

## **PARAMOUNT SCIENCE NOTES**

### **PRIMARY FIVE**

#### **TERM ONE**

**THEME: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATIONS**

**TOPIC: KEEPING OF POULTRY AND BEES**

#### **POULTRY KEEPING**

- This is the rearing of domestic birds

#### **POULTRY**

- These are domestic birds

#### **Types/examples of poultry**

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

#### **Examples of poultry products**

- Eggs
- Meat
- Feathers
- Poultry droppings
- Bones

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

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

#### **Importance (uses) of poultry to people**

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

#### **TERMS USED IN POULTRY KEEPING**

<b>TERMS</b>	<b>DESCRIPTION</b>
Poultry (fowls)	▪ Domestic birds
Hen	▪ Adult female chicken
Cock	▪ Adult male chicken
Pullet	▪ Young female chicken
Cockerel	▪ Young male chicken
Capon	▪ Castrated male chicken
Chick	▪ Young bird
Incubation	▪ Providing of necessary conditions to a fertile egg to hatch
Incubation period	▪ Time taken by a fertilized egg to hatch
Incubator	▪ Machine used to hatch eggs
Layers	▪ Type of chickens kept for egg production
Broilers	▪ Type of chickens kept for meat production
Dual purpose chickens	▪ Type of chickens kept for both eggs and meat
Brooding	▪ Giving of special care to chicks below 8 weeks

Broody hen	▪ Hen incubating eggs to hatch them
Brooder	▪ Special structure in which chicks are cared for
Culling	▪ Removal of unproductive birds from the flock
Moulting	▪ Shedding of old feathers in birds

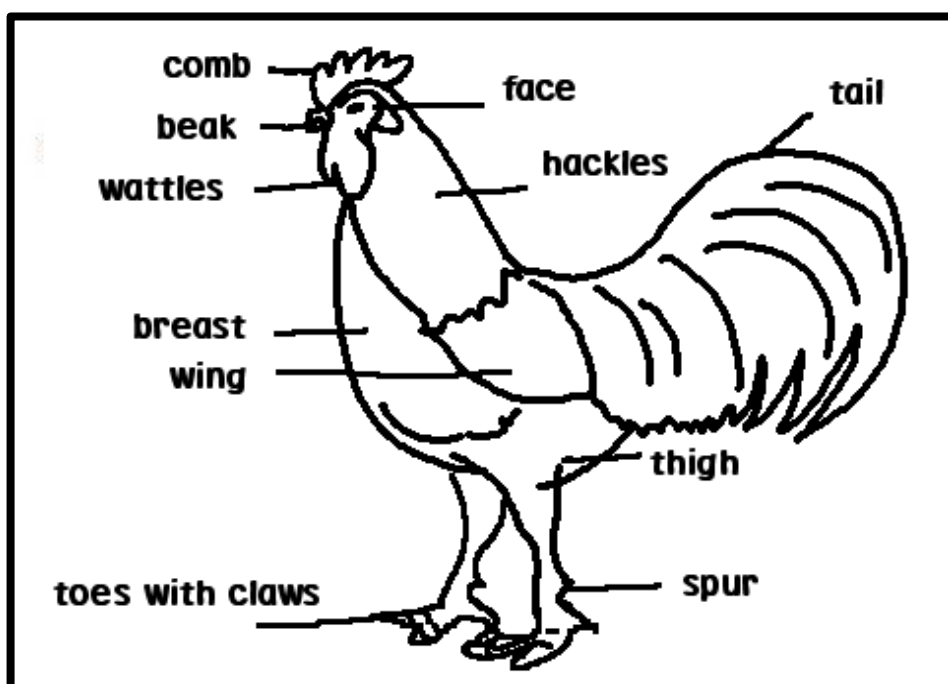
### **STRUCTURAL DIFFERENCES BETWEEN A HEN AND A COCK**

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

### **Why do cocks have brightly coloured feathers?**

- To attract hens for mating

### **EXTERNAL PARTS OF A DOMESTIC BIRD**



### **FUNCTIONS OF EACH PART**

PARTS OF THE BIRD	FUNCTIONS
Eyes	For sight
Beak	For feeding (for picking up food) For protection For egg turning during incubation
Spur	For protection
Nostril	For smelling food
Legs	For walking
Toes with claws	For scratching
Wattle and comb	For temperature regulation

### **MOULTING IN BIRDS**

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

## Why do birds moult their feathers?

- To grow new feathers

## FEATHERS

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

### Uses of feathers to a bird

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

### Uses of feathers to people

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

## TYPES OF FEATHERS

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

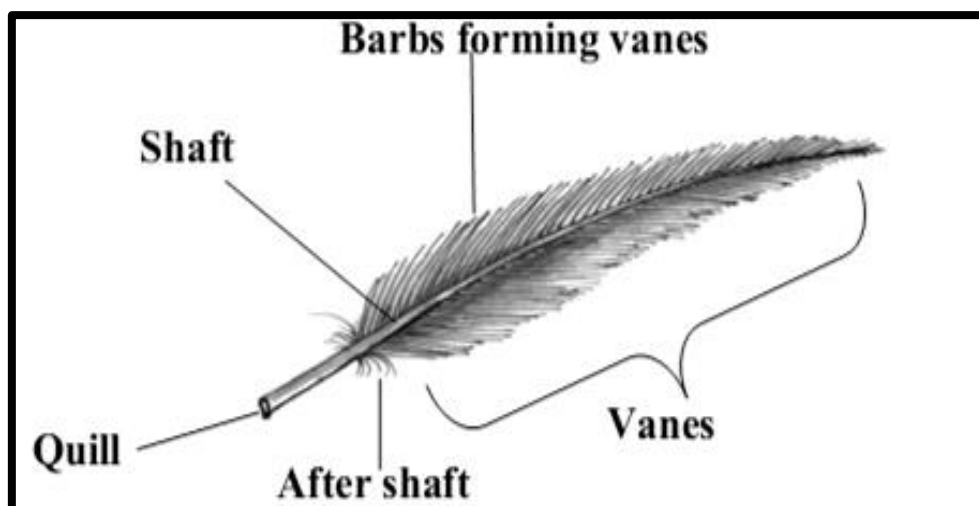
### QUILL FEATHERS (FLIGHT FEATHERS)

- They are found on the **wings** and **tail**.
- They are divided into **primary** and **secondary** feathers
- Primary feathers are bigger than secondary feathers

### Importance of quill feathers

- For flight (they help in flying)

### Structure of a quill feather



### Shaft (rachis)

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

#### Vane

- It is the flat expanded part of the feather

#### Barbs

- They form the vane

#### Quill

- It is the extreme end of the shaft

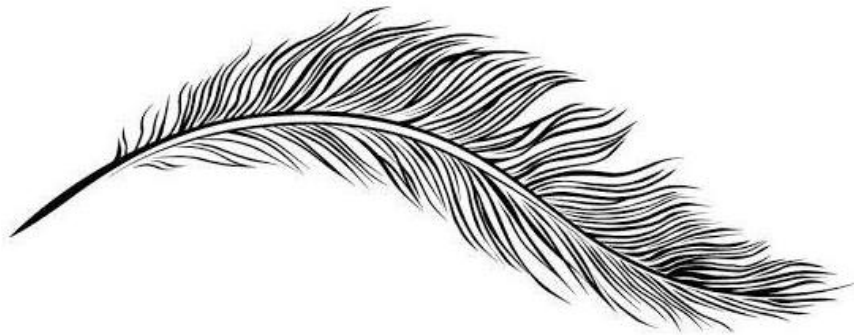
#### COVERT FEATHERS (BODY FEATHERS)

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

#### Importance of covert feathers

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

#### Structure of a body feather



#### Why are bird streamlined?

- To overcome viscosity (to reduce air resistance)

#### What is viscosity (fluid friction)?

- This is the friction in liquids and gases

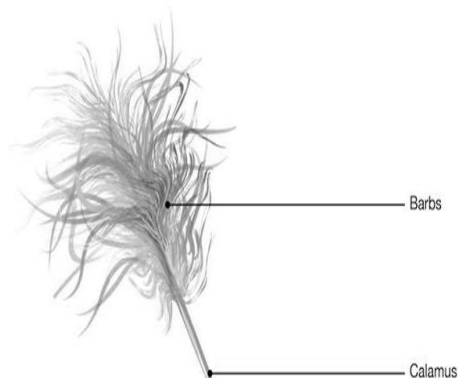
#### DOWN FEATHERS

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

#### Importance of down feathers

- They insulate the bird's body

#### Structure of a down feather



#### FILOPLUME FEATHERS

- These are the feathers that remain when a bird has been plucked

- They are found nearest to the skin between the covert feathers
- ~~They are the tiniest (smallest) feathers~~

- They have no quill

### **A drawing of a Filoplume feather**



**Filoplume Feather**



### **EXERCISE**

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



### **TYPES OF CHICKEN**

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

### **There are three main types of chicken, namely:**

- Broilers
- Layers
- Dual purpose chicken

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

- These are chicken kept mainly for meat production.

### **Examples of broilers**

- Light Sussex
- Plymouth Rock
- Jersey Giant

- Orpington
- Cornish white
- Sykes

### **LAYERS (LIGHT BREEDS OF CHICKEN)**

- These are chicken kept mainly for egg production

#### **Examples of layers**

- White leghorn
- Brown egger
- Ancona
- Minorca

### **DUAL PURPOSE CHICKEN**

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

#### **Examples of dual purpose chicken**

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

### **ACTIVITY**

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

### **BREEDS OF CHICKEN**

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

#### **Examples of breeds of chicken.**

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

### **TYPES OF BREEDS OF CHICKEN**

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

## **LOCAL BREEDS**

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

### **Characteristics local breeds**

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

### **ADVANTAGES OF LOCAL BREEDS OVER EXOTIC BREEDS**

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

### **WAYS OF IMPROVING THE LOCAL BREEDS OF POULTRY**

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

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

- By carrying out cross breeding

## **EXOTIC BREEDS**

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

### **Characteristics of exotic breeds**

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

### **ADVANTAGES OF EXOTIC BREEDS OVER LOCAL BREEDS**

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

### **CROSS BREEDS (HYBRIDS)**

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

### **Advantages of cross breeds over local breeds.**

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

### **Advantages of cross breeds over exotic breeds.**

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

### **CROSS BREEDING**

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

### **Why do farmers carry out cross breeding among chicken?**

- To improve the quality of their breeds

### **EXERCISE**

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

### **SYSTEMS OF POULTRY KEEPING**

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

### **FREE RANGE SYSTEM**

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

### **Why is free range system common in rural areas?**

- There is enough land

### **Why is free range system not used in urban areas?**

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

### **Simple diagram to illustrate a free range system**





### Advantages of free range system

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

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

- The farmer doesn't buy poultry feeds

### Disadvantages of free-range system

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

### What are vermins?

- These are wild animals that attack and harm domestic animals

### Deep litter system

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

### Simple diagram to illustrate

### Advantages of deep litter system

- Many birds are kept in a small space

- Birds are protected from bad weather
- Birds are protected from predators
- Birds are protected from thieves
- Culling is easy
- It is easy to collect manure
- It is easy to collect eggs
- It is easy to keep farm records

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

- Many birds are kept in a small space

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

- Due to limited land/there is shortage of land

#### **Disadvantages of deep litter system**

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

#### **LITTER**

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

#### **Examples of materials commonly used as litter**

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

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

- It is poisonous to birds when eaten.

#### **IMPORTANCE OF LITTER**

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

By absorbing moisture from poultry droppings

- It prevents breaking of eggs

By absorbing shock

- It keeps the floor of a poultry house warm

By reducing heat loss

#### **DISADVANTAGES OF LITTER**

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

#### **QUALITIES OF GOOD LITTER**

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

#### **NOTE**

- Litter should be kept dry and turned regularly

To prevent dampness in the poultry house

- Old litter should be removed from the poultry house

To prevent ectoparasites like chicken mites

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

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

**BATTERY SYSTEM (CAGE SYSTEM)**

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

**ADVANTAGES OF BATTERY SYSTEM (CAGE SYSTEM)**

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

**How does battery cage system reduce loss of eggs?**

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

**DISADVANTAGES OF BATTERY CAGE SYSTEM**

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

**A SIMPLE DIAGRAM SHOWING BATTERY SYSTEM/CAGE SYSTEM**



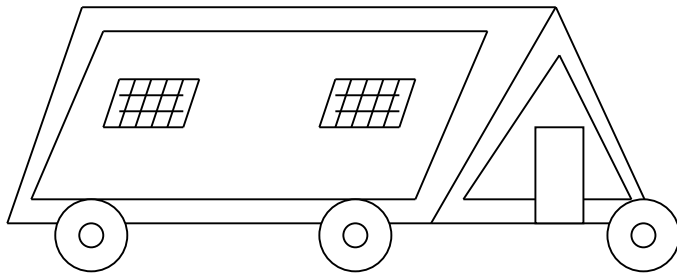
## **PEN SYSTEM (FOLD SYSTEM)**

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

### **Importance of a pen to the birds.**

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

### **A simple structure of fold / pen system**



### **Advantages of pen system**

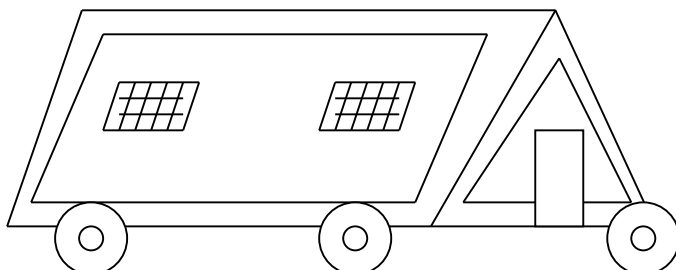
- Birds cannot destroy crops
- Birds are protected from predators
- Birds are protected from bad weather
- Poultry feeds are not wasted

### **Disadvantages of fold pen system**

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

### **Activity**

1. a) Which system of keeping poultry minimizes fowl vices?  
b) Besides minimizing fowl vices, mention any **two** other advantages of the above named poultry system.  
c) Write down any **one** disadvantage of the poultry system named in 'a' above.
2. The diagram below shows a structure used in a certain system of keeping poultry. Study it carefully and answer the questions that follow.



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

- b) What scientific name is given to the above portable house shown above?
- c) Point out any one advantage and disadvantage of the above poultry system.
  - i) Advantage
  - ii) Disadvantage

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

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

#### **DEBEAKING**

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

#### **An illustration showing debeaking**

#### **Importance of Debeaking**

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

#### **How does debeaking control poultry vices?**

- It makes the bird's beak blunt

#### **Danger of debeaking to a bird**

- It can damage the tongue of a bird

#### **DEWORMING**

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

#### **Reasons / Importance of deworming**

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

#### **METHODS OF DEWORMING**

- Drenching
- Dosing

#### **i) DRENCHING**

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

### A drawing showing a drenching gun.



#### ii) DOSING

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

### FEEDING POULTRY

- This is the providing of food to poultry

#### Reasons for proper feeding poultry

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

### CHICKEN MASH

- These are chicken feeds crushed into small pieces

#### Components of chicken mash

- Maize bran
- Fish meal
- Bone meal
- Sunflower seeds
- Snail shells
- Cotton seeds

#### Why are poultry feeds always mixed with grit?

- For easy crushing of food in the gizzard

### TYPES OF MASH (CHICKEN FEEDS)

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

### CHICKEN AND DUCK MASH

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

### **GROWERS MASH**

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

### **LAYERS MASH**

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

### **Why are crushed snail shells always added to layer mash?**

- To provide calcium to the birds

### **Why do layers sometimes lay soft shelled eggs?**

- Due to lack of calcium in their diet

### **Why should layer mash contain a lot of calcium?**

- To enable birds lay hard shelled eggs

### **BROILERS MASH**

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

### **Reasons why birds should be fed on green vegetables?**

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

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

- They are poisonous (toxic) to birds

### **FEEDING EQUIPMENT FOR BIRDS**

- **Food trough**

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

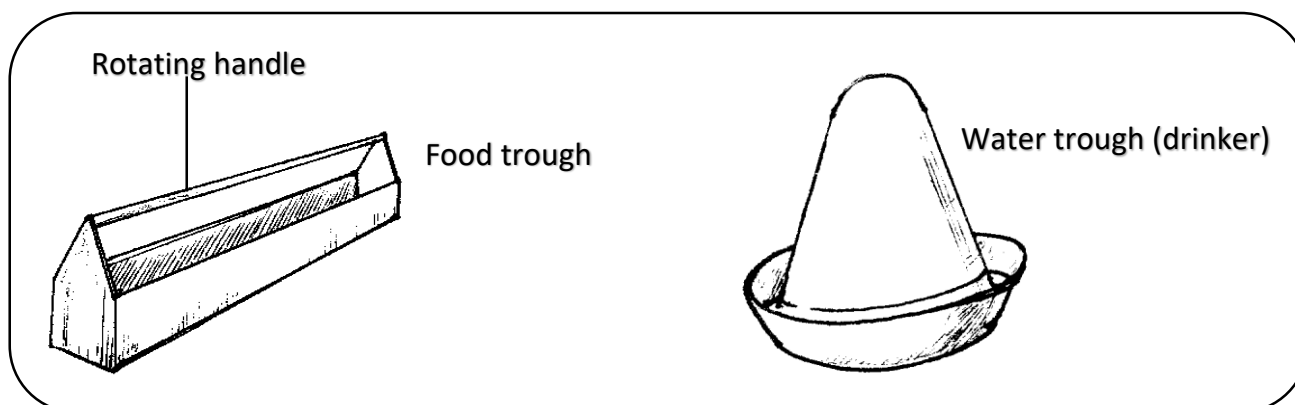
- **Water trough (drinker)**

It is where water is put for the birds to drink

### **NOTE**

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

### **DIAGRAMS SHOWING FEEDING EQUIPMENT FOR BIRDS**



### **EXERCISE**

1. Which routine activity helps to reduce egg eating on a poultry farm?
2. How is drenching different from dosing?
3. Give one reason why birds need to be fed properly.
4. What is chicken mash?

5. What type of feeds are suitable for the following:
  - a) Chicks
  - b) Broilers
  - c) Layers of 8-16weeks
6. What is the danger of failure to include calcium in layer's mash?
7. How are vegetables hung in a poultry house useful?
8. How are the following containers important in a poultry house?
  - a) Drinker
  - b) Food trough

### **HOUSING POULTRY**

- This is the providing of shelter to birds

### **REASONS FOR PROPER HOUSING POULTRY**

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

### **QUALITIES OF A GOOD POULTRY HOUSE**

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

### **CULLING**

- This is the removal of unproductive birds from the flock

### **Examples of unproductive birds that should be culled**

- Sick birds
- Off layers
- Birds with vices

### **Ways of culling**

- Slaughtering/killing
- Selling
- Isolation



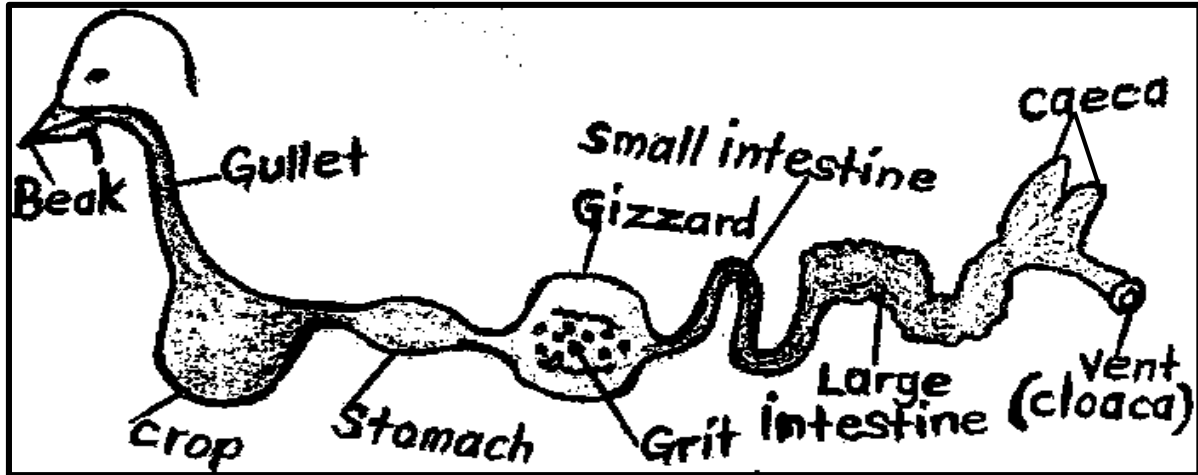
## **CROSS BREEDING**

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

### **Why do poultry farmers carry out cross breeding?**

- To improve the quality of their breeds

## **DIGESTIVE SYSTEM OF A HEN**



## **FUNCTIONS OF EACH PART OF THE DIGESTIVE SYSTEM OF A BIRD**

### **BEAK (BILL)**

- It picks food

### **GULLET (OESOPHAGUS)**

- It passes food to the crop

### **CROP**

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

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

- Food is moistened
- Food is softened

### **Examples of birds that do not have a crop**

- Owl
- Goose
- Button quail

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

- It eats little food at a time

## **TRUE STOMACH (PROVENTRICULUS)**

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

## **GIZZARD**

- It crushes (grinds) food

### **How is the gizzard adapted to its function?**

- It has grit (small stones) that grind food

### **How is the gizzard able to withstand the grit?**

- It has thick (muscular) walls

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

- Teeth

**Grit**

- ✓ These are small stones found in the gizzard
- They crush food into small particles

**SMALL INTESTINES (ILEUM)**

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

**Main processes that take place in small intestines**

- Food absorption
- Food digestion

**LARGE INTESTINES**

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

**CAECUM**

- It stores undigested food for a short time

**VENT (CLOACA)**

- It passes out droppings

**ACTIVITY**

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

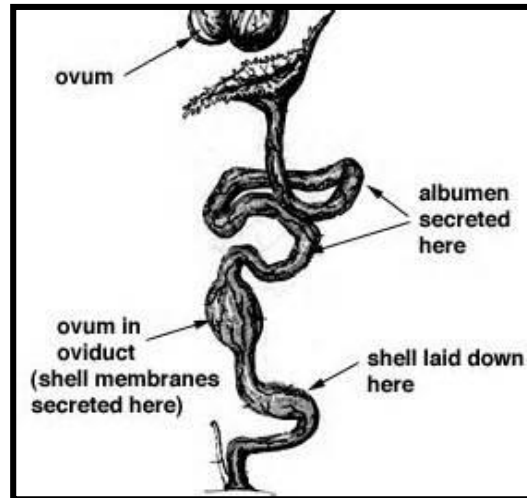
**DEVELOPMENT OF AN EGG**

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

**NOTE**

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

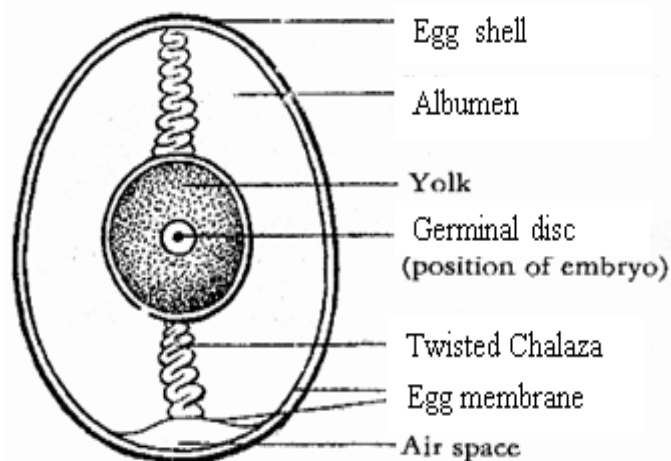
## A SIMPLE STRUCTURE OF AN OVIDUCT OF A HEN



## REPRODUCTION IN BIRDS

- They reproduce by laying eggs (they are oviparous )
- Their eggs are fertilized internally
- Birds undergo **internal fertilization**
- Fertilization in birds occurs in the **oviducts**

## STRUCTURE OF A FERTILIZED EGG OF A BIRD



## FUNCTIONS OF EACH PART OF A FERTILIZED BIRD'S EGG

### EGG SHELL

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

### Why is the egg shell porous?

- To allow gaseous exchange

### How is the egg shell adapted to gaseous exchange?

- It is porous

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

- It is hard

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

- To lay hard shelled eggs

## SHELL MEMBRANE

- It prevents an egg from drying up

### **AIR SPACE**

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

### **EGG YOLK**

- It provides fats and proteins to the embryo

### **ALBUMEN (EGG WHITE)**

- It provides water and proteins to the embryo

### **CHALAZA**

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

### **GERMINAL DISC**

- ✓ It is found in unfertilized egg
- It develops into an embryo after fertilization

### **EMBRYO**

- ✓ It is found in a fertilized egg
- It develops into a young bird

### **FUNCTIONS OF AN EGG TO THE EMBRYO**

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

### **ABNORMALITIES IN BIRD'S EGGS**

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

### **KINDS OF ABNORMAL EGGS OF BIRDS**

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

### **QUALITIES OF A GOOD EGG**

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

### **FACTORS THAT MAY MAKE AN INCUBATED FERTILE EGGS FAIL TO HATCH**

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

## **ACTIVITY**

1. How do birds reproduce?
2. Which type of fertilization do birds undergo?
3. In the space below, draw an egg and show the following parts; **yolk, chalaza, albumen, and air space.**



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

## **INCUBATION PERIOD**

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

## **INCUBATION PERIOD**

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

## **INCUBATION OF DIFFERENT BIRDS**

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

## **INCUBATION**

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

## **Conditions necessary for incubation**

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

To prevent eggs from drying up

- Egg turning

To prevent the embryo from sticking to the shell membrane

- Good oxygen supply

For respiration of the growing embryo inside an egg

## **TYPES OF INCUBATION**

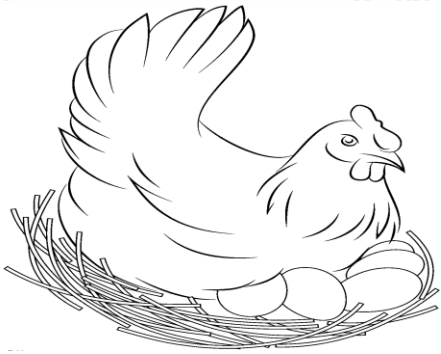
- Natural incubation
- Artificial incubation

## **NATURAL INCUBATION**

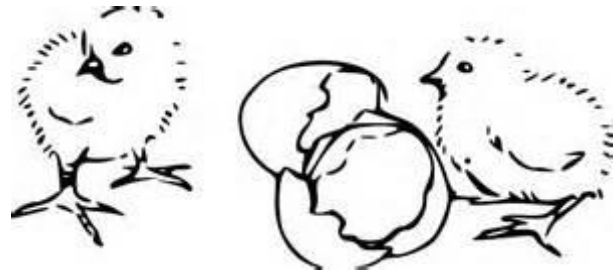
- This is when a hen sits on the eggs to hatch them

- **A broody hen** is a hen incubating the eggs
- The broody hen usually comes off to feed and gets little exercise

#### **Diagram of a hen incubating eggs**



#### **A chick hatching from an egg**



#### **WAYS OF CARING FOR A BROODY HEN**

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

#### **ADVANTAGES OF NATURAL INCUBATION**

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

#### **DISADVANTAGES OF NATURAL INCUBATION**

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

#### **Why is natural incubation not good for commercial farmers?**

- Few chicks are hatched at a time

#### **ARTIFICIAL INCUBATION**

- This is when an incubator is used to hatch eggs

#### **INCUBATOR**

- This is a machine used to hatch eggs

#### **Types of incubators**

- Electric incubators
- Kerosene incubators

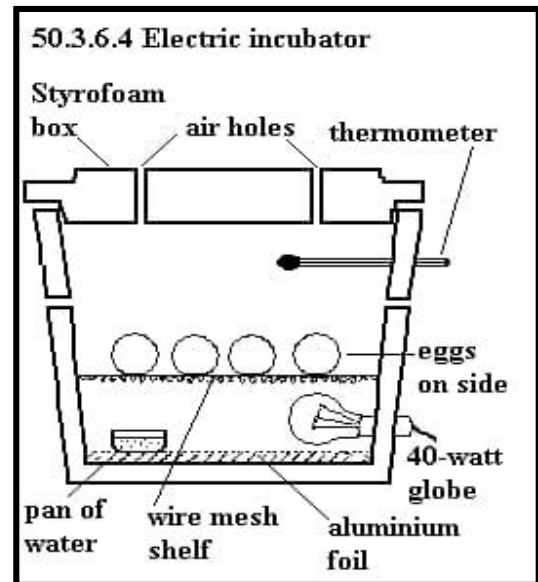
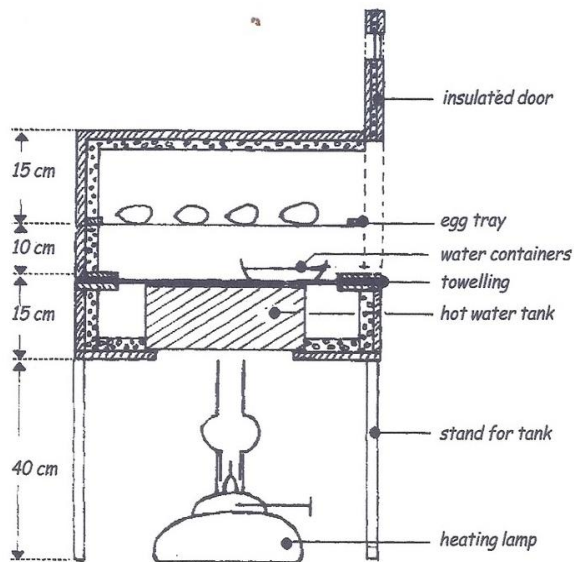
#### **Electric incubators**

- These are incubators that use electricity to provide warmth

#### **Kerosene incubators**

- These are incubators that use kerosene to provide warmth

### A diagram showing an incubator



### A clutch:

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

### How are the following important in an incubator?

#### Thermometer

- ✓ It helps to regulate temperature in an incubator

#### Heater (Heating lamp/infrared bulb)

- ✓ It provides warmth to the eggs

### ADVANTAGES OF ARTIFICIAL INCUBATION

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

### Why is artificial incubation good for commercial farmers?

- Very many eggs are hatched at once

### DISADVANTAGES OF ARTIFICIAL INCUBATION

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

### BROODING

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

### Examples of special care given to chicks

- Food
- Warmth
- Shelter

## **WAYS OF CARING FOR CHICKS BELOW 8 WEEKS**

- By giving them food
- By giving them warmth
- By giving them shelter

### **How is shelter important to chicks?**

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

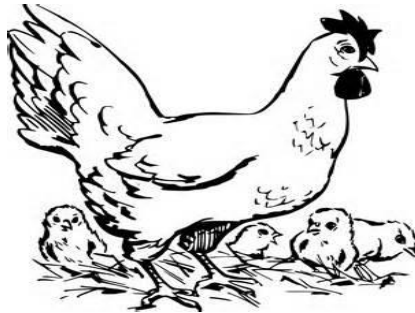
## **TYPES OF BROODING**

- Natural brooding
- Artificial brooding

### **NATURAL BROODING**

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

#### **A diagram showing natural brooding**



### **ADVANTAGES OF NATURAL BROODING**

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

### **DISADVANTAGES OF NATURAL BROODING**

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

### **ARTIFICIAL BROODING**

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

### **BROODER**

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

### **TYPES OF BROODERS**

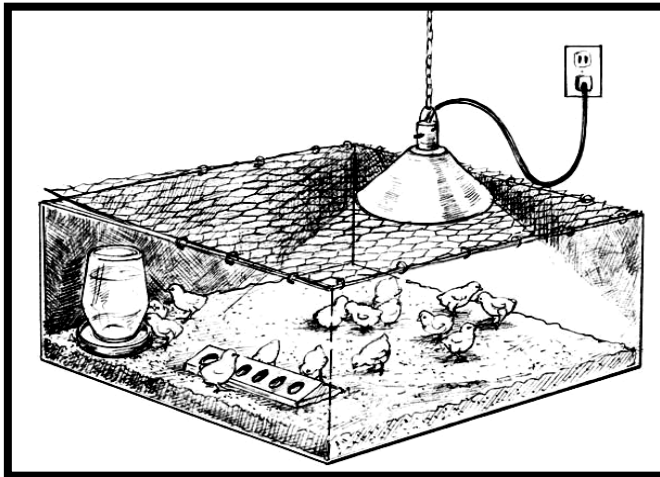
- Infrared brooder
- Kerosene brooder
- Charcoal brooder



## **INFRARED BROODER**

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

### **A simple diagram of infrared brooder**



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

### **Importance of infrared lamp**

- It provides light
- It provides warmth

### **Advantages of using an infrared brooder**

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

### **Disadvantages of using an infrared brooder**

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

## **KEROSENE BROODER**

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

### **A simple diagram of Kerosene brooder**



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

### **DANGERS OF A KEROSENE LAMP IN A BROODER**

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

## **CHARCOAL BROODER**

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

### **A simple diagram of charcoal brooder**



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

### **DANGERS OF A CHARCOAL STOVE IN A BROODER**

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

### **ACTIVITY**

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

**Study the diagram below carefully and answer questions 4 - 6.**



4. What type of incubation is shown in the diagram above?
5. Give any one disadvantage of the above type?
6. How can a farmer care for the above broody hen?
7. Mention any one type of incubators.
8. Why do commercial farmers prefer artificial incubation?
9. Give any one care chicks get from mother hens.
10. State any one advantage of natural brooding.
11. What is a brooder?
12. Write down any two types of brooders?
13. How is a lamp important in a brooder?

