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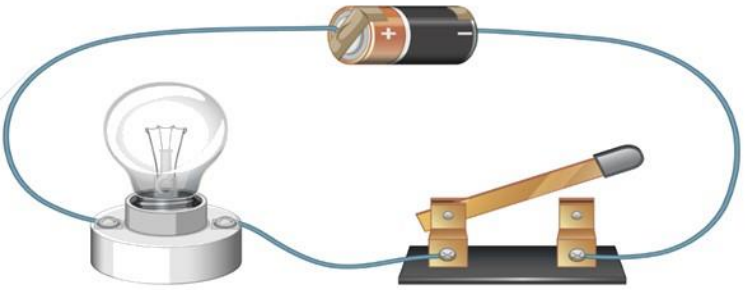


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THEME : HUMAN HEALTH

TOPIC 1: SANITATION

1) **Sanitation**: is the general cleanliness of an area.
2) Sanitation are the steps taken to promote public cleanliness involving community effort to disease prevention.
3) **Sanitation** is the general cleanliness of the environment.

Elements of sanitation

1. Provision of good housing
2. Proper disposal of human wastes
3. Supply and use of safe water
4. Vector control
5. Safe guarding of food
6. Prevention of pollution of air and water.

Ways of keeping the environment clean.

1. Draining away all stagnant water to deny mosquitoes breeding grounds.
2. Digging rubbish pits and provision of dustbins for proper disposal of rubbish.
3. Having a latrine or toilet for proper disposal of faeces and urine.
4. Spraying vectors with insecticides.

Reasons for practising good sanitation

1. Good sanitation prevents spread of diseases.
2. It prevents accidents like cuts from broken bottles.
3. It prevents water and air pollution.
4. Good sanitation prevents food contamination.

Latrines

A latrine is a place for urination and defecation.

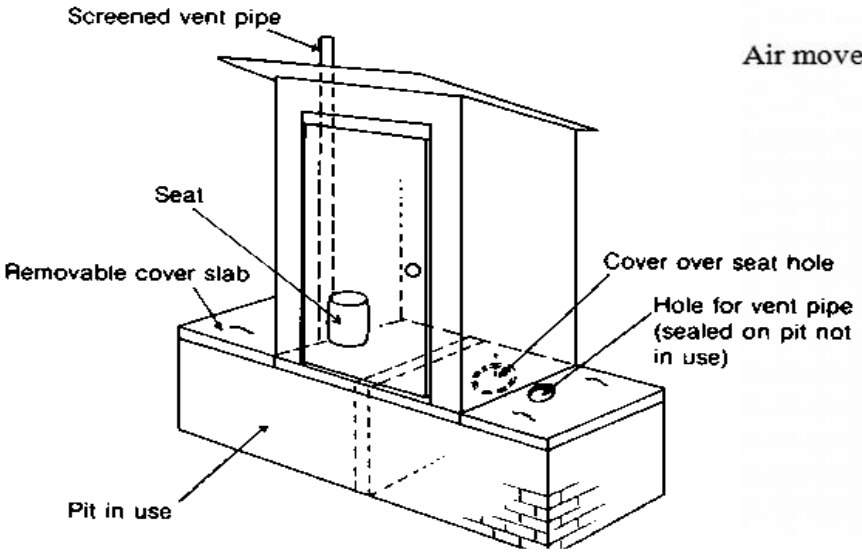
Types of latrines;

1. Ordinary pit latrines
2. VIP latrines
3. Toilets
4. Potties

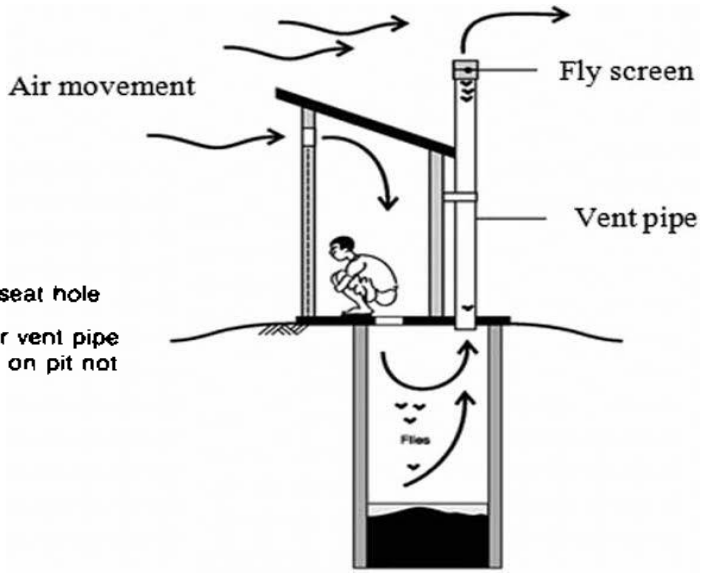
Characteristics of pit latrines;

1. They are deep to hold faeces of the users for so many years.
2. They have strong floors to stand on and smooth enough to sweep and clean.
3. They have enough hole to allow in faeces and urine but small enough to prevent children from falling in.
4. They have a lid to cover the hole completely and keep houseflies out of it.
5. They have walls and doors for privacy.
6. They have a roof which protects people from rain and sunshine.

Structures of VIP latrines.



External structure of a VIP latrine



Internal structure of a VIP latrine

Differences between a VIP latrine and an ordinary pit latrine;

1. A VIP latrine has a vent pipe where as an ordinary pit latrine doesn't have a vent pipe.
2. A VIP latrine doesn't have a lid where as an ordinary pit latrine has a lid.
3. A VIP latrine has a screen whereas an ordinary pit latrine doesn't have a screen.

Similarities between a VIP latrine and an ordinary pit latrine;

1. Both latrines can be smoked. Both latrines have a hole
2. Both latrines have a slab.

Advantages of VIP latrine over an ordinary pit latrine;

1. A VIP latrine does not smell badly.
2. A VIP latrine has a screen which traps houseflies.

Ways of keeping pit latrines clean.

1. Regular sweeping to push faeces and urine into the hole.
2. Slash tall grass around it to prevent dangerous insects and animals.
3. Regular smoking with dry plant materials.

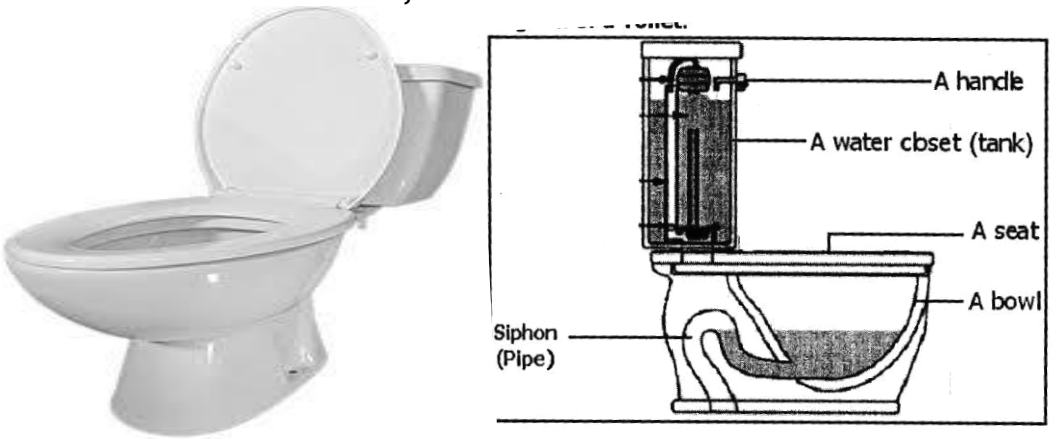
Site for latrines

- ✓ All latrines should be below or down hill near the water source. This prevents faeces from mixing with water to contaminate it.
- ✓ All latrines should be 30 metres away from water sources to allow water which comes into contact with faeces to filter out into the soil.
- ✓ All latrines should be at least 10 metres away from school, home, hotel to prevent bad odour from reaching people.

Toilets

- ✓ Toilets are commonly found inside modern houses in cities and towns.
- ✓ Toilets unlike latrines use water to flush waste matter into septic tanks or into the sewage pipes.

Structure of a water closet toilet;



Functions of the parts of a water closet toilet.

1) A seat

It is where a person sits to deposit human waste.

2) A bowel

It is a basin containing water where faeces and urine are deposited.

3) Lid

It covers the bowel to prevent vectors from coming into contact with faeces and urine.

4) Water closet/tank

It holds water for flushing.

5) Handle

It is pulled or pushed to flush faeces and urine away.

6) Sewage pipes

They carry faeces and urine to the septic tank or sewage system.

Ways of maintaining toilets clean;

1. Flush the toilet away after use.
2. Wash hands with clean water and soap after use.
3. Avoid using any other hard material like clothes, sticks, stones because they block the pipe to the septic tank.
4. Do not put any other thing in the toilet apart faeces, urine and toilet tissue.

Potties;

Potties are small containers used by young children for depositing faeces and urine





A picture of a potty

Uses of potties;

It collects faeces and urine of young children.

Ecosan toilets

Ecosan means ecosystem sanitation conveniences.

Problems faced by urban toilets;

- ✓ Blockage due to use of hard things.
- ✓ Lack of water for flushing
- ✓ In case of leakage of sewage from pipes, contamination of water occurs this may lead to easy spread of water borne diseases.

Importance of using toilets and latrines;

1. They prevent houseflies from spreading germs
2. They prevent contamination of water sources if properly used.
3. They promote sanitation
4. They control air pollution.

Diseases spread due to poor sanitation;

1. Cholera
2. Typhoid
3. Dysentery
4. Diarrhoea
5. Hepatitis
6. Malaria
7. Elephantiasis
8. Yellow fever
9. Dengue fever
10. Sleeping sickness.
11. Worm infections

THEME : HUMAN HEALTH
TOPIC 2: ACCIDENTS AND FIRST AID

An accident is a sudden happening that causes harm to the body.

Examples of accidents

- ✓ Fainting
- ✓ Animal bites
- ✓ Nose bleeding
- ✓ Bruises
- ✓ Choking
- ✓ Food poisoning
- ✓ Burns
- ✓ Scalds
- ✓ Cuts

Foreign bodies in natural opening

What is first aid?

First aid is the immediate help given to a casualty before he/she is taken to the nearest health centre.

Who is a casualty?

A casualty is a person who has been involved in an accident and needs assistance of first aid.

Reasons for giving first aid

1. First aid saves life
2. First aid promotes quick recovery
3. First aid stops bleeding
4. It reduces pain
5. It prevents further injuries

What is a first aid kit?

A first aid kit is a set of equipment used when giving first aid for a certain type of an accident

Items found in a first aid kit

- ✓ Cotton wool
- ✓ Plaster
- ✓ Razor blade
- ✓ Bandage
- ✓ Pain killers
- ✓ A pair of scissors

Who is a first aider?

A first aider is any person who gives first help to a casualty.

Or a first aider is any person who gives assistance to a casualty.

Qualities of a good first aider

1. He/she should be quick in giving first aid.
2. He/she should be knowledgeable enough
3. He/she should have skills
4. He/she should be clean
5. He should be time saving

BURNS:

A burn is an injury on the skin caused by dry heat. Or
A burn is an injury caused by a hot object

Causes of burns include

1. Through body contact with hot plates, cookers, hot burning charcoal.
2. Through body contact with un-insulated electric wires carrying current
3. Through body contact with chemicals like acids
4. Through body contacts with fire

Degree of burns

Degree of burns is a term used to describe how severe the burn is.

