because it leads to drug resistance.

Drug misuse

- It is the taking of medical drugs without prescriptions.
- It results from self prescription of a drug.
- It is often caused by ignorance.

Factors that lead to drug misuse:

- a) Sharing drugs with others
- b) Failure to use or follow given prescriptions.
- c) Buying drugs from unqualified people such hawkers.
- d) Self medication

Self medication

- **It is taking of a drug without consulting health experts.**

Dangers of self medication

- a) It can lead to taking overdose or underdose.
- b) It may worsen one's health problems.
- c) It leads to risk of medicine abuse and addiction.
- d) One may take the wrong drug.

Storage of essential drugs:

Proper storage makes the drug last longer while poor storage makes drugs get spoilt very fast.

NB

1. Drugs should be protected from moisture, sunlight and dirt.

They should be stored in cool, dry and dark places like cupboards.

2. Drugs in containers should be well sealed.
3. They should be kept out of reach of children.
This prevents poisoning in children.

Storage of vaccines

Vaccines should be stored in refrigerators or coolers.

Exercise

1. What is a medical prescription?

-
2. Write down two advantages of drug prescription.

a) _____

b) _____

3. Mr. Muganga of Muhumuza Health Centre wrote 1x3 (morning, after lunch and after supper for three days) on a patient's medicine.

- a) What did he mean to the patient?

- b) How many tablets was the patient supposed to take in a day?

-
- c) How many tablets formed the dose?

4. Give the danger of taking the following:

- I) Drug underdose.

- II) Drug overdose.

5. Give two reasons why we take drugs when sick.

a) _____

Obtaining clean water from dirty water

- Clean water is water free from impurities

Water impurities:

- Impurities are contaminants or foreign objects in water.

Examples of water impurities:

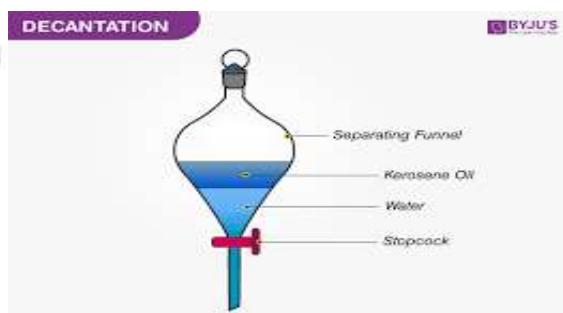
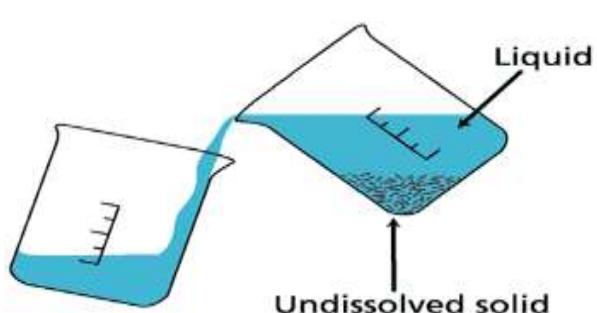
- Mineral salts
- Germs
- Human wastes
- soil
- herbicides
- Insecticides
- silt from erosion
- insecticides