## **POULTRY VICES (FOWL VICES)**

- These are bad habits in poultry

### **EXAMPLES OF POULTRY VICES**

- Egg eating
- Feather pecking
- Toe pecking
- Cannibalism

#### **Cannibalism**

- This is when a bird eats flesh of other bird

#### **Egg eating**

- This is when layers eat their eggs

#### **Feather pecking**

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

### **CAUSES OF POULTRY VICES**

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

### **CONTROL OF POULTRY VICES**

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

### **EFFECTS OF POULTRY VICES**

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

### **POULTRY DISEASES**

- These are diseases that affect domestic birds.

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

- Virus
- Bacteria
- Protozoa

## **EXAMPLES OF POULTRY DISEASES**

### **Viral poultry diseases**

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

### **SIGNS OF NEWCASTLE DISEASE**

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

### **Protozoan poultry diseases**

- Coccidiosis
- Blackhead

### **SIGNS OF COCCIDIOSIS**

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

### **Bacterial poultry diseases**

- Fowl typhoid
- Pneumonia

## **GENERAL CAUSES OF POULTRY DISEASES**

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

## **CONTROL OF POULTRY DISEASES**

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

## **EFFECTS OF DISEASES IN POULTRY**

- Death of poultry
- Poor growth of poultry
- Drop in egg production
- Poor quality eggs and meat

## **PARASITES OF POULTRY**

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

## **TYPES OF PARASITES OF POULTRY**

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

### **1. ECTOPARASITES**

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

## **EXAMPLES OF ECTOPARASITES IN POULTRY**

- Lice
- Chicken mites
- Fleas
- Fowl ticks

## **2. ENDOPARASITES**

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

## **EXAMPLES OF ENDOPARASITES IN POULTRY**

- Tapeworm
- Hookworm
- Threadworm (pinworm)

## **GENERAL CAUSES OF POULTRY PARASITES**

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

## **EFFECTS (DANGERS) OF PARASITES ON POULTRY**

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

## **CONTROL OF PARASITES IN POULTRY**

- Regular deworming
- Use of pesticides to kill external parasites
- Regular cleaning of the poultry house
- Providing clean feeds to poultry
- Feeding poultry in clean equipment
- Applying Vaseline or paraffin to kill ectoparasites

## **FARM RECORDS**

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

## **TYPES OF FARM RECORDS**

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

## **REASONS FOR KEEPING FARM RECORDS**

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

## **AN EXAMPLE OF PRODUCTION RECORD**

Paramount Poultry Farm

P.O. Box 711

Wakiso

(a) Month: November 2021

(b) Breeds of chicken: White Leghorn

(c) Age of the flock: 18 weeks

(d) Number of birds: 1000

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

## **SOCIAL INSECTS**

- These are insects that live and work together

### **EXAMPLES OF SOCIAL INSECTS**

- Some bees e.g honeybees and bumblebees
- Wasps
- Termites
- Ants e.g white ants, red ants, black ants and safari ants

## **GROUPS OF BEES**

- Solitary bees
- Social bees

### **1. SOLITARY BEES**

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

### **EXAMPLES OF SOLITARY BEES**

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

### **2. SOCIAL BEES**

- These are bees that live and work together

### **EXAMPLES OF SOCIAL BEES**

- Honeybees
- Bumblebees

## **APICULTURE**

- This is the keeping of honey bees
- ✓ A group of bees is called a **bee colony**
- ✓ A group of bees in motion is called a **bee swarm**
- ✓ A person who rears honeybees is called an **apiarist**
- ✓ A place where many bee hives are kept is called an **apiary**
- ✓ A habitat for bees is called a **bee hive**

## **IMPORTANCE OF BEES TO PLANTS AND PEOPLE**

### **PEOPLE**

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

### **PLANTS**

- Bees pollinate flowers on crops

## **DANGER OF BEES IN THE ENVIRONMENT**

- They sting people and animals

## **FACTORS THAT LEAD TO BEE STINGS (WHAT CAUSES BEES TO STING?)**

- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| ▪ Honey harvesting during day time    | ▪ Standing in path of bee swarm      |
| ▪ Honey harvesting without a smoker   | ▪ Playing near the hive              |
| ▪ Using cosmetics made from beeswax   | ▪ Crushing a bee near a hive         |
| ▪ Making a lot of noise near the hive | ▪ Chasing away bees with naked hands |

## **FIRST AID FOR BEE STINGS**

- Apply ice pack to reduce pain and swelling
- Use your fingernail to remove the stinger from the skin
- Wash the sting area with water and soap remove residual bee venom
- Apply a paste of baking soda and water to reduce pain and swelling

## **MAIN BEE PRODUCTS (MAIN PRODUCTS GOT FROM HONEY BEES)**

- Honey
- Beeswax
- ✓ Honey is kept in **honey combs**

## **Other bee products**

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

## **USES OF HONEY TO PEOPLE**

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

## **Why does honey take long to get spoilt?**

- It is acidic and contains little moisture

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

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

## **BEESWAX**

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

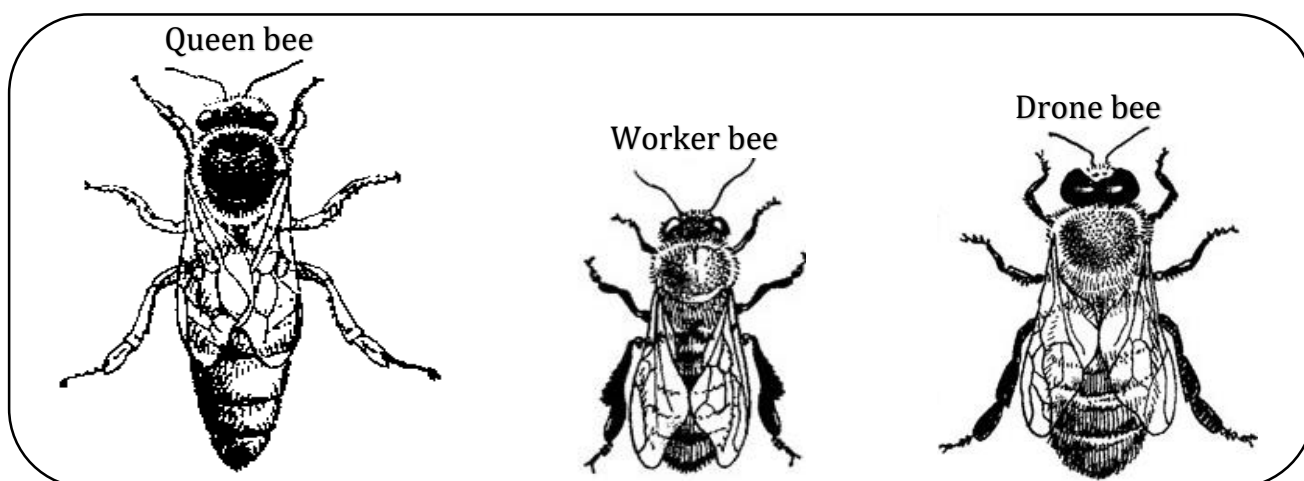
## **PRODUCTS FROM BEESWAX**

- |               |               |
|---------------|---------------|
| ▪ Wax candles | ▪ Chewing gum |
| ▪ Shoe polish | ▪ Aftershave  |
| ▪ Lip balm    | ▪ Cosmetics   |
| ▪ Skin cream  | ▪ Crayons     |

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

- Worker bees
- Drone bees
- Queen bees

## **DRAWINGS SHOWING THE TYPES (CASTES) OF HONEYBEES**





## 1. QUEEN BEE

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

## 2. WORKER BEES

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

## ROLES OF A WORKER BEES IN THE HIVE

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

## **PROPOLIS**

- This is a mixture of wax, saliva and sap
- This is a sticky substance collected by worker bees from plants.

## **USES OF PROPOLIS TO BEES**

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

## **USES OF PROPOLIS TO PEOPLE**

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

## **3. DRONE BEE**

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

## **ACTIVITY**

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

## THE LIFE CYCLE OF A HONEY BEE

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

## TYPES OF EGGS LAID BY QUEEN BEE

- Fertilized eggs
- Unfertilized eggs

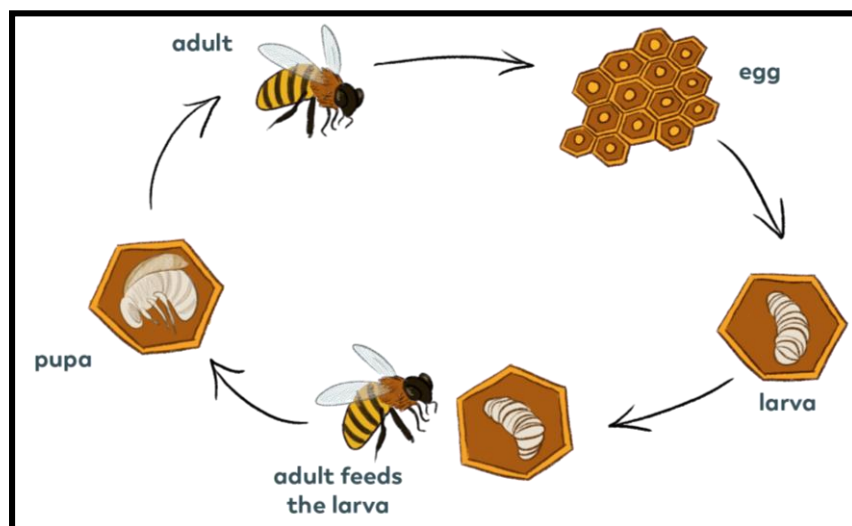
### Note:

- ✓ Fertilized eggs develop into **queens** and **worker bees**
- ✓ Unfertilized eggs develop into **drone bees**
- ✓ The adult stage in the life cycle of insects is called **imago**

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

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

## A diagram showing the life cycle of bees



## SWARMING IN BEES

- ✓ This is when a portion of a bee colony leaves the hive looking for a new hive
- ✓ This is the massive movement of bees from one place to another looking for a new hive.

## ABSCONDING IN BEES

- ✓ This is when all bees leave the hive.
- ✓ This is when bees completely abandon the hive.
- They leave behind pollen, unhatched eggs and young bees that cannot fly.

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

- Overcrowding of bees in the hive
- When the hive is damaged (leaking)
- Attack from enemies of bees
- When a new queen bee develops
- Old queen/infertile queen
- When bees have been attacked by a certain disease
- Bad smell around the hive
- A lot of noise around the hive+
- Direct smoke into the hive
- Direct sunshine into the hive
- Lack of flowering plants and water in an area
- Dampness of the bee hive

### **REASONS FOR ABSCONDING IN BEES (CAUSES OF ABSCONDING IN BEES)**

- Attack from enemies of bees
- Overcrowding of bees in the hive
- Drought conditions (Lack of flowering plants and water in an area)
- Direct sunshine into the hive

### **HOW TO PREVENT SWARMING AND ABSCONDING IN BEES**

- Siting a beehive near flowering plants
- Siting a beehive near open water sources
- Keeping agrochemicals away from the hive
- Feeding bees during drought conditions
- Siting a beehive in a quiet place / noise free place
- Protecting the beehive from direct sunshine
- Protecting bees from their enemies
- Protecting the hive from strong wind

### **BEE HIVE**

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

### **TYPES OF BEEHIVES**

- Traditional (local) beehive
- Modern beehive

#### **i) TRADITIONAL BEEHIVES**

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

### **EXAMPLES OF TRADITIONAL (LOCAL) BEEHIVES**

- Kigezi beehive
- Dug out log hive
- Tin hive

## **DRAWINGS SHOWING TRADITIONAL BEEHIVES**

### **ADVANTAGES OF TRADITIONAL (LOCAL) BEE HIVE**

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

#### **Why?**

- Materials are locally available

### **DISADVANTAGES OF LOCAL BEE HIVE**

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

#### ii) **MODERN BEEHIVES**

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

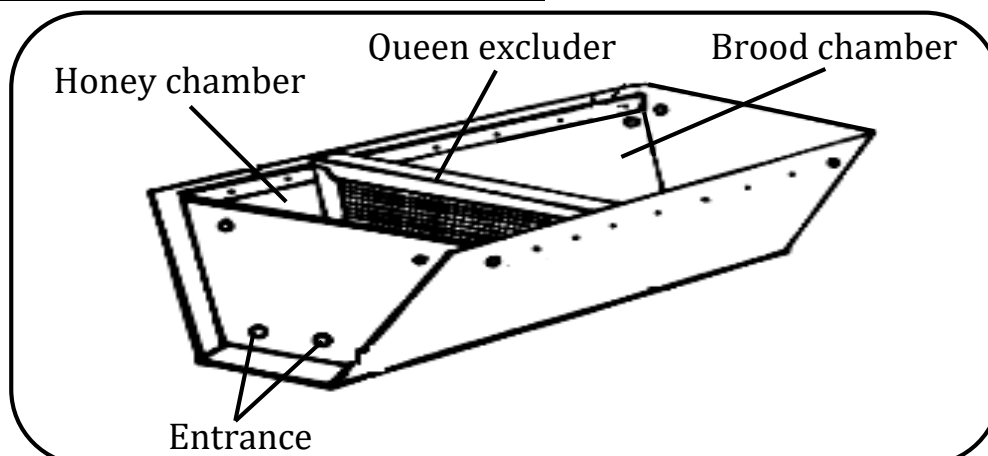
### **EXAMPLES OF MODERN BEE HIVES**

- Top bar hive
- Box hive

### **CHAMBERS OF MODERN BEE HIVES**

- Brood chamber
- Honey chamber

### **INTERNAL STRUCTURE OF A MODERN BEE-HIVE**



## **IMPORTANCE OF EACH PART OF A MODERN BEEHIVE**

### **ENTRANCE**

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

### **BROOD CHAMBER**

- It is where honey is kept

### **HONEY CHAMBER**

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

### **QUEEN EXCLUDER**

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

## **IMPORTANCE OF QUEEN EXCLUDER IN A MODERN BEEHIVE**

- It prevents the queen from laying eggs in honey
- It prevents the mixing of honey and eggs

## **ADVANTAGES OF MODERN BEEHIVES**

- Clean honey is harvested
- They are durable (long lasting)
- The hive are not damaged during honey harvesting
- They are easy to inspect honey combs

## **DISADVANTAGES OF MODERN BEEHIVE**

- It is expensive to make

### **ACTIVITY:**

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

## **HARVESTING HONEY**

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

## **DISADVANTAGES OF HARVESTING HONEY AT NIGHT**

- The brood may be crushed and contaminate honey

- It is difficult to separate brood combs and honeycombs

### **EQUIPMENT NECESSARY DURING HARVESTING HONEY AND THEIR IMPORTANCE**

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

### **STEPS FOLLOWED WHEN HARVESTING HONEY**

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

### **NOTE:**

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

### **A simple drawing showing an apiarist ready to harvest honey**



### **FACTORS TO CONSIDER WHEN HARVESTING HONEY**

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

### **HONEY EXTRACTION**

- This is the removal of honey from honey combs.

### **METHODS OF EXTRACTING HONEY**

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

### **Of what use is a strainer during honey extraction?**

- It is used to remove impurities from honey

### **SITING THE BEE HIVE (SETTING A BEE HIVE)**

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

### **APIARY**

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

### **FACTORS TO CONSIDER WHEN SITING HIVES**

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

### **STOCKING THE HIVE**

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



### **WAYS OF STOCKING THE HIVE**

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

### **DIAGRAMS SHOWING CATCHER BOX AND SWARM CATCHING NET**

#### **Note**

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

### **BAITS IN BEE KEEPING**

- These are things used to attract honeybees into a new hive

#### **Examples of baits in bee keeping**

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

### **FEEDING BEES**

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

### **CONDITIONS THAT MAKE FARMERS PROVIDE SUPPLEMENTARY FEEDS TO BEES**

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

### **EXAMPLES OF SUPPLEMENTARY FEEDS FOR BEES**

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

### **HANDLING OF BEES BY A BEE KEEPER (OCCASIONS WHEN A BEE FARMER HANDLES BEES)**

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

### **ENEMIES OF BEES (BEE PESTS)**

- Safari ants **and** Red ants
- Hive beetles
- Wax moths
- Bee-killer wasps / beewolves
- Bee-eater birds
- Honey Badgers: These spoil the hives, kill bees and eat honey
- Termites
- Mice
- Moles
- Shrews

### **WAYS OF PROTECTING BEES FROM ENEMIES (BEE PESTS)**

- Hang the hive between poles/ Raise the hive above the ground
- ✓ To prevent ants and termites from destroying the hive
- Smear oil at the bases of poles
- ✓ To prevent termites from destroying the poles holding the hives
- Put grease on the wires
- ✓ To prevent ants and termites from reaching the hive
- Repair broken hives
- ✓ To prevent honey badgers

### **DISEASES OF HONEY BEES**

- American foulbrood
- Chalkbrood
- Nosema disease
- Sacbrood

### **CONTROL OF DISEASES IN HONEYBEES**

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

## **TOPIC: MEASURES**

### **REGULAR OBJECTS**

- These are objects with definite shapes

### **EXAMPLES OF REGULAR OBJECTS.**

- Cube e.g dice
- Cuboid e.g brick, box and block.
- Cylinders e.g chalk, pipe etc.
- Cone
- Sphere e.g basket ball
- Circle
- Triangle
- Square
- Rectangle
- Trapezium
- Kite

## **MEASURING REGULAR OBJECTS.**

### **LENGTH**

- This is the distance between points
- The standard unit of length / SI unit / base unit of length is **metre**

### **Other units for measuring length**

- |                    |                    |
|--------------------|--------------------|
| ▪ Kilometres (Km)  | ▪ decimetres (dm)  |
| ▪ Hectometres (Hm) | ▪ centimetres (cm) |
| ▪ Decametres (Dm)  | ▪ millimetres (mm) |

### **CAPACITY**

- This is the amount of liquid a container can hold
- The SI base unit of capacity is **litres (L)**

### **Other units for measuring capacity**

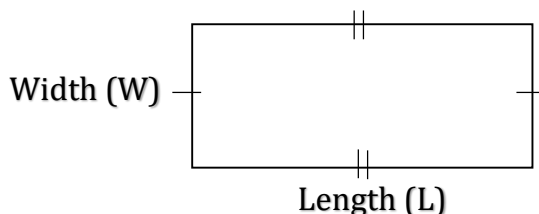
- millilitre (mL)

### **AREA**

- Area is the amount of space occupied by a two-dimensional object
- Area is measured in **square units**
- The standard unit of area is **square metre (m<sup>2</sup>)**

### **Examples of square units (units for measuring area)**

- |   |   |
|---|---|
| ▪ Square Kilometres (Km <sup>2</sup> )  | ▪ Square decimetres (dm <sup>2</sup> )  |
| ▪ Square Hectometres (Hm <sup>2</sup> ) | ▪ Square centimetres (cm <sup>2</sup> ) |
| ▪ Square Decametres (Dm <sup>2</sup> )  | ▪ Square millimetres (mm <sup>2</sup> ) |
- In two dimensional objects e.g squares and rectangles, the longer side is the length while the shorter side is the width.



### **VOLUME**

- Volume is the amount of space occupied by a three-dimensional object.
- Volume is measured in **cubic units**
- The standard unit of volume is **cubic metre (m<sup>3</sup>)**

### **Examples of cubic units (units for measuring volume)**

- Cubic metres (m<sup>3</sup>)
- Cubic centimetres (cc)
- Cubic millimetres (mm<sup>3</sup>)

### **Why is it easier to transport a kilogram of stones than a kilogram of feathers?**

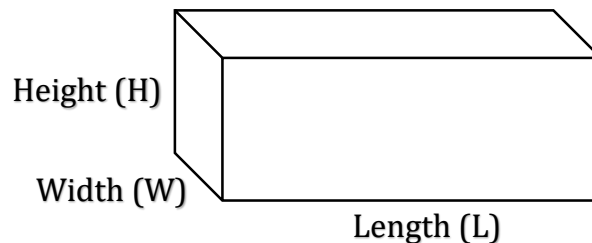
- A kilogram of stones occupies less space than a kilogram of feathers.
- A kilogram of stones has less volume than a kilogram of feathers.

### Why does a kilogram of feathers take up more space than a kilogram of stones?

- A feather is less dense than a stone.

### FINDING VOLUME OF REGULAR SHAPED OBJECTS

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

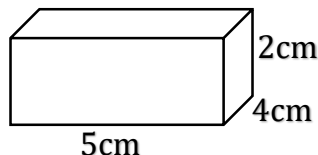


$$\text{Volume} = \text{Length} \times \text{width} \times \text{Height}$$

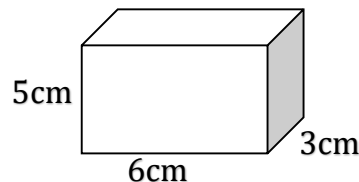
### EXERCISE

1. Find the volume of the figures.

(a)



(b)



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

### IRREGULAR OBJECTS

- These are objects with indefinite shapes.

### EXAMPLES OF IRREGULAR OBJECTS

- |                |            |
|----------------|------------|
| ▪ Stones       | ▪ Mango    |
| ▪ Keys         | ▪ Padlock  |
| ▪ Needles      | ▪ Scissors |
| ▪ Broken glass | ▪ Pens     |
| ▪ Orange       |            |

### FINDING VOLUME OF IRREGULAR OBJECTS

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

### EQUIPMENT USED IN DISPLACEMENT METHOD

- **Water**
- **Measuring cylinder**
- ✓ To measure the volume of displaced water
- **Overflow can (eureka can)**
- ✓ To pour displaced water into the measuring cylinder
- **String (thread)**

- ✓ To lower the irregular object gently into the container

### **CONTAINERS USED IN DISPLACEMENT METHOD**

- Measuring cylinder
- Over flow can (Eureka can)

### **How are the containers above adapted to their functions?**

- **Measuring cylinder:** It has a measuring scale
- **Over flow can :** It has a spout which directs displaced water into the measuring cylinder

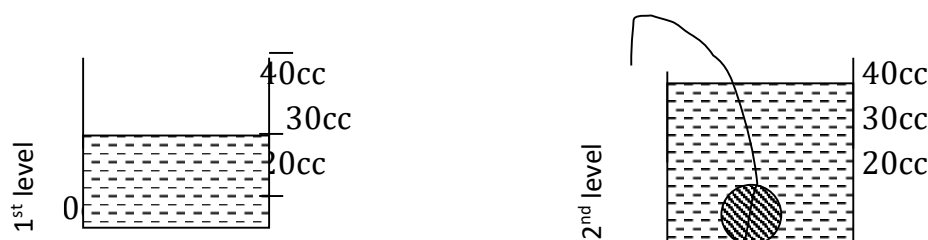
### **Why is displacement method called so?**

- It involves measuring the volume of displaced water

### **EXPERIMENTS TO SHOW DISPLACEMENT METHOD**

#### **1. Using a measuring cylinder**

- Put water into a measuring cylinder and record its volume
- Tie a thread on an irregular object and lower it into the measuring cylinder
- Record the new volume of water
- The difference between the volumes of water is the volume of the stone



$$\begin{aligned}
 \text{Volume of the stone} &= 2^{\text{nd}} \text{ level} - 1^{\text{st}} \text{ level} \\
 &= 35\text{cc} - 30\text{cc} \\
 &= 5\text{cc}
 \end{aligned}$$

The volume of the stone is 5cc

### **Why is the volume of an irregular object in the above diagram 5cc?**

- The volume of displaced water is 5cc.

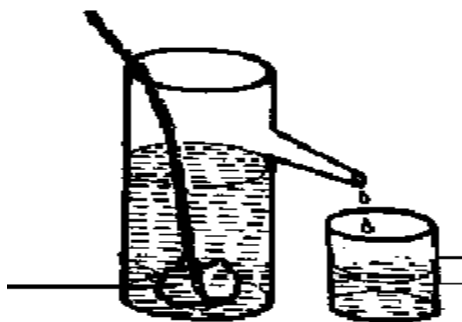
### **Why is the volume of an irregular object equal to the volume of displaced water in displacement method?**

- A sinking object displaces water (liquid) equal to its volume.

#### **2. Using an overflow can and measuring cylinder**

- Fill the overflow can with water up to the level of spout
- Use a thread to gently place an irregular object into the overflow
- Water will overflow and the spout will direct it to the measuring cylinder
- The volume of the irregular object is equal to the volume of displaced water in the measuring cylinder

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



The volume of the irregular object is 10cc.

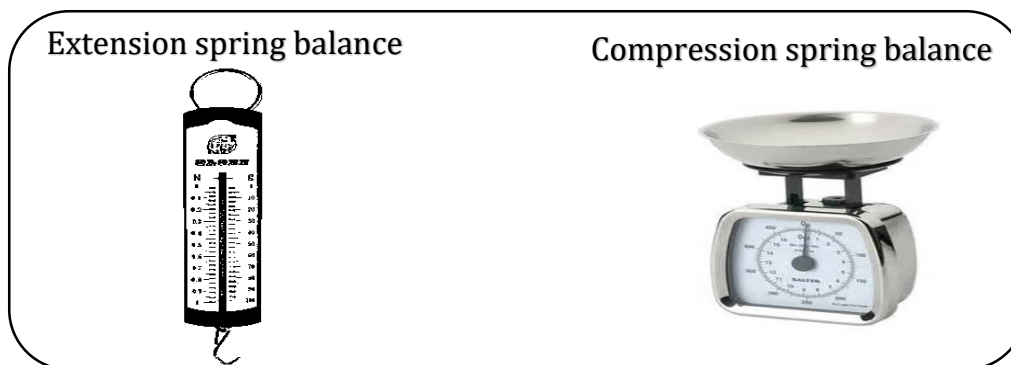
### EXAMPLES OF CONTAINERS USED TO MEASURE VOLUME OF LIQUIDS

- |                      |                 |
|----------------------|-----------------|
| ▪ Measuring cylinder | ▪ Beaker        |
| ▪ Burette            | ▪ Conical flask |
| ▪ Pipette            |                 |

### WEIGHT

- Weight is the force of gravity acting on an object
- ✓ Weight is measured in **Newtons (N)**
- ✓ Weight is measured by an instrument called **spring balance**
- ✓ Weight is changes

### DIAGRAMS SHOWING SPRING BALANCES



### FACTORS THAT DETERMINE WEIGHT OF AN OBJECT

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

### NOTE:

- Objects weigh less on the moon than on earth **because** there is less force of gravity on the moon than on earth
- Objects weigh less in water than in air **because** there is more buoyancy in water than in air
- When an object is lifted up, it overcomes the **force of gravity**.
- It is difficult to push a wheel barrow uphill **because** we are opposing the force of gravity.
- It is easier to push a wheel barrow downhill **because** we are helped by the force of gravity.

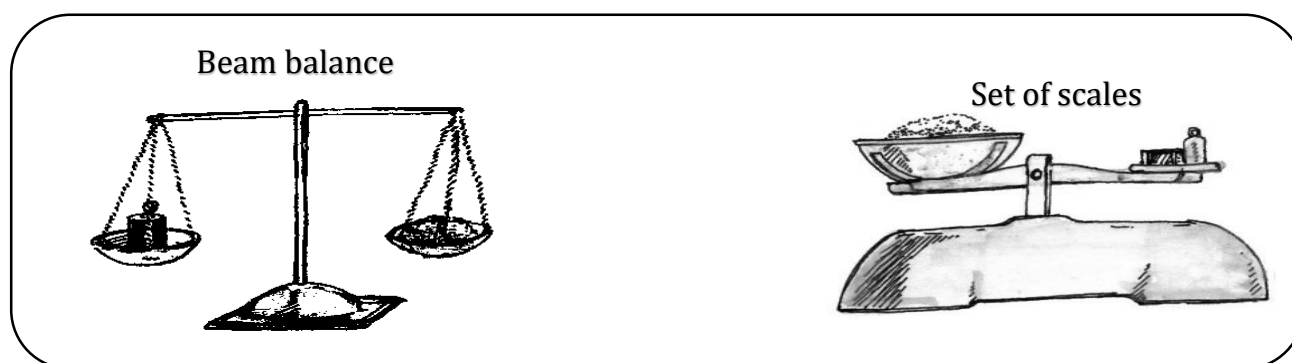
## MASS

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

## Examples of instruments used for measuring mass

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

## DIAGRAMS SHOWING WEIGHING SCALES



## DIFFERENCES BETWEEN MASS AND WEIGHT

MASS	WEIGHT
Mass is the amount of matter in an object	Weight is the force of gravity acting on an object
Mass is constant	Weight changes (it is variable)
Mass is measured in grams and kilograms	Weight is measured in Newtons
Mass can never be zero	Weight can be zero if no gravity acts upon an object
Mass is a scalar quantity	Weight is a vector quantity

## DENSITY

- This is the mass of an object per unit volume
- The SI unit of density is **kilogram per cubic metre (kg/cm<sup>3</sup>)**

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

## IMPORTANCE OF DENSITY

- It enables us to identify floating and sinking objects
- It enables us to identify pure and impure substances
- It enables us to find mass of an object
- It enables engineers to use strong but light metals to make bodies of aeroplanes

## FINDING DENSITY

### **Example I**

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

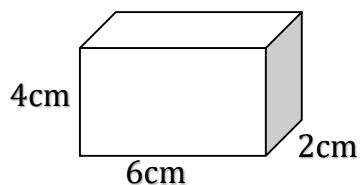
$$D = \frac{M}{V}$$

$$D = \frac{150g}{3cc}$$

$$D = 50g/cc$$

### **Example 2**

If the mass of the cuboid below is 48g. Find its density



$$V = L \times W \times H$$

$$= 6cm \times 2cm \times 4cm$$

$$= 48cm^3$$

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

$$D = \frac{150g}{3cc}$$

$$D = 50g/cc$$

### **Example 3**

Calculate the volume of a stone whose mass is 48g and density 6g/cc

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

$$6g/cc = \frac{48g}{V}$$

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

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

$$V = 8cc$$

### **DENSITIES OF SOME SUBSTANCES**

Substance	Density (g/cc)
Gold	19.3
Mercury	13.6
Lead	11.3
Silver	10.5
Copper	8.9
Brass	8.3
Iron	7.8
Tin	7.3
Aluminium	2.7
Glass	2.7
Rubber	1.3



Salt solution	1.2
Water at 4°C	1.0
Ice	0.92
Methylated spirit	0.83
Kerosene	0.8
Alcohol	0.8
Petrol	0.7
Cork	0.25
Air	0.0012
hydrogen	0.00009

- Aluminum is used to make bodies of aeroplanes because it is a strong metal with low density (It is strong and light)

### **HYDROMETER**

- It is used to measure densities of liquids e.g. milk, beer and wine
- A special hydrometer used to measure density of milk is called **lactometer**

### **FLOATING OBJECTS**

- These are objects that remain on water surface.
- ✓ The density of pure water is 1 g/cc
- ✓ Objects with density less than 1 g/cc (less dense than water), **float on water**
- ✓ Most objects float **because** they are less dense than water

### **CHARACTERISTICS OF FLOATING OBJECTS**

- Some objects are less dense than water
- Some objects are exactly the same density as water

### **EXAMPLES OF FLOATING OBJECTS**

#### **i) Objects that float because they are less dense than water**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>▪ Cork</li> <li>▪ Plastic</li> <li>▪ Ice cubes</li> <li>▪ Dry wood</li> <li>✓ Kerosene</li> <li>✓ Petrol</li> <li>✓ Diesel</li> <li>✓ Cooking oil</li> <li>✓ Lubricating oil</li> </ul> | <ul style="list-style-type: none"> <li>▪ Sponge</li> <li>▪ Leaf</li> <li>▪ Feathers</li> </ul> |
|--|--|
- } Floating liquids

#### **ii) Objects that float due to upthrust force (buoyancy)**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>▪ Boat</li> <li>▪ Ferry</li> </ul> | <ul style="list-style-type: none"> <li>▪ Ship</li> <li>▪ Dhow</li> </ul> |
|---|--|

### **How does upthrust force (buoyancy) enable a boat to float on water?**

- It reduces the weight of a boat (makes a boat to weigh less)

### **iii) OBJECTS THAT FLOAT DUE TO SURFACE TENSION**

- Water striders
- Paper clips

### **Why do objects such as paper clips and razorblades sometimes tend to float on water?**

- Due to high surface tension of water

### **Name the force in liquids that are responsible for surface tension.**

- Cohesion (cohesive forces)

### **SINKING OBJECTS**

- These are objects that go to the bottom of water.
- Objects whose density is more than 1g/cc (denser than water), **sink in water**.
- Objects sink in water **because** they are denser than that water.