Degrees of burns include

1. First degree burn
2. Second degree burn
3. Third degree burn

First degree burn.

A first-degree burn is a minor burn in which there are no blisters formed.
What is a blister?
A blister is a raised skin with some liquid underneath.

Second degree burn.

A second-degree burn is a severe burn in which blisters are formed on the skin at the site of the injury.



First aid for second degree burn

If the blister is not broken, leave it to prevent infection of the wound.
If the blister is broken, wash the area with soap and clean water and then cover the skin with cloth to prevent flies bringing germs

Third degree burn

This is the most severe burn in which the skin is burnt deeply and appears shinny white.

First aid for a third-degree burn

- ✓ First put the burnt area in cold water then cover with a clean cloth.
- ✓ Encourage the burnt casualty to drink a lot of fluids like ORS because victims of second- and third-degree buns lose a lot of water from their bodies through the burnt skin by evaporation.

SCALDS

A scald is an injury caused by wet heat.

Or a scald is an injury caused by hot liquids.

Causes of scalds

- ✓ Through body contact with hot water
- ✓ Through body contact with hot water, hot tea, hot milk, hot soup, hot porridge

First aid of scalds

Put the injured part in cold water for at least 10 – 15 minutes

Reasons for putting injured part in cold water

- ✓ To cool the temperature of injured part
- ✓ To prevent further damage of the underlying body cells

NOTE: If the injured part cannot be put in cold water, pour cold water on the injured part

Prevention of scalds and burns

1. Keep hot objects far from children's reach.
2. Cook food in raised fire places
3. Prevent children from playing near fire places
4. Avoid children from playing with hot liquids and metals
5. Keep away inflammable liquids such as petrol from the living house.
6. Construct fire guards around places where cooking is done
7. People should use insulators when lifting hot objects from the fire
8. People should avoid using appliances with un – insulated electric wires.

Fever and convulsions

Fever: Is a condition of the body when the temperature goes beyond the normal.

Note: Fever is not a disease but a symptom of many diseases.

Convulsions: Are sudden violent body movements which cannot be controlled

Convulsion: Is when the body shakes or jerks involuntarily.

Causes of fever and convulsions

- ✓ Diseases/illness like malaria, measles, meningitis, typhoid etc

- ✓ Epilepsy (Fits)
- ✓ Exposure of the body to high temperature
- ✓ Poisoning

Note: High fever causes convulsions

First aid for fever

- ✓ Remove most of the persons clothes
- ✓ Perform tepid sponging
- ✓ Encourage the person to drink more cold fluids than normal

First aid for convulsions

- ✓ Make the person get enough air supply
- ✓ Remove all the tight clothes and loosen others
- ✓ Clear the space where the victim is convulsing from
- ✓ Put an object between the teeth to prevent the victim from biting the tongue.

Near drowning and drowning.

Near drowning: Is a condition when a person stops breathing due to having a lot of water in lungs but not yet dead.

Drowning: Means dying as a result of the lungs being filled with water.

Causes of near drowning and drowning

1. Swimming pools
2. Bathe tubs
3. Ponds
4. Basins full of water
5. Ditches
6. Lakes and rivers
7. Seas and oceans

Prevention of near drowning

1. People should not swim in deep waters without life savers
2. People sailing on water should wear life jackets
3. People should acquire swimming skills.
4. Swimming pools should be fenced
5. Septic tanks and other sewerage systems should be covered
6. Children should not go near big water sources without grown up people
7. Bath tabs should not be left with water
8. Containers filled with water should be kept out of reach of children.

First aid for near drowning

1. Yell for help
2. Remove the person from water as soon as possible

3. If the person is not breathing lie the casualty on his back with the head tilted
4. Perform mouth to mouth breathing (kiss of life)

Fainting.

Fainting is the brief loss of consciousness.

Causes of fainting

1. Shortage of enough oxygenated blood flowing to the brain
2. Prolonged hunger
3. Standing in sunshine for a long period of time
4. Extreme sorrow or anger
5. Extreme pain
6. Shocking news
7. Too much excitement
8. Vigorous/strenuous exercises
9. Illness

First aid for fainting

1. Remove tight clothes around the neck, chest and waist
2. Put the casualty in an open space with fresh air
3. Make the casualty lie on the back facing up while raising the legs to encourage enough flow of blood containing oxygen to the brain
4. Fanning the casualty if the day is hot

Foreign bodies

A foreign body is any external matter that enters the body either through a natural opening or wound.

Examples of natural openings

- ✓ Mouth
- ✓ Ears
- ✓ Rectum
- ✓ Eye
- ✓ Nose
- ✓ Vagina

Examples of foreign bodies

- ✓ Seeds
- ✓ Broken glasses
- ✓ Small bones
- ✓ Grains
- ✓ Coffee berries
- ✓ Tear gas
- ✓ Small stones
- ✓ Insects
- ✓ Nib of a pen
- ✓ Dirt/dust
- ✓ Thorns

First aid of foreign bodies in the eyes

- ✓ Wash the eyes with plenty of clean water
- ✓ Use a clean corner of a soft piece of cloth to wipe the foreign body out of the eye.

Note: Never use sharp objects because they can damage the eye and cause more pain.

If the foreign body remains in the eye, take the casualty to hospital.

First aid for foreign body in the ear

If it is an insect, tell the victim to sit and bend the head to one side and pour clean water.

Note: If it is not an insect, do not attempt to remove it because you can push if further and injure the ear drum.

First aid of foreign body in the nose

✓ Blow the nose if it is an insect, dirt, dust or small stones.

First aid of foreign body in the throat

✓ Observe good eating habits

Prevention of accidents caused by foreign bodies

1. Keep away objects like seeds buttons, beads, coins, bottle tops etc from children
2. Food must always be chewed properly before swallowing
3. Observe good eating habits
4. Advising children not to put objects in their ears, eyes and nose

Poisoning

Poisoning: Is the act of taking any harmful substance which can affect our health.

Poison is any substance either solid, gas or liquid which when taken into the body may damage our health or cause death.

Common poisonous substances.

1. Rat poison
2. Insecticides
3. Agro chemicals
4. Paraffin
5. Petrol

Signs of a poisoned person

1. Vomiting
2. Rapid breathing
3. Diarrhoea
4. Loss of body balance
5. The person feels thirsty
6. Fever and sweating
7. Bleeding
8. Mental confusion

First aid for poisoning

Give the casualty plenty of fluids like water, juice, milk to dilute the poison

Note: A person who has taken paraffin/jik should not be made to vomit because it causes more damage to the lungs, throat and stomach.

Fractures

A fracture is a broken or cracked bone in the body.

Types of fractures.

- ✓ **Simple fracture**: is a type of fracture where the broken or cracked bone remains inside the flesh
- ✓ **Compound fracture**: is a type of fracture where the broken or cracked bone comes out of the body.
- ✓ **Green stick fracture**: is a type of fracture which occurs in young children where the bone tears like a twig.

Causes of fracture

1. Accidents
2. Rough play/games
3. Vigorous exercises

First aid of fractures

Tie splints around the injured part.

Note: Splints are used to keep the broken bones in their normal position

Splints also control further injuries.

Note the following:

When considering first aid for a fracture, you should consider the 3Bs.

B Breathing
B Bleeding
B Broken bone

Prevention of burns and scalds:

1. Keep hot objects far from children's reach.
2. Cook food in raised places.
3. Prevent children from playing near fire places.
4. Avoid children from playing with hot liquids and metals.
5. Keep away inflammable liquids such as petrol from the living house.
6. Construct fire guards around places where cooking is done.
7. People should use insulators when lifting hot objects from the fire.
8. People should avoid using appliances with insulated electric wires.

THEME: SCIENCE IN HUMAN ACTIVITIES AND OCCUPATION

TOPIC 3: SCIENCE AT HOME AND IN OUR COMMUNITY

Water is a chemical substance made up of hydrogen and oxygen

Components of water

1. Hydrogen
2. Water

Sources of water

- ✓ Rain
- ✓ Lakes
- ✓ Rivers
- ✓ Seas
- ✓ Oceans
- ✓ Springs
- ✓ Ponds
- ✓ Swamps
- ✓ Artesian wells
- ✓ Valley dams

Pure water

Pure water is water which contains no impurities

Properties or characteristics of pure water

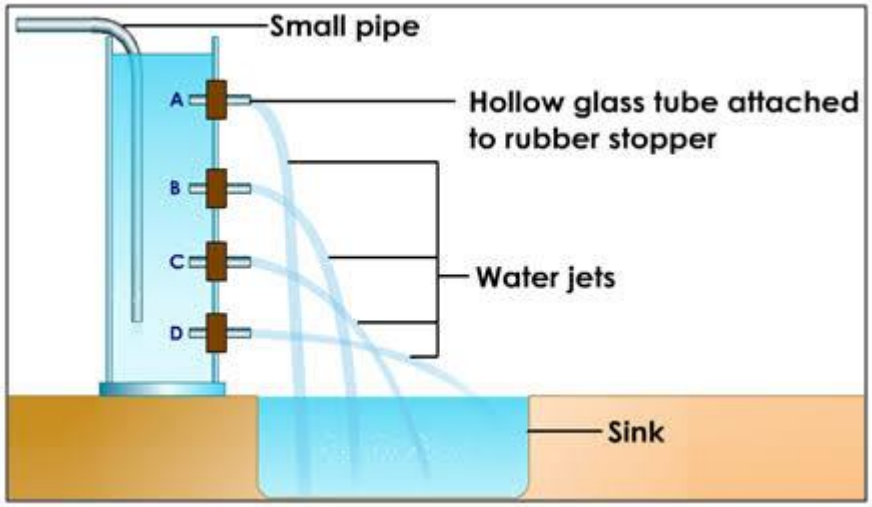
1. It is colourless
2. It is tasteless
3. It is odourless (has no smell)
4. It is free from bacteria and other living creatures like algae
5. It is free from dissolved salts and gases

Properties of water

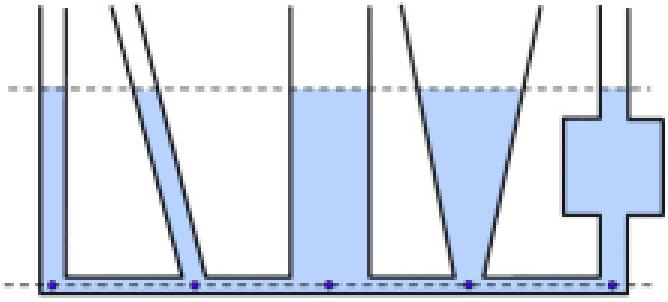
1. Water exerts pressure
2. Water finds its own level
3. Water is a good solvent
4. Water can dissolve gases

Diagrams showing the properties of water

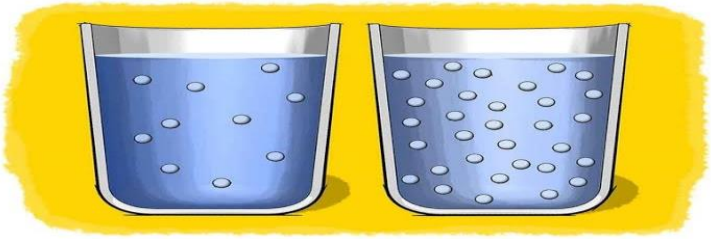
1. Water exerts pressure



2. Water finds its own level



3. Water can dissolve gases



Uses of water in the body

1. Water makes up part of blood as plasma
2. Water helps to dissolve digested food for easy digestion
3. Water maintains the shape of the body cells
4. Water takes part in changes that must occur in the body such as cooling as sweat.
5. Water is a medium where chemical changes takes place in the body.