Methods of obtaining clean water

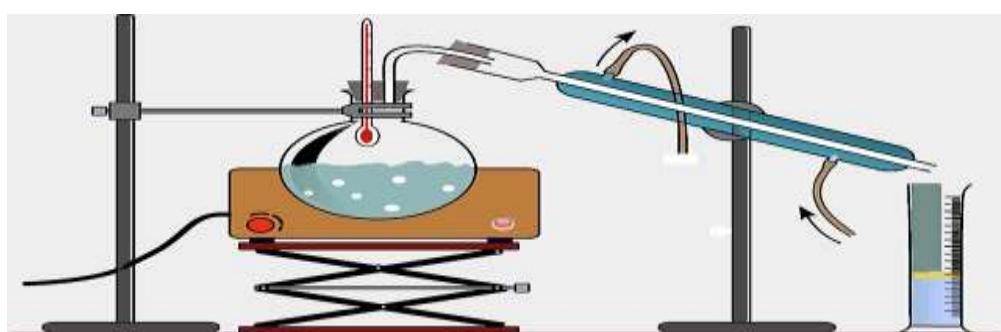
1. Filtration of water



2. Decantation of water



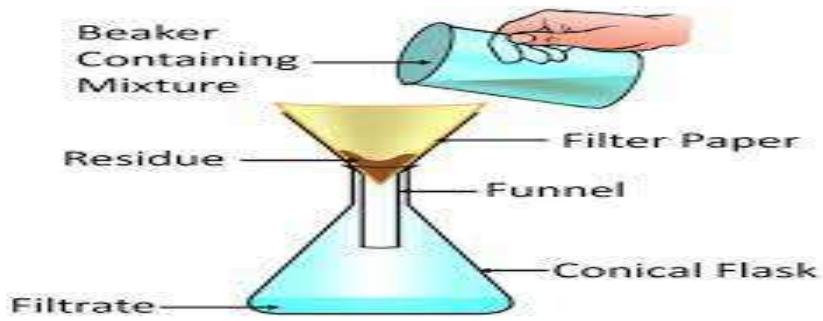
3. Distillation of water



Filtration of water

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- Filtration is the removal of solid particles from water by passing the mixture through a porous material.



Things used to filter water

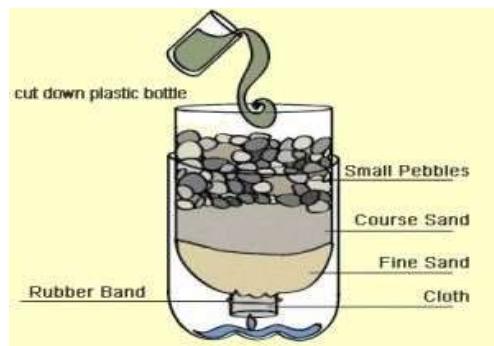
- Plastic filter



- Cloth filter



- Gravel filter



NB

1. Filtered water should be boiled before drinking it.
-This is because during filtration germs are neither removed nor killed since they are microscopic.
2. Filtered water is good for washing, cooking, mopping, etc

3. During filtration, the clean liquid got is called a **filtrate** and the solid matter removed are **residues**.

Application or uses of filtration method at home

- Removing tea leaves from tea.
- Removing fruit seeds from juice.
- Removing husks from local beer.
- Getting clean water from muddy water.
- Separating leaves from water got from open walls.

Exercise

1. Write two examples of water contaminants besides soil.

a) _____ b) _____

2. How can solid impurities be removed from water?

3. Name any two items that can be used to filter water.

I) _____ II) _____

4. When using gravel filter, what is the use of the following:

a) Charcoal? _____

b) Sand? _____

5. Why is water obtained by filtration not good for drinking?

6. Identify two activities done at home using filtration.

I) _____

II) _____

Obtaining clean water from dirty water

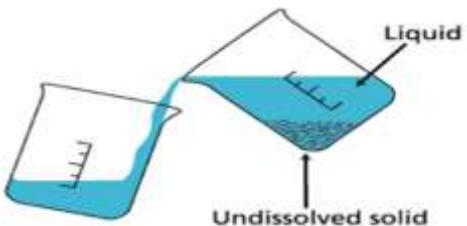
DECANTATION

This is the pouring off of clean water leaving the settled dirt at the bottom of a container.

How it is done

- Allow the mixture of water and dirt to settle for several hours in a covered container.
This allows most of the suspended dirt to settle at the bottom of the container.
- Carefully pour off clear water on top into another container.
- The clear water collected is not yet safe for drinking because decantation does not remove germs and neither does it kill germs.
Therefore, the water should be boiled if it is for drinking.

An illustration of decantation



WATER TREATMENT

For a large water supply like in a town, it is not easy to boil water.

- Therefore, chemicals can be used to treat water.
- The chemicals such as chlorine, water guard tablets etc. help to kill germs contained in water.

Water purification involves many stages namely:

1. Screening
2. Sedimentation
3. Filtration
4. Chlorination

a) Screening: is the removal of solid floating materials from the water.

b) Sedimentation: is the removal of impurities by allowing large particles to settle at the bottom of the tank.

Note:

1. Chemicals such as alum is added to water to make solid particles in water stick together forming large particles. This is called **coagulation**.