### **EXAMPLES OF SINKING OBJECTS**

- |             |             |
|-------------|-------------|
| ▪ Stone     | ▪ Glass     |
| ▪ Sand      | ▪ Iron nail |
| ▪ Steel bar | ▪ Mercury   |

### **NOTE:**

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

### **BEHAVIOUR OF OBJECTS WHEN PUT IN WATER**

- Floating
- Sinking

### **SINKING**

- This is when an object goes to the bottom of water.

### **FLOATING**

- This is when an object remains on water surface

### **LAW OF FLOTATION**

- A floating body displaces its own weight of the liquid in which it floats.

### **FACTORS THAT AFFECT FLOATING**

- Density of an object
- Upthrust force (buoyancy)
- Surface tension of water

### **BUOYANCY (UPTHRUST)**

- This is the upward force that acts on an object put in a fluid (liquid or gas)
- Buoyancy is measured in Newton (**N**)

### Why do objects weigh less when put (immersed) in water or other fluids?

- Due to upthrust (buoyancy)

### How is buoyancy important to sailors?

- It enables their boats to float on water

### Examples of objects that float due to upthrust (buoyancy)

- Boat

### SURFACE TENSION

- This is the property that allows a liquid surface to resist an external force
- It is caused by **cohesive force on the liquid surface**

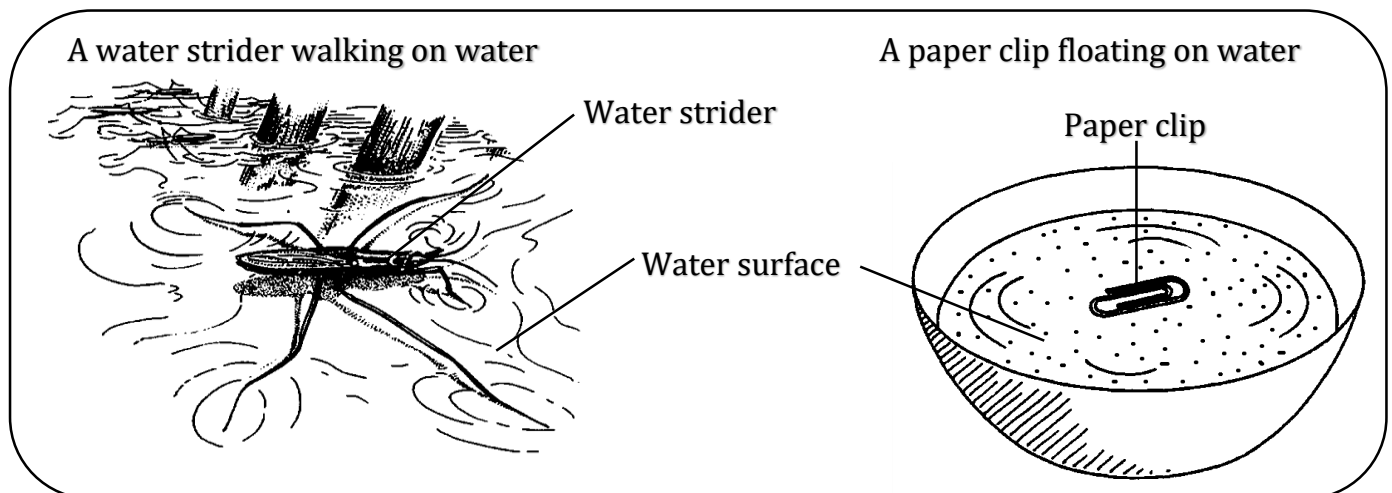
### EXAMPLES OF SURFACE TENSION

- A paper clip, razor bade or needle floating on water
- Mosquito eggs floating on water
- A water strider walking on water

### FACTORS THAT AFFECT SURFACE TENSION

- **Temperature**  
✓ Surface tension decreases with an increase in temperature.
- **Impurities in the liquid**  
✓ More impurities in the liquid reduce its surface tension.

### DIAGRAMS OF OBJECTS THAT FLOAT DUE TO SURFACE TENSION OF WATER



### What enables paper clips and small insects (e.g water striders) to float on water?

- Surface tension of water

### APPLICATION OF SURFACE TENSION

- It helps small insects (water striders) to walk on water
- It allows small objects which are denser than water to float on water e.g paper clips, coins, needles, mosquito eggs and razorblades

### MISCIBLE AND IMMISCIBLE LIQUIDS

#### MISCIBLE LIQUIDS

- These are any two liquids which that can mix completely.
- Miscible liquids **have different boiling points**

### **EXAMPLES OF MISCIBLE LIQUIDS**

- Water and alcohol (water and ethanol)
- Water and milk
- Petrol and diesel
- Water and vinegar
- Water and lemon juice

### **METHOD OF SEPARATING MISCIBLE LIQUIDS**

- Fractional distillation

### **IMMISCIBLE LIQUIDS**

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

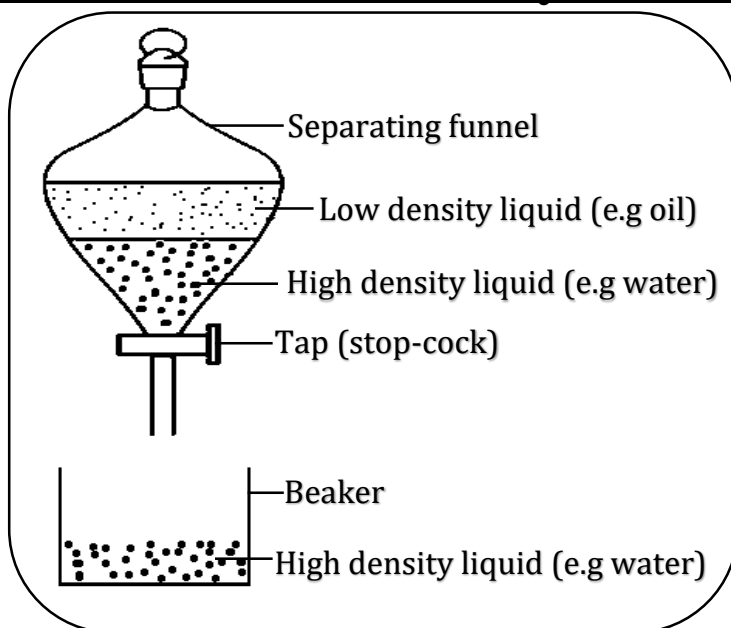
### **EXAMPLES OF IMMISCIBLE LIQUIDS**

- Water and petrol
- Water and oil
- Water and diesel
- Water and benzene

### **METHODS OF SEPARATING IMMISCIBLE LIQUIDS**

- Using a separating funnel
- Decantation

### **A DIAGRAM SHOWING SEPARATION OF IMMISCIBLE LIQUIDS USING A SEPARATING FUNNEL**



## **TOPIC: IMMUNIZATION**

### **IMMUNIZATION**

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

### **TYPES OF IMMUNIZATION**

- Primary immunization
- Mass immunization
- Booster immunization

### **PRIMARY IMMUNIZATION**

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

### **MASS IMMUNIZATION**

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

### **BOOSTER IMMUNIZATION**

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

### **IMPORTANCE OF IMMUNIZATION**

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

### **IMMUNITY**

- This is the ability of the body to resist diseases

### **TYPES OF IMMUNITY**

- Natural immunity
- Artificial immunity

### **NATURAL IMMUNITY**

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

### **WAYS OF ACQUIRING NATURAL IMMUNITY**

- Through breastfeeding (through suckling breast milk)
- After recovering from sickness (illness)

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

- It may lead to death

### **ARTIFICIAL IMMUNITY**

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

### **How does the body acquire artificial immunity?**

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

## **VACCINES**

- These are medical drugs used for immunization

## **IMPORTANCE OF VACCINES**

- They boost immunity

## **How do vaccines boost immunity?**

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

## **What are antibodies?**

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

## **METHODS OF ADMINISTERING VACCINES (METHODS OF IMMUNIZATION)**

- Oral method
- Injection method

## **TYPES OF VACCINES**

- Killed vaccines
- Live-attenuated vaccines
- Toxoid vaccines
- Viral vector vaccines

## **LIVE-ATTENUATED VACCINES**

- These are vaccines made from weakened germs
- ✓ They provide strong and long-lasting immunity against diseases

## **Examples of live-attenuated vaccines**

- Yellow fever vaccine
- Rotavirus vaccine (for diarrhoea)
- MMR vaccine (for Measles, mumps and rubella)
- Oral polio vaccine (OPV) or Sabin polio vaccine
- Measles vaccine
- Mumps vaccine
- Rubella vaccine
- BCG vaccine
- Chicken pox vaccine

## **KILLED (INACTIVATED) VACCINES**

- These are vaccines made from killed germs

## **Examples of killed (inactivated) vaccines**

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

## **TOXOID VACCINES**

- These are vaccines made from toxins produced by germs

### **What are toxins?**

- These are poisonous substances produced by germs

## **EXAMPLES OF TOXOID VACCINES**

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

## **VIRAL VECTOR VACCINES**

- These are vaccines that use a modified version of a virus to protect against certain diseases.

### **Examples of viral vector vaccines**

- COVID-19 vaccines (e.g AstraZeneca vaccine **and** Johnson & Johnson vaccine)
- Ebola vaccines (e.g rVSV-ZEBOV vaccine)

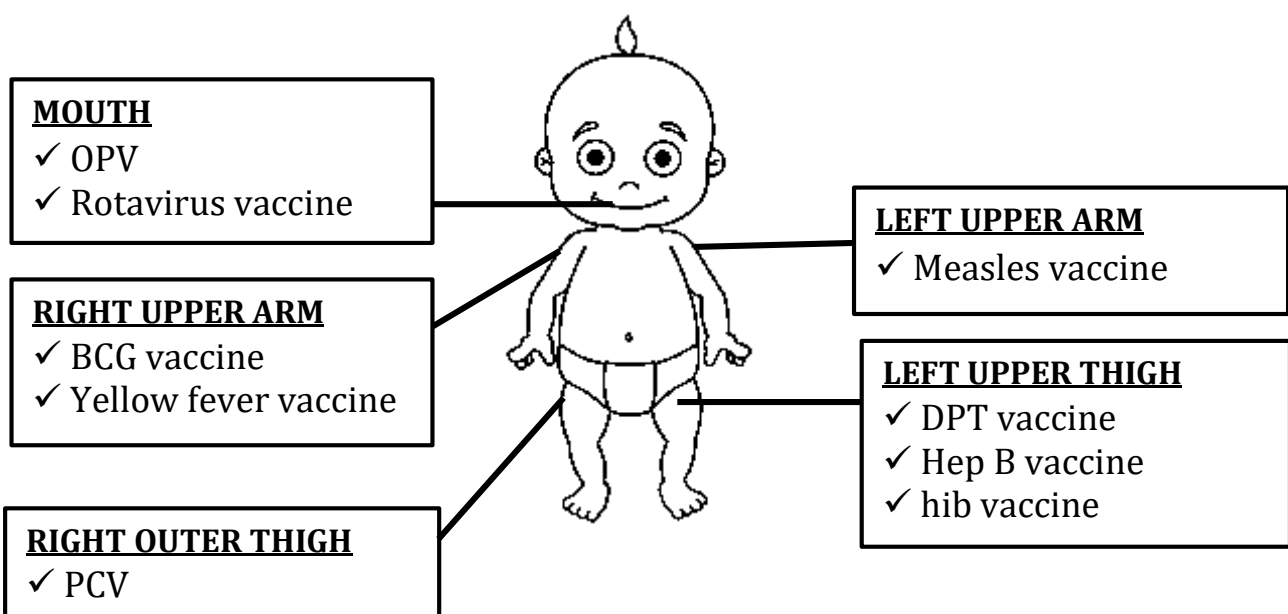
### **ACTIVITY:**

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

## **IMMUNISATION SITE**

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

## **IMMUNISATION SITES ON HUMAN BODY**



**Why are vaccines injected at different parts of the body?**

- For easy identification of the disease immunized

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

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

**Why are babies given BCG and polio vaccines at birth?**

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

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

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

**Why was DPT replaced with DTaP?**

- DTaP has fewer side effects than DPT

**Why DPT (DTaP) is called a triple vaccine?**

- It prevents three immunizable disease

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

- It prevents five immunizable diseases

**Why is polio vaccine given very many times?**

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

**Why is Polio vaccine always given orally?**

- It is very effective when given orally than injection

**Write the following vaccines in full**

- OPV: Oral Polio vaccine



- **IPV:** Inactivated Polio vaccine
- **BCG:** Bacille Calmette-Guerin (Bacillus of Calmette and Guerin)
- **DPT:** Diphtheria, Pertussis and Tetanus
- **DTaP:** Diphtheria, Tetanus and Pertussis
- **MMR:** Measles, Mumps and Rubella
- **HPV:** human papillomavirus vaccine
- **Hib:** Haemophilus influenza type B
- **PCV:** Pneumococcal Conjugate Vaccine

**Mention any two of 5-in-1 vaccines**

- DPT+ Hep B + Hib vaccine
- DTaP+ IPV + Hib vaccine

**A TABLE SHOWING IMMUNISABLE DISEASES, VACCINES, MODE OF ADMINISTRATION, NUMBER OF DOSES AND AGE AT WHICH THEY ARE GIVEN.**

DISEASE	VACCINE	HOW IT IS ADMINISTERED	DOSES	AT WHAT AGE
▪ Tuberculosis	BCG	Injection on upper right arm	1	At birth
▪ Poliomyelitis	Polio vaccine (OPV)	Drops in the mouth	4	At birth 6 weeks 10 weeks 14 weeks
<ul style="list-style-type: none"> <li>▪ Diphtheria</li> <li>▪ Whooping cough</li> <li>▪ Tetanus</li> <li>▪ Hepatitis B</li> <li>▪ Haemophilus influenza type B</li> </ul>	DPT + Hep B + Hib vaccine	Injection on the left thigh	3	6 weeks 10 weeks 14 weeks
Measles	Measles vaccines	Injection on the left upper arm	1	9 months (36 weeks)

**How many times should a baby be taken for immunization before his/her first birthday?**

- 5 times

**IMMUNISABLE DISEASES**

- These are diseases that can be prevented by immunization

**CHILDHOOD IMMUNISABLE DISEASES**

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

**EXAMPLES OF CHILDHOOD IMMUNIZABLE DISEASES**

- Measles
- Polio
- Tuberculosis
- Whooping cough

- Hepatitis B
- Haemophilus influenza B

- Diphtheria
- Tetanus

### **MEASLES (RUBEOLA)**

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

### **How does measles spreads?**

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

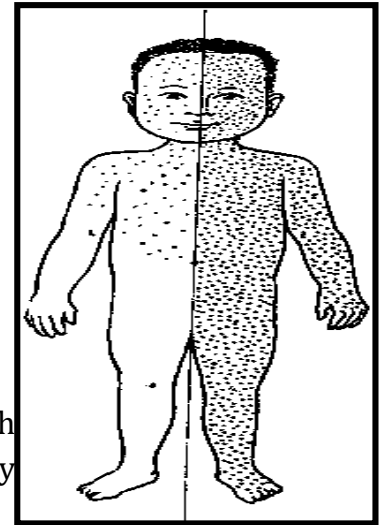
### **Signs of measles**

- Runny nose
- Skin rash

### **Symptoms of measles**

- Fever
- Sore throat

- Dry cough
- Watery eye



- Loss of appetite
- Body weakness

### **PREVENTION OF MEASLES**

- Isolate and treat infected ones
- Immunize children against measles

### **POLIOMYELITIS (POLIO)**

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

### **Signs of poliomyelitis**

- Paralysis of the limb
- Stiffness of the neck

- Stiffness of the back
- Vomiting

### **Symptoms of poliomyelitis**

- Muscle weakness
- Headache
- Sore throat

- Fever
- Neck pain
- Back pain

### **Effect of poliomyelitis to an individual**

- It leads to lameness

### **WAYS OF PREVENTING AND CONTROLLING POLIOMYELITIS**

- Immunization using polio vaccines (IPV & OPV)
- Drinking boiled water
- Proper use of latrines (proper disposal of human wastes)

- Wash hands with clean water and soap before eating food

### **How are crutches useful to a polio victim?**

- Crutches help the polio victim to move

### **TUBERCULOSIS**

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

### **Name the germ (bacterium) that causes tuberculosis**

- Mycobacterium tuberculosis

### **How does tuberculosis spread?**

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

### **Signs of tuberculosis**

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

### **Symptoms of tuberculosis**

- General body weakness
- Backache
- Mild fever

### **Ways of preventing and controlling tuberculosis**

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

### **How is smoking related to TB?**

- Smoking worsens tuberculosis

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

- AIDS

### **Why is tuberculosis common among AIDS patients?**

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

### **Signs common in both tuberculosis and AIDS patients**

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

## **TETANUS**

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

## **Signs of tuberculosis**

- Stiffness of the muscles
- Stiffness of the jaw / Lockjaw
- The baby stops breast feeding

## **Symptoms of tuberculosis**

- Fever
- Difficulty in swallowing
- Fast pulse

## **Why is tetanus called LOCK JAW disease?**

- It makes the jaws of the baby to become stiff

## **PREVENTION AND CONTROL OF TETANUS**

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

## **GROUPS OF PEOPLE WHO ARE GIVEN TT VACCINE**

- Teenage girls
- Pregnant women
- Accident victims

## **Why is DPT vaccine given to babies at 6 weeks?**

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

## **WHOOPING COUGH (PERTUSSIS)**

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

### **How does pertussis (whooping cough) spread?**

- Through inhaling contaminated air

### **Signs of whooping cough (pertussis)**

- Chronic cough (coughing spells)
- A pause in breathing (Apnea)
- Runny nose
- Vomiting

### **Symptoms of whooping cough (pertussis)**

- Fatigue (General body weakness)
- Fever

### **Prevention and control of whooping cough (pertussis)**

- Immunize babies using DPT vaccine
- Isolate and treat the infected ones

## **DIPHTHERIA**

- It is an airborne disease (droplet infection)
- It affects the respiratory system
- It mainly affects the throat and nose
- It is caused by a bacterium

### **How does diphtheria spread?**

- Through inhaling contaminated air
- Through touching open sores on person with diphtheria skin infection

### **Signs of diphtheria**

- Swollen neck
- Sore throat
- Swollen palate (swollen roof of the mouth)
- Difficulty in breathing
- Increased heart beat

### **Symptoms of diphtheria**

- Fatigue (General body weakness)
- Fever

### **Prevention and control of whooping cough (pertussis)**

- Immunize babies using DPT vaccine
- Isolate and treat the infected ones

## **HAEMOPHILUS INFLUENZA TYPE B**

- This disease is caused by a virus
- It is prevented using Hib vaccine.

## **HEPATITIS B**

- It is caused by a virus
- It affects the liver

### **Name the virus (germ) that causes hepatitis B.**

- Hepatitis B virus

### **How does hepatitis B spread?**

- Through sharing blood contaminated needles with infected person
- From an infected mother to the baby during child birth
- Through playing unprotected sex with infected person

### **Signs of hepatitis B**

- Dark urine
- Vomiting
- Jaundice (yellowing of the eyes and skin)

### **Symptoms of hepatitis B**

- Joint pain
- Loss of appetite
- Abdominal pain in the upper right side
- Joint pain
- General body weakness

### **Prevention of hepatitis B**

- Immunize with Hep B vaccine
- Avoid playing unprotected sex with infected person
- Avoid sharing needles with infected person

### **OTHER IMMUNIZABLE DISEASES**

- Cholera
- COVID-19
- Meningitis
- Yellow fever
- Diarrhoea
- Pneumonia
- Cervical cancer
- German measles (rubella)
- Rabies
- Small pox
- Mumps

### **EFFECTS OF IMMUNISABLE DISEASES**

- Increased death rate of infants
- Lameness
- Mental disabilities

### **ROLES OF INDIVIDUALS, FAMILIES AND COMMUNITIES IN IMMUNIZATION**

#### **1. PARENTS**

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

#### **2. CHILDREN**

- Taking their siblings (young brothers and sisters) for immunization
- Informing parents about the day for immunization

- Reciting songs and plays on immunization
- Helping to identify children who have not been immunized in the community

### **3. GOVERNMENT**

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

### **4. COMMUNITY LEADERS**

- Inviting health workers to educate members about immunisation
- Encouraging members to organize immunisation centres
- Encouraging members to take their children for immunisation
- Reporting immunisable disease outbreak

### **Child health card (Immunisation card)**

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

### **INFORMATION ON THE CHILD HEALTH CARD**

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

### **IMPORTANCE OF CHILD HEALTH CARD**

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

### **WAYS OF IDENTIFYING A CHILD WHO WAS IMMUNIZED AGAINST TB**

- Checking the child health card
- Checking the injection scar on the right upper arm

### **ORGANIZATIONS THAT CARRY OUT IMMUNISATION ACTIVITIES IN UGANDA**

- **WHO:** World Health Organization
- **UNICEF:** United Nations Children's Fund
- **UNEPI:** Uganda National Expanded Program on Immunization

### **UNEPI:**

- **UNEPI** stands for Uganda National Expanded Program on Immunization

- It is under Ministry of Health

### **TARGET GROUPS FOR UNEPI**

- Infants
- Women of child bearing age

### **ROLES OF UNEPI**

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

**NID** stands for National Immunisation Days

### **Other organizations that support UNEPI in immunisation**

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

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

- For all ugandans to be immunised

### **Reasons why children in some families are not immunised.**

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

### **Name the vaccine that prevents Neonatal tetanus**

- Tetanus Toxoid vaccine

### **Activity**

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



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

## **TOPIC: DIGESTION**

### **BODY SYSTEMS**

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

### **DIGESTIVE SYSTEM**

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

### **DIGESTION**

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

### **IMPORTANCE OF FOOD DIGESTION**

- It breaks down food for easy absorption of nutrients

### **TYPES OF FOOD DIGESTION**

- Mechanical digestion
- Chemical digestion

### **MECHANICAL DIGESTION**

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

## **EXAMPLES OF MECHANICAL DIGESTION**

- Chewing of food
- Churning of food

## **CHEMICAL DIGESTION**

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

## **How does chemical digestion depend on mechanical digestion?**

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

## **ENZYMES**

- These are chemical substances that speed up chemical digestion

## **IMPORTANCE OF ENZYMES**

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

## **CHARACTERISTICS OF ENZYMES**

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

## **Why are enzymes denatured (destroyed) by heat?**

- They are proteins in nature

## **TYPES OF ENZYMES**

- Amylase
- Lipase
- Protease

## **CONDITIONS UNDER WHICH ENZYMES WORK**

- Alkaline conditions
- Acidic conditions

## **EXAMPLES OF ENZYMES AND THE MEDIUM (PH) IN WHICH THEY WORK BEST**

ENZYME (S)	MEDIUM OF ACTION (pH)
<ul style="list-style-type: none"><li>▪ Pepsin</li><li>▪ Rennin</li></ul>	<ul style="list-style-type: none"><li>▪ Acidic medium</li></ul>
<ul style="list-style-type: none"><li>▪ Salivary amylase</li><li>▪ Lipase</li><li>▪ Trypsin</li><li>▪ Peptidase (erepsin)</li><li>▪ Sucrase</li></ul>	<ul style="list-style-type: none"><li>▪ Alkaline medium</li></ul>

### **What is meant by pH?**

- This is the degree of acidity or alkalinity

### **ALIMENTARY CANAL**

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

### **How does food move in the alimentary canal?**

- By peristalsis

### **What is peristalsis?**

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

### **PARTS OF THE HUMAN DIGESTIVE SYSTEM**

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

### **PARTS OF THE ALIMENTARY CANAL**

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

### **Parts of the digestive system besides the alimentary canal**

- Liver
- Pancreas
- Gall bladder

### **Name the three major glands of the digestive system**

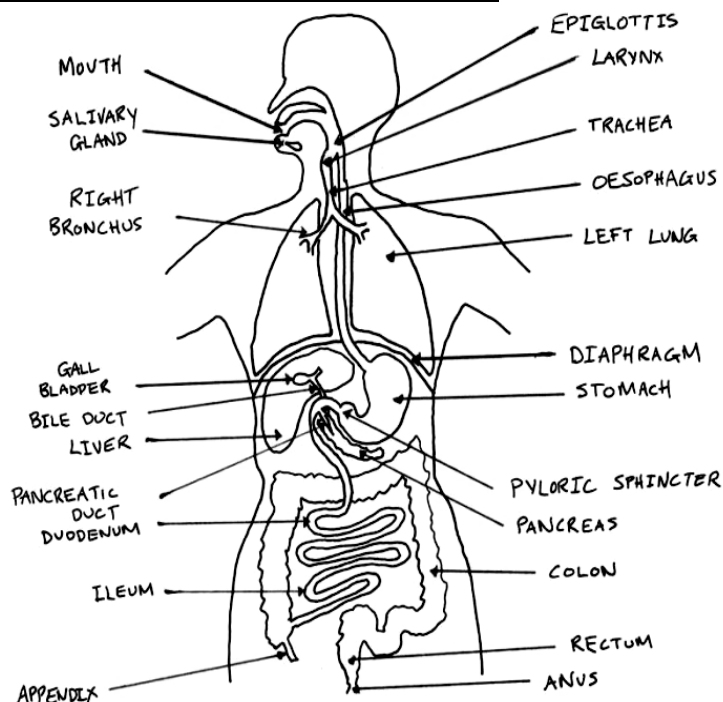
- Salivary glands
- Liver
- Pancreas

### **ACTIVITY**

1. How does digestion differ from digestive system?
2. Where does digestion of food
  - i) Begin?
  - ii) End?
3. Name the two types of digestion
4. Mention any one example of mechanical digestion
5. State the role of enzymes in chemical digestion.

6. Name any two enzymes that work under acidic pH
7. How does eating hot food affect the chemical digestion?

### **THE STRUCTURE OF THE HUMAN DIGESTIVE SYSTEM**



### **DIGESTION OF FOOD IN THE MOUTH**

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

### **SALIVA (SALIVARY JUICE)**

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

### **IMPORTANCE OF SALIVA**

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

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

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

### **IMPORTANCE OF THE TONGUE**

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

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

- Epiglottis

### **FOOD IN THE GULLET (OESOPHAGUS)**

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

### **Importance of the gullet**

- It passes (directs) food to the stomach

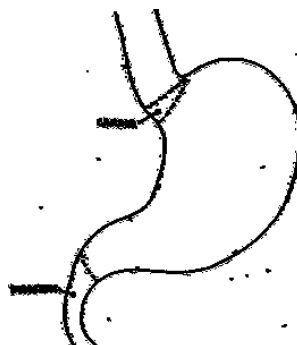
### **A diagram showing peristalsis in the gullet**



### **FOOD DIGESTION IN THE STOMACH**

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

### **Simple diagram to illustrate (The stomach)**



### **IMPORTANCE OF STOMACH**

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

### **SUBSTANCES THAT ARE ABSORBED IN THE STOMACH**

- Simple sugars
- Common salt
- Medicines
- Alcohol

### **THINGS PRODUCED BY THE STOMACH WALLS**

- Gastric juice
- Hydrochloric acid
- Mucus

#### **1. GASTRIC JUICE**

- This is the digestive juice found in the stomach

#### **Name the two digestive enzymes in gastric juice**

- Pepsin
- Rennin (chymosin)

Pepsin and Rennin work in acidic conditions

### **IMPORTANCE OF PEPSIN AND RENNIN**

#### **Pepsin**

- It works on proteins

#### **Rennin (chymosin)**

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

#### **How important is clotting of milk proteins in babies?**

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

#### **2. HYDROCHLORIC ACID**

- It kills germs taken in with food
- It provides acidic conditions for pepsin to digest proteins
- It activates pepsin

#### **3. MUCUS**

- It protects stomach walls from hydrochloric acid and enzymes

### **THE SMALL INTESTINES (SMALL BOWEL)**

- It lies between the stomach and the large intestines

## **PARTS OF THE SMALL INTESTINES**

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

## **FOOD IN THE DUODENUM**

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

## **DIGESTIVE JUICES FOUND IN THE DUODENUM**

- Pancreatic juice
- Bile juice (bile)

## **PANCREAS**

- This is a digestive organ/gland below the stomach

## **Functions of pancreas**

- It produces pancreatic enzymes
- It produces insulin hormone

## **Enzymes found in pancreatic juice (duodenum)**

- Pancreatic amylase
- Lipase
- Trypsin
- ✓ Enzymes in pancreatic juice work under **alkaline condition**

## **Pancreatic amylase**

- It changes starch to maltose

## **Lipase**

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

## **Trypsin**

- It changes peptides to amino acids

## **Importance of the pancreas**

- It produces pancreatic juice

## **BILE JUICE (BILE)**

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

## **FUNCTIONS OF BILE DURING FOOD DIGESTION**

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

## **GALL BLADDER**

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

## **IMPORTANCE OF GALL BLADDER**

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

## **FOOD IN THE ILEUM**

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

## **Digestive enzymes found in intestinal juice (succus entericus)**

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

## **Processes that occur in the ileum**

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

## **Main material absorbed in the ileum**

- Digested food (food)

## **Food absorption**

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

## **ADAPTATIONS OF THE ILEUM TO ITS FUNCTIONS**

- It is long

To increase surface area for food absorption

- It has many villi

To increase surface area for food absorption

- It has thin walls (thin epithelium)

For easy diffusion of digested food

- It has a dense network of blood capillaries



For easy diffusion of digested food

- It is coiled

To increase surface area for food absorption

- It has narrow lumen

To slow food movement that allows proper absorption

### **Why does digestion of food end in the ileum?**

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

### **HEPATIC PORTAL VEIN**

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

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

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

### **THE LIVER**

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

### **Write down the functions of the liver.**

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

### **Why does a dead body (corpse) feel cold?**

- The liver that produces heat has stopped working

### **Why is a liver called a storage organ?**

- It stores some vitamins and mineral salts

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

- Alcohol
- Urea
- Expired drugs

### **ATABLE SHOWING FOOD VALUES AND THEIR END PRODUCTS**

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

## **USES OF EACH FOOD VALUE (CLASS OF FOOD) IN OUR BODIES**

- Carbohydrates provide energy to the energy
- Proteins build the body tissues/help in proper growth of the body
- Proteins repair worn out body tissues
- Proteins help in making of enzymes
- Fats and oils (lipids) keep the body warm
- Fats and oils (lipids) provide energy to the body

## **THE LARGE INTESTINES (LARGE BOWEL)**

- It is about 1.5 metres long

## **PARTS OF THE LARGE INTESTINES**

- |          |          |
|----------|----------|
| ▪ Caecum | ▪ Rectum |
| ▪ Colon  | ▪ Anus   |

## **CAECUM**

- It connects the small intestines to the colon

## **COLON**

- It absorbs water and salts

## **Main process that place in the colon**

- Absorption of water

## **Materials absorbed in the large intestines (colon)**

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

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

- In the ileum

## **RECTUM**

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

## **ANUS**

- It passes out faeces/stool/excrement

## **Egestion (defecation)**

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

## **MATERIALS THAT MAKE UP FAECES (COMPONENTS OF FAECES)**

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

## **PARTS OF THE ALIMENTARY CANAL THAT CARRIES OUT ABSORPTION OF MATERIALS**

- Ileum
- Colon
- Stomach

### **ACTIVITY**

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

### **SUMMARY TABLE OF DIGESTIVE PROCESSES**

Part	Gland	Digestive juice	Enzymes	Food changes
Mouth	Salivary glands	saliva	Salivary amylase (Ptyalin)	Starch to maltose
Stomach	Gastric glands	Gastric juice	pepsin	Proteins to peptides
			Rennin	clots milk proteins in the stomach of infants (curdles/coagulates milk the stomach of infants)
Duodenum	liver	bile	No enzyme	Emulsifies the fats
	pancreas	Pancreatic juice	Trypsin	Proteins to peptides Peptides to amino acids
			Pancreatic amylase	Starch to maltose
			Lipase	Lipids (fats) to fatty acids and glycerol

Ileum		Intestinal juice (succus entericus)	Lactase	Lactose to glucose/galactose
			Maltase	Maltose to glucose
			Sucrase	Sucrose to glucose/fructose
			Lipase	Fats to fatty acids and glycerol
			peptidase	Peptides to amino acids
Colon				Water absorption
Rectum				Storage of faeces

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

- Constipation
- Diarrhoea
- Indigestion
- Vomiting
- Intestinal obstruction
- Heartburn

### **CONSTIPATION**

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

### **Causes**

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

### **INDIGESTION**

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

### **Causes**

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

### **INTESTINAL OBSTRUCTION**

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

### **VOMITING**

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

### **HEARTBURN**

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

### **DISEASES OF THE DIGESTIVE SYSTEM**

- Appendicitis
- Peptic ulcer
- cholera
- Typhoid
- Diarrhoea
- Dysentery
- Hepatitis

### **Appendicitis**

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

### **Peptic ulcers**

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

### **Dysentery**

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

### **Typhoid**

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

### **Ways through which food is made dirty**

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

### **Good eating habits**

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

To kill germs in hands

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

To prevent constipation

- Avoid talking while eating food

To prevent choking

- Feeding on a balanced diet.
- Wash hands after eating.
- Washing fruits/vegetables before eating them