Domestic uses of water

1. Water is used for cooking food
2. It is used for washing clothes
3. Water is used for bathing our bodies
4. Water is used for washing utensils
5. Water is provided to animals to drink

Industrial uses of water

1. Water is used for generating electricity
2. Water is used for recreation like swimming and boating
3. Water is used for cooling machines in industries
4. Water is used to clean machines in industries

Preparation of clean water

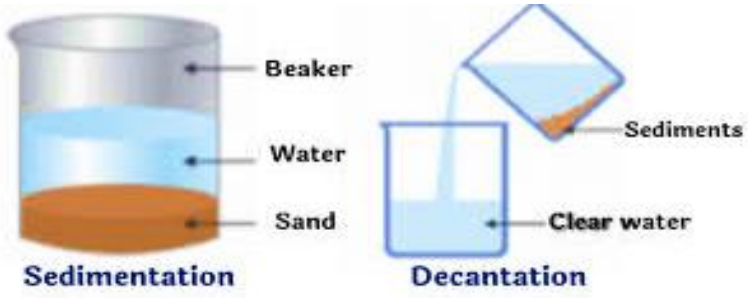
Methods of obtaining clean water from dirty water include:

1. Decantation/Decanting method
2. Filtration/Filtering method
3. Distillation (clean water is water that does not contain germs)

Decantation

This is the method of removing solid particles from water

Experiment to show decantation

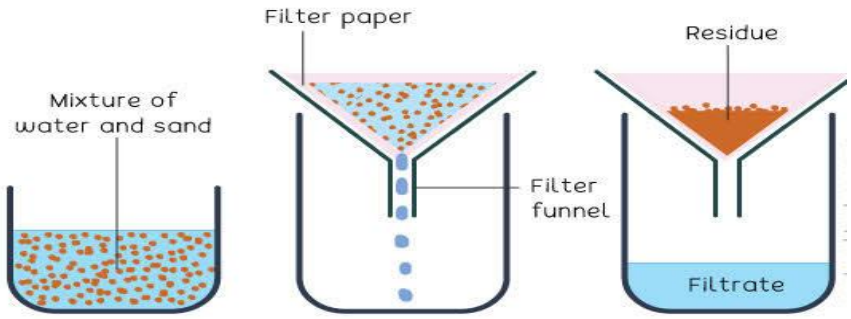


Filtration

This is the process of separating solid particles from water

The solid particles that remain on the filter are called the filtrate

Experiment to show filtration



Distillation

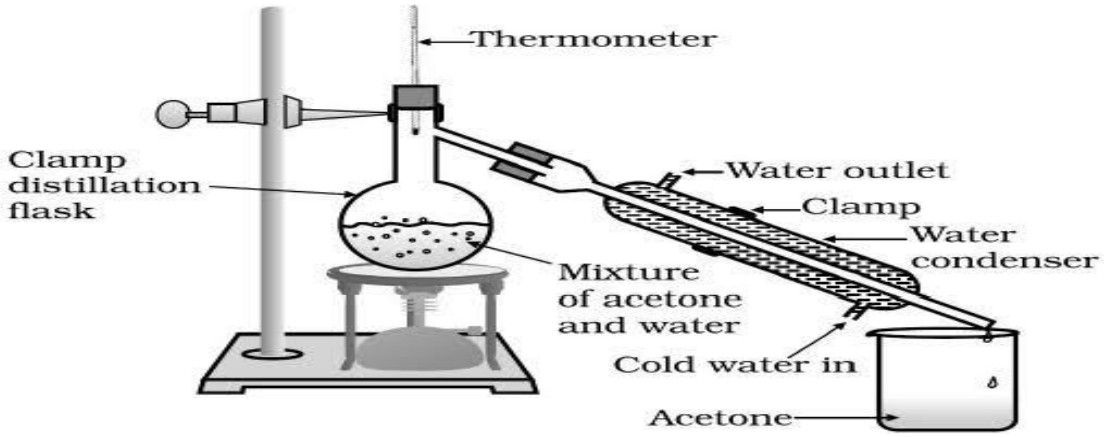
This is the process which involves evaporation of the liquids and then condensing the vapour to liquid form.

The water obtained through distillation is called distilled water

Note: Distilled water is used by doctors to mix drugs for injection.

Distilled water is not food for drinking because it does not contain mineral salts.

Experiment to show distillation method



Preparation of safe water

Safe water is water which is free from germs

Methods of preparing safe water

- ✓ Boiling water
- ✓ Distillation
- ✓ Treating water using chemicals like chlorine, water guard, Florine, calcium chloride, potassium permanganate

Water pollution or water impurities

Water pollution is the process of making water contaminated.

Water impurities are substances added to water and change the nature of quality of water

Examples of water impurities

1. Bacteria
2. Viruses
3. Microscopic plants and animals like amoeba and spirogyra
4. Dead plant matter
5. Fine particles of mud
6. Sand

Ways of polluting water

1. Urinating in water sources
2. Defecating in water sources
3. Dumping industrial wastes in water sources
4. Dumping heavy metals in water sources
5. Silting
6. Leakages of petroleum products into water sources

Silting

This is the deposition of soil and other materials into the water bodies by erosion.

Examples of silts

1. Soil
2. Grass
3. Metal scraps
4. Plastics
5. Polythene paper

Effects of silting to water bodies

1. Silts reduces the depth of water bodies
2. Silts leads to dryness of rivers, swamps and lakes
3. Silting leads to flooding of surrounding areas
4. Silts kill aquatic animals
5. Silts cover the breeding ground for fish

Dangers of water

- ✓ Water carries harmful germs that cause diseases like cholera and typhoid
- ✓ Poisonous substances from factories, human wastes, detergents are often dumped into rivers and lakes by water.
- ✓ Flowing water causes soil erosion
- ✓ Heavy floods destroy man's crops and cause a lot of damage to property.

Hard and soft water

- ✓ **Hard water** is water that contains certain mineral salts dissolved in it. Hard water does not form scum with soap easily
- ✓ **Soft water** is water that forms scum easily with soap

Ways of removing hardness from water

- ✓ Adding chemicals to hard water e.g chlorine and water guard
- ✓ Boiling water

Cleaning clothes in a home

1. **Sorting** is the practice of identifying dirty clothes which have been used.
2. **Soaking** is the act of sinking clothes in water and soap for easy removal of dirt and other spots on a cloth
3. **Washing** is the act of squeezing of the cloth together with soap
4. **Rinsing i**s the act of dipping soapy clothes in clean water to remove soap solution

Types of washing clothes

1. Hand washing
2. Machine washing

Activities after washing clothes

1. Drying clothes
2. Ironing clothes
3. Packing clothes

Reasons for ironing clothes

1. To kill parasites like lice, itch mites etc
2. To kill germs
3. To look smart

Items used to clean clothes

1. Clean water
2. Detergents
3. Soap
4. Basin

THEME: THE HUMAN BODY

TOPIC 4: MUSCULAR AND SKELETAL SYSTEMS

Definition of the skeleton.

- ✓ A skeleton is the supportive structure of the body of an organism.
- ✓ A skeleton is a structure that supports the body

Types of skeletons

They include;

a) Hydrostatic skeleton
b) Exo skeleton
c) Endo skeleton

1. **Hydrostatic skeleton.**

This is a type of skeleton where the body of an organism is filled with a liquid under pressure.

Organisms with hydrostatic skeleton

a) Earthworm
b) Slugs
c) Snail
d) Caterpillars
e) Star Fish,
f) Jelly Fish
g) Intestinal Worms

2. Exo skeleton.

This is a type of skeleton found outside the body of a creature.

Exo skeleton is common with all arthropod/ insects like house flies, grass hoppers, mosquitoes, spider , crab, crustaceans, myriapods, arachnids, terrapins, tortoise.

Exo skeleton provides support and protection to soft parts of a centipede arthropod etc.

Animals with exo skeleton periodically shed their outer most layer and form the new cuticle on the exposed surface. This is called **ecdysis (moulting**)

3. Endo skeleton.

This is the type of skeleton where the hard tissues are found inside the body of an organism.

All vertebrates have endo skeleton.

Examples of animals with endo-skeleton

Man, Goat, Cat, Sheep, Lion, Hen

They have bony skeleton in their bodies.

These animals can grow by a continuous increase in the size and not by a series of ecdysis.

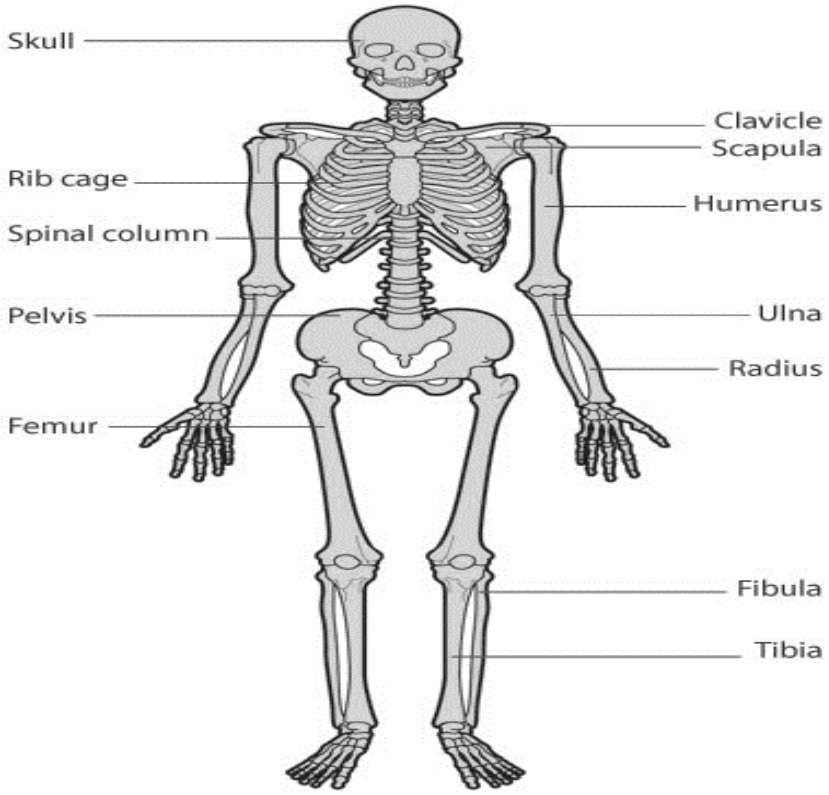
The structure of the human skeleton

The human skeleton is made up of 206 bones in total.

The human skeleton is subdivided into two main regions namely

1. Axial skeleton
2. Appendicular skeleton.

The structure of human skeleton



Axial skeleton

This region consists of the vertebral column/spine and skull. It forms the foundation of the skeleton and on this the ribs are attached.

i) The back – bone

This forms the central axis of the body and has 33 bones called vertebrae.