2. Sedimentation does not kill germs.

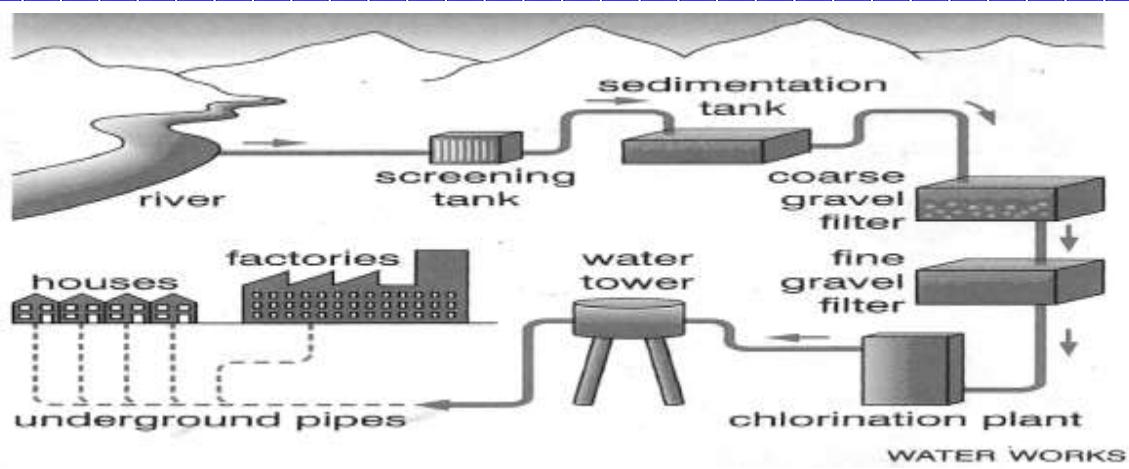
c) Filtration:

This is whereby large particles are filtered out leaving out clear water.

d) Chlorination:

- This is the addition of chlorine in its correct amount to kill germs contained in water.
- This makes the water safe for drinking.
- There are chlorine tablets which people use to put in their water for drinking.
- The water passes on to a big reservoir or tank for storage.
- It should be well covered to prevent re-contamination. This water is now pumped through pipes into our homes and factories for use.

A diagram showing the stages in purification of water



Note: Water supplied through the pipes still need to be boiled if it is to be drunk because it may get contaminated during the supply.

Exercise

1. Name the method of obtaining clean water that involve pouring off clean water leaving the dirt at the bottom of the container.
2. Why is the method you have named above not good for getting water for drinking?
3. How can germs be killed in water?
4. Name one chemical added to water to kill germs.
5. How is screening different from sedimentation as used in water purification?
6. State two ways of preventing drinking water from contamination.

(ii)



7. The diagram shows a method of obtaining clean water. What scientific name is given to the substance marked X?.

8. Give any two domestic uses of water.

WATER IMPURITIES AND USES OF WATER

Water impurities

- These are the suspended dirt in water.

Examples of water impurities:

- Human wastes (faeces and urine)
- Animal wastes (poultry droppings, cow dung, fodder)
- Pollutants from farm animals
- Silt from erosion

Note: Siltation is the deposition of fine soil particles into water bodies.

Uses of water

- The clean and safe water for drinking can also be used to clean clothes.
- Turns turbines connected to generators which produce hydro electricity.

Cleaning clothes in a home.

This involves the following steps;

1. Sorting clothes:

This is done to;

- separating clean clothes from dirty ones
- separate clothe accoing to colour
- separate heavy materials from light ones.

This makes washing easy which prevents wastage of soap and water.

2. Soaking clothes:

This is done to soften dirt or stains.

3. Washing clothes:

This is done to remove dirt from clothes.

4. Rinsing clothes:

This is done to remove soap and dirt from clothes.

5. Wringing:

This is done to remove excess water from clothes.

6. Hanging:

This is done to enable the cloth dry.

7. Ironing:

It is done to kill all the germs in a cloth, kill parasites and removes creases from the cloth.