To prevent hookworm infestations

To remove germs

- Eat well cooked food

To ease digestion

- Brush teeth every after a meal.
- Do not eat contaminated

To prevent food poisoning and diarrhoeal diseases

### **Bad eating habits**

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

### **How to improve on the working condition of digestive system**

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

### **Activity**

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

## **TERM TWO**

### **OUR ENVIRONMENT**

- Environment refers to all things that surround an organism

### **Components of the environment**

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

### **SOIL**

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

### **TERMS USED IN SOIL**

- **Soil texture** – This is the roughness or smoothness of soil particles.
- **Soil structure** – This is the arrangement of soil particles in an area.
- **Soil tone** - This is the colour of soil.
- **Soil sampling** – This is the taking of soil samples from an area with the aim of analyzing them in the laboratory
- **Irrigation** – This is the artificial method of providing water to crops in dry areas
- **Soil aeration** - This is the movement of air in the soil
- **Soil pH** - This is the degree of acidity or alkalinity of the soil
- **Soil drainage** -This is the downward movement of water in the soil
- **Soil capillarity**- This is the upward movement of water between small spaces in the soil
- **Soil profile**- This is the vertical arrangement of soil layers / Is the arrangement of soil layers from the top to the bottom
- **Soil Leaching** – Is the sinking of soil nutrients to deeper soil layers where plant roots cannot reach
- **Soil exhaustion**- Is the loss of soil fertility
- **Soil fertility** – Is the ability of the soil to support plant growth
- **Soil erosion**- Is the gradual removal of top soil by its agents

### **METHODS OF SOIL FORMATION (How soil is formed)**

- Weathering
- Decomposition

## **WEATHERING**

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

## **TYPES OF WEATHERING**

- Chemical weathering
- Biological weathering
- Physical weathering

## **FACTORS THAT CAUSE WEATHERING**

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

## **How does temperature cause weathering?**

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

## **How does acid rain cause weathering of rocks?**

- It causes chemical reactions

## **Decomposition**

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

Decomposition is a **chemical change**

## **How do bacteria help in decomposition?**

- They breakdown organic matter

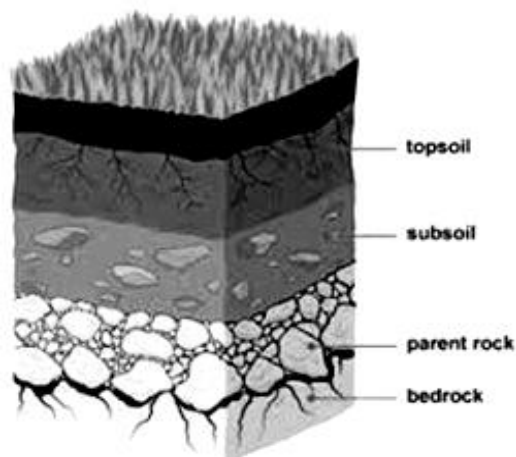
## **Importance of weathering and decomposition in the environment**

- They help in soil formation

## **SOIL PROFILE**

- Soil profile is the vertical arrangement of soil layers

## **Structure of soil profile**





### **Layers of soil (soil horizons)**

- Top soil (A horizon): it is the uppermost layer of the soil
- Sub soil (B horizon)
- Parent/bed rocks (C horizon) – provides materials for road construction

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

- Due to leaching

### **Places where soil profile can clearly be seen**

- Rubbish pit
- Pit latrine
- Mining sites

### **TYPES OF SOIL**

- Loam soil
- Clay soil
- Sand soil

### **Diagrams showing the types of soil**

### **LOAM SOIL**

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

### **Use of loam soil**

- It is used for crop growing

### **Reasons why Loam soil is the best for crop farming**

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

### **CLAY SOIL**

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

- It is water logged
- It has the highest capillarity

### **Uses of clay soil**

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

### **Why clay soil is used for brick making and ceramics**

- It is sticky when wet

### **Why clay soil is poorly aerated and drained**

- It has very small spaces between its particles

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

- It leads to lack of oxygen for respiration

### **Examples of clay products**

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

### **Crops that grow well in swamps/wetlands**

- |                  |           |
|------------------|-----------|
| ▪ Rice           | ▪ Cabbage |
| ▪ Sweet potatoes | ▪ Yams    |
| ▪ Sugarcanes     |           |

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

- Due to lack fresh air around their roots

### **How can clay soil be improved?**

- By adding humus and lime

### **SAND SOIL**

- It has very big spaces between particles
- It has big rough particles (has coarse/rough texture)
- It has the lowest water holding capacity
- It has the lowest capillarity
- It lacks humus (it is not fertile)/it has low mineral content
- It is well drained
- It is well aerated

### **Uses of sand soil**

- It is used for building houses

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

### **How can sandy soil be improved?**

- By adding humus

### **Why is sand soil well drained?**

- It has large spaces between its particles/has spaced soil particles

### **Why is sand soil the best for building houses?**

- It dries up quickly

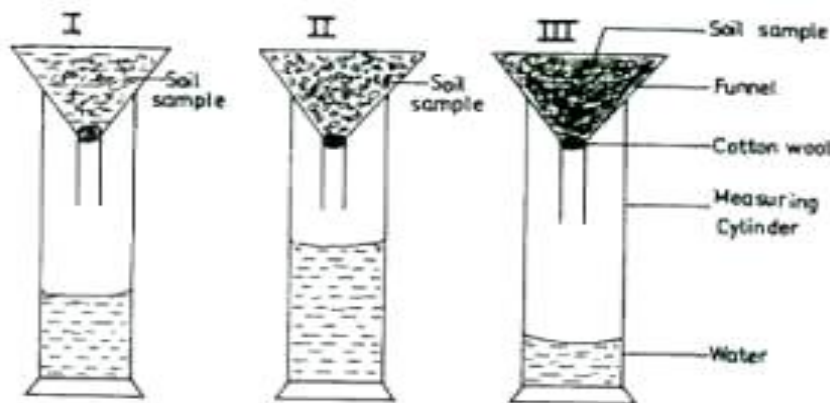
### **SOIL CAPILLARITY**

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

### **Experiments to show soil capillarity**

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

### **Illustration**



### **Observation**

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

### **Conclusion**

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

### **Why does water rise highest in clay soil?**

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

## **SOIL DRAINAGE (SOIL PERMEABILITY)**

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

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

- Put cotton wool in each funnel

**Why?** Cotton wool allows water to drain slowly

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

### **Illustration**

### **Observation**

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

### **Conclusion**

- Sand soil has the best drainage (greatest permeability)

**Why?** It has very big spaces between its particles

- Clay soil has least drainage (lowest permeability)

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

- Loam soil has the moderate drainage (moderate permeability)

## **COMPONENTS/ELEMENTS OF COMPONENTS (SOIL CONSTITUENTS)**

- These are things that make up soil

### **They include:**

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

**Mineral salts** occupy the greatest percentage in soil

### **How are the following components of soil formed?**

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

### **Examples of soil components found in spaces between soil particles.**

- Water
- Air

### **Organic components of soil**

- Humus
- Soil organisms

### **Inorganic components of soil**

- Rock particles
- Water
- Air
- Mineral salts

### **WATER AS A COMPONENT OF SOIL**

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

### **Functions of water in the soil**

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

### **EXPERIMENT TO SHOW THAT SOIL CONTAINS WATER**

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

### **Illustration**

### **Observation**

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

### **Conclusion:**

- Water droplets show that soil contains water

### **State the importance of the following in the experiment shown above**

### **Glass cover**

- To trap and condense water vapour into water droplets

### **Heat /source of heat**

- To evaporate water in the soil

### **AIR AS A COMPONENT OF SOIL**

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

### **Importance of air in the soil**

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

### **EXPERIMENT TO SHOW THAT SOIL CONTAINS AIR**

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

### **Observation**

- Air bubbles come out of the soil

### **Conclusion**

- Air bubbles from the soil show that soil contains air

### **HUMUS AS A COMPONENT OF SOIL**

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

### **Mention two groups of living things that help in decomposition**

- Bacteria
- Fungi

### **Functions of humus in the soil**

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

### **How does humus keep warmth in the soil?**

- By absorbing sun's heat

### **EXPERIMENT TO SHOW THAT SOIL CONTAINS HUMUS**

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

### **Illustration**

### **Observation**

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

### **Conclusion**

- Smoke from the soil shows that soil contains humus

### **MINERAL SALTS AS COMPONENT OF SOIL**

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

### **EXAMPLES OF MINERAL SALTS IN THE SOIL**

<b>MINERAL SALTS</b>	<b>IMPORTANCE TO PLANTS</b>
Nitrates and phosphates	<ul style="list-style-type: none"><li>▪ They help legumes to make proteins</li></ul>
Phosphorus	<ul style="list-style-type: none"><li>▪ It strengthens plant cell</li></ul>
Potassium	<ul style="list-style-type: none"><li>▪ It forms the plant cell</li><li>▪ It makes the plant resistant to diseases and drought</li></ul>
Iron and magnesium	<ul style="list-style-type: none"><li>▪ They form chlorophyll</li></ul>
Calcium	<ul style="list-style-type: none"><li>▪ It forms plant cell wall</li></ul>

### **EXPERIMENT TO SHOW THAT SOIL CONTAINS MINERAL SALTS**

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

### **Illustration**

### **Observation**

- Crusts of salt are seen in the beaker

### **SOIL ORGANISMS AS COMPONENT OF SOIL**

- These are living things found in soil

### **EXAMPLES OF SOIL ORGANISMS**

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

### **EXPERIMENT TO SHOW THAT SOIL CONTAINS ORGANISMS (EARTHWORMS)**

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

### **Functions of organisms in the soil**

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

### **How do earthworms and termites aerate the soil?**

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

### **State the importance of putrefying bacteria in the soil.**

- They help in decomposition

### **ROCK PARTICLES AS COMPONENT OF SOIL**

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

### **Importance of rock particles in the soil**

- They provide mineral salts to the soil



- They hold plant roots firmly
- They form the frame work of the soil

### **SOIL EXHAUSTION (SOIL INFERTILITY)**

- This is the loss of soil fertility

#### **Causes of soil exhaustion**

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

### **LEACHING**

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

#### **Causes of leaching**

- Constant irrigation
- Heavy rainfall (floods)

#### **Effects (dangers) of leaching**

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

### **SOIL EROSION**

- This is the removal of top soil by its agents

#### **Agents of soil erosion**

These are things that make soil erosion to take place

- Flowing water
- Strong wind
- Moving animals

#### **Causes of soil erosion**

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

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

### **How does deforestation cause soil erosion?**

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

### **How does over stocking and over grazing cause soil erosion?**

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

### **DEFORESTATION**

- This is the massive cutting down of trees without replacement

### **Why do people practise deforestation?**

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

### **Effects of deforestation**

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

### **WAYS (METHODS) OF CONTROLLING SOIL EROSION**

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

### **CONTROL OF SOIL EROSION IN SCHOOL COMPOUND**

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

### **How do trees control soil erosion?**

- Trees reduce the speed of wind (trees act as windbreaks)
- Trees leaves reduce the strength of raindrops that fall on soil
- Tree roots bind/hold soil particles together

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

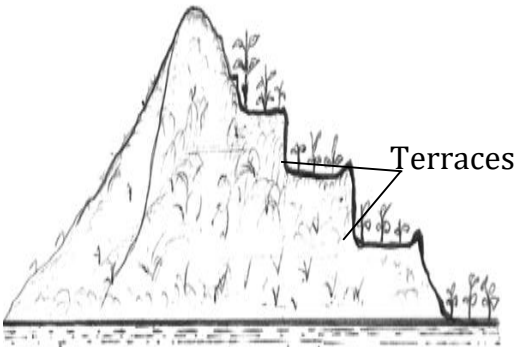
- Terracing

- Contour ploughing
- Strip cropping

### **Terracing**

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

#### **A diagram showing terracing**



#### **How does terracing control soil erosion?**

- Terraces reduce the speed of flowing water

### **TYPES OF SOIL EROSION**

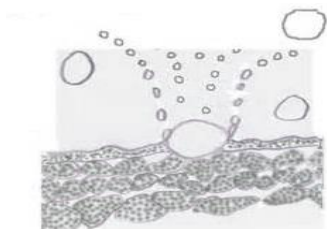
- Splash erosion (rain drop erosion)
- Sheet erosion
- Rill erosion
- Gully erosion
- River bank erosion

### **SPLASH EROSION**

This occurs when rain drops form small holes in the soil

Rain drops scatter soil particles

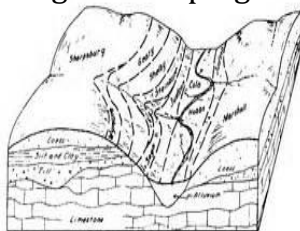
It is common on soil where iron sheets pour water



### **SHEET EROSION**

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

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



### **RILL EROSION**

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

These small channels are called **rills**

It is common on **gentle sloping areas**

Rill erosion results from sheet erosion



### **GULLY EROSION**

- This is when big channels formed on soil by flowing water
- It is common on **hilly areas**

### **EFFECTS (DANGERS) OF SOIL EROSION**

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

### **SILTING**

- This is the deposition of eroded materials into a water body

### **AGENTS OF SILTING**

- Flowing water
- Strong wind
- Moving animals

### **SILT**

- These are eroded materials deposited into a water source

### **EXAMPLES OF SILT**

- Soil/mud
- Cow dung
- Grass
- Rubbish

### **CAUSES OF SILTING**

- Soil erosion
- Cultivating along riverbanks and lake shores
- Allowing animals to drink in water sources
- Clearing vegetation on riverbanks and lake shores

### **EFFECTS (DANGERS) OF SILTING**

- It leads to water pollution
- It makes water bodies shallow (it reduces the depth of a water body)
- It leads to flooding of water bodies
- It leads to death of some marine animals
- It destroys the habitats for marine animals

### **How does silting lead to floods (flooding of water bodies)?**

- By reducing the capacity or depth of water bodies

### **How does silting lead to death of aquatic (marine) animals?**

- Silt suffocates marine animals

### **CONTROL OF SILTING**

- Planting short grass around water sources
- Putting silt traps around water bodies
- Avoid cultivating along river banks and lake shores
- Using a dredging machine to remove silt from water bodies

### **SOIL CONSERVATION:**

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

### **Soil fertility**

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

### **WAYS OF CONSERVING SOIL (WAYS OF MAINTAINING ON SOIL FERTILITY)**

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

### **INTERCROPPING**

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

### **MULCHING.**

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

### **Mulches**

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

### **EXAMPLES OF MULCHES**

- |                        |                     |
|------------------------|---------------------|
| ▪ Dry grass            | ▪ Dry maize stalks  |
| ▪ Dry coffee husks     | ▪ Dry bean husks    |
| ▪ Dry banana leaves    | ▪ Dry banana fibres |
| ▪ Chopped banana stems |                     |

### **Main reason for mulching**

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

### **ADVANTAGES OF MULCHING (REASONS FOR MULCHING)**

- It keeps water (moisture) in the soil
- ✓ Mulches reduce the rate of evaporation of moisture from the soil
- It controls the growth of weeds
- ✓ Mulches prevent weeds from getting sunlight
- It improves soil fertility
- ✓ Mulches rot to form humus
- It controls soil erosion (sheet erosion)

- ✓ Mulches reduce the speed of flowing water
- ✓ Mulches prevent rain drops from hitting the soil directly
- ✓ Mulches prevent top soil from being blown away by strong wind
  - It regulates soil temperature
- ✓ Mulches act as heat insulators

### **DISADVANTAGES OF MULCHING**

- Mulches can be fire hazards (mulches can easily catch fire)
- Mulches hide crop pests.
- Wet mulches can grow into weeds.
- Mulching is tiring

### **CROP ROTATION**

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

### **FACTORS TO CONSIDER WHEN CARRYING OUT CROP ROTATION**

- Legumes should be included in crop rotation
- ✓ They add nitrogen in the soil
- Bush fallowing should be included in crop rotation
- ✓ It helps the soil to regain its fertility (it restores soil fertility)
- Deep-rooted crops should follow shallow-rooted crops
- ✓ It improves proper use of soil nutrients
- Crops of the same family should not follow each other
- ✓ To starve pests
- ✓ To control parasitic weeds

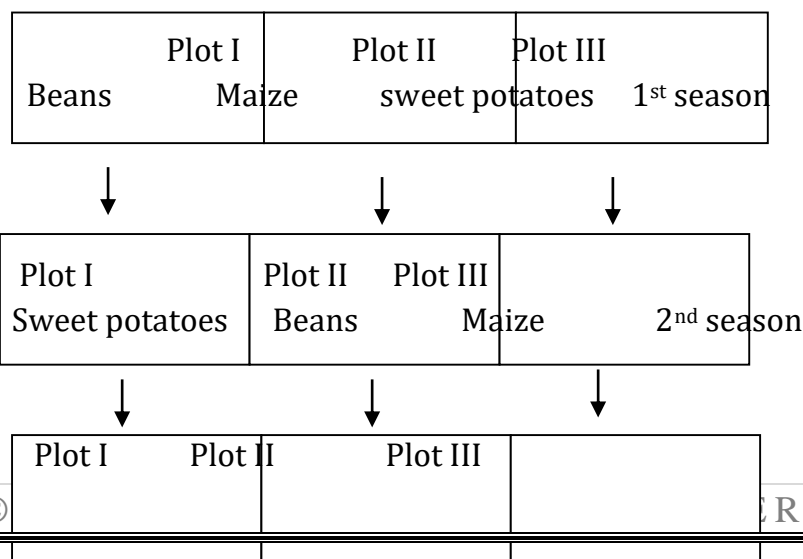
### **BUSH FALLOWING**

- This is the practice in which the land is left uncultivated for a period of time to regain its fertility.

### **Importance of bush fallowing**

- It helps the soil to regain its fertility

### **An illustration of crop rotation on a three year cycle**



### **Advantages of crop rotation**

- ❖ It controls crop pests  
It starves crop pests to death
- ❖ It controls parasitic weeds  
It starves parasitic weeds to death
- ❖ It improves soil fertility  
It involves legumes which add nitrogen to the soil  
It involves bush fallowing which help the soil to rest and regain its fertility
- ❖ It improves crop yields
- ❖ It controls soil erosion  
It involves growing of cover crops

### **FERTILIZERS**

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

### **Methods of applying fertilizers**

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

### **TYPES OF FERTILIZERS**

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

### **Natural fertilizers (manure or organic fertilizers)**

- These are fertilizers got from plant and animal remains
- They are called organic fertilizers **because** they are made from plants and animals remains

### **EXAMPLES (TYPES) OF MANURE:**

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

### **Farm yard manure: (FYM)**

- This is the manure got from animal waste

### **Materials from which Farmyard manure is made**

- Animal dung
- Animal droppings
- Urine

### **GREEN MANURE**

This is manure got from decomposed crops and dry grass (e.g maize, beans and cow peas)  
Crops are cut before flowering and ploughed back into the garden

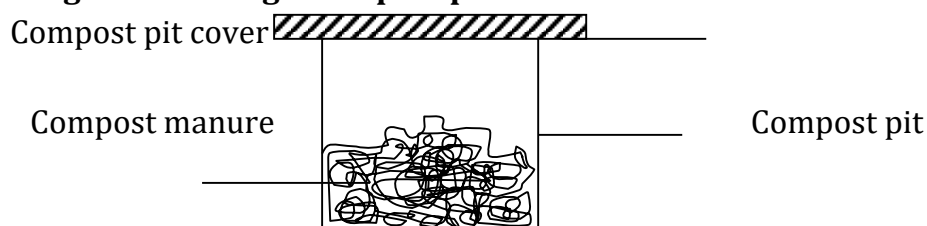
### **COMPOST MANURE**

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

#### **Methods of making compost manure**

- ❖ Pit method
- ❖ Heap method

#### **A diagram showing a compost pit**



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

**Compost cover** prevents bad smell from going out of the pit

#### **Why are faeces not always used as manure?**

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

### **Advantages of natural fertilizers**

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

### **Disadvantages of natural fertilizers**

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

### **Artificial fertilizers (inorganic fertilizers)**

- These are fertilizers made in factories (industries)

#### **Types (groups) of artificial fertilizers**

- Straight fertilizers
- Compound fertilizers



## **STRAIGHT ARTIFICIAL FERTILIZERS**

- These are fertilizers made up of one element

### **Examples of straight fertilizers**

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

## **COMPOUND FERTILIZERS**

- These are fertilizers made up of two or more elements.

### **Examples of compound fertilizers**

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

### **Advantages of using artificial fertilizers**

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

## **DISADVANTAGES OF ARTIFICIAL FERTILIZERS**

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

## **AGROFORESTRY**

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

### **Importance of agroforestry**

Trees provide shades to the crops

Tree leaves form manure when they rot

Trees help in water cycle

Trees help to control soil erosion

Some trees act as fences

Trees reduce global warming

Trees purify air

Trees provide wood fuel  
Trees provide wood for timber  
Fruit trees provide fruits to the farmer.  
Trees are sources of herbal medicine.  
Shady trees prevent growth of some weeds  
Trees provide extra support to weak stems  
Tree leaves form manure when they rot

### **SOIL POLLUTION**

- This is the releasing of harmful substances into the soil

### **SOIL POLLUTANTS**

- These are substances that are harmful to the soil

### **EXAMPLES OF SOIL POLLUTANTS**

- Plastics
- Polythene papers
- Scrap metals
- Agrochemicals (e.g herbicides and pesticides)
- Old engine oil
- Broken glasses
- Garbage

### **Ways of polluting the soil (causes of soil pollution)**

- Dumping polythene papers on the soil
- Dumping plastics on the soil
- Dumping broken glasses on the soil
- Dumping scrap metals on the soil
- Dumping garbage on the soil
- Dumping untreated industrial waste into the soil
- Using herbicides to kill weeds
- Excessive use of artificial fertilizers
- Pouring old engine oil to the soil

### **DANGERS OF SOIL POLLUTANTS (How do soil pollutants affects the soil?)**

- **Polythene papers, plastics, broken glasses and scrap metals**
  - ✓ They lead to soil exhaustion (soil infertility)
  - ✓ They prevent water and air from entering the soil
- **Waste (old) engine oil**
  - ✓ It kills the soil organisms
  - ✓ It prevents air from entering the soil
- **Artificial fertilizers**
  - ✓ They destroy soil texture
  - ✓ They make the soil acidic
- **Herbicides and pesticides**
  - ✓ They kill soil organisms

### **EFFECTS OF SOIL POLLUTION**

- It leads to soil exhaustion/soil infertility
- It leads to death of soil organisms
- It leads to poor crop yields

### **CONTROL OF SOIL POLLUTION**

- Use organic manure instead of artificial fertilizers
- Ensure proper disposal of non-biodegradable waste e.g polythene papers and plastics.
- Use the 5Rs of waste management
- Avoid dumping polythene papers on the soil
- Avoid dumping plastics on the soil
- Avoid dumping broken glasses on the soil
- Avoid dumping untreated waste from factories on the soil

### **NON-BIODEGRADABLE WASTES**

- These are wastes that cannot rot/decay

### **Examples of non-biodegradable wastes**

- Old plastics
- Polythene papers
- Broken glasses
- Scrap metals

### **How do non-biodegradable wastes affect the soil?**

- They prevent water and air from entering the soil
- They lead to soil exhaustion
- They lead to soil pollution
- They lead to death of soil organisms

### **WRITE DOWN THE 5RS OF WASTE MANAGEMENT**

- Recycle
- Reuse
- Return
- Reduce
- Reject/Refuse

### **RECYCLE**

- This is the converting of a waste material into a new material.

### **RECYCLABLE WASTES**

- These are waste materials that can be converted into new materials.
- These are waste materials that can be processed and used again.

### **EXAMPLES OF RECYCLABLE WASTE**

- Old plastics
- Scrap metals
- Broken glasses
- Old papers

## **MATTER AND ENERGY**

### **TERMS USED IN MATTER AND ENERGY**

#### **COHESION**

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

## **ADHESION**

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

## **VISCOSITY**

- This is the friction found in liquids and gases

## **MATTER**

- This is anything that occupies space and has weight

## **AN ATOM**

- This is the smallest unit of matter that has properties of a chemical element

## **MOLECULE**

- This is a group of two or more atoms joined together

## **PROPERTIES OF MATTER**

- ❖ Matter occupies space (matter has volume)
- ❖ Matter has weight
- ❖ Matter exerts pressure
- ❖ Matter is made up of molecules
- ❖ Matter can neither created nor destroyed

## **EXAMPLES OF MATTER**

- |              |         |
|--------------|---------|
| ▪ Stones     | ▪ Chalk |
| ▪ Water      | ▪ Milk  |
| ▪ Air        | ▪ Smoke |
| ▪ Human body | ▪ Ash   |
| ▪ Soil       |         |

## **THINGS THAT ARE NOT REGARDED AS MATTER**

- |               |          |
|---------------|----------|
| ▪ Radio waves | ▪ Dreams |
| ▪ Memories    | ▪ Warmth |
| ▪ Ideas       |          |

## **Why is warmth not regarded as matter?**

- It does not occupy space
- It has no weight

## **MAIN STATES OF MATTER**

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

## **NOTE**

- **Water** can exist in all the three main states of matter.

## **Why does water exist in all the three main states of matter?**

- The orientation of hydrogen bonds in water allows it to change to all the three main states of matter.

### **Besides the three main states of matter, name other state of matter**

- Plasma (e.g stars and the sun belong to plasma state of matter)

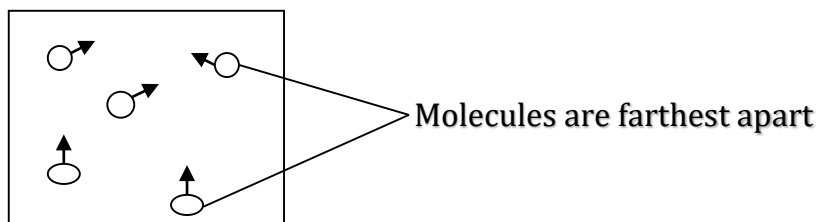
### **GASEOUS STATE**

- Molecules in gases are farthest apart.
- Heat travels **fastest** in gaseous state.
- ✓ It has mobile (freely moving) molecules.
- Sound travels **slowest** in gaseous state.
- ✓ Its molecules are farthest apart.
- Gases turn into liquid by **condensation**.
- Gases turn into solids by **deposition**.

### **EXAMPLES OF SUBSTANCES IN GASEOUS STATE OF MATTER**

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

### **A DIAGRAM SHOWING MOLECULES IN GASEOUS STATE**



### **PROPERTIES OF GASES**

- They have no shape.
- Molecules in gases are farthest apart.
- Heat travels in gases by **convection**.
- Gaseous state has the smallest density.
- Gases have no cohesion forces.

### **AIR**

- This is the mixture of gases

### **COMPONENTS OF AIR**

- |                   |       |
|-------------------|-------|
| ▪ Nitrogen:       | 78%   |
| ▪ Oxygen:         | 21%   |
| ▪ Rare gases:     | 0.97% |
| ▪ Carbon dioxide: | 0.03% |

### **PROPERTIES OF AIR**

- |                      |                         |
|----------------------|-------------------------|
| ▪ Air has weight     | ▪ Air can be compressed |
| ▪ Air occupies space | ▪ Air exerts pressure   |

## **DIAGRAMS SHOWING THE PROPERTIES OF AIR**

### **1. AIR HAS WEIGHT**

**What shows that air has weight in the diagram above?**

- An inflated balloon has lifted a deflated balloon.

**Why does an inflated balloon lift a deflated balloon?**

- An inflated balloon is heavier than a deflated balloon.

**Why should an inflated balloon be tied with a thread on its neck??**

- To prevent air from inside it from escaping

### **APPLICATION OF AIR HAS WEIGHT**

### **2. AIR EXERTS PRESSURE**

**State the importance of cardboard in the experiment above.**

- To prevent water from coming out

**Why does the cardboard stick on glass for some time without falling?**

- Air pressure outside is equal to pressure inside the glass

### **APPLICATION OF AIR EXERTS PRESSURE**

- It helps in drinking soda using straws
- It helps in sucking ink into fountain pens
- It helps in sucking liquid medicine using a syringe
- It helps in flying kites and balloons

### **3. AIR CAN BE COMPRESSED**

### **APPLICATION OF AIR CAN BE COMPRESSED**

- It helps in spraying agrochemicals (e.g using knapsack sprayer)
- It helps in pumping air in tubes of tyres (e.g using pumps)
- It helps in spraying insecticides and perfumes (e.g using aerosol sprays)
- It helps in using fire extinguishers to put out fire
- It helps tyres to support the weight of vehicles

### **4. AIR OCCUPIES SPACE**

#### **APPLICATION OF AIR OCCUPIES SPACE**

- It helps us to fill up balloons with balloons

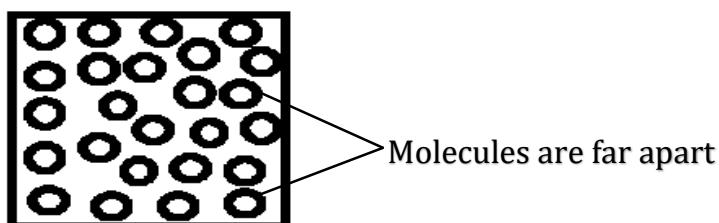
### **LIQUID STATE**

- Molecules in liquids are farther apart.
- Liquids turn into gases by **evaporation**.
- Liquids turn into solids by **freezing**.

### **EXAMPLES OF SUBSTANCES IN LIQUID STATE**

- |           |          |            |
|-----------|----------|------------|
| ▪ Water   | ▪ Soda   | ▪ Kerosene |
| ▪ Alcohol | ▪ Milk   | ▪ Porridge |
| ▪ Syrup   | ▪ Petrol | ▪ Honey    |

### **A DIAGRAM SHOWING MOLECULES IN LIQUID STATE**



### **PROPERTIES OF LIQUIDS**

- They have indefinite shape

- They take up the shape of the container in which they are put.
- Liquids flow
- ✓ They have weak cohesion forces
- Heat travels in liquid state by **convection**.
- Molecules in liquids are farther apart
- Liquids find their own level
- Pressure in liquids increases with increase in depth
- Pressure in liquids act equally in all directions at the same level

### **DIAGRAMS SHOWING PROPERTIES OF LIQUIDS**

### **VISCOSITY**

- This is the friction in liquids and gases

### **VISCOUS LIQUIDS**

- These are liquids that cannot flow easily
- They have great viscosity

### **EXAMPLES OF VISCOUS LIQUIDS**

- Porridge
- Syrup
- Honey

### **SOLID STATE**

- Molecules in solids are compact (closely packed together)
- Solids turn into liquids by **melting**
- Solids turn into gases by **sublimation**
- Sound travels **fastest** in solids
- ✓ It has closely packed molecules

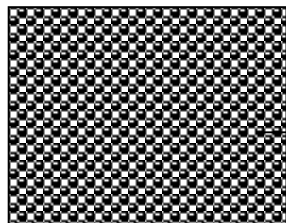


- Heat travels **slowest** in solid state

### EXAMPLES OF SUBSTANCES IN SOLID STATE

- Wood
- Soil
- Charcoal
- Maize flour
- Ice
- A bar of soap

### A DIAGRAM SHOWING MOLECULES IN SOLID STATE



Molecules are far apart

### PROPERTIES OF SOLIDS

- They have shape.
- They have compact (closely packed) molecules.
- ✓ They have strong cohesion (cohesive force).
- Heat travels in solids by **conduction**.
- Solids have the greatest density
- Solids cannot be reduced by compression

### PHYSICAL CHANGES

These are changes that do not form new permanent substances.