The back bone is divided into 5 regions.

1. **Cervical region**
   This is found in the neck and has seven bones.
2. **Thoracic region**
   This is found behind the chest and the ribs are attached on it.
   The ribs together form the rib cage.
   The thorax region has 12 vertebrae
3. **Lumber region**

This is found in the abdomen and has 5 vertebrae.

4. **Sacral region** - the sacrum is found in the pelvic and has 5 vertebrae fused together.
5. **Coccyx region** – this is found in the tail and has 4 vertebrae fused together.

The rib cage – this is made up of 24 ribs (12 pairs) all of which are attached to the back – bone (spine)

The upper 14 ribs (7 pairs) are attached directly to the sternum (breast bone) by means of cartilages.

ii) The skull

This is made up of 22 bones.

It consists of the cranium and face – bones.

The cranium is formed by many bones fused together by interlocking serrated edges.

These edges become fused in adulthood.

2. Appendicular skeleton

This consists of the girdles and the four limbs.

Pectoral (shoulder) girdles.

- ✓ These are made up of 4 bones, two on either side.
- ✓ These bones are the scapula (shoulder bones) and clavicle (idler bones)
- ✓ Pelvic (hip girdle) This is made up of 3 bones.

The limbs.

These include two upper limbs and two lower limbs

a **The upper limbs (arms)**

- These have tree (3) long bones each.
- The three bones are humerus, radius and ulna.
- In each arm there are short bones such as carpals (8), metacarpals / bones of the palm (5) and phalanges / finger bones (14)

b **The lower limbs (legs)**

- These also have 3 long bones each.
- The three bones are femur, tibia and fibula
- In each limb there are patella / knee bone(1), tarsal / ankle bones (8), metatarsals / foot bones, (5) and phalanges / toe bones (14)

Functions of the skeleton

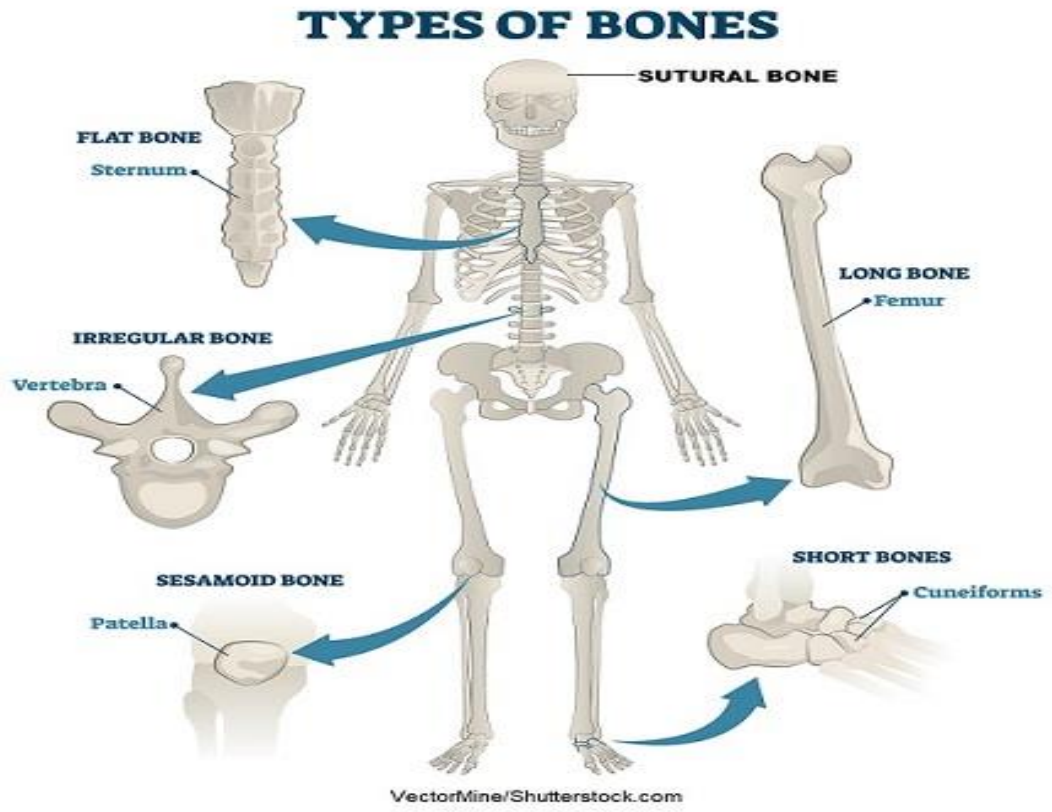
1. It gives support to the soft parts of the body.
2. It helps in movement which is caused by the muscles attached to it.
3. It provides surface for attachment of muscles.
4. It protects the delicate organs.
   - ✓ The skull protects the brain
   - ✓ The eye sockets protects the eyes
   - ✓ The rib cage protects the heart and lungs.
   - ✓ The pelvis (pelvic girdle) protects the reproductive organs.

- ✓ The back bone protects the spinal cord.

5. It contributes to the formation of blood cells e.g in porous ends of the long bones the red blood cells and some white blood cells are made.

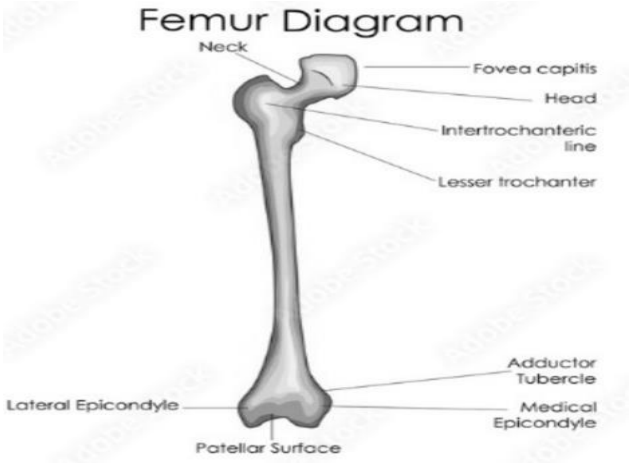
BONES

These are hard connective tissues found in the body of an organism.



1 **Long bones**

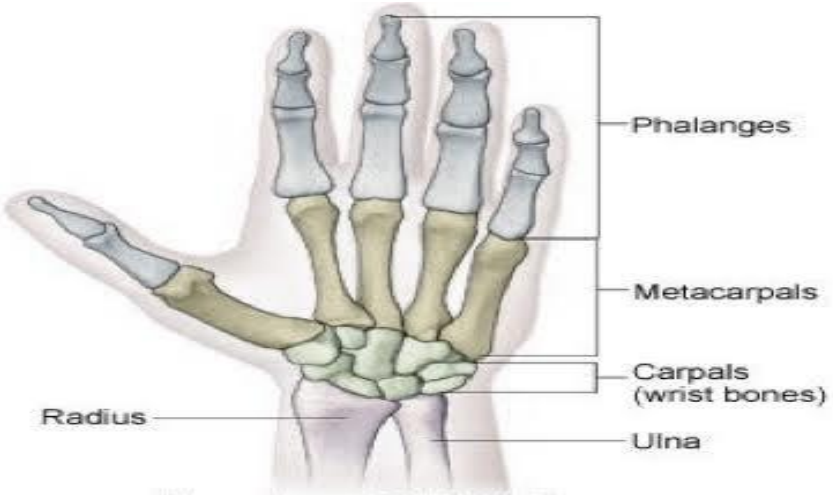
These bones are found in the arms and legs e.g femur, radius, fibula, ulna and tibia. The femur is the longest and strongest bone in the body. □



2 **Short bones**

These are found in the last edges of the limbs.

These include the carpals, metacarpals, phalanges, tarsals, metatarsals

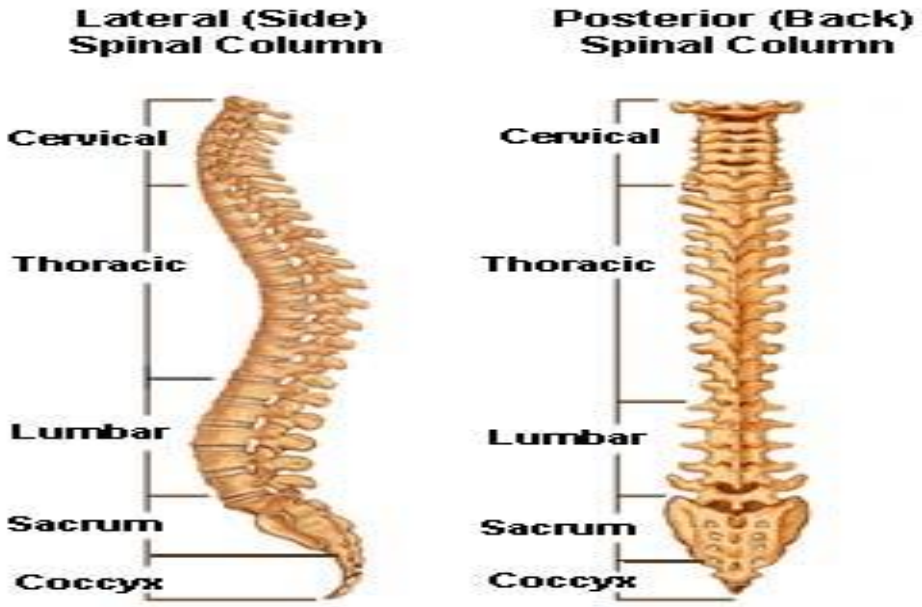


3 **Flat bones**

These include the bones of the skull, scapula, patella (knee cap). ***structure of the skull***

4 **Irregular bones**

These include the vertebrae of the spinal column.

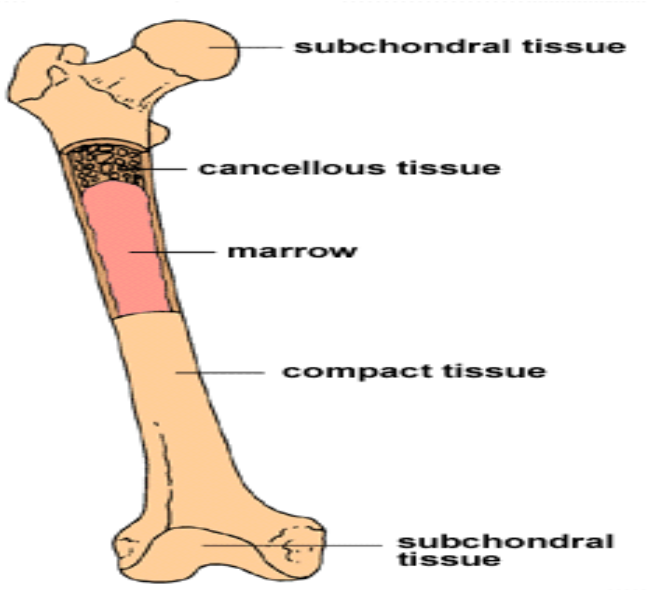


Functions of the bones.