Learners' activity

- 1) Name any two sources of water in our community.
- 2) Give two ways of making water clean and safe for drinking.
- 3) Ochwo felt thirsty after taking a race around the school playground. What does this show about our bodies?
- 4) Briefly explain the following terms as used in water purification

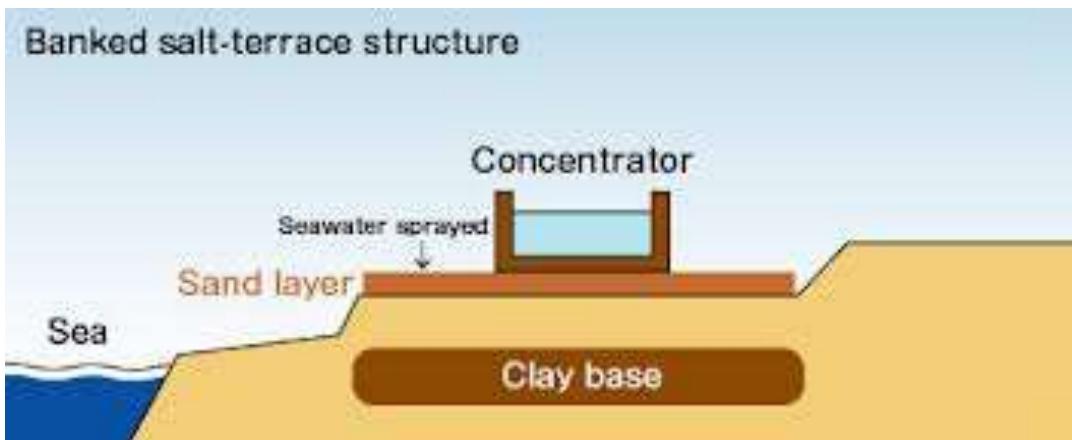
- a) Screening
 - b) Sedimentation
 - c) Chlorination
- 5) Point out any two examples of impurities found in water.
 6) Give two ways in which water can be useful to people.

PREPARING LOCAL SALT FROM ASH

Steps taken

- i) Carry and spray the sea water onto the sand on the terrace.
- ii) After drying the sand, scoop it up and put it into concentrator.
- iii) Sea water is poured into concentrator to dissolve the crystallized salt on the sand.
- iv) The salt concentrate drains from the bottom of the concentrator.
- v) The salt concentrate is then boiled to crystallize the salt.
- vi) The sand is now taken out of the concentrator and spread on the field again.

An illustration of preparing local salt from ash.



USING HEAT ENERGY

Heat energy is directly or indirectly used for example;

- Using energy from the wind
- Using energy from water
- Fermentation and brewing
- Improving housing standards
- Sun and solar drier (using solar energy)

USING ENERGY FROM THE WIND

- ✓ When air is heated, it becomes light and rises up.
- ✓ The cold air displaces it.
- ✓ This leads to continuous movement of air called **convection current**.
 Moving air is called wind.

This wind is used for;

- Winnowing seeds or grains
- Turning wind turbines used to drive generators which produce electricity.
- Turning vanes of wind mill used:
 - i. To crush grains to obtain flour.
 - ii. To crush sugar canes to extract juice.
 - iii. For sawing timber.
- Moving sail boats at a high speed along the sea.
- Speeding up the rate of evaporation which enables clothes to dry up fast.



A windmill

USING ENERGY FROM WATER

When we use water energy, we are indirectly using heat energy from the sun.

Below are some of the uses of energy from water;

- Boiling water turns into steam which drives engine.
- Steam is also pumped through pipes to heat materials which do not need direct heating from the flame. For example warming houses during winter
- Hot springs have hot water for preparing tea, porridge, for bathing and washing.
- The energy associated with rocks is called **geothermal energy**.
- Geothermal energy saves wood fuel and money once used.
- Fast running water from a dam turns the turbines which drive generators to produce hydro-electricity.

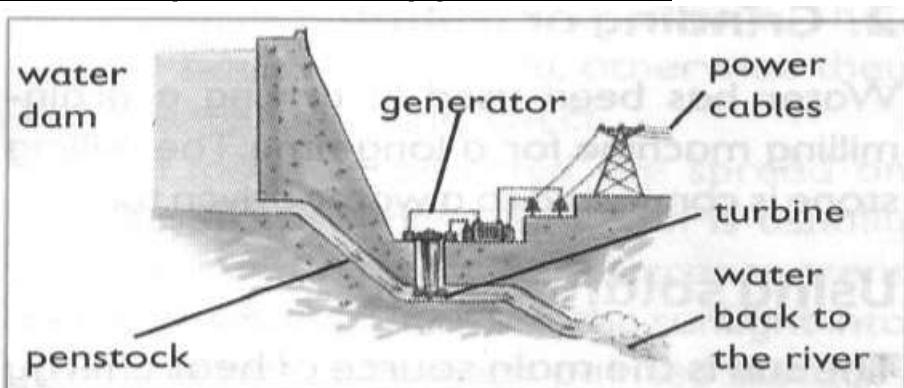
Hydro-electricity power stations in Uganda includes;

Jinja Owen falls dam

Bujagali electric power station

Mubuku electric power station etc.