#### **Changes in the states of matter**

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

#### Why?

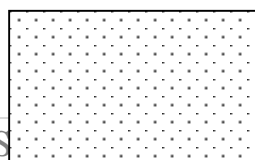
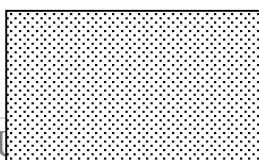
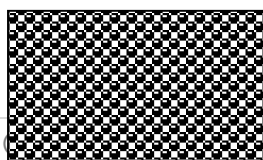
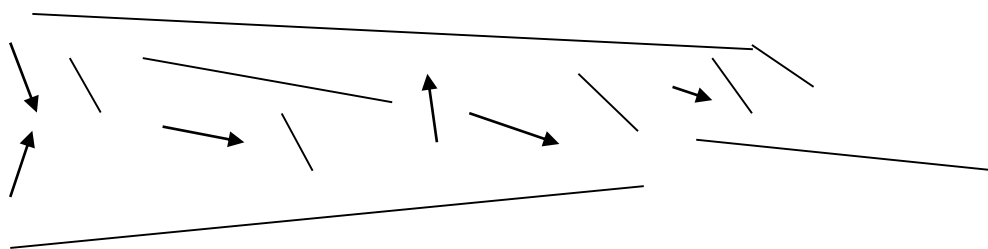
They are reversible

No new permanent substance is formed

### EXAMPLES OF PHYSICAL PROCESSES

- Melting
- Condensation
- Evaporation
- Freezing (solidification)
- Sublimation
- Deposition

### A summary of changes in the states of matter



### **Name the process at A - F**

- A is melting
- B is condensation
- C is evaporation
- D is freezing (solidification)
- E is sublimation
- F is deposition

### **PHYSICAL PROCESSES CAUSED BY HEAT LOSS**

- Freezing (solidification)
- Deposition
- Condensation

### **PHYSICAL PROCESSES CAUSED BY HEAT GAIN**

- Melting
- Evaporation
- Sublimation

### **PHYSICAL PROCESSES ARE INVOLVED IN WATER CYCLE**

- Evaporation
- Condensation

### **EVAPORATION**

- This is the physical process by which a liquid changes to a gas
- ✓ Evaporation is caused by **heat energy / increase in temperature / heat gain / heating**

### **EXAMPLES OF EVAPORATION**

- Crystallization
- Drying of clothes
- Drying of sweat

### **IMPORTANCE OF EVAPORATION**

- It helps us to recover salt or sugar that has been dissolved in water
- It helps us to obtain common salt from lakes and seas
- It helps in the water cycle
- It helps in drying of clothes
- It helps in distillation
- It helps to cool our bodies during sweating

### **FACTORS THAT AFFECT THE RATE OF TRANSPIRATION.**

- Temperature of the liquid
- Surface area of the liquid
- Wind speed
- Humidity

### **Temperature of the liquid**

- ✓ The rate of evaporation increases with increase in temperature e.g a cup of hot tea evaporates quicker than a cup of cold tea

### **Surface area of the liquid**

- ✓ The rate of evaporation increases as with increase in surface area e.g the same amount of water will evaporate quicker in wide container than in a narrow container

### **Wind speed**

- ✓ The rate of evaporation increases with increase in wind speed e.g clothes on a clothesline dry quicker on a windy day than on a still day

### **Humidity**

- ✓ The rate of evaporation decreases with increase in humidity

### **STEPS TAKEN TO RECOVER SALT FROM A MIXTURE OF SALT AND SAND**

- Put the mixture in a clean container
- Add water and stir to dissolve salt
- Filter to remove sand / to obtain salt solution
- Evaporate the salt solution to dryness

### **CONDENSATION**

- This is the physical process by which a gas changes to liquid
- It is caused by **heat loss / decrease in temperature / cooling**

### **EXAMPLES OF CONDENSATION**

- Formation of dew
- Formation of clouds
- Formation of fog

### **By what process are clouds, fog and dew formed?**

- By condensation

### **Why is dew formed at night?**

- Due to very low temperature which lead to condensation

### **Why does dew disappear during day time?**

- Due to high temperature which lead to evaporation

### **Why is dew formed at night but not during day time?**

- The temperature is very low at night and it is high during day time

### **IMPORTANCE OF CONDENSATION**

- It helps in the water cycle
- It helps in distillation
- It helps in water desalination

### **How is condensation important in the water cycle?**

- It helps in the formation of clouds

## **MELTING**

- This is the physical process by which of a solid changes to a liquid
- It is caused by **heat energy / increase in temperature / heat gain / heating**

### **Examples of substances that can melt**

- |                 |              |
|-----------------|--------------|
| ▪ Butter / fats | ▪ Blueband   |
| ▪ Ice cubes     | ▪ Candle wax |

## **EXAMPLES OF MELTING**

- Melting of metals
- Snow melting
- Melting of butter in a hot pan
- Melting of candle wax
- Turning of ice cubes into water

## **IMPORTANCE OF MELTING**

- It helps in iron smelting
- It helps in purity analysis of butter and ghee
- It helps in making of alloys
- It enables a fuse to break the circuit in case of high voltage

## **FREEZING (SOLIDIFICATION)**

- This is the physical change of a liquid to a solid

## **IMPORTANCE OF FREEZING**

- It helps in making of ice cubes
- It helps in making of ice cream
- It helps in preserving some food stuffs e.g ice cream, fish, meat, fruits and vegetables

## **NOTE:**

- Pure water freezes at 0°C (32°C)

## **Why does water take long to freeze when salt is added to it?**

- Salt lowers the freezing point of water

## **SUBLIMATION**

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

### **EXAMPLES OF SUBLIMATES (SUBSTANCES THAT CAN SUBLIME)**

- |                                  |                     |
|----------------------------------|---------------------|
| ▪ Iodine                         | ▪ Sulphur           |
| ▪ Dry ice (solid carbon dioxide) | ▪ Arsenic           |
| ▪ Mothballs (Naphthalene)        | ▪ Ammonium chloride |
| ▪ Camphor                        | ▪ Snow              |

## **USES OF SUBLIMATES**

- Mothballs are used as pesticides
- They are used as air fresheners (deodorants)

- They are used as perfumes

### **IMPORTANCE OF SUBLIMATION**

- It helps in purification of metals
- It helps in using air fresheners
- It helps us to use mothballs to keep away moths from clothes
- It enables dry ice to put out fire

### **Which component of air is added to the atmosphere when dry ice sublimates?**

- Carbon dioxide

### **DEPOSITION (DESUBLIMATION)**

- This is the physical process by which a gas changes directly to a solid

### **EXAMPLE OF DEPOSITION**

- Snow formation
- Frost formation

### **How is snow formed?**

- By deposition

### **MIXTURE**

- This is a combination of two or more substances.

### **EXAMPLES OF MIXTURES**

- Concrete: (cement + sand + stone)
- Porridge: (maize flour + water)
- ORS: (Sugar + salt + water)

### **TYPES OF MIXTURES**

- Solution
- Suspension

#### **1. SOLUTION**

- This is the mixture of a solute and solvent
- This is a uniform mixture of two or more substances

### **TYPES OF SOLUTION**

- Saturated solution
- Super saturated solution
- Unsaturated solution

### **SATURATED SOLUTION**

- This is a solution which cannot dissolve any more solute at that temperature

### **SUPER SATURATED SOLUTION**

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

## **UNSATURATED SOLUTION**

- This is the solution that can dissolve more solutes.

## **SOLUTE**

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

## **EXAMPLES OF SOLUTES**

- Salt
- Sugar
- Glucose
- Sucrose

## **SOLUBLE SUBSTANCES**

- These are substances that can dissolve.

## **EXAMPLES OF SOLUBLE SUBSTANCES**

- Sugar
- Salt
- Glucose
- Sucrose

## **Why does salt dissolve in water?**

- Salt is soluble

## **INSOLUBLE SUBSTANCES**

- These are substances that cannot dissolve in a liquid

## **EXAMPLES OF INSOLUBLE SUBSTANCES**

- Stones
- Sand particles

## **Why can't sand dissolve in water?**

- Sand is insoluble

## **SOLVENT**

- This is a substance (liquid) that dissolves a solute

## **Examples of solvents**

- Water
- Milk
- Kerosene
- Alcohol

## **Why is water is called a universal solvent?**

- It dissolves most solutes

## **2. SUSPENSION**

- This is a mixture of two substance in which a solid is spread but does not dissolve in a liquid.

## **EXAMPLES OF SUSPENSION**

- Maize flour in water
- Muddy water
- Sand in water
- Paints

## **METHODS OF SEPARATING MIXTURES**

- Decantation (decanting)
- Filtration method (filtering)

- Evaporation to dryness
- Using a magnet
- Hand picking or sorting
- Flotation
- Distillation
- Sieving
- Using a separating funnel
- Winnowing
- Crystallization

## **METHODS OF SEPARATING MIXTURES OF SOLIDS AND LIQUIDS**

### **1. FILTRATION METHOD**

- This is the removal of solid particles from a liquid using a filter
- The solid particles are called **residue**
- The clear liquid is called **filtrate**

### **MATERIALS THAT CAN BE USED AS FILTER (USED FOR FILTERING)**

- Clean thick cloth
- Sieve
- Filter paper
- Porcelain filter

### **APPLICATION (USES) OF FILTRATION AT HOME**

- It helps in separating passion fruit juice from seeds
- It helps in obtaining clean water from dirty water
- It helps in preparing local salt from ash

Water obtained by filtration is not good for drinking

#### **Why?**

Filtration does not kill germs.

**Diagram showing filtration**

### **2. DECANTATION METHOD**

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

#### **Importance of decantation**

It is used to obtain clean water from muddy water

#### **Steps for decanting**

Put dirty (muddy) water in a container

Allow solid particles to settle at the bottom

Carefully pour off the clear liquid

**Diagram illustrating decantation**

Water obtained by decanting is not good for drinking

#### **Why?**

Decanting does not kill germs

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

- By boiling
- Using UV light
- Adding chemicals (like chlorine and fluorine)

### **Uses of water collected by decantation and filtration**

- For washing
- For cooking
- For irrigation (watering crops)
- For mopping
- For cooling machines

### **3. EVAPORATION TO DRYNESS**

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

#### **Importance of evaporation to dryness**

- It is used to recover salt that has been dissolved in water
- It is used to obtain salt from lake and sea water

#### **How can you recover salt or sugar that has dissolved in water?**

- By evaporation to dryness

### **STEPS TAKEN TO OBTAIN SALT FROM A MIXTURE OF SALT AND SAND**

- Put the mixture in a clean container
- Add water and stir (to dissolve salt)
- Filter to obtain salt solution (filter to remove sand)
- Evaporate the salt solution (filtrate) to dryness

### **4. DISTILLATION**

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

The pure liquid obtain is called **distillate**

Distilled water (distillate) is not good for drinking

#### **Why is it not recommendable to drink distilled water (distillate)?**

- It lacks minerals salts

### **USES OF DISTILLED WATER**

- It is used to mix medical drugs in hospitals
- It is used to clean the human body before taking an injection
- It is used to clean some medical instruments
- It is used in intravenous rehydration
- It is used in car radiators

### **APPLICATION OF DISTILLATION**

- It is used to obtain pure alcohol from crude alcohol
- It is used to obtain distilled water from impure water
- Fractional distillation helps to obtain petroleum products from crude oil (petroleum)

#### **Dangers of distillation**

It can lead to burns and scalds



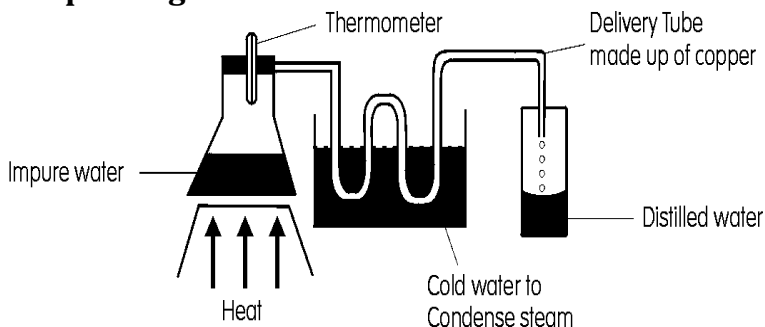
It can lead to fire outbreak

## Physical processes in distillation

Evaporation

Condensation

### Simple diagram to show distillation



Copper delivery tubes **do not rust**

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

## METHODS OF SEPARATING MIXTURES OF SOLIDS

### 1. FLOTATION

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

#### EXAMPLES OF MIXTURES SEPARATED BY FLOTATION

- Saw dust and sand
- Bad beans and good ones

### 2. USING A MAGNET

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

#### APPLICATION OF USING A MAGNET IN SEPARATING MIXTURES

- Searching iron pins from grass
- Separating iron wires from copper wires
- Separating iron bits and maize flour

#### APPLICATION OF HAND PICKING (SORTING)

- Separating stones from rice
- Separating bad beans from good ones

### 3. SIEVING

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

### 4. WINNOWING

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

#### APPLICATION OF WINNOWING

- Separating husks from bean seeds
- Separating hulls from rice grains

## SEPARATING MIXTURES OF LIQUIDS

- By fractional distillation
- By using a separating funnel

## **NOTE**

### **DILUTION**

- This is the process of making a concentrated solution weak
- When a substance is in its original form, **it is concentrated**
- When water has been added to a substance, **it is diluted**

### **Examples of dilution**

- Adding water to milk
- Adding water to an acid

### **DIFFUSION**

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

### **EXAMPLES OF DIFFUSION**

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

## **ENERGY**

- Energy is the ability to do work.

### **SOURCES OF ENERGY**

- |          |                  |
|----------|------------------|
| ▪ Sun    | ▪ Running water  |
| ▪ Fuels  | ▪ Uranium        |
| ▪ Plants | ▪ Electric cells |

### **FORMS OF ENERGY**

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

### **Why is heat regarded as form of energy?**

- Heat can do work (it does work)

### **TYPES OF ENERGY (MECHANICAL ENERGY)**

- Potential energy
- Kinetic energy

### **POTENTIAL ENERGY**

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

### **Examples of objects with potential energy**

- |                                      |                               |
|--------------------------------------|-------------------------------|
| ▪ A stone resting on a raised ground | ▪ A car parking in a garage   |
| ▪ A book placed on table             | ▪ A baby on the mother's back |

### **KINETIC ENERGY**

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

### **EXAMPLES OF OBJECTS WITH KINETIC ENERGY**

- A child running along the road
- A stone thrown up in air
- A car moving on the road
- A leaf falling from a tree

### **EXPERIMENTS ABOUT KINETIC AND POTENTIAL ENERGY**

### **HEAT ENERGY**

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

### **SOURCES OF HEAT ENERGY**

- These are objects which produce heat.

### **TYPES OF SOURCES OF HEAT**

- Natural sources of heat
- Artificial sources of heat

<b>TYPES OF SOURCES OF HEAT</b>	<b>EXAMPLES</b>
<b>1. <u>Natural sources of heat</u></b> These are sources of heat created by God	<ul style="list-style-type: none"><li>▪ Sun (This is the main natural source of heat)</li><li>▪ Erupting volcanoes</li><li>▪ Lightning</li><li>▪ Natural gas</li><li>▪ Food during respiration</li></ul>
<b>2. <u>Artificial sources of heat</u></b> These are sources of heat made by man	<ul style="list-style-type: none"><li>✓ Electricity</li><li>✓ Fire</li><li>✓ Burning charcoal</li><li>✓ Burning candle</li><li>✓ Biogas</li><li>✓ Friction</li><li>✓ Hot electric bulbs</li></ul>

### **USES OF HEAT IN OUR ENVIRONMENT**

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

**Disinfectants** are substances that kill germs

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

### **DANGERS OF HEAT**

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

### **EFFECTS OF HEAT ON MATTER**

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

### **Effects of heating/heat gain on a metal (What happens to a metal when heated?)**

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

### **Effects of cooling/heat loss on a metal (What happens to a metal when cooled?)**

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

### **NOTE**

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

### **WHAT HAPPENS TO THE FOLLOWING WHEN WATER IS FROZEN?**

- **Mass:** It remains constant (does not change)
- **Volume:** It increases
- **Density:** It reduces

### **EXPANSION**

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

### **APPLICATION (IMPORTANCE) OF EXPANSION**

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

### **EFFECTS (DANGERS) OF EXPANSION**

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

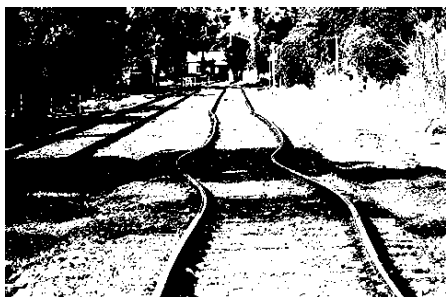
#### **NOTE:**

- Sagging electric live wires can cause electric shock

### **How to prevent dangers (effects) of expansion**

- Leaving gaps between railway lines
- ✓ To provide room for expansion on hot days

#### **After expansion**



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



- Making holes of rails oval shaped
- ✓ To allow the railway line slip easily during expansion
- Leaving gaps between metal bars of bridges
- ✓ To provide room for expansion on hot days
- Avoid leaving furniture in sunshine
- Avoid keeping glass soda bottles in a refrigerator for a long time
- Avoid pouring very hot liquid in glass containers
- Timber should be dried under shade to prevent bending (warping)

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

- The gaps become narrow

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

- Sunny weather

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

- Due to expansion

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

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

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

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

**An illustration of soda bottle**

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

**Experiment to show expansion in solids**

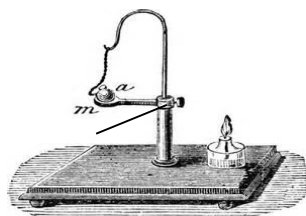
**Experiment I (metallic ball and ring experiment)**

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

**Before heating**



**After heating**



**What does the experiment shown above show?**

- Expansion in metals (solids expand when heated)

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

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

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

- The metallic ball contracts (due to contraction)

**EXPERIMENT II (USING A BIMETALLIC STRIP)**

**Bimetallic strip**

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

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

**Heating**

**cooling**

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

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

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

- Iron contracts faster than copper

**Application (uses) of bimetallic strips**

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

**Thermostat**

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

**Electric appliances that use thermostats (bimetallic strips)**

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

**EXPERIMENT TO SHOW EXPANSION IN GASES**

**EXPERIMENT I**

**Requirements**

- Empty bottle
- Empty balloon
- Hot water

**Diagrams**

**What does the experiment shown above show?**

- Expansion in gases (gases expand when heated)

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

- The balloon will swell (expand)

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

- Due to expansion of air inside the bottle

**What substance is contained in an empty bottle?**

- Air

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

- To prevent air from escaping

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

- The balloon will become empty

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

- Due to contraction of air inside the bottle

**EXPERIMENT II**

- Put an inflated balloon under sunshine for some time

**Diagram**

**What does the experiment shown above show?**

- Expansion in gases (gases expand when heated)

**What will happen to the balloon after some time?**

- The balloon will burst

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

- Due to expansion of air inside the bottle

**Which property of air is shown by an inflated balloon?**

- Air occupies space

**Experiment to show expansion in liquids**

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

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

Place the flask in a beaker of hot water

**Diagram**

**Observation**

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

**Conclusion**

Liquids expand when heated

**CONTRACTION**

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

**Application (importance) of contraction**



- It helps in measuring lowest temperatures

### **EFFECTS (DANGERS) OF CONTRACTION**

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

### **WAYS OF PREVENTING THE DANGERS OF CONTRACTION**

- Making electric and telephone wires longer than the distance between poles (Fixing electric wires loose between poles)
- ✓ To provide room for contraction on cold days

### **AN ILLUSTRATION SHOWING THE APPEARANCE OF ELECTRIC WIRES ON COLD DAYS**

#### **Why are electric wires fixed loosely between the poles?**

- To provide room for contraction on cold days

#### **How do electric wires appear on cold days?**

- They appear tight

#### **Why do electric wires appear tight on cold days?**

- Due to contraction

#### **What type of weather makes electric wires to appear tight?**

- Rainy weather

### **AN ILLUSTRATION SHOWING THE APPEARANCE OF ELECTRIC WIRES ON HOT DAYS**

#### **How do electric wires appear on hot days?**

- They appear loose (sagging)

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

- Due to expansion

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

- Sunny weather

## **HEAT INSULATORS AND CONDUCTORS**

### **Heat insulators (bad conductors of heat)**

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

#### **Examples of heat insulators**

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

### **Why is air regarded as an insulator / bad conductor of heat?**

- Its molecules are too far to disperse heat from one another

#### **Application (uses) of insulators in our daily life**

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

## **NOTE**

### **Why do clay charcoal stoves use less charcoal?**

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

### **How do clay charcoal stoves conserve trees?**

- They use less charcoal

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

- To prevent the hands of the user from getting burnt

### **Why are electric wires covered with insulators?**

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

### **Why is wool regarded as a better insulator than cotton?**

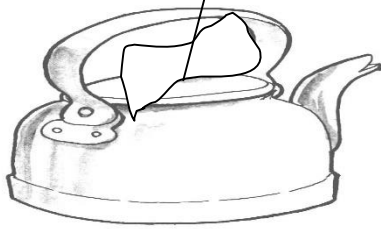
- Wool has more tiny spaces than cotton

### **How do sweaters keep our body warm?**

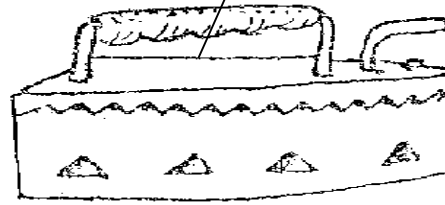
- By preventing heat loss

## Simple diagram to illustrate handles of iron box and kettle

Plastic handle of kettle



Wooden handle of iron box



## Heat conductors (good conductors of heat)

These are materials that allow heat to pass through them easily

### Examples of heat conductors (good conductors of heat)

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

All metals are conductors of heat

**Silver** is the best heat conductor

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

**Copper** is the second best heat conductor

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

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

### Why?

Asbestos is a bad conductor of heat

### **Reasons why most utensils are made of aluminium**

It is a good conductor of heat

It does not rust

It is cheap

It is light

Mercury is a liquid metal that conducts both heat and electricity

Water is the worst conductor of heat (0.01%)

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

### **Application (uses) of good conductors of heat**

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

## **HEAT REFLECTORS AND ABSORBERS**

## **1. HEAT REFLECTORS**

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

### **Examples of heat reflectors**

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

## **APPLICATION OF HEAT REFLECTORS**

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

## **2. HEAT ABSORBERS**

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

### **Examples of heat absorbers**

- Dull coloured objects (black objects)
- Unpolished objects

## **APPLICATION OF HEAT ABSORBERS**

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

## **NOTE**

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

### **Why?**

- Black absorbs heat while white reflects heat

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

### **Why?**

- Blue absorbs heat while white reflects heat

## **Which property of air enables clothes to dry?**

- Air exerts pressure

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

- Wind

## **How does wind help in drying of clothes?**

- It increases the rate of evaporation

## **HEAT TRANSFER**

- This is the movement of heat from one point to another
- ✓ Heat travels from a point of higher temperature to a point of lower temperature

### **METHODS OF HEAT TRANSFER**

- Conduction
- Convection
- Radiation

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

### **Methods of heat transfer in the states of matter**

Conduction

Convection

### **Vacuum**

This is the space without matter

Heat travels through vacuum by **radiation**

Vacuum does not allow heat transfer by conduction and convection

### **Why?**

It has no matter

### **WAYS OF MANAGING HEAT IN OUR DAILY LIFE**

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

### **CONVECTION**

- This is the process by which heat travels through fluids (liquids and gases)
- This is the method of heat transfer in liquids and gases

### **EXPERIMENT TO SHOW CONVECTION IN LIQUIDS**

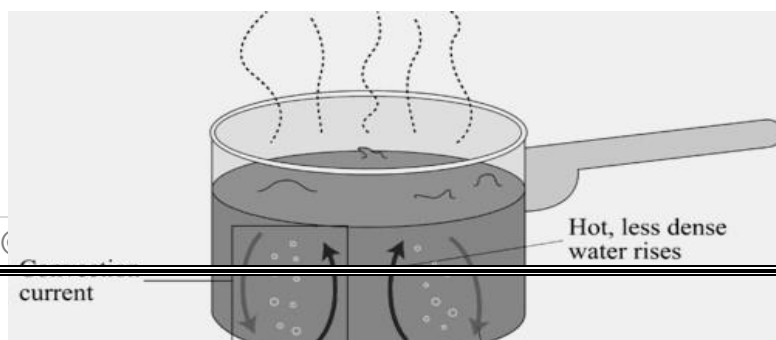
#### **Materials needed**

Water

Beaker (saucepan)

Source of heat (stove)

#### **Convection currents in boiling water**



### **Observation**

Heated molecules become lighter and move downwards

Unheated molecules become denser and move upwards

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

### **What causes convection currents?**

Different densities of molecules

### **Conclusion**

Heat travels through liquids by the process of convection

### **Note**

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

Heat travels in water by **convection**

### **IMPORTANCE OF CONVECTION OF HEAT IN THE ENVIRONMENT**

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

### **A diagram showing air circulation in a house**

### **CONVECTIONAL CURRENT**

- This is the continuous flow of molecules that transfers heat in fluids (liquids and gases)

### **What causes convection currents?**

- Difference in densities of molecules

## **COMPONENTS OF VENTILATION ON A HOUSE**

- Doors
- Windows
- Ventilators
- Louvres

## **Why should houses be properly ventilated?**

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

## **Importance of louvres on a house**

- They allow free air circulation

## **Importance of doors and windows on a house**

- They allow in fresh air
- They allow in light

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

- To allow in fresh air easily

## **Importance of ventilators on a house**

- To let out stale air

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

- To let out stale air easily

## **Why does stale air go up?**

- It is less dense than fresh air

## **Differences between fresh air and stale air**

- Fresh air is denser than stale air
- Fresh air is cool while stale air is warm

## **SIMPLE DIAGRAM OF VIP LATRINE**

### **Screen**

It traps and kills houseflies

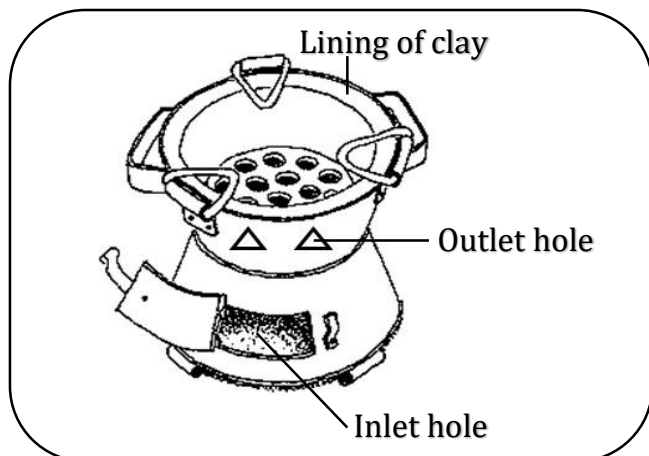
### **Vent pipe**

It drives out stale air

## **Entrance**

It allow in fresh air

### **Convection currents in charcoal stove and charcoal iron box**



The handle of iron box is made of dry wood or plastic

#### **Why?**

To prevent the user's hands from getting burnt

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

#### **Why?**

Aluminum /iron is a good conductor if heat

Charcoal stoves and iron boxes have lining of clay

#### **Why?**

To prevent heat loss

### **Which fuel is used in charcoal stoves and iron boxes?**

- Charcoal

### **How is charcoal made?**

- When wood is burnt in limited supply of oxygen

### **What happens if wood is burnt in plenty of oxygen?**

- Wood turns into ash (complete combustion occurs)

### **Advantages of using clay charcoal stoves over metallic charcoal stoves**

- Clay charcoal stoves use less charcoal
- Clay charcoal stoves keep heat for a long time

### **Disadvantages of using charcoal stoves and iron boxes**

- They pollute air
- They encourage deforestation for charcoal
- They can lead to burns
- They can lead to fire outbreak

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

- Through rural electrification



### **What enables charcoal stoves and iron boxes to continue burning?**

- They have holes which allow free air circulation
- They have holes to allow in fresh air

### **BREEZE**

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

### **TYPES OF BREEZE**

- Land breeze
- Sea breeze

#### **1. LAND BREEZE**

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

#### **Why?**

- The land is cooler than the sea

### **DIAGRAM SHOWING LAND BREEZE**

- Land cools faster than the sea
- The air on the sea becomes warmer than the air on land
- Warm air on the sea becomes less dense and rises
- Cool air on land moves towards the sea to occupy the space left by warm air

#### **2. SEA BREEZE**

- This is the movement of cool air from sea to land
- Sea breeze helps to bring fresh air to the land
- Sea breeze occurs during **day time**

#### **Why?**

- The sea is cooler than land

### **DIAGRAM SHOWING SEA BREEZE**

- Land warms faster than the sea
- The air on land becomes warmer than the air on the sea
- Warm air on the land becomes less dense and rises
- Cool air on sea moves towards the land to occupy the space left by warm air

### **REASONS WHY THE SEA IS COOLER THAN LAND DURING DAY TIME**

- Water reflects heat while land absorbs heat
- Sun rays go deep into water since it is transparent unlike land
- Water waves mix the warm water at the surface with cool water below it

### **REASONS WHY THE LAND HEATS UP QUICKLY DURING DAY TIME**

- Land absorbs heat
- Heat doesn't go deep inside the land

### **CONDUCTION**

This is the method of heat transfer in solids

This is the process by which heat travels through solids

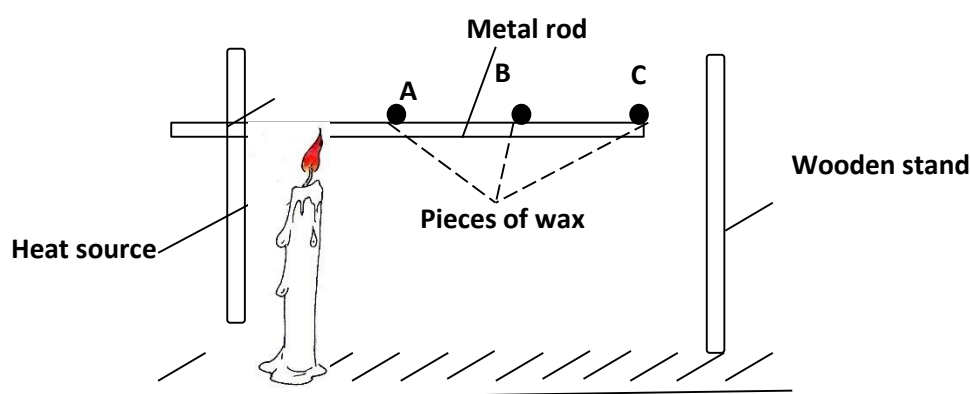
- Molecules in solids vibrate (shake) but do not move

### **Experiment to show heat transfer by conduction**

Tie a metal rod on a wooden stand

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

Put one end of the metal rod on source of heat



### **Observation**

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

### **Conclusion**

- Melting of wax shows that heat travels through solids

**What shows that heat has traveled through the metal rod?**

- Melting of the wax

**State the role of candle wax in the experiment above.**

- They melt after receiving heat

**Experiment to show heat transfer in insulators and conductors of heat**

**Materials needed**

Iron nail

Piece of wood

Plastic

Candle wax

Source of heat

**An illustration**

**Observation**

- Wax on iron nail melts first
- Wax on plastic melts second
- Wax on wood melts last

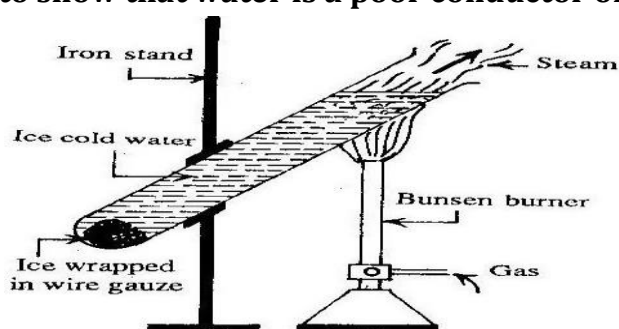
**Conclusion**

Iron is a good conductor of heat

Plastic is the poor conductor of heat

Wood is a poor conductor of heat

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



**Observation**

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

**Conclusion**

- Water is a poor conductor of heat

**Questions**

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

- Heated molecules are less dense than cold molecules

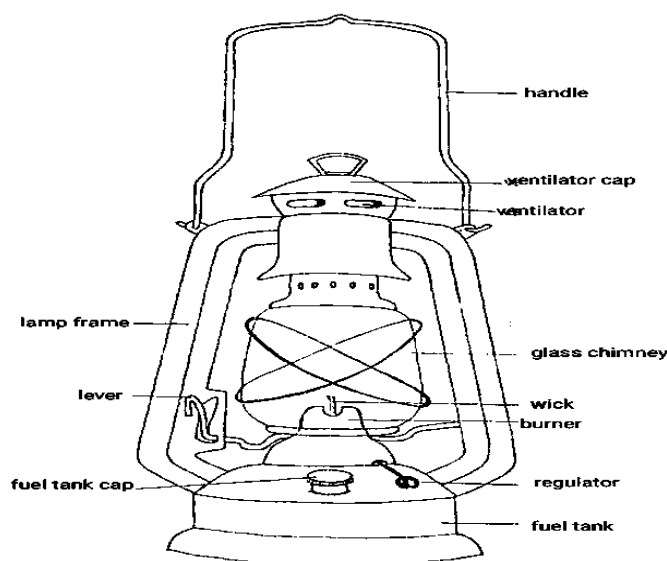
### **What shows that water is a poor conductor of heat?**

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

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

- It helps in ironing of clothes
- It enables us to cook food in saucepans
- It helps in iron smelting
- It helps in melting of ghee and butter
- It enables us to roast meat on metal rods

### **Air circulation in a lantern lamp**



#### **Fuel tank**

- It keeps paraffin (kerosene)

#### **Glass chimney**

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

#### **Why is the glass chimney made transparent?**

- To allow out light

#### **Ventilator (ventilation hole)**

- It lets out stale air (soot and smoke)

#### **Inlet holes**

- To allow in fresh air

#### **Wick**

- It burns to produce light

#### **Regulator**

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

#### **Fuel tank cap**

- It is opened to refill fuel in the tank

#### **Lever**

- It is turned to light the wick

### **CAPILLARY ACTION (CAPILLARITY)**

- This is the upward flow of liquids through porous materials (narrow tubes).

### **EXAMPLES OF CAPILLARY ACTION**

- Movement of water/soda up the straw
- Movement of water from roots to leaves of a plant
- Movement of kerosene through the wick
- Movement of tears through tear ducts

### **How does kerosene move up the wick?**

- By capillarity (capillary action)

### **Which fuel is commonly used in lantern lamps?**

- Kerosene (paraffin)

### **Why is petrol not used in lantern lamps?**

- Petrol is highly flammable
- Petrol is very volatile

### **Why is kerosene used in lantern lamps but not petrol yet they are both flammable liquids?**

- Kerosene is less volatile than petrol.