1. They manufacture blood cells i.e
   - ✓ White blood cells are manufactured in the yellow bone marrows of long bones.
   - ✓ red blood cells are manufactured in the red bone marrows of short bones

2. It provides the surface area for attachment of muscles

The structure of a bone



Cartilage

These cover the ends of the bone that moves.

They act as cushions to absorb friction when bones rub each other.

Yellow bone marrow

This is where white blood cells are manufactures from. It also contains fat cells.

Spongy bone.

This is the porous part of the bone which is filled red bone marrow.

Hard bone

This part protects the bone marrow from escaping. It contains calcium.

Bones and their other bones.

1. Skull – cranium
2. Scapula – shoulder bone
3. Sternum – breast bone
4. Clavide – collar bone
5. Jaw bone – mandible
6. Back bone – spine / vertebral column
7. Pelvis – hip bone
8. Tail bone – coccyx
9. Patella – knee cap
10. Femur – thigh bone
11. Tibia – shin bone
12. Palm bones – metatarsals
13. Ankle bone – tarsals

JOINTS

Definition of a joint:

- A joint is where two or more bones meet in the body.
- ✓ At the joint the bones are joined to each other by ligaments.
- ✓ The ligaments also help to prevent dislocation of the bones.
- ✓ At the end of some bones, there are cartilages which act as slippery and smooth surface. Within the joint there is synovial fluid which helps to reduce friction

Types of joints

These include:

- Movable joints
- Immovable joints

1. Movable joints

- These are joints which allow movement.
- Movable joints are held together by ligaments and tendons.

Examples of movable joints

- Hinge joint.
- Ball and socket joint.
- Pivot joints.
- Gliding / plane joints.

Hinge joint

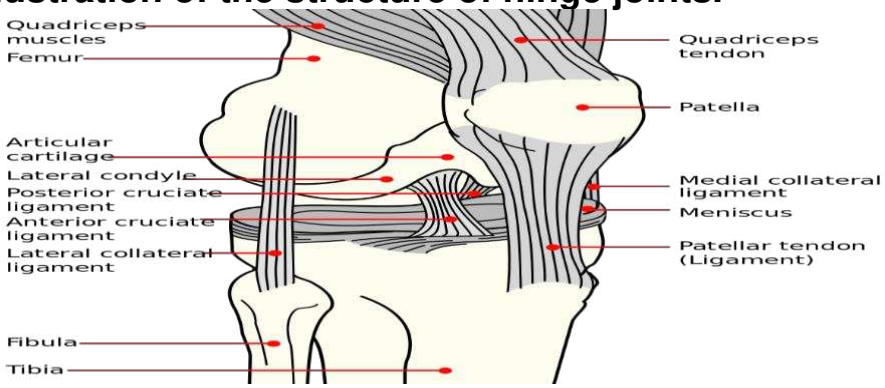
- This is a type of movable joint which allows movement in one plane.

Examples of hinge joint

1. The elbow joint.
2. The knee joint.

NB: They are called hinge joints because their movement is like that of a door on its hinges.

Illustration of the structure of hinge joints.



Ball and socket joints

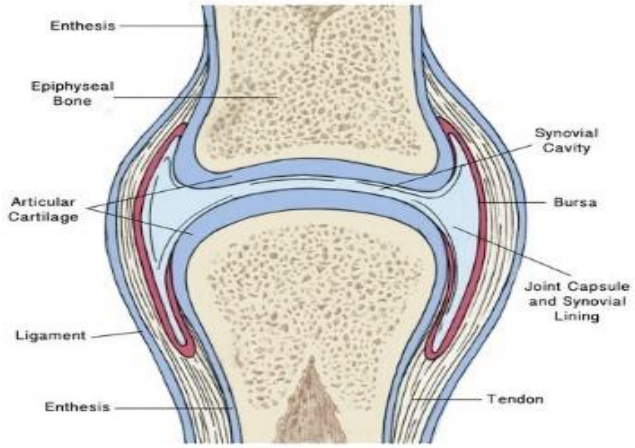
This is a type of movable joints which allow movement in three planes all round movements. i.e. forward, backward, side ways and in circular form.

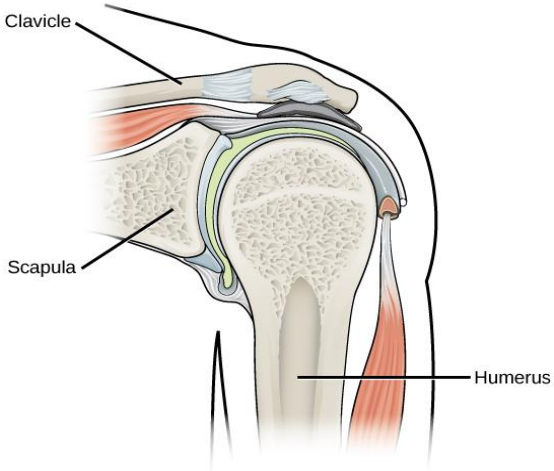
Examples:

- The shoulder joint.
- The pelvic girdle (hip joint)

They are called ball and socket because the ball shaped end of one bone fits into a socket in the other bone.

Illustration of the structure of ball and socket joint.



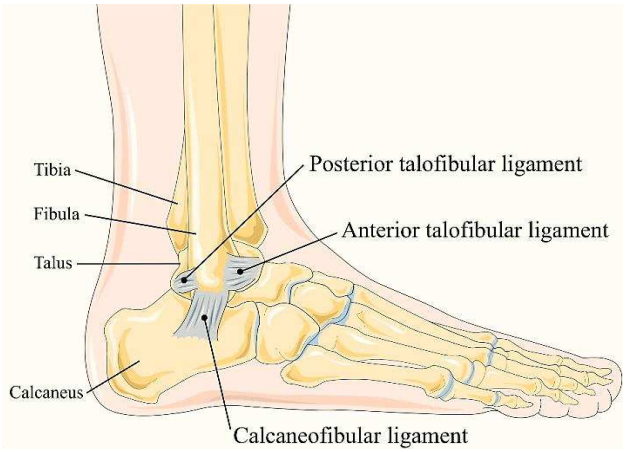


Pivot joints

- This is a type of joint which allows rotation of certain parts of the body on other parts.
- An example of pivot joints is the neck vertebra.
- Pivot joints helps us to nod our heads.

Gliding joints / plane joint

- This is a type of joint where two moving bones are flat and slide over one another easily.
- Gliding joints are found in the wrist and ankles.



Importance of joints.

1. Joints allow movements in the body.
2. They enable us to stretch and bend the body.

Features of a typical movable joint

1. The cartilage and synovial fluid – reduce friction in the joint.
2. Ligaments – structures which join bones together at a joint.
3. Tendons – structures which join muscle to bone.
4. Synovial membrane / synovium – is a capsule of fibrous material whose inner membrane secretes synovial fluid.

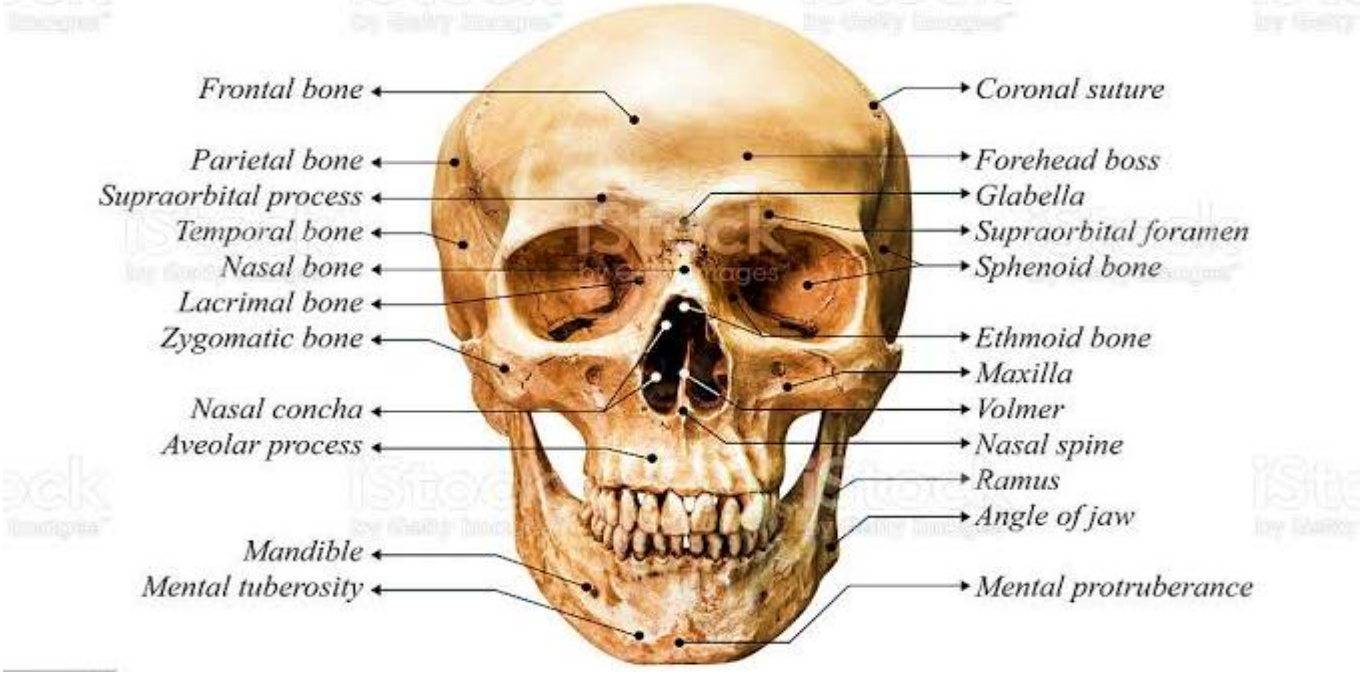
2. **Immovable joints**

- This is a type of joint that does not allow any movement because they are tightly fixed together.

Examples:

The suture joints found in the skull.

An illustration to show the structure of the suture joints of the skull



MUSCLES

These are elastic substances found in the body of animals or muscles are the soft flesh attached to the bones.

- Muscles are connected to the bones by tough fibrous tissues called tendons.
- Muscles only relax and contract.

There are three types of muscles namely;

1. Voluntary or skeletal muscles
2. Involuntary or smooth muscles.
3. Cardiac muscles.

(A) Voluntary or skeletal muscles

These are muscles whose movement can be controlled.

1. They are always attached to the skeleton.

2. These are muscles that contract and relax at one's will.
3. These are muscles attached or joined to the bones i.e skeletal muscles.
4. These muscles form the bulk of the body.
5. They contract and relax at will.