Cross section of hydro-electricity power station.



Uses of electricity in our houses

It is used for;

MPS Science Lesson Notes

- Lighting
- Cooking
- Operating household appliances e.g flat iron, computer, radios, fans, cookers, refrigerators, electric kettles etc.

Learner's Activity

1. Identify any three ways of using heat energy in our daily life.
2. How can wind be useful in our environment?
3. Briefly explain how geothermal energy is important in conservation of the environment.
4. Mention any one hydro electric power station in Uganda.
5. Suggest one way in which electricity can be useful in our homes.

USING SOLAR ENERGY

This is heat obtained directly from the sun. It can be used for;

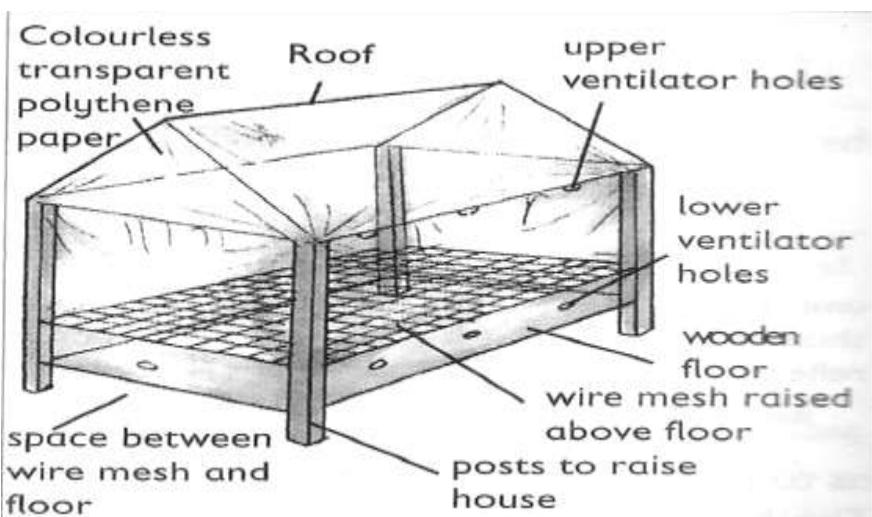
- Cooking
- Lighting
- Drying clothes and harvested crops.
- Is a source of electricity

Solar drier

This is used to dry food stuffs.

Examples of food stuffs dried in a solar drier include-
Cassava, Maize, Fish, soya, beans, groundnuts, etc.

Structure of a solar drier



Note:

- The inside walls of a solar drier are painted black. This is to absorb heat for drying the food kept inside quickly and efficiently.
- Ventilation holes are made both at the bottom and top of the drier. This allows free movement of air over the food being dried.

- The roof is usually covered with a transparent polythene paper.
This allows the sunlight into the solar drier.

Housing standards

Heat can be used to improve housing standards in the following ways;

- Baking bricks by fire which makes them strong and more durable.
- Speeding up drying of built parts of a house during construction.
The drying depends upon the materials used.
- Keeping the house cool through ventilation.
Ventilation is the replacement of warm air by fresh cold air.
- A good house should be well ventilated to allow fresh air in and bad air out.

Using heat energy at home and in our community.

The family and the community at large use heat energy in many ways for example;

- For cooking.
- Drying foods for storage.
- Processing and preserving fruits.
- Extracting oil from seeds.
- Household activities such as ironing and drying clothes.

Learners activity.

1. Give two examples of food stuffs that can be dried in a solar drier.
2. Suggest a reason for painting the inner walls of a solar drier black.
3. Briefly explain the term ventilation.
4. Give two ways in which heat energy can be used to improve housing standards in our community.
5. Suggest two ways in which people in your locality use heat energy.