### **RADIATION**

This is the method of heat transfer in vacuum and space

Radiation does not need any medium.

**Radiant heat** is the heat transferred by radiation

### **SIMILARITY BETWEEN RADIANT HEAT AND LIGHT**

- Both travel in straight line
- Both travel in all directions from the source
- Both travel at the same speed
- Both can be reflected
- Both can be absorbed

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

- It helps in drying wet clothes
- It helps in drying harvested crops
- It helps in sunbathing or basking
- It enables us to feel warm when seated near fire
- It helps in water cycle
- It helps in food preservation

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

- By radiation

## **THE THERMOS FLASK (VACUUM FLASK)**

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

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

### **A diagram showing vacuum flask**

## **FUNCTIONS OF EACH PART OF A VACUUM FLASK**

### **CORK (STOPPER)**

- It prevents the heat loss or gain by conduction

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

- It is an insulator of heat

### **Materials used to make cork**

- Plastic
- Wood
- Rubber

### **VACUUM**

- It prevents heat loss or gain by conduction and convection

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

- It has no molecules

### **SILVERED WALLS**

- They prevent heat loss or gain by radiation

### **How do the double silvered walls prevent heat loss or gain by radiation?**

- They reflect radiant heat

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

- They are shiny

### **VACUUM SEAL**

- It prevents matter from entering the vacuum

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

- It is sealed

### **CORK BASE (PAD OR ASBESTOS PAD)**

- It absorbs shock

### **PLASTIC CASE**

- It protects the inner parts of the flask from damage

### **CUP**

- It is used to take what is inside the flask

### **HANDLE**

- It is used to hold (lift) the flask

### **Reasons why thermos flasks are not common in most homes**

- They are expensive to buy
- They are delicate to handle

### **TEMPERATURE**

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

### **UNITS FOR MEASURING TEMPERATURE**

- Kelvin
- Degree Celsius
- Degree Fahrenheit

### **TYPES OF TEMPERATURE SCALES**

- Celsius scale
- Fahrenheit scale
- Kelvin scale

### **CELSIUS SCALE**

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

### **FAHRENHEIT SCALE**

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

### **KELVIN SCALE**

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

### **FIXED POINT**

- This is a standard degree of hotness or coldness

### **Name the two fixed points on temperature scales**

- Freezing point/melting point (lower fixed point)

- Boiling point (upper fixed scale)

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

**Melting point** is the temperature at which ice changes to water

**Boiling point** is the temperature at which pure water boils

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

## **THERMOMETER**

- This is an instrument used to measure temperature
- Thermometers can either be analog or digital

## **TYPES OF THERMOMETERS**

- Clinical thermometer (doctor's thermometer)
- Wall thermometer
- Laboratory thermometer
- Six's thermometer (maximum and minimum thermometer)
- Infrared thermometer (temperature gun)

### **1. CLINICAL THERMOMETER (DOCTOR'S / MEDICAL THERMOMETER)**

- It is used to measure temperature of the human body or animal's body
- The normal human body temperature is 37°C or 98.4°F.
- It either uses **Celsius scale** or **Fahrenheit scale**

### **GROUPS OF PEOPLE (HEALTH WORKERS) WHO USE CLINICAL THERMOMETERS**

- Doctors
- Nurses
- Veterinary officers

### **PLACES WHERE A CLINICAL THERMOMETER IS FOUND**

- Clinics
- Sick bay
- Hospitals
- Dispensaries
- Pharmacies

### **Which human body condition is always detected with a clinical thermometer?**

- Fever

### **Human body parts where a clinical thermometer can be placed**

- Under the armpits
- In the mouth under the tongue
- In the vagina
- In the rectum via the anus

### **Why is the clinical thermometer put closed body parts?**

- The temperature of the closed body parts is almost the same as internal body temperature

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

- To prevent the sick child from biting the clinical thermometer



**Conditions that can make a woman put a clinical thermometer in the vagina.**

- During pregnancy
- During basal body temperature birth control method / when detecting ovulation

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

- It is the temperature range within which a person is still alive
- The human body temperature normally does not go below 35°C or above 42°C

**Why does the temperature scale of a clinical thermometer start from 35°C?**

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

**Why does the temperature scale of a clinical thermometer stop at 42°C?**

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

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

- Alcohol

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

- Alcohol cannot break (burst) the thermometer while boiling water can break it.

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

- To prevent the spread of germs / To kill germs on the thermometer

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

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

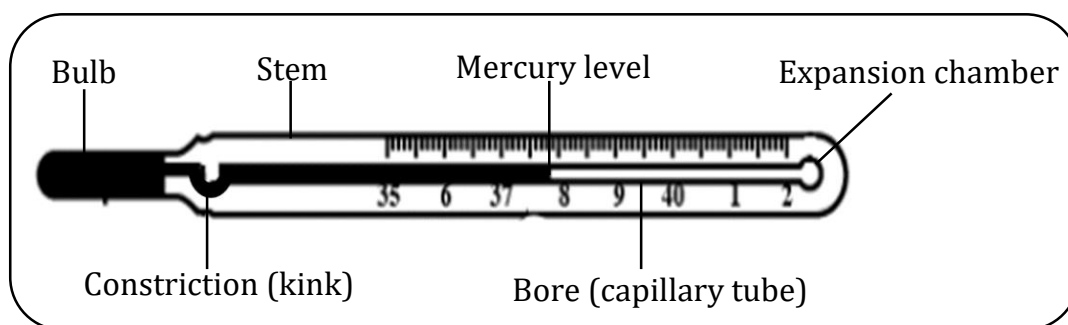
**How is the clinical thermometer reset?**

- By shaking it

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

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

**A DIAGRAM SHOWING CLINICAL THERMOMETER**



**FUNCTIONS OF EACH PART OF A CLINICAL THERMOMETER**

**BULB**

- It stores mercury

**Why is the bulb made with thin glass (silver lining)?**

- To enable it conduct heat easily

**KINK (CONSTRICION)**

- It prevents back flow of mercury before readings are taken

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

- It has a bend (it is curved)

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

- Both prevent the back flow of liquids

**STEM**

- It protects the inside parts of a thermometer
- It contains a temperature scale for correct measurements

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

- The stem magnifies the mercury thread

**Why is the stem made of transparent glass?**

- To enable the doctor see the mercury level

**Why does a clinical thermometer has a curved stem?**

- To magnify the temperature scale

**BORE (CAPILLARY TUBE)**

- It allows expansion and contraction of mercury
- It allows the flow of mercury when measuring temperature

**Why is the bore made narrow?**

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

**EXPANSION CHAMBER**

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

**MERCURY**

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

**ADAPTATIONS OF THE CLINICAL THERMOMETER**

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

**2. LABORATORY THERMOMETER**

- It is used to measure temperature during science experiments
- It uses mercury
- Its temperature scale runs from  $-10^{\circ}\text{C}$  to  $110^{\circ}\text{C}$

### **Examples of science experiments in which a laboratory thermometer is used**

- Artificial incubation
- Measuring freezing points and boiling points of substances

### **A DIAGRAM SHOWING A LABORATORY THERMOMETER**

### **Disadvantage of using a laboratory thermometer**

- It lacks a kink to prevent the back flow of mercury

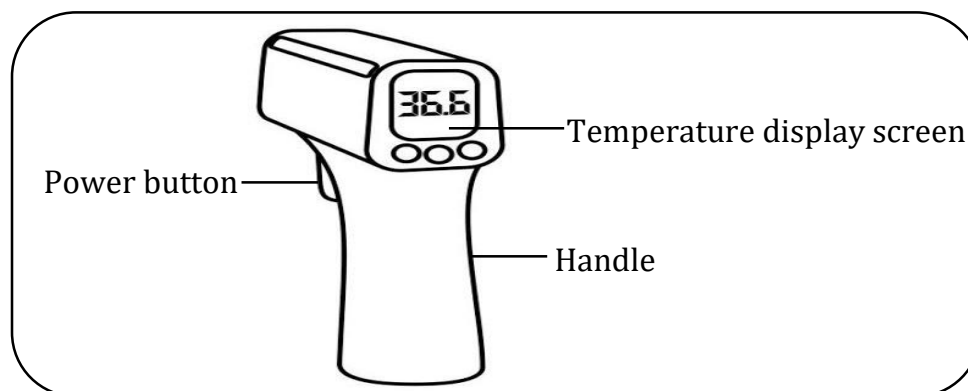
### **DIFFERENCES BETWEEN A CLINICAL THERMOMETER AND A LABORATORY THERMOMETER**

- A clinical thermometer measures temperature of the human body while a laboratory thermometer measures temperature higher than that of the human body
- A clinical thermometer has a kink while a laboratory thermometer lacks a kink
- A clinical thermometer gives more accurate temperature readings than a laboratory thermometer
- A clinical thermometer has a narrow temperature range while a laboratory thermometer has a wide temperature range

### **3. INFRARED THERMOMETER (TEMPERATURE GUN)**

- It measures human body temperature without direct contact with the skin
- It uses dry cells as a source of electricity

### **A DIAGRAM SHOWING AN INFRARED THERMOMETER**



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

- It measures human body temperature without direct contact with the skin

### **ADVANTAGE AN INFRARED THERMOMETER OVER A CLINICAL THERMOMETER**

- It prevents spread of coronavirus unlike a clinical thermometer.

### **DISADVANTAGE OF AN INFRARED THERMOMETER TO A CLINICAL THERMOMETER**

- It is more expensive than a clinical thermometers

### **4. WALL THERMOMETER**

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

### **5. SIX'S THERMOMETER (MAXIMUM AND MINIMUM THERMOMETER)**

- It measures the highest and lowest temperature of the day
- It uses both mercury and alcohol
- It uses alcohol to read lowest temperature and mercury to read highest temperature.

### **A DIAGRAM SHOWING THE SIX'S THERMOMETER**

### **How is the six's thermometer reset?**

- By using a magnet to move the metal indices

### **Why is alcohol used in minimum thermometers (to measure lowest temperatures)?**

- It has a very low freezing point ( $-114.1^{\circ}\text{C}$ ) / It doesn't solidify easily

### **Advantage of using alcohol over mercury in thermometers**

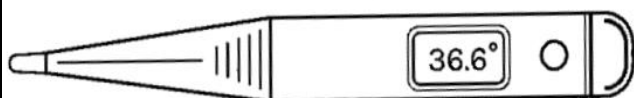
- Alcohol has lower freezing point ( $-114.1^{\circ}\text{C}$ ) than mercury ( $-38.83^{\circ}\text{C}$ )

### **Why is mercury used in maximum thermometers (to measure highest temperatures)?**

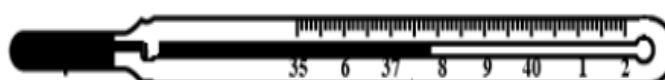
- It has a very high boiling point ( $356.7^{\circ}\text{C}$ )

**The diagrams below show two clinical thermometers A and B. Study them carefully and answer questions that follow.**

A (digital)



B (Analog)



**State the advantages of using clinical thermometer A (digital thermometer) over clinical thermometer B (analog).**

- Clinical thermometer A is easier to read than clinical thermometer B
- Clinical thermometer A is more accurate than clinical thermometer B
- Clinical thermometer A provides faster results than clinical thermometer B

**State one disadvantage of using clinical thermometer A over clinical thermometer B.**

- Clinical thermometer A is more expensive than clinical thermometer B

**THERMOMETERIC LIQUIDS**

- These are liquids used in thermometers

**Examples of thermometric liquids**

- Mercury
- Alcohol

**THERMOMETERS THAT USE MERCURY**

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

**THERMOMETER THAT USES BOTH MERCURY AND ALCOHOL**

- Six's thermometers

**ADVANTAGES OF USING MERCURY IN THERMOMETERS**

**(Reasons why mercury is commonly used in thermometers)**

- It is visible or easily seen (it is opaque)
- It expands uniformly
- It is a good conductor of heat
- It does not wet (stick on) the glass tube
- It has a high boiling point (about 356.7° C)

**DISADVANTAGES OF USING MERCURY IN THERMOMETERS**

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

**Reasons why alcohol is not commonly used in clinical thermometers**

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

**Disadvantages of using water in thermometers**

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

## **CALCULATIONS**

### **CHANGING FROM CENTIGRADE SCALE TO FAHRENHEIT SCALE**

**Formula:**  $^{\circ}\text{F} = (\text{C} \times \frac{9}{5}) + 32$

**Standard formula:**  $9\text{C} + 160 = 5\text{F}$

#### **Examples**

##### **1. Change $0^{\circ}\text{C}$ to Fahrenheit scale**

$$^{\circ}\text{F} = \frac{9}{5} \text{C} + 32$$

$$^{\circ}\text{F} = \frac{9}{5} \times 0 + 32$$

$$^{\circ}\text{F} = 0 + 32$$

$$^{\circ}\text{F} = 0 + 32$$

$$0^{\circ}\text{C} = 32^{\circ}\text{F}$$

##### **2. Change $100^{\circ}\text{C}$ to Fahrenheit scale**

$$= (\text{C} \times \frac{9}{5}) + 32$$

$$= (100 \times \frac{9}{5}) + 32$$

$$= (20 \times 9) + 32$$

$$= 180 + 32$$

$$100^{\circ}\text{C} = 212^{\circ}\text{F}$$

General formula  $(9\text{C} + 160) = 5\text{F}$

General formula  $9\text{C} = (5\text{F} - 160)$  or  $^{\circ}\text{F} = \frac{9}{5}\text{C} + 32$

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

(a)  $60^{\circ}\text{C}$

(c)  $15^{\circ}\text{C}$

(b)  $40^{\circ}\text{C}$

(d)  $45^{\circ}\text{C}$

### **CHANGING FROM FAHRENHEIT SCALE TO CENTIGRADE SCALE**

To change from Fahrenheit to centigrade scale: Subtract 32 and then multiply by  $\frac{5}{9}$

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

#### **Examples**

##### **❖ Change $32^{\circ}\text{F}$ to centigrade scale**

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

$$= \frac{5}{9} (32 - 32)$$

$$= \frac{5}{9} (0)$$

$$= (0/9)$$

$$= 32\text{F}^{\circ} = 0^{\circ}\text{C}$$

##### **Change $212^{\circ}\text{F}$ to centigrade scale**

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

$$= \frac{5}{9} (212 - 32)$$

$$= \frac{5}{9} (180)$$

$$= 5 \times 20$$

$$212^{\circ}\text{F} = 100^{\circ}\text{C}$$

##### **6. Change the following Fahrenheit to centigrade scale**

(b)  $95^{\circ}\text{F}$

(c)  $59^{\circ}\text{F}$

(d)  $86^{\circ}\text{F}$

(e) 113°F

(f) 104°F

### **BURNING (COMBUSTION)**

- This is a chemical reaction which uses oxygen to produce heat and light
- Burning is a **chemical change**

### **CONDITIONS NECESSARY FOR BURNING (COMBUSTION)**

- Ignition temperature

This is the minimum temperature at which a fuel must be heated before it catches fire

- Oxygen
- Presence of a fuel (combustible substance)

### **Forms of energy produced during burning**

- Heat energy
- Light energy

### **FUELS (COMBUSTIBLE SUBSTANCES)**

- These are substances that are burnt to produce energy
- Fuels mainly produce heat energy

### **Characteristics of a good fuels (combustible substance)**

- It should be cheap
- It should burn easily in air
- It should produce large amount of heat
- It should be readily available

### **GROUPS OF FUELS (CLASSIFICATION OF FUELS)**

- Solid fuels
- Liquid fuels
- Gaseous fuels

#### **Solid fuels**

- These are solids that are burnt to produce energy

#### **Examples of solid fuels**

- Firewood
- Wood shaving
- Coke
- Charcoal
- Briquettes
- Sawdust
- Coal

#### **Liquid fuels**

- These are liquids that are burnt to produce energy

#### **Examples of liquid fuels**

- Kerosene (paraffin)
- Petrol
- Diesel
- Aviation fuel (Jet fuel)

#### **Gaseous fuels**

- These are gases that are burnt to produce energy

#### **Examples of gaseous fuels**

- Coal gas
- Natural gas
- Biogas

**In which way is the function of food in the human body similar to that of petrol in a car?**

- Both food and petrol are burnt to produce energy

**FLAMMABLE (INFLAMMABLE) GASES**

- These are gases that can catch fire easily

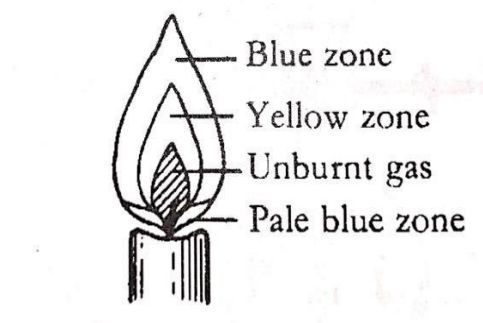
**Examples of flammable gases**

- Methane (biogas)
- Natural gas
- Butane
- Propane
- Coal gas

**FLAME**

- This is the visible and gaseous part of fire
- This is the glowing gas produced during burning

**Regions (zones or parts) of a flame**



**BLUE ZONE (OUTER ZONE)**

- It is the outermost region
- It is near the base (bottom) of a flame
- It is the hottest region

**Why blue zone the hottest region of the flame?**

- It is where complete burning (combustion) occurs

**Why does complete combustion occur in the blue zone??**

- It receives enough oxygen

**YELLOW ZONE (MIDDLE ZONE)**

- It is the brightest region
- It is moderately hot
- It gives out light

**CENTRAL ZONE (UNBURNT GAS/DARK ZONE)**

- This region is found deep inside the flame
- It surrounds the wick



- It is the coolest region of a flame
- It does not give out light

**Give a reason why the dark zone does not give out any light. (why is dark region the coolest part of a flame?)**

- There is no burning in this zone

**Why is there no burning in the dark zone?**

- It does not receive any oxygen

**Examples of gases that do not burn**

- |                  |         |           |
|------------------|---------|-----------|
| ▪ Carbon dioxide | ▪ Xenon | ▪ Krypton |
| ▪ Nitrogen       | ▪ Argon | ▪ Helium  |

## **EXPERIMENT TO SHOW THAT OXYGEN SUPPORTS BURNING**

**Why does the candle go off when covered for some time?**

- Oxygen is used up
- Due to lack of oxygen supply

**Which component of air supports burning of the candle shown above?**

- Oxygen

**Name the gas contained in the test tube when the candle goes off (stops burning)**

- Carbon dioxide

## **EXPERIMENT TO SHOW THAT OXYGEN SUPPORTS BURNING**

- Put some water in the beaker
- Fix a burning candle in the beaker
- Cover the candle with a test tube

**Why does the candle continue burning for some time?**

- It still has oxygen

**Why does the candle finally go off (stop burning)?**

- Oxygen is used up

**Why does the water level rise as shown in diagram B?**

- To occupy space for the used oxygen

### **WAYS OF PUTTING OUT FIRE**

- Using fire extinguishers
- Using water for non-petrol fires
- Using sand
- Using thick blankets
- Rolling yourself on ground

### **Ways of putting out petrol fire**

- Using fire extinguishers
- Using sand

### **Gases used in fire extinguishers**

- Carbon dioxide
- Nitrogen

### **Why is carbon dioxide used in fire extinguishers?**

- It does not support burning

### **Why is oxygen not used in fire extinguishers?**

- Oxygen supports burning

### **Why are fire extinguishers painted with bright colours?**

- For easy identification
- To easily be seen in case of fire accidents

### **STEPS TAKEN WHEN USING A FIRE EXTINGUISHER**

- **P:** Pull the pin
- **A:** Aim the nozzle at base of fire
- **S:** Squeeze the handle
- **S:** Sweep nozzle side to side

### **Why is water not used to put out petrol fire?**

- Petrol floats on water and burning continues

### **How does sand put out fire?**

- It cuts off oxygen supply

### **How does water put out fire?**

- Water reduces the temperature of fuel below its ignition temperature

### **RUSTING**

- This is the chemical change in some metals that needs moisture and oxygen to take place
- Metals turn **reddish brown** on rusting
- Rusting is a **chemical change**

### **Why is rusting regarded as a chemical change?**

- It is a new permanent substance
- It is irreversible

### **Examples of metals that can rust**

- Iron
- Steel

### **Examples of metals that do not rust**

- Copper
- Aluminum
- Silver

- Stainless steel
- Brass
- Bronze

### **CONDITIONS NECESSARY FOR RUSTING**

- Oxygen
- Moisture

### **What is the role of moisture (water) in iron rusting?**

- It speeds up oxidation of iron

### **Importance of rusting**

- It adds iron in the soil

### **Disadvantages of rusting**

- It makes metals weak
- It spoils the colour of metals
- It makes sharp metals blunt
- It makes keys fail to fit in padlocks
- It makes bolts and nuts hard to drive (unscrew)
- It makes water in rusty containers is poisonous

### **Ways of preventing and rusting and corrosion**

- By keeping iron metals in clean dry places
- By painting some metals
- By galvanizing (coating iron with zinc)
- By enameling (coating iron with enamel)
- By greasing or oiling some metals
- By making alloys

### **How does painting prevent rusting?**

- Paint cuts off oxygen and moisture supply
- Paint prevents direct contact of moisture and oxygen with the metal

### **EXPERIMENT TO SHOW RUSTING**

- Put iron nails in a test tube and wet them with tap water
- Invert the test tube and place it in a beaker of water
- Leave them for at least a week

## Observations

- The iron nails will rust (will turn reddish brown)
- The water level in the beaker will rise

## Conclusion

- The water level rises to occupy space for the used oxygen

## EXPERIMENT TO SHOW RUSTING

- Put an iron nail in each test tube: A, B and C
- Put tap water in test tube A and cork it

Tap water has oxygen

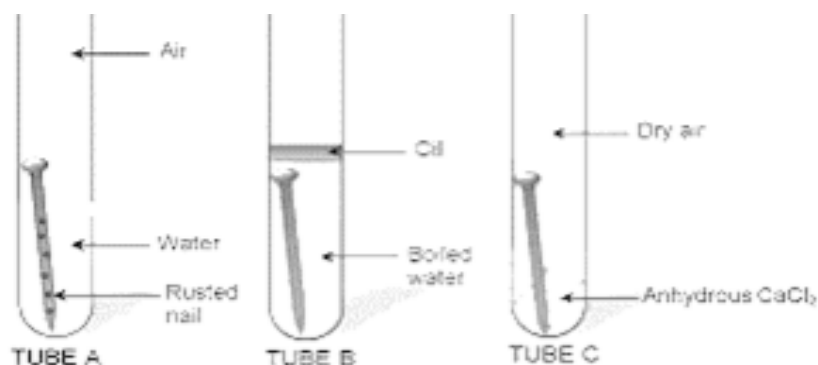
- Put boiled water and oil in test tube B

Boiling removes oxygen from water

Oil cuts off oxygen supply

- Put Calcium chloride in test tube C and cork it

Calcium chloride helps to dry air (remove water from air)



## Observation

The iron nail in test tube A rusted

- Due to presence of moisture and oxygen
- It has all necessary conditions for rusting

The iron nail in test tube B did not rust

- Oil cuts off oxygen supply

The iron nail in test tube C did not rust

- It lacks moisture (water)

## **TOPIC: GROWING TUBER CROPS**

### **Tuber crops**

These are crops with swollen underground stems or roots that store food

### **Groups (types) of tuber crops**

- Root tubers

## ➤ Stem tubers

### Root tubers

- These are swollen underground roots that store food

### Examples of root tubers

- |                  |                   |
|------------------|-------------------|
| ▪ Cassava        | ▪ Parsnips        |
| ▪ Sweet potatoes | ▪ Swede           |
| ▪ Carrots        | ▪ Dahlia          |
| ▪ Turnips        | ▪ Beetroot (beet) |

### Propagation (growing) of some root tubers

- Carrots by means of **seeds**
- Cassava by means of **stem cuttings**
- Sweet potatoes by means of **vines or stem cuttings**

Carrots are first planted in a nursery bed (seed bed) and later transplanted

Carrots are rich in Vitamins (Vitamin A) which helps in good night vision

### Stem tubers

These are swollen underground stems with stored food

### Examples of common stem tubers

- |                |              |
|----------------|--------------|
| ▪ Irish potato | ▪ White yams |
|----------------|--------------|

### Propagation (growing) of stem tubers

Irish potatoes and white yams are propagated by means of **stem tubers**

### Methods of planting tuber crops

#### ➤ Broadcasting method

This is when crops are scattered randomly in the garden

#### ➤ Row planting (row cropping)

This is when crops are grown in lines with proper spacing

### Qualities of good crops to be grown

- They should be resistant to diseases
- They should be resistant to bad weather
- They should have great market value
- They should be good yielding

### Ways of caring for tuber crops

- |                            |               |
|----------------------------|---------------|
| ▪ Weeding                  | ▪ Watering    |
| ▪ Spraying with pesticides | ▪ Thinning    |
| ▪ Pruning                  | ▪ Earthing up |

### PESTS FOR TUBER CROPS

- |   |              |                       |
|---|--------------|-----------------------|
| ▪ Weevils                                 | ▪ Millipedes | ▪ Green cassava mites |
| ▪ Squirrels                               | ▪ Wild pigs  | ▪ Aphids              |
| ▪ Caterpillars                            | ▪ Moles      | ▪ Army worm           |
| ▪ Rats                                    | ▪ White fly  |                       |
| ▪ Grass hoppers (variegated grasshoppers) |              |                       |

### Signs of tuber crops attacked by pests

- Wilting of the crop
- Damaged roots and stems

- Black patches on the leaves
- Holes on leaves

### **Effect of pests and disease on tuber crops**

- They destroy leaves
- They eat and destroy tubers

- They make tubers rot
- They eat and destroy the stems

### **DISEASES OF TUBER CROPS**

- Cassava Mosaic
- Brown streak

- Bacterial blight
- Bacterial wilt

### **Signs of diseased crops**

- Stunted growth
- Poor quality of yields

- Yellowing of leaves
- Black patches on the leaves

### **Controlling pests and diseases of tuber crops**

- Spraying using pesticides
- Planting disease resistant varieties
- Regular weeding
- Pruning
- Use of scare crows

- Crop rotation
- Remove and burn infected plants
- Fencing the garden
- Poisoning them
- Use of traps

### **CHARACTERISTICS OF PESTS FOR TUBER CROPS**

- They have sharp claws to dig out tubers from the soil
- They have sharp incisors to bite tubers
- Some have fingers for uprooting the tubers

### **METHODS OF HARVESTING TUBER CROPS**

- Digging out (e.g. sweet potatoes and Irish potatoes)
- Uprooting (e.g. cassava)

### **SCIENCE ORIENTED CLUBS**

- These are clubs that are formed on science basis

### **Objectives of science oriented clubs**

- To enable children acquire science skills
- To make children pick interest in science subjects
- To enable children discover science facts

### **Examples of science oriented clubs**

- Young farmers' club
- Wildlife club
- Environmental protection clubs
- Science and technology clubs

### **Young farmers' club**

- This is a group of young people in a community who have interest in farming

### **Roles of young farmers' club at school**

- They grow food crops in the school garden
- They organize study tours to farm schools
- They teach better farming methods to their fellow school
- They teach school children how to grow and care for crops

### **CO-OPERATIVE SOCIETIES**

- These are groups of people who join together to do a business that they cannot do successfully as individuals.

### **Functions of co-operative societies**

- They provide loans to farmers
- They provide farm machinery for hire
- They find market for the farmers' produce
- They have better storage facilities for farmers' produce
- They teach better farming methods to the farmers

## **BACTERIA AND FUNGI**

### **BACTERIA**

- These are tiny organisms with one cell (single celled microbes)
- They are under **kingdom monera**
- A group of bacteria is called a **colony**

### **Characteristics of bacteria**

- They are single celled/unicellular organisms
- They have a cell wall
- They lack a nucleus
- They are microscopic organisms (microorganisms/microbes)
- They have improper shape
- They have flagella

### **Why are bacteria called unicellular organisms?**

- They have one cell

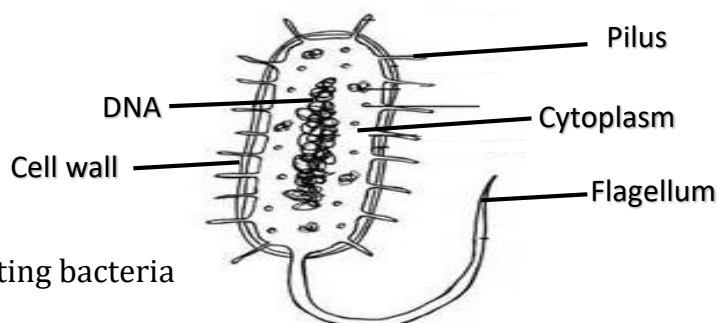
### **Why are bacteria called microbes/microorganisms/microscopic organisms?**

- They are too small to be seen with the naked eyes
- They can only be seen with a microscope

### **How does a microscope help a doctor to see bacteria?**

- It magnifies bacteria (it makes bacteria to appear bigger)

### **Structure of a bacterium**



### **Cell wall**

- For protecting bacteria

### **Flagella**

- These are tail-like structures on some bacteria
- A bacterium can be with a single flagellum or numerous flagella
- They help bacteria to move (for movement)

### **How do bacteria move (locomote)?**

- By using their flagella

### **Pilus**

- For attachment to the source of food

### **How are bacteria able to survive harsh environmental and chemical conditions?**

- By forming endospores

### **Feeding in bacteria (how bacteria feed)**

- Some bacteria feed on dead organic matter (they are saprophytes)
- Some bacteria make their own food (they are autotrophs)

### **Places (habitats) where bacteria breed from and live**

- |                |                        |
|----------------|------------------------|
| ▪ Soil         | ▪ Rotting matter       |
| ▪ Latrines     | ▪ On plants            |
| ▪ Septic tanks | ▪ On bodies of animals |
| ▪ Rubbish pits | ▪ Infected blood       |
| ▪ Dirty water  | ▪ Nasal mucus          |
| ▪ Dirty food   | ▪ Root nodules         |

### **Conditions needed by bacteria to reproduce (breed)**

- |                    |          |
|--------------------|----------|
| ▪ Food             | ▪ Warmth |
| ▪ Moisture (water) | ▪ Oxygen |

### **Reproduction/breeding in bacteria (how do bacteria reproduce?)**

- By binary fission

### **BINARY FISSION**

- This is the form of asexual reproduction where a parent cell divides into two identical daughter cells

### **Single celled organisms that reproduce by cell division (binary fission)**

- |            |              |
|------------|--------------|
| ▪ Bacteria | ▪ Paramecium |
| ▪ Amoeba   | ▪ Euglena    |
| ▪ Virus    |              |

### **Diagram to show binary fission**

### **Why is the mode of reproduction shown above called asexual reproduction?**

- It does not involve the union of gametes

### **How are bacteria are named?**

- According to their shapes

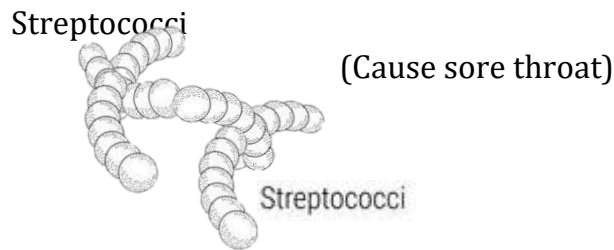
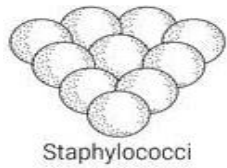
### **TYPES/GROUPS OF BACTERIA (ACCORDING TO THE SHAPES)**

- Spherical bacteria (cocci)
- Spiral shaped bacteria (spirilla)
- Rod shaped (cylindrical) bacteria (bacilli)
- Comma shaped bacteria (vibrios)
- Corkscrew shaped bacteria (Spirochaetes)

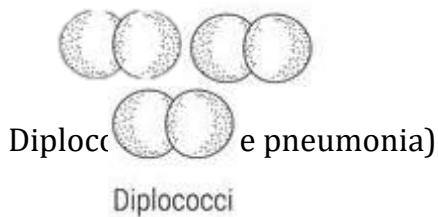
### **Spherical bacteria**



- These are called **cocci**
- They can be monococcus (single), diplococcus (in pairs), tetracoccus (in fours) and staphylococcus (in clusters)
- These cause boils, sore throat and pneumonia



Staphylococci (causes boils)



### **Rod shaped bacteria (cylindrical bacteria)**

They are called **Bacilli**

Bacillus anthracis causes **anthrax**

Salmonella typhi causes **typhoid**

### **Spiral shaped bacteria**

- These are called **spirilla**

Treponema causes **syphilis**

### **Comma shaped bacteria**

- These are called **vibrios**
- They have flagella at one end
- Vibrio cholerae causes **cholera**

### **Respiration of bacteria**

- Some bacteria need oxygen for respiration
- These are called **aerobic bacteria**
- Other bacteria don't need oxygen
- These are called **anaerobic bacteria**