Examples of voluntary muscles:

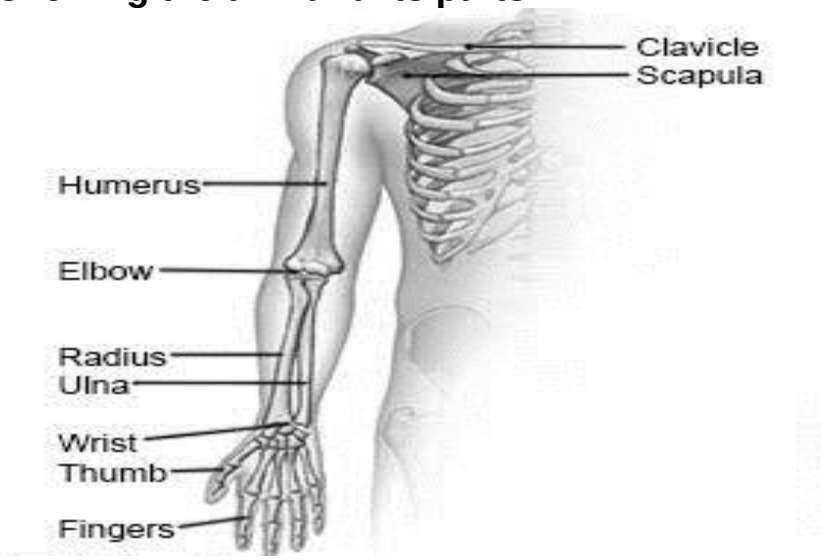
1. Biceps muscles
2. Triceps muscles
3. Calf muscles
4. Fermalis muscles
5. Masseler muscles

Characteristics of voluntary muscles.

1. They are attached to bones.
2. They relax and contract at one's will

When bending the arm, the biceps contract while the triceps relax.
When the arm straighten the biceps relax and the triceps contract

Diagram showing the arm and its parts.



(B) INVOLUNTARY OR SMOOTH MUSCLES

- ✓ These are muscles whose movement is automatic.
- ✓ We have little or no control over them.
- ✓ These muscles are not connected to the bones.
- ✓ They do not contract and relax at will.

Characteristics of involuntary muscles

1. They are not attached to the bones.
2. They have automatic movement
3. They are located on body organs

4. Intercostal muscles
5. These muscles move automatically

Examples of the involuntary muscles:

1. Muscles of the walls of the alimentary canal.
2. Muscles of the reproductive system.
3. Muscles of the blood vessels.
4. Muscles of the excretory system.

(C) CARDIAC MUSCLES

These muscles combine both structures of the voluntary and involuntary muscles.
They contract and relax alternatively without any nervous stimulation
They move automatically and rhythmically.

Examples of cardiac muscles.

Muscles of the heart;
These have the capacity to contract and relax throughout life without getting tired.

They only stop when the person is dead.

Function of muscles.

1. They help in joining bones in our body.
2. They help in movement (Locomotion)
3. They help animals to perform work.
4. They aid in movement of food through the alimentary canal
5. Some muscles help in controlling blood pressure
6. They are used in storage of oxygen
7. Muscles maintain proper body postures

NOTE:

- Antagonistic muscles are muscles which work in pairs.
- When one relaxes the other contracts.
- Examples are the Biceps and Triceps muscles of the arm.

Importance / functions of the skeletal and muscular system

1. They give the body shape.
2. They help in body movement
3. They protect the inner delicate organs of the body.
4. They help in manufacturing of blood cells.
5. They provide room for muscular attachment

POSTURE:

Posture is the way a person positions his or her body when performing an activity. There is correct posture for sitting, standing, walking, running and sleeping.

Types of posture

✓ Good posture
✓ Bad posture

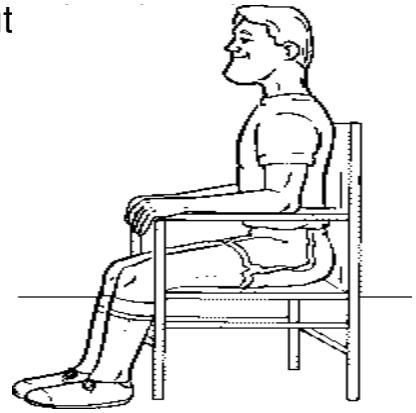
<u>Good posture</u>:

This is the proper way of positioning the body when performing an activity.

How to promote good posture.

1. Always sit properly without bending.
2. By tightening the ankles and knees during movement.
3. By placing all the feet on the ground during movement
4. By putting all body weight on both but





Good sitting posture

Importance of having good body posture

1. It makes the muscles and bones strong.
2. It allows proper growth and development of body organs.
3. It prevents skeletal and muscular disorders and deformities
4. Allows proper digestion of food
5. It makes one look smart
6. It prevents chest and back pain

Bad posture

This is the improper positioning of our bodies when performing an activity.

Activities that can lead to bad posture

1. Standing while bending forward.
2. Sleeping while bending some body parts
3. Sitting while bending forward
4. Waling and running while bending forward

Dangers/Effects of bad posture

1. It leads to deformation of bones and muscles
2. It causes chest and back pain
3. It causes indigestion

4. It leads to poor blood circulation in the body
5. It causes skeletal disorders

Importance of body exercise

1. It promotes physical fitness
2. It allows proper circulation of blood in the body
3. It makes the joints more flexible
4. It reduces the level of fats in the body
5. They strengthen bones and muscles
6. They break fatigue
7. They increase energy production in muscles
8. They promote the proper functioning of the body organs and system
9. It reduces the risks of getting heart diseases
10. It eases food digestion

Diseases and disorders associated with the skeletal and muscular system.

1. Polio
2. Rickets
3. Osteomalacia
4. Tuberculosis of the spine
5. Leprosy
6. Osteoporosis
7. Tetanus
8. Cancer of the bones
9. Arthritis

(i) **POLIO.**

- It is caused by a virus passed out by an infected person in faeces.
- The virus can get into our bodies through drinking contaminated water.
- The virus can also get into our bodies by eating contaminated food.
- The disease affects bones especially the limbs.
- That is why it is called the disease of the limbs or bones.

Signs and symptoms.

1. Deformed bones of the limbs
2. High fever
3. Paralysis of the limbs
4. General body weakness
5. Lameness

Prevention and control of polio

1. Immunisation with polio vaccine by giving drops in the mouth.
2. Use latrines wherever possible.
3. Wash hands with soap and water before eating food.

4. Drink boiled water.

(ii) TUBERCULOSIS OF BONES

- ✓ Tuberculosis is caused by a bacterium called a mycobacterium.
- ✓ The bacterium was first discovered by Robert Koch in 1882.
- ✓ The bacteria is spread through air and through milk from infected cows.
- ✓ There are several types of mycobacterium.
- ✓ There is one which causes Tuberculosis of the lungs and the other which cause Tuberculosis of the spine or backbone.

Symptoms of tuberculosis of bones.

1. Long lasting painful backache.
2. A lump grows on the spine.
3. Pain in the backbone while walking.
4. Paralysis of the legs and failure to walk.

Prevention and control of tuberculosis.

1. Immunisation with BCG vaccine on the right upper arm at birth.
2. Isolate the infected person.
3. Treatment of the infected person.
4. Drink boiled or pasteurized milk because the bacteria also attacks cows and can be spread through un boiled milk.

(iii) TETANUS

- It is caused by a bacterium found in the soil.
- The bacteria enter the body through fresh cuts or wounds.
- It attacks muscles making them stiff and also breathing becomes difficult.
- In new born babies, it can enter through the umbilical cord if its cut with a dirty un-sterilised instrument like a razor blade or knife.

Signs and symptoms of tetanus.

1. Stiff muscles all over the body.
2. Spasms when touched.
3. The baby stops sucking mother's breasts.

Prevention and control of tetanus.

- Early immunization with DPT vaccine on the left upper thigh.
- Treatment of the infected people

Leprosy

- It is caused by bacteria.
- It is spread through direct body contact with an infected person
- It attacks both muscles and bones.

Prevention

- Isolating infected person
- Avoid sharing towels , basins , beddings with an infected person.
- Treat early cases with antibiotics

RICKETS

It is a deficiency disease which affects bones especially during pregnancy when the mother did not have enough foods containing Vitamin D, Calcium and phosphorous.

- It causes oxbow legged or knock-knees legs.
- In adults, rickets can cause common fractures.

Signs and symptoms of Rickets.

1. Weak bones especially leg bones.
2. Poor teeth formation.
3. Fractures very common to one person.
4. Oxbow legs.
5. Knock-knee legs.

Prevention and control of Rickets.

- Include foods containing vitamin D, Calcium and Phosphorous in the diet.

Dis-orders of the skeletal and muscular system.

1. Fractures.
2. Sprains.
3. Strains.
4. Dislocation.

Fracture

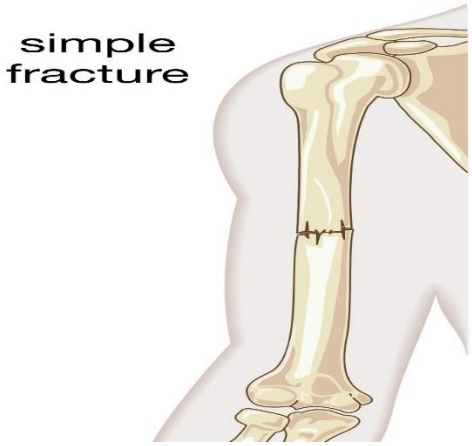
A fracture is a cracked or broken bone

Types of fracture.

1. Simple fracture
2. Compound fracture
3. Green stick fracture
4. Comminuted fracture

Simple (closed) fracture

This is when a bone breaks and remains inside the body (flesh).
The muscles and blood vessels may be damaged.



Compound (open) fracture.

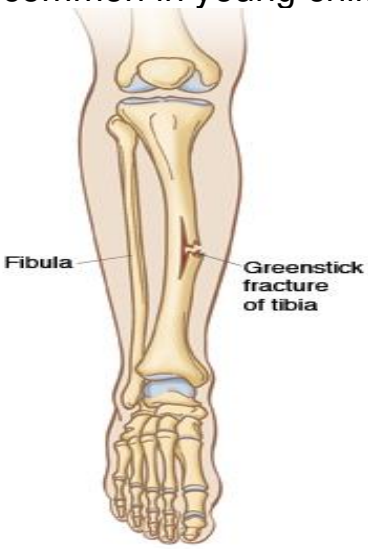
This is when the bone breaks and comes out of the skin (flesh).



Green stick fracture.

This is a type of fracture where the bone does not break completely. Part of the bone remains attached.

This type of fracture is common in young children because their bones are soft.



Comminuted fracture.
This is a type of fracture where the bone is broken into several parts.



Signs of fracture
1. Severe pain and tenderness of the site of injury.
2. Failure to move the fractured part with ease.
3. Bleeding of the wound in case of a compound fracture.
4. In case of a compound fracture, the bone is seen pushing out of the skin.
5. Swelling and bruising of the fractured part
6. The injured limb may be shortened or may lie in an unusual position.
7. The broken limb appears crooked.

First aid for fractures.
1. Removes any object which may have caused the fracture.
2. Stop any bleeding around the injured part.
3. Give comfort and assurance that he / she is to recover soon.
4. Prevent infection of the injured part by using antiseptics.
5. Prevent any further movement of the injured part.
6. Apply a splint to keep the bones in position.

If the bones keeps moving further or injuries may occur.
NB: An arm sling is tied around the neck to support a broken arm.

Sprains and strains
- ✓ A sprain is an injury on the ligament.
- ✓ A sprain is a torn or over stretched ligament.
- ✓ A strain is a torn or over stretched muscle.

Signs and symptoms of sprains and strains.
1. Severe pain at the injured part.
2. Sudden swelling and bruising of the injured part.
3. Failure to move the affected part with ease.

First aid for sprains and strains.

1. Use a firm bandage to support the affected part.
2. Movement of the affected part should be stopped.
3. In case of a sprained wrist, an arm sling should be applied for support.
4. Take the patient to a doctor.