### **How do bacteria enter in our bodies?**

- Through inhaling contaminated air
- Through drinking contaminated water
- Through eating contaminated food
- Through dirty wounds
- Through playing unprotected sex with an infected person

### **Nature of bacteria**

- Useful bacteria (harmless bacteria)
- Harmful bacteria (useless bacteria)

### **Useful bacteria**

- These are bacteria that are important in the environment

### **Examples of useful bacteria**

- **Putrefying bacteria:** help in decomposition of organic matter to form humus
- **Anaerobic bacteria:** ferment waste in biogas digester to produce biogas
- **Nitrogen fixing bacteria (rhizobia):** fix nitrogen into the soil
- Nitrifying bacteria

### **Importance of bacteria (ways in which bacteria are useful)**

- Some bacteria help to fix nitrogen in the soil e.g nitrogen fixing bacteria /rhizobia
- Some bacteria help in decomposition of organic matter e.g putrefying bacteria
- Some bacteria help to reduce the volume of faeces in latrines and sewage tanks
- Bacteria help to break down complex sugars in the digestive system (some bacteria help in food digestion)
- Some bacteria help in production of vinegar

**Vinegar** is used to preserve meat

- Some bacteria help in biogas production e.g anaerobic bacteria
- Some bacteria help in making of some vaccines
- Some bacteria help in making cheese, butter and yoghurt
- Bacteria help in genetic engineering

### **Why is it bad to pour kerosene and oil in latrines?**

- Oil kills bacteria and maggots that would reduce volume of faeces

### **How does oil kill bacteria and maggots in latrines?**

- Oil cuts off oxygen supply to bacteria and maggots

### **Examples of processes which need bacteria to take place**

- Decomposition
- Fermentation of milk (production of cheese, butter and yogurt)
- Production of drugs (vaccines and antibiotics)
- Production of vinegar
- Anaerobic fermentation (biogas production)
- Fixation of nitrogen in the soil

### **HARMFUL BACTERIA**

- These are bacteria that are dangerous in the environment

### **Examples of harmful bacteria**

- **Clostridium tetani:** causes tetanus

- **Vibrio cholerae:** causes cholera
- **Salmonella typhi:** causes typhoid
- **Treponema pallidum:** causes syphilis
- **Mycobacterium:** causes leprosy and tuberculosis

#### **Dangers of bacteria (how bacteria are harmful/nuisance)**

- Some bacteria cause bacterial diseases (they are pathogens)
- Some bacteria spoil milk (make food go bad)
- Some bacteria make wounds septic
- Some bacteria cause ripening of premature fruits

#### **Which hormone in plants is responsible for ripening of mature fruits?**

- Ethylene hormone

**Pathogens** are tiny organisms that cause diseases

#### **How do bacteria protect themselves against the host's immune system?**

- By forming a protective capsule (layer of slime) on its cell wall

#### **A table showing bacterial diseases in people, livestock and plants**

<b>In people</b>	<b>In livestock</b>	<b>In poultry</b>	<b>In plants</b>
<ul style="list-style-type: none"> <li>▪ Cholera</li> <li>▪ Tetanus</li> <li>▪ Typhoid</li> <li>▪ Syphilis</li> <li>▪ Bacillary dysentery</li> <li>▪ Pneumonia</li> <li>▪ Gonorrhoea</li> <li>▪ Diphtheria</li> <li>▪ Tuberculosis</li> <li>▪ Leprosy</li> <li>▪ Lyme disease</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anaplasmosis</li> <li>▪ Mastitis</li> <li>▪ Black quarter</li> <li>▪ Pneumonia</li> <li>▪ Tuberculosis</li> <li>▪ Anthrax</li> <li>▪ Brucellosis</li> <li>▪ Foot rot</li> </ul>	<ul style="list-style-type: none"> <li>▪ Fowl cholera</li> <li>▪ Fowl typhoid</li> <li>▪ Pneumonia</li> </ul>	Bacterial Wilt Fire blight Bacterial spot

#### **PREVENTION OF DANGERS CAUSED BY HARMFUL BACTERIA**

- Immunize against bacterial diseases
- Reheat leftover food before eaten
- Always cover leftover food
- By preserving food
- Wash hands after visiting latrine
- Always drink safe water
- Use of antibiotic drugs to treat bacterial infections
- Use of antiseptic drugs to kill bacteria
- Sterilize medical equipment before use
- Abstain from sex
- Keep cuts and wounds clean
- Use clean hands to handle food
- Proper use of latrines and toilets

- Use of disinfectants to clean latrines

### **ANTISEPTICS**

- These are substances used to kill germs on the human body
- They prevent wounds from becoming septic

#### **Examples of antiseptics (antiseptic drugs)**

- Dettol
- **Iodine**: It is used to kill germs on cuts
- Carbolic acid
- Hydrogen peroxide
- **Alcohol**: It is used in hand sanitizers

### **ANTIBIOTICS**

- These are drugs that treat bacterial infections

#### **Examples of antibiotics (antibiotic drugs)**

- Penicillin
- Septrin

### **DISINFECTANTS**

- These are chemicals that kill germs on non-living surfaces

#### **Examples of disinfectants**

- Jik
- Jeyz
- Chlorine (bleach)

### **FUNGI**

- These are organisms that lack chlorophyll and cannot make their own food
- Fungi belong to **Kingdom fungi**
- They can either be unicellular or multicellular organisms
- Fungi are found in **moist places**
- Fungi lack proper roots but they have threadlike structures called **hyphae**
- A group of hyphae is called **mycelium**
- Fungi cannot make their own food
- Most fungi are saprophytes

#### **Why are fungi unable to make their own food?**

- They lack chlorophyll

#### **Why are fungi called saprophytes?**

- They feed on dead organic matter

#### **Why are fungi very common in wet season/moist places?**

- There is a lot of rotting matter on which fungi feed
- There is enough water to support growth of fungi

### **REPRODUCTION IN FUNGI**

- Most fungi reproduce by means of spores
- Yeast reproduces by budding

### **Feeding in fungi**

- Most fungi feed saprophytically (feed on dead organic matter)
- Some fungi feed parasitically (get food from their host)

### **Characteristic of fungi**

- They lack chlorophyll
- They have a nucleus
- Fungi have a cell wall
- Most fungi are filamentous
- Most fungi reproduce by means of spores and budding in yeast
- Most fungi feed saprophytically

### **Conditions necessary for growth of fungi**

- Moisture
- Warmth

### **Examples of fungi**

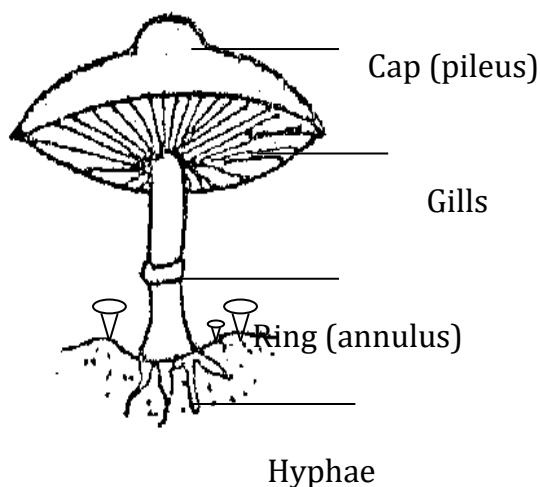
- Yeast
- Moulds (penicillium moulds, rhizopus and mucor)
- Mushrooms
- Toad stools
- Puff balls
- Bracket fungi

Bracket fungi always grow on tree trunks

### **MUSHROOM**

- It reproduces by means of spores
- It is propagated by means of spores
- It feeds saprophytically (feeds on dead organic matter)
- Some mushrooms are edible while others are poisonous

### **A diagram showing a mushroom**



### **How are mushrooms grown (propagated/reproduce)?**

- By means of spores

The part of a mushroom visible above the ground is called **fruiting body (sporophore)**

The part of a mushroom below the ground is called **mycelium**

### **Functions of each part**

#### **Cap (pileus)**

- It protects the gills

#### **Gills**

- They produce and store spores

#### **Stalk/stem/stipe**

- It holds the cap and gills

#### **Ring**

- It protect the mushroom when it is still young

#### **Hyphae**

- They absorb food (nutrients) from dead matter

### **Why is a mushroom not called a plant?**

- A mushroom has no chlorophyll while plants have chlorophyll
- A mushroom cannot make its own food while a plant makes its own food

### **YEAST**

- Yeast contains an enzyme called **zymase**
- Yeast speeds up fermentation of alcohol
- Yeast reproduces by **budding**

#### **A diagram to show budding in yeast**



### **Toadstools**

- They grow on decaying organic matter
- Toadstools resemble mushrooms
- They are poisonous

### **Moulds**

- These are furry tiny fungi that grow on rotten organic matter (rotten cassava, breads and sweet potato)

#### **Examples of moulds**

- Penicillium
- Rhizopus
- Mucor

Rhizopus causes rotting of fruits and vegetables

Mucor spoils breads and cakes

Penicillium is used to make penicillin and cheese

### **Importance of fungi (useful fungi)**

- Some fungi are eaten as food e.g some mushrooms, morels and truffles

(Some fungi are sources of proteins/fungal proteins)

- Mushrooms are sold for income

- Yeast helps in brewing/making alcohol/fermentation of alcohol

It speeds up fermentation

- Yeast helps in baking

It leavens breads/rise the dough

- Yeast extracts are a source of Vitamin B
- Penicillium are used to make penicillin (antibiotic drug)
- Penicillium is used in making cheese
- Fungi help in decomposition (break down organic matter)

### **Dangers of fungi (how fungi are harmful/nuisance)**

- Some fungi make food go bad e.g moulds
- Some fungi destroy wood
- Toadstools are poisonous when eaten
- Some fungi cause fungal diseases

### **Fungal diseases in plants and animals**

#### **In people**

- |                  |                 |
|------------------|-----------------|
| ▪ Ringworm       | ▪ Barber's itch |
| ▪ Candidiasis    | ▪ Jock itch     |
| ▪ Athlete's foot |                 |

#### **In plants**

- Black spot
- Tomato blight
- Potato blight
- Maize rust
- Powdery mildew
- Corn smut

### **Prevention and control of fungal diseases**

- Regular bathing
- Avoid sharing dirty clothing with infected person
- Spray using fungicides
- Do not eat any mushroom that you don't understand
- Preserving food
- Using essential drugs
- Do not eat uncovered smelly food
- Store food in cool dry places

### **Similarities between fungi and bacteria**

- Both can cause diseases
- Both feed on dead matter
- Both have a cell wall
- Both help in decomposition
- Both fungal and bacterial diseases can be treated

### **Differences between bacteria and fungi**

- Bacteria reproduce by binary fission (cell division) while fungi reproduce by means of spores or budding
- Some bacteria make their own food while fungi don't make their own food
- Most bacteria have one cell while most fungi have many cells
- Bacterial diseases are immunisable while fungal disease are not immunisable

## **THE GREAT SCIENTISTS**

### **Sir Isaac Newton**

- He discovered Newton's laws of motion

### **Edward Jenner (1749 – 1895)**

- He made vaccine for smallpox.

### **Louis Pasteur (1822 – 1895)**

- He discovered pasteurization of milk
- He discovered bacteria make milk go bad

### **Sir Ronald Ross (1857 – 1982)**

- He discovered the cause of malaria

### **Sir Alexander Fleming (1886 - 1985)**

- He discovered penicillin

### **Joseph Lister (1827 – 1912)**

- He discovered the antiseptic to prevent wounds from becoming septic

### **Robert Koch (1843 – 1910)**

- He discovered the bacteria that cause tuberculosis, anthrax and cholera

### **Sir William Harvey (1578 – 1657)**

- He discovered blood circulation in the human body.

## **TERM THREE**

### **TOPIC: CHANGES IN THE ENVIRONMENT**

#### **ENVIRONMENT**

- These are things that surround an organism

#### **Types of changes in our environment**

- Biological changes
- Chemical changes
- Physical changes

#### **BIOLOGICAL CHANGES**

- These are changes that occur in the life of living things

#### **Characteristics of biological changes**

- They are irreversible (cannot be reversed)
- They take place in life of living things

#### **Examples of biological changes**

- Moulting
- Germination
- Flowering
- Growth
- Fertilization
- Fruiting
- Reproduction
- Ovulation

#### **Advantages of biological changes**



- Moulting helps some organisms to increase in size
- Reproduction prevents extinction of living things
- Reproduction increases population of living things

### **CHEMICAL CHANGES**

- These are changes that form a new permanent substance

#### **Characteristics of chemical changes**

- They are irreversible (cannot be reversed)
- They form a new permanent substance
- They either absorb or give off heat
- The weight an object changes

#### **Examples of chemical changes**

- |                 |                      |                  |
|-----------------|----------------------|------------------|
| ▪ Burning       | ▪ Fermentation       | ▪ Photosynthesis |
| ▪ Rusting       | ▪ Respiration        |                  |
| ▪ Decomposition | ▪ Chemical digestion |                  |

#### **Advantages of chemical changes**

- Burning produces heat for cooking
- Rusting adds mineral salts (e.g iron) to the soil
- Decomposition helps in soil formation
- Fermentation helps in making of alcohol and yogurt
- Respiration helps the body to get energy
- Chemical digestion eases absorption of food
- Photosynthesis helps plants to get food
- Photosynthesis provides oxygen to animals
- Photosynthesis helps to purify air

#### **Disadvantages of chemical changes**

- |                                       |                                    |
|---------------------------------------|------------------------------------|
| ▪ Rusting weakens metals              | ▪ Burning pollutes the environment |
| ▪ Rusting spoils the colour of metals | ▪ Burning causes fire accidents    |

### **PHYSICAL CHANGES**

- These are changes that do not form a new permanent substance

#### **Characteristics of physical changes**

- They do not form a new permanent substance
- They are reversible
- They neither absorb nor give off heat

#### **Examples of physical changes**

- |                |               |                      |
|----------------|---------------|----------------------|
| ▪ Evaporation  | ▪ Sublimation | ▪ Crystallization    |
| ▪ Condensation | ▪ Deposition  | ▪ Breaking of an egg |
| ▪ Freezing     | ▪ Expansion   |                      |
| ▪ Melting      | ▪ Contraction |                      |

#### **Advantages of physical changes**

- Evaporation helps us to obtain salt from salt solution
- Evaporation helps to concentrate liquid foods e.g noodles
- Evaporation and condensation help in water cycle

- Evaporation of sweat cools our bodies
- Freezing helps in making of ice cubes
- Freezing helps in food preservation e.g ice cream, juice and tomatoes
- Melting helps us to butter in cooking
- Melting helps in making of alloys
- Sublimation helps us to wear perfumes

### **Disadvantages of physical changes**

- Freezing makes water transport difficult
- Expansion causes cracks on buildings and furniture
- Expansion breaks bridges on hot days
- Expansion bends wet timber dried under sunshine
- Contraction reduces air pressure in the tubes of tyres
- Contraction causes breaking of hot glass when cold water is put in it
- Contraction causes breaking of electric bulbs when exposed to cold water
- Some cause weather changes in the atmosphere

## **NATURAL AND PEOPLE MADE CHANGES**

### **NATURAL CHANGES**

- These are changes that occur in nature

### **Examples of natural changes**

- Floods
- Lightning
- Change in seasons
- Earth quake
- Wind movement

### **MAN MADE CHANGES**

- These are changes that are caused by man

### **Examples of man made changes**

- Afforestation
- Industrialization
- Vegetative propagation
- Deforestation
- Cross breeding
- Mulching
- Bush burning
- Artificial insemination
- House construction
- Road construction

## **ADVANTAGES AND DISADVANTAGES OF MANMADE CHANGES**

MANMADE CHANGE	ADVANTAGES	DISADVANTAGES
Mulching	It keeps water in the soil It improves soil fertility Controls weeds	Mulches hide pest Wet mulches grow into weeds Mulching is tiring
Road construction	It eases transport It eases communication	It leads to destruction of vegetation Poor roads cause accidents
MANMADE CHANGE	ADVANTAGES	
House construction	Houses protect from bad weather Houses protect from thieves	

	Houses protect from wild animals
Afforestation	Trees control soil erosion Trees help in rain formation Trees provide wood fuel Trees provide herbal medicine Trees provide timber
<b>MANMADE CHANGE</b>	<b>EFFECTS</b>
Deforestation	It causes soil erosion It causes drought It destroys wild life It leads to global warming
<b>Bush burning</b>	It causes soil erosion It leads to soil infertility

## **TOPIC: KEEPING GOATS, SHEEP AND PIGS**

### **COMMON TERMS USED IN KEEPING GOATS**

- **A nanny goat (doe):** This is an adult female goat
- **A Billy goat (buck):** This is an adult male goat
- **Wether:** This is a castrated billy goat
- **Kid:** This is a young goat
- **Kidding:** This is the act of giving birth to kids (act of giving birth in goats)
- **Browsing:** This is the act of feeding on leaves and soft shoots of plants
- **Weaning:** This is the gradual introduction of other foods to a baby to supplement breast milk
- **Gestation period:** This is the time taken from conception to birth
- **Lactation:** This is production of milk by the mother's mammary glands after birth

### **REASONS FOR GOAT KEEPING (WHY FARMERS KEEP GOATS AND SHEEP?)**

- For milk production
- For meat production
- For income after sale
- For mohair production

### **IMPORTANCE (USES) OF GOATS TO PEOPLE**

- They provide milk
- They provide meat
- They are sold for money
- Their droppings and urine are used as farm yard manure
- Their skins are used to make leather products and dance costumes
- Angora goats provide mohair
- They are used as dowry
- They are used as sacrifices

### **Examples of leather (products made from animal skins)**

- Leather shoes
- Leather bags
- Leather belts
- Leather jackets

### **EXTERNAL PARTS OF A GOAT**

### **TYPES OF GOATS**

- A type of goats is a group of goats kept for a specific purpose

### **TYPES OF GOATS**

- Dairy breeds (milk goats)
- Meat goats
- Mohair goats

### **BREEDS OF GOATS**

- A breed of goats is a group (family) of goats with the similar characteristics (features)

### **Types of breeds of goats**

- Local breeds (indigenous/native breeds)
- Exotic breeds
- Cross breeds

### **LOCAL BREEDS**

- These are breeds of goats that have been in Uganda for a long time
- Local breeds of goats are mainly kept for **meat**

### **Characteristics of local breeds of goats**

- They are small in size
- They are resistant to diseases
- They are resistant to bad weather
- They mature slowly
- They need less care and attention
- They have good quality products
- They produce less products

### **EXAMPLES OF LOCAL BREEDS OF GOATS**

- Mubende goats
- Small East African goats

- Kigezi goats
- Sebei goats
- Karamoja goats

### **ADVANTAGES OF LOCAL BREEDS**

- They are resistant to diseases
- They are resistant to bad weather
- They need less care and attention
- They produce less milk and meat
- They have good quality products

### **DISADVANTAGES OF LOCAL BREEDS**

- They mature slowly
- They produce less milk and meat
- They have hard meat

### **EXOTIC BREEDS OF GOATS**

- These are breeds of goats that were imported from other countries

### **CHARACTERISTICS OF EXOTIC BREEDS OF GOATS**

- They are big in size
- They are vulnerable to diseases
- They are vulnerable to bad weather
- They need much care and attention
- They mature quickly
- They produce a lot of meat and milk

<b>EXAMPLES OF EXOTIC BREEDS OF GOAT</b>	<b>REASON FOR KEEPING THEM</b>
<ul style="list-style-type: none"> <li>▪ Boer goats</li> <li>▪ Savanna goats</li> <li>▪ Kalahari Red goats</li> <li>▪ Somali goats (Galla goats)</li> <li>▪ Galla goats (Somali goats)</li> <li>▪ Kiko goats</li> </ul>	For meat production
<ul style="list-style-type: none"> <li>❖ Saanen goats</li> <li>❖ Toggenburg goats</li> <li>❖ Alpine goats</li> <li>❖ Anglo-Nubian goats</li> <li>❖ Golden Guernsey goats</li> </ul>	For milk production
<ul style="list-style-type: none"> <li>✓ Angora goats</li> </ul>	For mohair production

### **Advantages of exotic breeds of goats**

- They mature quickly
- They produce a lot of meat and milk
- They have soft meat

### **Disadvantages of exotic breeds of goats**

- They are not resistant to diseases
- They are not resistant to bad weather
- They need much care and attention

### **BREEDING IN GOATS**

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

### **How often do goats breed in a year?**

- Goats breed once in a year.

### **GESTATION PERIOD OF A GOAT**

- **Gestation period** is the time taken from conception to birth
- The gestation period of a nanny goat is **5 months (150 days)**

### **HEAT PERIOD IN GOATS**

- This is the time when the nanny goat is ready to mate with a billy goat

### **Signs of a nanny goat on heat**

- It becomes restless
- It mounts other goats
- It stands still when mounted
- It urinates frequently
- It makes a lot of noise
- Loss of appetite
- The vulva swells and turns red
- Mucus discharge from the vulva

### **CARING FOR A PREGNANT GOAT**

- Providing concentrates one month before kidding.
- ✓ Concentrate feeds re rich in carbohydrates and proteins.
- Providing them with mineral licks.
- ✓ Mineral licks are rich in mineral salts
- Providing a separate clean dry shelter to pregnant goats

### **WEANING IN GOATS**

- Weaning should be done at least 3 - 4 months after kidding.

### **SIGNS OF A GOOD MILK BREED OF GOAT**

- It has a large udder and teats.
- It has large milk veins which appear below the belly.
- It has strong and well placed hind legs.
- It has strong back muscles.

### **MANAGEMENT (ROUTINE) PRACTICES IN GOAT KEEPING**

#### **(Ways of caring for farm animals)**

- Numbering
- Dehorning/Disbudding
- Hoof trimming
- Castration
- Deworming
- Dehorning
- Spraying
- Dipping
- Dusting
- Culling
- Feeding
- Housing

### **NUMBERING (IDENTIFICATION OF ANIMALS)**

- This is the putting of a mark or label on the body of animals.

### **Importance of numbering (livestock identification)**

- It helps a farmer to easily find his lost animals
- It helps a farmer to keep proper farm records

### **HOOF TRIMMING**

- This is cutting of overgrown hooves from the animal

- It reduces the risk of foot rot disease

### **DEHORNING/DISBUDDING**

- **Dehorning** is the removal of horn buds from the animal
- **Disbudding** is the removal of horn buds from the animal
- It increases space in the barn/byre

### **CASTRATION**

- This is the removal or inactivation of testicles of a male animal

### **METHODS OF CASTRATION**

- Open castration
- Closed castration
- Loop castration (band castration)

#### **1. OPEN CASTRATION (SURGICAL CASTRATION)**

- This is when the scrotum is cut to remove the testicles

#### **Instruments used in open castration**

- Sharp knife
- Razorblade
- Scalpel

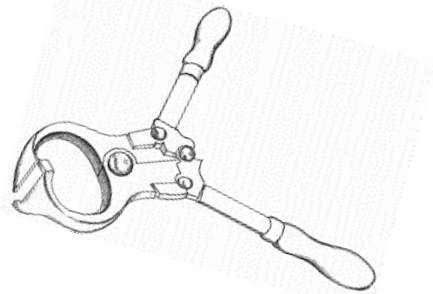
#### **2. CLOSED CASTRATION**

- This is the use of burdizzo to crush the sperm ducts and blood vessels

#### **Instrument used in closed castration**

- Burdizzo

#### **A diagram showing a burdizzo**



#### **How is a burdizzo useful on cattle farm?**

- It is used in closed castration

#### **How is a burdizzo adapted to its function?**

- It has blunt pincers

#### **3. LOOP CASTRATION (BAND CASTRATION)**

- This is the use of a rubber band to squeeze and break the sperm ducts and blood vessel

#### **Instruments used in loop castration**

- Rubber band
- Elastrator

**An elastrator** is used to apply rubber band around the scrotum during band castration

#### **Why is loop castration impossible in pigs (boars)?**

- They don't have sagging testicles

### **ADVANTAGES OF CASTRATION**

- It prevents inbreeding
- It prevents random mating
- It makes the animal humble (docile)
- It makes the animal grow big and fat
- It reduces bad smell in male animals
- It prevents unwanted pregnancies

## **DISADVANTAGES OF CASTRATION**

- It is painful
- It increases the risk of infections
- It needs a skilled person
- It denies the male animal its right of reproduction

## **DEWORMING**

- This is the giving of medicine through the mouth to kill worms (endoparasites) in animals

### **Why farmers deworm their animals? (Importance of deworming)**

- To kill endoparasites (worms)

## **METHODS OF DEWORMING**

- Drenching
- Dosing

### **1. DOSING**

- This is the giving of solid medicine through the mouth to kill worms in animals

### **2. DRENCHING**

- This is the giving of liquid medicine through the mouth to kill worms in animals.

### **Farm tools used for drenching**

- Drenching gun
- Syringe
- Bottle

## **DIAGRAM OF A DRENCHING GUN**

### **How is a drenching gun important on a livestock farm?**

- It is used for drenching

### **State the importance of spraying, dipping and dusting livestock with acaricides**

- To kill ticks and mites
- To prevent tick-borne diseases

### **How is a knapsack sprayer important on a goat farm?**

- It is used for spraying acaricides

## **HOUSING GOATS**

- This is the act of constructing a house for goats

## **QUALITIES OF A GOOD HOUSE FOR GOATS**

- It should be well ventilated
- It should have a strong roof



- It should have a slanting floor
- It should be clean and dry

### **IMPORTANCE OF A HOUSE TO GOATS**

- To protect goats from bad weather
- To protect goats from predators
- To protect goats from thieves

### **DANGERS OF SHARING A HOUSE WITH DOMESTIC ANIMALS**

- It leads to bad smell in the house
- It leads to parasites in the house
- It leads to competition for oxygen
- It leads to easy spread of diseases to people
- It leads to destruction of household property

### **SYSTEMS (METHODS) OF GRAZING GOATS**

- Free range grazing or Herding
- Tethering
- Paddock grazing
- Zero grazing
- Strip grazing

### **Mention three methods of rotational grazing**

- Tethering
- Paddock grazing
- Strip grazing

### **HERDING**

- This is when a herdsman looks after animals as they graze
- It is also called **free range grazing** because animals move on their own looking for food

### **Advantages of herding**

- Animals get a balanced diet
- Animals make enough body exercise
- Less attention is needed
- It is cheap to manage

### **Disadvantages of herding**

- It leads to easy spread of diseases
- Animals can destroy crops
- Animals can get lost
- It needs a big piece of land
- It can lead to overgrazing

### **PADDOCK GRAZING**

- This is the method of grazing in which a pastureland divided into small fenced plots
- **Paddocks** are small fenced plots on pastureland

### **An illustration showing paddock grazing**

### **Advantages of paddock grazing**

- It allows proper use of pasture
- It gives pasture time to grow
- Manure is evenly distributed on the farm
- It controls over grazing
- It controls tickborne diseases

### **How does paddock grazing control ectoparasites and diseases in livestock?**

- It starves ticks to death (it breaks the feeding cycle of ticks)

### **DISADVANTAGES OF PADDOCK GRAZING**

- It is expensive to manage
- It needs a big piece of land
- Animals do not make enough body exercises

### **STRIP GRAZING**

- This is the grazing of animals on a pastureland divided into strips using electric wires.

### **Advantages of strip grazing**

- There is proper use of pasture.
- It controls diseases and parasites
- It prevents over grazing
- Animals do not destroy crops

### **Disadvantages of strip grazing**

- It is expensive to maintain
- Few animals are kept
- Animals do not make enough body exercises
- It can only be used in areas with electricity

### **TETHERING**

- This is the method of grazing where a farmer ties the animal on a peg or tree using a rope
- The animals tethered is moved to a new place when necessary

### **An illustration showing tethering**

### **Advantages of tethering**

- There is no need for fencing
- It is easy to start
- It is cheap to manage
- It needs a small piece of land
- Animals may not destroy crops
- The farmer gets time to do other work

### **Disadvantages of tethering**

- Animals do not get balanced diet
- Few animals are kept
- Animals can easily be stolen
- Animals can easily be killed by predators
- The rope can easily strangle the animal

- Animals do not make enough body exercises

### **ZERO GRAZING**

- This is the keeping of animals in stalls where water and food are provided.
- It is also be called **stall grazing**

### **An illustration showing zero grazing**

### **Advantages of zero grazing**

- Many animals are kept in a small area
- It prevents wastage of feeds
- It needs a small piece of land
- It protects animals from bad weather
- It is easy to collect manure
- It is easy to cull sick animals
- Animals produce a lot of milk

### **Why?** There is no wastage of energy

- It controls the spread of diseases and parasites

### **Disadvantages of zero grazing**

- It is expensive to manage
- Animals lack body exercises
- It needs a lot of labour

### **SHEEP REARING**

### **TERMS USED IN SHEEP REARING**

#### **Ram:**

- This is a mature male sheep.

#### **Ewe:**

- This is a mature female sheep.

#### **Lamb:**

- This is the young of a sheep.

#### **Lambing:**

- This is the act of giving birth in sheep.

#### **Mutton:**

- This is the meat of sheep.

#### **Shearing:**

- This is the removal of wool from a sheep.

#### **Docking:**

- This is the cutting of the lamb's tail short

### **Gestation period:**

- This is the period between conception and birth.

### **REASONS FOR DOCKING**

#### **Importance of docking sheep**

- It makes mating easy
- It promotes hygiene of a sheep (reduces the risk of fly strike)

### **REASONS FOR REARING SHEEP (Why do farmers keep sheep?)**

- For meat (mutton) production
- For income after sale
- For wool production

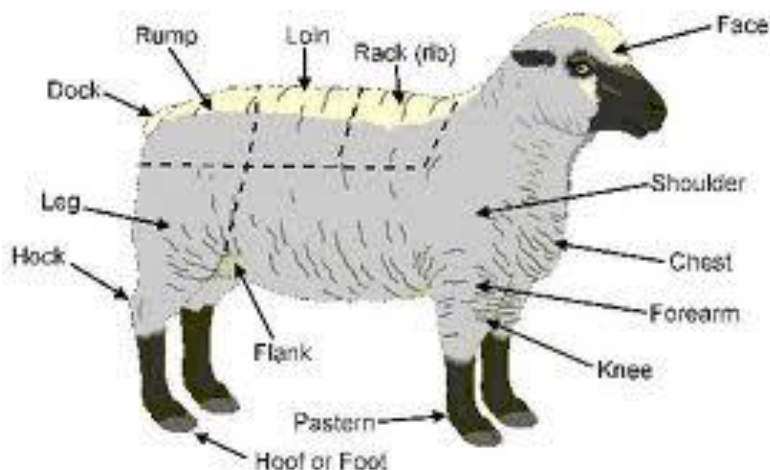
### **IMPORTANCE OF KEEPING SHEEP**

- It is a source of meat (mutton)
- It provides wool (fleece)
- It provides skins to make leather products
- Its droppings are used as farm yard manure
- Its horns and hooves are used to make buttons and glue
- It is used as sacrifice on cultural ceremonies

### **Products from goats and sheep**

- Mutton (meat)
- Wool (fleece)
- Skins
- Sheep droppings
- Horns and hooves

### **EXTERNAL PARTS OF A SHEEP**



### **GROUPS OF SHEEP KEPT IN UGANDA**

#### **LOCAL (INDIGENOUS/NATIVE) BREEDS OF SHEEP**

All local breeds of sheep are kept for mutton production

- Black-headed Persian
- Red Maasai
- Somali sheep
- Dorper

#### **EXOTIC BREEDS OF SHEEPS**

- Suffolk
- Dorset
- Southdown
- Cheviot
- Texel
- Hampshire
- Merino
- Rambouillet
- Bluefaced Leicester
- Romney marsh

#### **Exotic breeds of sheep kept for meat (mutton) production/mutton breeds of sheep**

- Suffolk
- Dorset
- Southdown
- Cheviot
- Texel
- Hampshire

#### **Exotic breeds of sheep kept for wool (fleece) production/wool breeds of sheep**

- Merino
- Rambouillet
- Bluefaced Leicester
- Romney sheep

#### **Exotic breeds of sheep kept for both mutton and wool production/dual purpose breeds of sheep**

- Corriedale sheep
- Romney sheep (previously called **Romney marsh sheep**)

#### **BREEDING IN SHEEP**

- A ewe should be served at the age of 16 -18 months
- The gestation period of sheep is **5 months (150 days)**.

#### **FLUSHING**

- This is the providing of extra nutritious feeds to a ewe before mating

#### **IMPORTANCE OF FLUSHING**

- It stimulates ovulation (increases the rate of ovulation)
- It increases the chances of multiple births

#### **STEAMING UP**

- This is the practice of feeding a pregnant animal on food rich in proteins

#### **IMPORTANCE OF STEAMING UP**

- It lengthens the next lactation period
- It increases colostrum
- It prevents low birth weight
- It enables the foetus to grow well
- It enables the pregnant animal to get strength for giving birth

#### **WEANING**

- This is the gradual introduction of other foods to a baby to supplement breast milk
- Weaning in sheep is done between 3 – 4 weeks.

#### **SHEARING:**

- This is the removal of wool (fleece) from a sheep
- It is done using **electric shears** or **hand shears**

- Electric shears remove wool faster than hand shears
- Weaning sheep should be sheared at 8 months
- A mature sheep should be sheared once a year

#### **Why is shearing done in summer season?**

- There is enough sunshine to keep the sheep warm

#### **Why is shearing not done in winter season?**

- To prevent death of sheep due to coldness

#### **FACTORS CONSIDERED WHEN CHOOSING A GOOD SHEEP (EWE/RAM).**

- It should be humble/docile/calm
- It should have well developed udder and teats
- It should be healthy (free from diseases)
- Its mother should have a multiple birth

#### **PARASITES (PESTS) IN FARM ANIMALS.**

- A **parasite** is an organism that depends on a host for food and shelter
- A **host** is an organism on which a parasite depends for food.

#### **How do parasites benefit from their host for survival?**

- They get food
- They get shelter

#### **GROUPS (TYPES OR CLASSES) OF PARASITES**

- External Parasites (ectoparasites)
- Internal Parasites (endoparasites)

#### **EXTERNAL PARASITES**

- These are parasites that live outside the body of host

#### **Examples of ectoparasites (external Parasites)**

- Ticks
- Tsetse flies
- Mites

#### **CONTROL OF ECTOPARASITES**

- Spraying with acaricides
- By dusting with acaricides
- Dipping in acaricides
- Clearing bushes around livestock farms (to control tsetse flies)
- Use tsetse fly traps to control tsetse flies
- By paddock grazing
- By deticking

#### **INTERNAL PARASITES**

- These are parasites that live inside the body of the host.
- They live in muscles, intestines and liver

#### **Examples of endoparasites (internal Parasites)**

- Tape worms
- Hook worms
- Thread worms

- Liver flukes
- Ascaris worm

### **Control of endoparasites**

- By deworming
- Giving animals clean feeds
- Regular cleaning of the houses for animals
- Regular cleaning of the feeding equipment for animals
- Grazing in well drained areas (to control liver flukes)

### **EFFECTS OF PARASITES (PESTS) OF CATTLE**

- Some parasites suck blood which leads to anaemia
- Some parasites spread diseases to animals
- Some parasites damage the skins of animals
- Some parasites cause discomfort to animals

### **DISEASES OF GOATS AND SHEEP**

- Foot rot
- Heart water
- Red water
- Pneumonia
- Coccidiosis
- Anthrax
- Nairobi diseases
- Nangana
- Mastitis
- Lamb dysentery
- East coast fever
- Rift valley disease
- Foot and mouth disease
- Blue tongue disease

### **PIG KEEPING**

- This is the rearing of domestic pigs

### **TERMS IN RELATION TO PIG KEEPING**

- **Piggery:** is the place where domestic pigs are kept.
- **Boar:** is male pig.
- **Sow:** is an adult female pig.
- **Barrow (hog):** castrated male pig
- **Herd:** a group of pigs
- **Gilt:** is a young female pig
- **Farrowing:** is the act of giving birth in pigs.
- **Pork:** is the meat from pigs.
- **Lard:** fats from pigs.
- **Sty:** house for pigs.
- **Litter:** A group of piglets produced by the sow at one time

- **Piglet:** is a young pig.
- **Runt:** is smallest and weakest piglet in a litter

**NOTE:**

- The gestation period of a pig (sow) is **3 months, 3 weeks and 3 days**

**EXTERNAL PARTS OF A PIG**

**TYPES OF BREEDS OF PIGS**

- Local breeds
- Exotic breeds
- Wild pigs (warthog)

**Examples of local breeds of pigs.**

Black pigs

Old spotted pigs

**Exotics breeds of pigs.**

- |                           |                      |
|---------------------------|----------------------|
| ▪ Landrace                | ▪ Poland China       |
| ▪ Large white (Yorkshire) | ▪ Wessex saddle back |
| ▪ Hampshire               | ▪ Tamworth           |
| ▪ Duroc                   | ▪ Camborough         |
| ▪ Middle white            |                      |

**Factors considered when selecting a good pig for rearing.**

>heredity: it should be from a good ancestral family.

>it should be free from sickness.

>the piglet should have 12 teats.

**SYSTEMS OF KEEPING PIGS**

- |                    |                    |
|--------------------|--------------------|
| ▪ Intensive system | ▪ Extensive system |
|--------------------|--------------------|

**CHARACTERISTICS OF A GOOD PIGSTY**

- It should have a slanting floor



- ✓ For easy cleaning
- ✓ For easy drainage of waste
- It should be well ventilated
- ✓ To allow free air circulation
- It should be cleaned dry
- To prevent the risks of pneumonia
- It should have farrowing pens
- It should not be slippery
- It should be leak proof
- It should have guard rails

To prevent the mother from crushing the piglets.

### TYPES OF FEEDS IN PIGS.

- The creep food
- Sow and weaner meal
- The fattener (finisher) meal.

#### 1. The creep food

- For piglets between 1 day to 8 weeks

#### 2. Sow and weaner meal

- For weaning piglets
- It is introduced to piglets at 8 weeks up to 50kgs

#### 3. The fattener (finisher) meal.

- For pig ready for sale
- It helps to fatten the pigs

### NOTE:

- ✓ Piglets are given red soil to provide iron.

### TEETH-CLIPPING

- This is the cutting of pointed teeth of piglets
- It should be done in the first day after birth.
- It can be done when the piglet is 15 minutes old
- It is done using **tooth clippers** or **forceps**

### REASON FOR TEETH CLIPPING (IMPORTANCE OF TEETH CLIPPING)

- To prevent injuries to the udder and teats of the sow
- To prevent injuries to the other piglets (littermates)

### Why should the sow be restrained (tied or put in a separate pen/pig sty) during tooth clipping?

- To prevent injuries as the sow tries to protect its young

### DISADVANTAGE OF TEETH CLIPPING

- It can cause damage to the gums
- It can lead to infections

## **COLOSTRUM**

- This is the first milk got from a mother animal after giving birth

## **IMPORTANCE OF COLOSTRUM**

- It opens up the digestive system of a baby
- It boosts immunity of the baby (it contains a lot of antibodies)
- It is easy to digest
- It has a lot of nutrients (it provides a balanced diet to a baby)
- It provides energy to the piglet to activate its own heat production

## **DISEASES IN PIGS**

### **Viral diseases**

- **Swine fever**
  - i) African swine fever
  - ii) Classical swine fever (hog cholera)
- Swine flu (swine influenza)

### **Bacterial diseases**

- Swine dysentery
- Mastitis
- Foot rot
- Pneumonia
- Greasy pig disease
- Anthrax

### **Protozoan disease**

- Coccidiosis
- Nagana (trypanosomiasis)

### **Malnutritional disease**

- Piglet anaemia

## **EXAMPLES OF ECTOPARASITES (EXTERNAL PARASITES) IN PIGS**

- Jiggers
- Lice
- Ticks
- Mange
- Fleas
- Mites

## **EXAMPLES OF ENDOPARASITES (INTERNAL PARASITES) IN PIGS**

- Tape worms
- Thread worms
- Ascaris worm
- Hook worms
- Liver flukes
- Lungworm

## **WAYS OF CONTROLLING ANIMAL DISEASES**

- Regular vaccination
- By culling
- By paddock grazing
- Isolate and treat sick animals
- Applying quarantine
- Proper feeding
- Use a strip cup to detect mastitis in milk
- Regular cleaning of the animal houses
- Spraying with acaricides to control tickborne diseases

- Use artificial insemination to avoid mating infection

### **RECORD KEEPING**

- This is the writing of information about different activities done on a farm

### **FARM RECORDS**

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

### **TYPES (EXAMPLES) OF FARM RECORDS**

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

### **REASONS FOR KEEPING FARM RECORDS (IMPORTANCE OF RECORD KEEPING)**

- It enables a farmer to know the profits or losses
- It enables a farmer to be taxed fairly
- It enables a farmer to get loans easily
- It enables a farmer to know the farm history
- It enables a farmer to plan for the farm
- It enables a farmer to make proper decisions

### **FACTORS TO CONSIDER BEFORE STARTING A LIVESTOCK FARM**

- Land
- Capital
- Labour
- Market
- Management

### **TOPIC: FOOD AND NUTRITION**

- **Food** is something good to eat or drink
- **Nutrition** is the study of food and how it is used in the body
- **Feeding** is the act of taking food into the body

### **IMPORTANCE OF FOOD IN THE BODY**

- It keeps the body healthy
- It gives the body energy
- It builds the body (helps in body growth)
- It keeps the body warm
- It repairs the worn out body tissues

## **BREASTFEEDING**

- This is the feeding of a baby on breast milk produced by the mother's mammary glands
- Babies should feed only on breast milk for 6 months without any other food
- At 6 months, babies should be weaned

## **EXCLUSIVE BREASTFEEDING**

- This is act of feeding a baby on breast milk alone for the first six months

## **ADVANTAGES OF BREASTFEEDING TO THE:**

### **i) BABY**

- It boosts the baby's immunity
- Breast milk is always ready
- Breast milk is at the right temperature
- Breast milk is easy to digest
- Breast milk has a balanced diet for a new born baby

### **ii) MOTHER**

- It is cheap
- It saves time
- Prolonged breastfeeding delays the next pregnancy
- It improves the mother's health since she feeds well to produce more breast milk

## **How does prolonged breast feeding delay the next pregnancy?**

- It delays ovulation

### **iii) FAMILY**

- It promotes saving in the family
- It improves the health of family members

## **DISADVANTAGES OF BREASTFEEDING TO THE:**

### **iv) BABY**

- The baby can be underfed in case the mother has little breast milk
- The baby does not feed in case the mother is absent
- It leads to easy spread of AIDS from an infected mother to the baby

### **v) MOTHER**

- It is difficult to practise when the mother is sick
- It can dehydrate the mother

## **BOTTLE FEEDING**

- This is the feeding of babies on animal's milk using bottle

## **CONDITIONS THAT CAN LEAD TO BOTTLE FEEDING**

- When the mother is HIV positive (has AIDS)
- When the mother dies
- When the mother is very sick
- When the mother produces little or no breast milk

- When the mother has breast cancer
- When the mother stays away for a long time

### **DISADVANTAGES OF BOTTLE FEEDING**

- It is expensive to manage
- It encourages early pregnancy
- Animal's milk is not easy to digest
- Milk in dirty bottles can lead to diarrhoeal diseases
- Animal's milk does not contain a balanced diet for human baby
- It wastes time (needs a lot of time to prepare milk)

### **WEANING**

- This is the gradual introduction of other foods to a baby to supplement breast milk
- Babies should be weaned at **6 months**
- Weaning babies need mashed (soft) food because **they have no teeth**
- Hard food during weaning **leads to indigestion**
- Weaning babies are fed frequently because **they have small stomach which allows little food (they eat little food at a time)**

### **REASONS FOR WEANING AT 6 MONTHS**

- To provide iron to the baby
- To prevent marasmus and kwashiorkor
- Breast milk alone is not enough for the baby

### **FOOD FOR WEANING BABIES**

- Mashed potato
- Mashed fruits
- Mashed egg yolk
- Meat soup
- Porridge

### **VULNERABLE GROUPS OF PEOPLE**

- These are people whose health can easily be harmed by poor feeding
- These are people whose health can easily be harmed without special care and diet

### **EXAMPLES OF VULNERABLE GROUPS OF PEOPLE**

- Pregnant women (expectant mothers)
- The sick people
- Breastfeeding mothers (lactating mothers)
- Babies (breastfeeding and weaning babies)
- The elderly people

### **FOOD VALUES FOR VULNERABLE PEOPLE**

#### **FOOD FOR PREGNANT WOMEN**

- They should eat more food **because** they share food with the embryo/foetus in the womb

FOOD VALUES	FUNCTION
Proteins	<ul style="list-style-type: none"> <li>▪ To build up body tissues of the foetus (for proper growth of the foetus)</li> </ul>

	<ul style="list-style-type: none"> <li>▪ To repair the worn out body tissues of a mother</li> </ul>
Carbohydrates	<ul style="list-style-type: none"> <li>▪ To provide energy to the mother's body</li> </ul>
Vitamins	<ul style="list-style-type: none"> <li>▪ To keep their body healthy</li> <li>▪ To boost the mother's immunity</li> </ul>
Roughage	<ul style="list-style-type: none"> <li>▪ To prevent constipation</li> </ul>
Fats and oils (lipids)	<ul style="list-style-type: none"> <li>▪ To provide energy and warmth</li> <li>▪ To keep their skins smooth and healthy</li> </ul>
<b>Mineral salts</b>	
Iron	<ul style="list-style-type: none"> <li>▪ To make blood</li> <li>▪ To prevent anaemia</li> </ul>
Calcium	<ul style="list-style-type: none"> <li>▪ To strengthen bones</li> </ul>

### **FOOD FOR BREASTFEEDING MOTHERS**

#### **i) Water (fluids)**

- To produce more breast milk

#### **ii) Carbohydrates**

- To provide energy to the body

#### **iii) Calcium**

- To replace calcium lost through breast milk

### **FOOD FOR BABIES**

#### **i) Proteins**

- To build the body tissues
- To make enzymes

#### **ii) Vitamins**

- To protect babies from diseases (to boost their immunity)

#### **iii) Carbohydrates**

- To provide energy to the body

#### **iv) Fats and oils (lipids)**

- To provide energy and warmth
- To keep their skins smooth and healthy

### **FOOD FOR BREASTFEEDING BABIES (NEW BORN BABIES)**

#### **i) Breast milk**

- It has a balanced diet for a baby (it has all food values apart from iron)
- It boosts the baby's immunity (it has a lot of antibodies)
- It is always ready
- It is at the right temperature
- It is easy to digest

### **THE SICK PEOPLE**

- Sick people can be invalid or convalescents

#### **An invalid**

- This is a person who is totally sick

#### **A convalescent**

- This is a person who is recovering from sickness

### **FOOD FOR THE SICK PEOPLE**

#### **i) Proteins**

- To repair the worn out body tissues

#### **ii) Vitamins and mineral salts**

- To boost their immunity

#### **iii) Fluids**

- For rehydration

### **FOOD FOR THE ELDERLY PEOPLE**

- The elderly people need mashed (soft) food because **they have no teeth (due to loss of teeth)**
- Feeding on hard food **leads to indigestion**
- The elderly people eat frequently because **they eat little food at a time**

#### **i) Carbohydrates**

- To provide energy to the body

#### **ii) Proteins**

- To repair the worn out body tissues

#### **iii) Vitamins and mineral salts**

- To boost their immunity

#### **iv) Fats and oils (lipids)**

- To keep their skin healthy
- To provide energy and warmth

### **MALNUTRITION AND MALNUTRITIONAL (DEFICIENCY) DISEASES**

#### **MALNUTRITION**

- This is the condition when the body lacks some food values
- This is the lack of some food values in the body
- Malnutrition is sometimes called **poor feeding** or **poor nourishment**

#### **CAUSES OF MALNUTRITION**

- |                                 |                            |
|---------------------------------|----------------------------|
| ▪ Poverty                       | ▪ Food taboos              |
| ▪ Shortage of food              | ▪ Inadequate breastfeeding |
| ▪ Ignorance about balanced diet |                            |

#### **SIGNS OF MALNUTRITION IN CHILDREN**

- |                          |                        |
|--------------------------|------------------------|
| ▪ Swollen belly          | ▪ Swollen moon face    |
| ▪ Reduced night vision   | ▪ Little brown hair    |
| ▪ Swollen moon face      | ▪ Bleeding gums        |
| ▪ Stunted growth         | ▪ Poor growth of teeth |
| ▪ Swollen legs           | ▪ Too much sleeping    |
| ▪ Poor healing of wounds |                        |

#### **SYMPTOMS OF MALNUTRITION IN ADULTS**

- Tiredness/fatigue
- Loss of interest in work
- Low concentration at work

### **EFFECT OF MALNUTRITION**

- It leads to deficiency diseases

### **PREVENTION OF DEFICIENCY DISEASES**

- By feeding on a balanced diet

### **MALNUTRITIONAL (DEFICIENCY) DISEASES**

- These are diseases caused by lack of some food values in the body
- **Deficiency** means lack of

### **CAUSES OF MALNUTRITIONAL (DEFICIENCY) DISEASES**

- Poverty
- Shortage of food
- Ignorance about balanced diet
- Food taboos
- Inadequate breastfeeding

### **EXAMPLES OF MALNUTRITIONAL (DEFICIENCY) DISEASES**

- These are diseases caused by lack of some food values in the diet

### **EXAMPLES OF DEFICIENCY DISEASES**

<b>Deficiency disease</b>	<b>Deficiency (lack of)/food value lacked</b>
Marasmus	Carbohydrates
Kwashiorkor	Proteins
<b>Vitamin deficiency diseases</b>	
Night blindness	Vitamin A
Beriberi	Vitamin B <sub>1</sub>
Pellagra	Vitamin B <sub>3</sub>
Scurvy	Vitamin C
Rickets/osteoporosis	Vitamin D
Infertility/Sterility	Vitamin E
Hemorrhagic disease/Vitamin K deficiency bleeding	Vitamin K
<b>Mineral salt deficiency diseases</b>	
Anemia	Iron
Rickets/Osteoporosis	Calcium
Goitre	Iodine

### **KWASHIORKOR**

- It is caused by lack of proteins in the diet

### **Signs of kwashiorkor in children**



- Little brown hair
- Swollen moon face
- Swollen belly full of air
- Edema (swollen feet)

**A drawing showing a baby suffering from kwashiorkor**

**Prevention of kwashiorkor**

- Feeding on food rich in proteins

**Examples of food sources of proteins**

- |        |              |                |
|--------|--------------|----------------|
| ▪ Eggs | ▪ Beans      | ▪ Grasshoppers |
| ▪ Meat | ▪ Groundnuts | ▪ Mushroom     |
| ▪ Milk | ▪ Cow peas   | ▪ Soya beans   |

**MARASMUS**

- It is caused by lack of marasmus in the diet
- Marasmus is also said to be starvation disease

**Signs of marasmus in children**

- |  |                  |
|--|------------------|
| ▪ Pot belly                            | ▪ Underweight    |
| ▪ Elderly face (little old man's face) | ▪ Very thin body |

**A drawing showing a baby suffering from marasmus**

**Prevention of marasmus**

- Feeding on food rich in carbohydrates

**Examples of food sources of carbohydrates**

- Maize
- Sweet potato
- Rice
- Cassava
- Irish potato
- Wheat
- Millet
- Bread

## **BERIBERI**

- It is caused by lack of vitamin B<sub>1</sub> (thiamine) in the diet
- It affects muscles, nerves and heart

### **Signs of beriberi in children**

- Vomiting
- Muscle weakness
- Loss of muscle function in the legs
- Paralysis
- Mental confusion

### **Prevention of beriberi**

- Feeding on food rich in vitamin B<sub>1</sub>

### **Examples of food sources of vitamin B<sub>1</sub>**

- Yeast
- Beef
- Whole grains
- Cauliflower
- Liver
- Pork

## **PELLAGRA**

- It is caused by lack of vitamin B<sub>3</sub> (niacin) in the diet
- It affects the skin

### **Signs of pellagra in children**

- Sores on the skin
- Loss of body weight
- Mental confusion

### **Prevention of pellagra**

- Feeding on food rich in vitamin B<sub>3</sub>

### **Examples of food sources of vitamin B<sub>3</sub>**

- Yeast
- Meat
- Cereals
- Liver
- Coffee or tea
- Milk

## **SCURVY**

- It is caused by lack of vitamin C in the diet
- It affects the skin

### **Signs of scurvy in children**

- Bleeding of gums
- Poor healing of wounds
- Sores on the mouth
- Retarded growth

### **Prevention of scurvy**

- Feeding on food rich in vitamin C

### **Examples of food sources of vitamin C**

Vitamin C is found in fresh fruits mainly

- Mango
- Orange
- Lemon
- Guava
- Pawpaw
- Jackfruit
- Pineapple
- Fruit juice

### **Why is vitamin C not found in cooked fruits?**

- Vitamin C is destroyed by heat

### **NIGHT BLINDNESS**

- It is caused by lack of vitamin A in the diet
- It affects the eyes

### **Signs of night blindness in children**

- Reduced vision at night
- Sores in the eyes
- Skin becomes dry and scaly
- Reduced resistance to diseases

### **Prevention of night blindness**

- Feeding on food rich in vitamin A

### **Examples of food sources of vitamin A**

- Carrot
- Red pepper
- Spinach
- Liver

### **RICKETS**

- It is caused by lack of vitamin A in the diet
- Lack of calcium and phosphorus in the diet
- It affects the bones

### **Signs of rickets**

- Bowlegs or knock-knee legs
- Oddly shaped skull
- Poor teeth formation
- Delayed tooth formation
- Common fractures

### **A drawing showing a baby suffering from rickets**

### **Symptom of rickets**

- Weak bones of the legs

### **Prevention of rickets**

- Feeding on food rich in vitamin D, calcium and phosphorus
- Sunbathing in early morning

### **Examples of food sources of vitamin D**

- |            |             |
|------------|-------------|
| ▪ Liver    | ▪ Oily fish |
| ▪ Red meat | ▪ Mushroom  |

## **TRADITIONAL FOOD CUSTOMS, BRIEFS AND TABOOS**

### **FOOD CUSTOMS**

- These are established practices which are accepted in a community about food

### **EXAMPLES OF FOOD CUSTOMS**

- A neighbor who helps during harvesting should be given a basket of food
- A family which gets an early harvest should send some food to the neighbour
- A woman should kneel while peeling or serving food
- You should give food to a visitor if found eating

### **ADVANTAGES OF FOOD CUSTOMS**

- They promote friendship in the community
- They promote sharing in the community
- They promote cooperation in the community
- They conserve culture
- They promote food security

### **FOOD BRIEFS**

- These are feelings taken to be true about food by a group of people

### **EXAMPLES OF FOOD BRIEFS**

- Women were not allowed to eat chicken because they would lead to infertility
- Men were not allowed to eat oil nuts because they would become impotent
- Children with measles were not allowed to eat meat because it would worsen the disease
- Babies were not allowed to eat eggs because they would defecate on bed

### **DANGERS OF FOOD BELIEF**

- They lead to deficiency diseases
- They lead to malnutrition

### **FOOD TABOOS**

- These are cultural or religious customs that forbid people to eat some kinds of food

### **EXAMPLES OF FOOD TABOOS**

#### **RELIGIOUS FOOD TABOOS**

- Muslims and SDA do not eat pork
- Muslims do not eat meat slaughtered by a non-Muslim
- Catholics do not eat meat on Good Friday (Fridays during lent period)

## **CULTURAL FOOD TABOO**

- Clan members are not allowed to eat their totems

## **ADVANTAGES OF FOOD TABOOS**

- Food taboos help to conserve plants and animals
- People who are not affected by taboos get a lot of food
- Food taboos promote respect for food hence good handling of our totems

## **DANGERS OF FOOD TABOOS**

- They lead to deficiency diseases
- They lead to malnutrition

## **FOOD CONSUMPTION**

- This is the type and amount of food eaten by people in a given area

## **FACTORS THAT DETERMINE FOOD CONSUMPTION.**

- Availability of food
- Food beliefs and taboos
- Level of hunger and appetite
- Taste of food
- Peer influence

## **EXAMPLES OF FOOD CONSUMPTION PATTERNS.**

- People near water bodies have a lot of fish but little fruits and vegetables.
- People near forests have a lot of fruits and vegetables but lack fish.
- People in villages have fresh foods unlike those in towns.

## **STAPLE FOOD**

- This is the food stuff commonly eaten by most people in a given area

## **EXAMPLES OF DIFFERENT COMMUNITIES AND THEIR STAPLE FOODS.**

- Baganda: **Matooke (banana)**
- Banyankore: **Millet**
- Iteso: **Millet**
- Banyoro: **Millet**
- Boarding schools: **Posho**
- Basoga: **Banana, sweet potatoes, and cassava**

## **Why are carbohydrates called the main staple foods?**

- They are more in the people's diet than other food values.

# **TOPIC: PRIMARY HEALTH CARE**

## **HEALTH**

- This is the state of physical, emotional, social and spiritual wellbeing of an individual

### **Aspects of health**

- Physical health
- Emotional health
- Social health
- Spiritual health

### **PRIMARY HEALTH CARE (P.H.C)**

- This is the essential health care where individuals, families and communities work together to solve their health problems

### **PRINCIPLES OF P.H.C**

These are basic rules followed when carrying out Primary Health Care

- Everyone must benefit (total health for all people)
- Everyone must participate
- P.H.C activities must be affordable
- P.H.C activities must be acceptable by culture or religion
- It must be organized according to priorities

### **ELEMENTS OF P.H.C**

- These are health programmes that protect and maintain good health

#### **Elements of P.H.C**

- First aid
- Immunization
- Family planning
- Water and sanitation
- Personal hygiene
- Control of Communicable Diseases (CCD)
- Control of Diarrhoeal Diseases (CDD)
- Food and nutrition
- Oral and dental health
- Maternal and child health
- Health education

### **IMPORTANCE OF THE ELEMENTS OF P.H.C**

#### **Health education**

- It helps people to address health concerns
- It helps people to know the value of good health
- It reduces poor traditional beliefs about diseases

#### **Ways of providing health education**

- Through health songs
- Through health debates and quiz
- Through health programmes on media
- Through forming health clubs

#### **Immunization**

- It prevents immunisable diseases among people
- It reduces infant mortality rate

#### **Food and nutrition**

It is promoted by feeding on a **balanced diet**

- It protects people from poor feeding and deficiency diseases

#### **Maternal and child health care**

It is promoted by getting **antenatal care (prenatal care)**

- It improves the health of pregnant women and their unborn babies

### **Water and sanitation**

- It promotes clean and safe water supply
- It prevents multiplication of insect vectors

### **Oral and dental health care**

It is promoted by brushing teeth and dental flossing

- It prevents teeth diseases and disorders

### **Family planning**

- It controls rapid population growth in a country
- It promotes saving in a family
- It promotes child spacing
- It enables a child to get enough basic needs

### **First aid**

- It saves life
- It reduces pain
- It promotes quick recovery
- It stops external bleeding
- It prevents further injuries

### **Control of communicable diseases (CCD)**

It is promoted by;

- Abstaining from sex
- Avoiding sharing sharp objects with an infected person
- Using condoms when playing sex
- Being faithful to your sexual partner

### **Communicable diseases**

- These are diseases that can spread from one person to another
- They are caused by germs
- They are also called **infectious diseases**

### **How do communicable diseases spread?**

- Through insect bites
- Through animal bites
- Through body contact with an infected person
- Through playing unprotected sex with an infected person
- Through inhaling contaminated air
- Through open cuts and dirty wounds

## **RESPONSIBILITIES OF AN INDIVIDUAL, FAMILY AND COMMUNITY IN PROMOTION OF PHC**

### **Activities done by an individual to promote P.H.C**

- Participating in general cleaning sessions
- Feeding on a balanced diet
- Bathing daily
- Brushing teeth every after a meal
- Washing hands with clean water and soap after visiting latrines

- Cutting fingernails and toenails short
- Washing clothes and beddings regularly
- Grooming hair
- Going for immunization
- Making O.R.S

#### **Activities done by a family to promote P.H.C**

- Constructing a latrine at home

For proper disposal of human wastes

- Digging a rubbish pit at home

For proper disposal of rubbish

- Boiling water for drinking

To prevent diarrhoeal diseases

- Setting up a plate rack at home

To prevent washed utensils from getting contaminated with dust

- Taking children for immunization
- Observing good food hygiene at home
- Preparing a balanced diet for members

To prevent deficiency diseases

- Having clean and safe water at home
- Destroying breeding places for insect vectors near the home
- Sharing health information among family members
- Avoiding drug abuse among family members

#### **Activities done by the community to promote P.H.C**

- Constructing public latrines
- Constructing public water sources (wells and bore holes)
- Protecting water sources
- Repairing damaged roads
- Organizing community health days
- Distributing public garbage containers
- Organizing general cleaning sessions
- Organizing public fumigation to kill insect vectors
- Establishing rehabilitation centres for the disabled
- Announcing any outbreak of a disease in the community

#### **Examples of community groups that promote PHC**

- Self-help groups
- Religious groups
- Village health committees
- Cooperative groups
- Social welfare groups
- Youth groups

#### **HEALTHY LIFESTYLES THAT PROMOTE GOOD HEALTHY**



- Feeding on a balanced diet
- Doing regular body exercises
- Getting enough rest and sleep to refresh the brain
- Avoid drug abuse e.g alcoholism and smoking
- Reading books in enough light
- Maintaining good body posture
- Washing clothes to remove germs
- Ironing clothes to kill germs and parasites
- Abstaining from sex to prevent contracting STDs
- Trimming finger nails to remove hiding places for germs

### **Importance of getting enough rest and sleep**

- It refreshes the brain
- It breaks fatigue

### **Importance of good posture**

- It prevents deformation of bones
- It prevents back and chest pain
- It prevents dislocation
- It helps in proper working of body organs

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

- It reduces body weight
- It makes the joints flexible
- It prevents heart attack
- It makes the heart muscles grow stronger
- It breaks fatigue (body weakness)
- It makes food digestion easy
- It prevents sprains and strains
- It helps the heart to pump more blood to the muscles

### **UNHEALTHY LIFESTYLES AND BAD SOCIAL HABITS**

- Tobacco smoking
- Alcoholism
- Playing unprotected sex with an infected person
- Drug abuse

### **Good health practices in schools**

- Conducting health parades
- Having a school health committee

### **SCHOOL (HEALTH CLUB) COMMITTEE**

- This is a group of people in a school who work together to promote good health

### **Members of the school health committee**

- School nurse
- Sanitary prefects

- Science teachers
- Senior man and woman
- School cleaners
- Food mess

### **Activities/roles/duties of a school health committee**

- Organizing health parades
- Organizing class health meetings
- Organizing general cleaning activities
- Organizing health education seminars
- Reporting any disease outbreak
- Discouraging anti-social behaviour
- Designing health rules
- Identifying school children who are not immunised
- Inviting health workers to discuss health issues with school children

### **HEALTH PARADES**

- This is an assembly done at school to check on children's hygiene

### **People who conduct health parades in schools**

- Health prefect
- Sanitary prefects
- Science teachers
- Teachers on duty

### **Activities carried out at a health parades**

- Checking children with unbrushed teeth
- Checking children with long fingernails
- Checking children with dirty uniforms
- Checking children with uncombed hair
- Checking children with jiggers

### **Why are health parades done? (Importance/reasons for carrying out health parades)**

- To promote personal hygiene among school children
- To promote good health among school children
- They promote child to child programme

### **CHILD TO CHILD PROGRAMME**

- This is a health programme where older children help the young ones to promote good health

### **A symbol showing child to child programme (approach)**



### **Activities done in child to child programme**

- Older children teach young ones how to use a latrine
- Older children teach young ones how to brush their teeth
- Older children teach young ones to wash hands before meals
- Older children teach young ones to wash hands after visiting latrines
- Older children take young ones for immunization

### **Importance of child to child programme**

- It prevents the spread of some communicable diseases among children
- It promotes good healthy lifestyles among children
- It improves health among children

### **PEOPLE WITH SPECIAL NEEDS IN THE COMMUNITY**

- These are people whose some body parts do not work well
- They are also called **people with disabilities (PWDs)**
- **PWDs** may either be physically or mentally affected

### **Types of disabilities**

- Physical disability
- Sensory disability

### **Physical disability**

- This is when a person's limbs (arms or legs) are crippled

### **Sensory disability**

- This is when a person's senses do not work well

### **Groups of people with disabilities (PWDs)**

- Crippled/lame people
- Blind
- Deaf
- Dumb
- Mentally disturbed people

### **CARE FOR DISABLED/PEOPLE WITH DISABILITIES (PWDs)/PEOPLE WITH SPECIAL NEEDS**

#### **Crippled/lame people**

- Providing them with wheel chairs
- Providing them with crutches
- Providing them with a walking stick
- Providing them with artificial legs and arms
- Providing them with special shoes
- Helping them to wear clothes

#### **Some equipment for helping the disabled/people with disabilities (PWDs) in movement**

- Wheel chair
- Crutches
- Artificial leg

- Artificial arm

### **Why should the crippled people be provided with wheel chairs?**

- To help them in movement

### **Blind people**

- Providing them with a white cane/sonar stick

To enable them locate places

To enable them dodge obstacles

- Bathing them
- Washing their clothes and beddings

### **Deaf people**

- Providing special hearing devices
- Use of sign language while communicating with them
- Use of typed conversations while communicating with them

### **Mentally disturbed people**

- Taking them to rehabilitation centres
- Helping them to go to latrines
- Bathing them
- Washing their clothes

### **SOME ABBREVIATIONS USED IN PRIMARY HEALTH CARE**

- **P.H.C:** Primary Health Care
- **M.C.H.C:** Maternal and Child Health Care
- **CHWs:** Community Health Workers
- **SYFA:** Safeguard youth from AIDS
- **TBAs:** Traditional Birth Attendants
- **PWDs:** People with disabilities
- **SNP:** Special Needs People
- **CDD:** Control of Diarrhoeal Diseases
- **CCD:** Control of Communicable Diseases
- **P.M.T.C.T:** Prevention of mother to child transmission of HIV
- **E.M.T.C.T:** Elimination of mother to child transmission of HIV
- **HIV:** human immunodeficiency virus