Dislocation

A dislocation is when the bones that form a joint have been displaced.

Signs and symptoms a dislocation.

1. Severe pain at the affected part.
2. Sudden swelling and bruising of the affected part.
3. Failure to move the affected part with ease.

First aid for dislocation

1. Prevent any further movement of the affected part.
2. Comfort the patient and assure him / her of quick recovery.
3. Take the patient to the doctor.
4. Avoid tampering with the affected part by trying to put the bones back into their normal position.

How to keep the muscular and skeletal systems healthy.

1. Eat a balanced diet.
2. Always maintain a good posture.
3. Take all children for immunization.
4. Avoid bad games.
5. Carry out regular physical exercises.

How to maintain proper skeletal and muscular system.

1. Eat foods containing a balanced diet especially mineral salts like calcium and phosphorous and also food containing vitamin D.
2. Have children taken for early immunization against tuberculosis, Polio and Tetanus.
3. Avoid bad games
4. Carry out regular physical exercises
5. Carry out regular body exercises.

Exercises are important because;

- ✓ The heart muscles grow stronger and larger.
- ✓ The heart delivers more blood to the muscles.
- ✓ More enzymes are made in the muscle tissue to break down glucose and fatty acids.
- ✓ Ligaments and tendons become stronger to reduce chances of injury
- ✓ Joints become more flexible.
- ✓ Weight is lost, i.e. you don't become extra fat.
- ✓ The risk of heart attack is reduced.
- ✓ Digestion of food is carried out quickly and easily.

THEME : HUMAN HEALTH

TOPIC 5 : THE RESPIRATORY SYSTEM

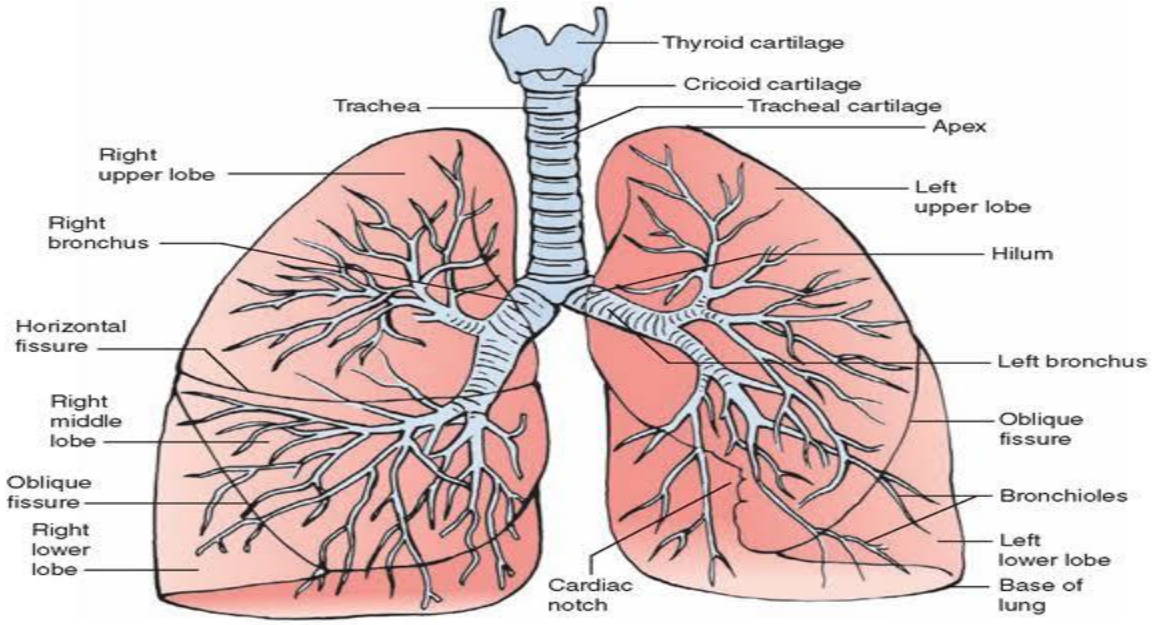
- Respiration is the process by which the body uses oxygen to burn down food to produce energy, carbon dioxide and water vapours.
- Respiration takes place in the body cells.

Types of respiration.

- There are two types of respiration i.e.
  1. Aerobic respiration – One which uses oxygen.
  2. Anaerobic respiration –One which does not use oxygen.

- Difference between breathing and respiration.
  1. Breathing is the taking in of air rich in oxygen and taking out of air with more carbon dioxide.

Illustration (diagram) of the internal structure of the lungs.



ORGANS OF RESPIRATION AND THEIR FUNCTIONS

- Epiglottis – Is a flap which protects the opening of the trachea during swallowing of food.
- Nose- The air passage into the trachea.
- It contains cilia and mucus which help to trap germs and dirt which enter the nose.
- In the nose, air is cleaned, warmed and moistened.
- ***It is not advisable to breathe through the mouth because;***
  1. The air will not be warmed so it can chill or make the lungs very cold.
  2. The mouth has no cilia to trap dust and germs.

THE TRACHEA.

- Also called the wind pipe.
- It is a passage of air down the lungs.
- The trachea contain tiny cilia for trapping dirt and germs.
- The trachea is made up of cartilage rings to keep it open.
- It divides into the bronchi which continues to divide into bronchioles and end up into the air sacs / alveoli.

The lungs.

- The lungs are both excretory and respiratory organs.
- This is because they are used in respiration and also putting out waste products.
- The lungs excrete carbon dioxide from the body which is a waste product of respiration.
- It is in the lungs where gaseous exchange takes place in the body. However, in the lungs, gases exchange takes place in the air sacs or alveoli.

Adaptations of air sacs / Alveoli to their function.

- They are thin walled to allow gases diffuse through easily.
- They are surrounded by a net work of blood capillaries which supply them with blood.

COMPOSITION OF AIR BREATHED IN AND OUT.

Type of air	Inspired air	Expired air
Oxygen 0_2	21%	16%
Carbon dioxide Co_2	0.03% 78%	4%
Nitrogen N_2	Less	78%
Water vapour	0.97%	More
Rare gases		0.97%

Explanation:

- 21% of oxygen is breathed in but only 16% is breathed out because most of it is used by various body reactions.
- 0.03% of carbon dioxide is breathed in and 4% is expired because more of it is produced by various reaction like respiration.
- 78% of Nitrogen is inspired and 78% expired because no body reaction needs nitrogen to occur.
- Less water is inspired but more is expired because more water vapour is produced by different body organs.
- 0.97% rare gases is inspired 0.97% expired because no body reactions required it to occur.

Mechanism of breathing (expiration and inspiration)

Inspiration:

1. The volume of the chest and lungs increase.
2. The diaphragm and the intercoastal muscles contact.
3. The ribs go up and out wards.
4. The lungs expand.
5. The stomach enlarges and swells.

Expiration:

1. The volume of the chest and the lungs decrease.
2. The ribs go down wards and in wards.
3. The diaphragm and intercoastal muscles relax.
4. The lungs and the stomach go to their original size.

The pleural membranes.

- The lungs are covered by the pleural membranes which secrete fluid called pleural fluid.
- This fluid lubricates and reduces friction between the lungs and the ribs.
- The ribs are held together in position by the intercoastal muscles.

Diseases and disorders of the respiratory system.

Disorders:

1. Hiccups.
2. Sneezing.
3. Choking.
4. Yawning.
5. Coughing

Diseases.

Communicable	Non-communicable
• Tuberculosis	- Emphysema
• Influenza	- Lung cancer
• Diphtheria	- Asthma
• Whooping cough (pertussis)	- Bronchitis
• Pneumonia	

Care for the respiratory system.

1. Eat a balanced diet.
2. Perform regular exercise.
3. Eat meals containing low animals' fats.
4. Avoid smoking.

Advantage of regular body exercises.

1. The heart muscles grow stronger and larger.
2. The heat delivers more blood to the body muscles.
3. They reduce the level of fats in the body.
4. The risk of high blood pressure and heart diseases is reduced.
5. Ligaments and tendons become stronger and reduce chances of injury.
6. Joints become flexible.
7. Weight is lost.

THEME : HUMAN HEALTH

TOPIC 6: THE REPRODUCTIVE SYTEM:

- Growth. This is an increase in size of an organism.
- Development: Is an increase in maturity.
- Puberty: Is a period of time when a boy or a girl becomes sexually mature.
- Adolescence: Is a transitional stage between childhood and adulthood.
- An adolescent: Is a boy or girl who is between childhood and adulthood.

Stages of adolescence;

There are four stages of adolescence/changes in adolescents. These include;

- Primary sex characteristics
- Secondary sex characteristics
- Social and emotional changes
- Out of step adolescent changes

1. Primary sex characteristics

These are changes involving the sexual organs to prepare them for their function in reproduction.

They can also be called basic sex characteristics.

Examples of primary sex characteristics in boys;

- The penis increases in size.
- The testes start producing sperms
- Wet dreams start.

Examples of primary sex characteristics in girls

- The uterus and the ovaries develop
- Production of ova begins (Ovulation).
- Menstruation period begins.

2. Secondary sex characteristics

These are changes that are related to physical features that distinguish a grown up man from a mature woman.

They can also be called physical sex characteristics.

Examples of secondary sex characteristics in boys (males);

In males, changes are as a result of the production of a hormone called testosterone.

- The voice breaks and deepens as the larynx enlarges
- Growth of hair under the armpits on the face, chest and around the sexual organs.
- The sweat glands become more active.
- The body becomes more muscular showing masculine structures.
- Pimples develop on the face

In girls (Females)

The ovaries produce two hormones which coordinate the ovaries to control the body reactions. These include; Oestrogen and progesterone

Characteristics include;

- Development of the breasts and stimulation of the mammary glands
- Enlargement of the hips and lining of the uterus
- The sweat glands become more active
- There is growth of hair under the arms on the pubes and around the sexual organs
- Heavier development of the skeleton and muscular structures showing feminine structures
- The face becomes smooth and good looking
- The voice becomes soft and attractive.

3. Social and emotional changes.

These are changes that take place in mind and not seen and may not be realized by the adolescent.

N.B: They occur the same way in boys and girls. These changes include;

- The adolescent becomes interested in the member of the opposite sex.
- The adolescent reacts quickly to different situations i.e a boy or a girl who was docile, humble and cooperative becomes resistant, irritable and disobedient.
- The adolescent wants a lot of freedom.
- The adolescent becomes angry and disappointed quickly.
- The adolescent rejects the rules of his/her parents
- The adolescent wants to be looked and be recognized as mature.
- The adolescents move in groups with boys and girls of the same age and interest.

N.B: This group is` called **peer group**

4. Out of step adolescent changes;

These are changes which occur differently to different people in the same age group.

Some of these changes occur earlier or individuals. They include;

1. The boy who was previously short may find himself taller compared to his age mates
2. A girl who was once considered small may find herself too fat compared to her age mates.
3. Anxiety may be created on those who mature later and left behind by their age mates.

Problems of adolescence;

1. This stage brings conflict between adolescents and their culture and religions
2. Adolescents are never satisfied with their demands
3. This stage also brings conflicts among adolescents.
4. This stage leads to development of antisocial behaviours such as sex offences.
5. Some adolescents can end up being imprisoned
6. Some adolescent girls may drop out of school due to early pregnancies.

Reproduction in humans;

- Reproduction: Is a process where living things increase in number.
- Reproduction: Is the process by which living things multiply themselves to produce young ones of their own kind.
- Reproduction: Is the process by which living organisms produce young ones similar to them.

Forms of reproduction;

1. Sexual reproduction
2. Asexual reproduction.

Asexual reproduction;

This is a type/form of reproduction where reproductive cells are not involved.

Examples include:

1. Binary fission in bacteria and protozoa
2. Spore formation in fungi
3. Budding in yeast and coelenterates
4. Vegetative propagation
5. Seed propagation

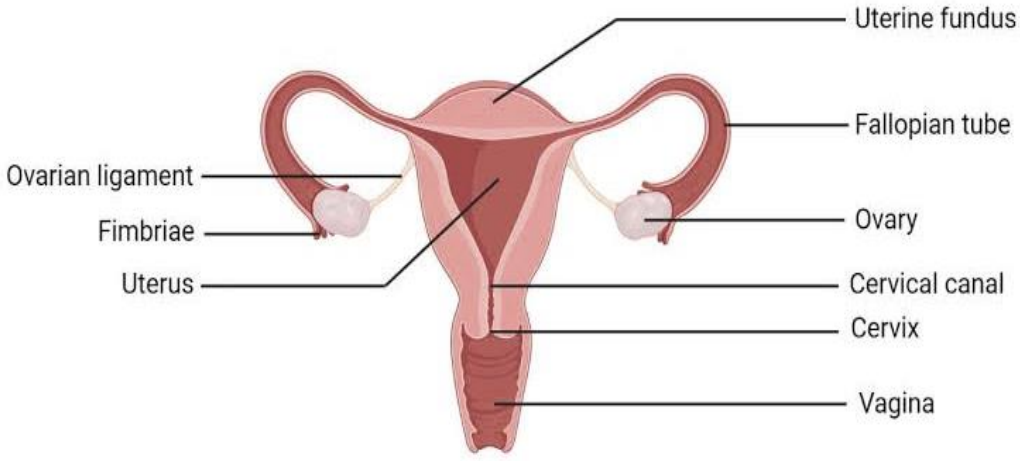
Sexual reproduction

This is a type/form of reproduction where reproductive cells are involved.

Terms used in sexual reproduction

- **Gametes**; These are reproductive cells.
- **Sperm cells**: These are male reproductive cells in animals.
- **Ova/eggs;** Female reproductive cells in animals.
- **Pollen grains:** They are male reproductive cells in flowering plants.
- **Ovules:** They are female reproductive cells in flowering plants.
- **Gonads:** These are specialized parts which produce reproductive cells.

Diagram of the female reproductive organ;

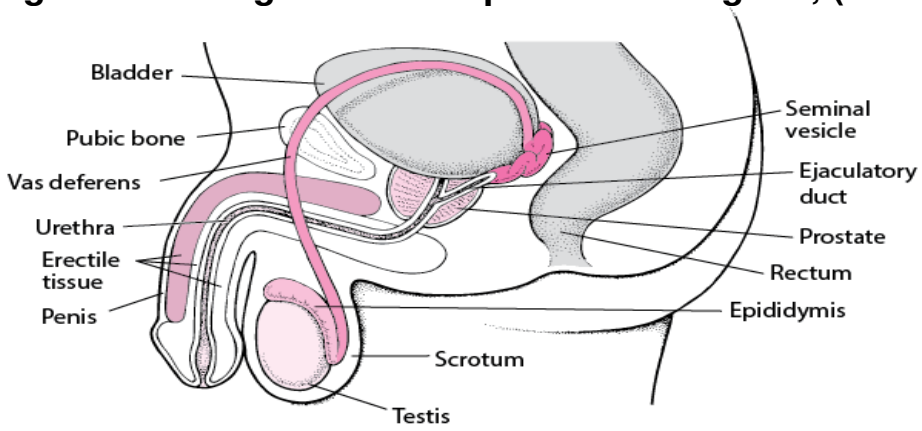


Functions of the parts;

- **Vulva**: It directs the penis into the vagina.
- **Vagina**: This is where the sperm cells are deposited. It also allows the baby to pass through at the time of birth (Birth canal)
- **Cervix**: It is a ring of muscular which closes the lower end of the uterus during pregnancy
- **Uterus/womb**: It is a point where conception takes place. It is also the part where foetus develops from.
- **Uterus wall**; It is where implantation takes place.
- **Oviduct/fallopian tube**: this is the part where fertilization takes place Ovaries:
- **Ovaries** produces ova/eggs

Ovaries produce several hormones called oestrogen and progesterone which control the development of secondary sex characteristics

Diagram showing the male reproductive organs; (Cross section)



Functions of the different parts;

Scrotum;

- It protects the testis from harm
- It regulates the temperature around the testes.

Testes;

- Testes produce sperms
- Testes also produce a hormone called testosterone which determine the secondary sex characteristics.

Epididymis;

- It stores sperm cells.

Penis

- The penis is used to deposit sperms into the vagina.

  N.B: Most sensitive part of the penis is the glans found at the tip of the penis.

Fore skin

- It covers the head of the penis (glans]
- It can be cut off or circumcised for hygiene reasons.

Urethra:

- This is the passage for both urine and sperm cells.

Sperm duct;

- This is a tube which passes the sperms to the urethra.

Prostate gland[cowpers gland].

- These produce the seminal fluid called semen which assists the sperm in movement.

Ovulation

- This is a process by which the ovary releases a mature ovum into the oviduct.

N.B:

Ovulation takes place every after 12 – 14 days from the day of menstruation.
The time when ovulation stops is called menopause, probably at the age of about 45 years.

Menstruation/menstrual cycle

Menstruation is the monthly shedding of blood by the uterus wall when fertilization fails to take place.

This happens because a hormone called oestrogen is released by the ovary which causes the uterus wall to thicken with layers of cells into which the ovum will sink if fertilized.

If the ovum is not fertilized the uterus wall breaks, the unwanted cells contain certain amount of blood are lost through the cervix and vagina.

N.B:

Menstruation occurs once every four weeks or 28 days and usually lasts for 3 – 5 days in normal cases.

Fertilization;

This is the fusion or union of the nuclei of the male and female gametes to form a zygote from which an individual develops.

Types of fertilization;

1. External fertilization
2. Internal fertilization

External fertilization;

This is the type of fertilization which involves fusion of gametes but outside the body of females

Examples of animals which have this type of fertilization include;

1. Frogs
2. Fish
3. Toads

Internal fertilization;

This is the type of fertilization which takes place inside the body of the female.

Examples of animals which undergo internal fertilization include;

1. Birds
2. Reptiles
3. Mammals

Implantation

This is the process where a fertilized ovum attaches itself onto the uterus wall. After implantation, we say conception has taken place and that confirms pregnancy

Pregnancy/gestation period;

This is the period from fertilization to birth.

In man, it lasts for 9 months.

N.B: Implantation takes place in the uterus while conception takes place in the uterus.

Signs of pregnancy (Dangers)

1. Monthly menstrual periods stop.
2. Breasts enlarge
3. Morning sickness especially in the 2nd and 3rd month of pregnancy.
4. Enlargement of the belly.
5. Cervix closes
6. Movement of the baby can be felt
7. Vomiting a lot and often.
8. Bleeding or coloured discharge from the vagina.
9. Prolonged anaemia
10. Severe swelling of the legs, face and hands.

Problems of frequent pregnancy or birth

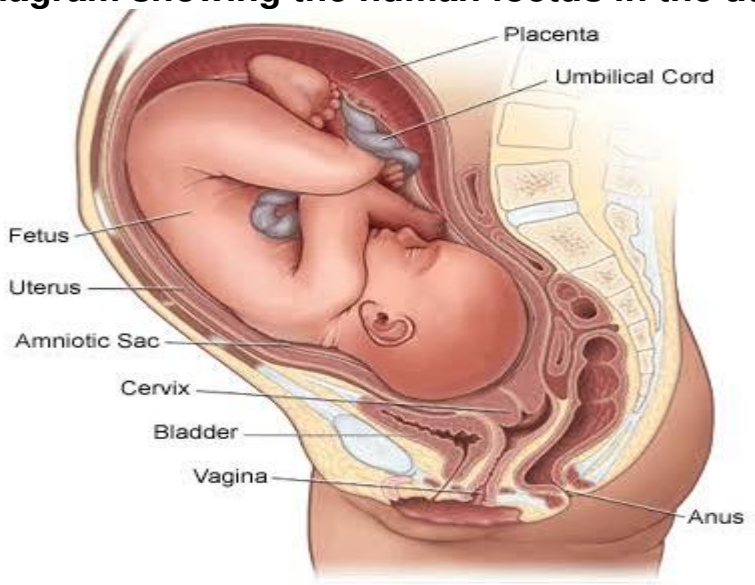
1. Premature births
2. Maternal anaemia
3. Miscarriage
4. Local birth weight
5. Proneness to diseases
6. High maternal mortality rate

Development of the foetus in the uterus;

Stages in pregnancy

- The fertilized ovum develops villi into the uterus.
- The part with the villi develops into a specialized organ called a placenta.
- The uterus wall under the influence of oestrogen and progesterone develop rich supply of blood vessels to facilitate exchange of materials between the mothers and foetus's blood.
- Developed oxygen, glucose, amino acids and salts from the mothers blood pass to the embryo while carbon-dioxide and other nitrogenous wastes pass in the opposite direction through the umbilical cord.
- A water sack called damage amnion which cushions it from damage surrounds the embryo.

Diagram showing the human foetus in the uterus.



Functions of different parts;

- **Umbilical cord**: Contains an artery and a vein through which materials are conducted to and from the foetus.
- **Amnion**: It holds the amniotic fluid.
- **Amniotic fluid**: It protects the foetus from damage or external harm.
- **Placenta**: Stores digested food and oxygenated blood used by the foetus. It does not allow toxic substances to reach the foetus

It is where waste materials from the foetus are first stored before they diffuse in the mother's womb.

- **Cervix**: It helps to separate the uterus from the vagina and closes the uterus during pregnancy.

Requirements needed by females during pregnancy;

- Ante-natal care
- Good nutrition (balanced diet)
- Regular physical exercises
- Adequate sleep and rest. However, oversleeping is not good.
- She should observe proper personal hygiene.
- She needs appropriate clothing like maternity dresses, brassiers.

N.B: Ante – natal care is sub – divided into three stages. Namely;

- Pre – natal care
- Ante – natal care
- Post – natal care

Teenage pregnancy

This is a type of pregnancy in a young woman who has not reached her 20th birth day when the pregnancy ends.

Teenage pregnancy may occur in married women.

Problems associated with teenage pregnancy;

1. Dropping out of school.
2. Parental and family rejection.
3. Complications during pregnancy
4. The cervix is so weak to hold the foetus.
5. Difficulty in delivering.
6. The young mother may not take care of the baby properly.
7. Community discrimination
8. She may fail to get marriage in future they are considered to be second-hand.

Common diseases and disorders of the reproductive system

Sexual transmitted diseases

These are diseases transmitted (STDs) through having unprotected sex with an infected person.

Note: Such diseases accumulate in the victim's body as a result of the destruction of the white blood cells by the HIV virus.

Examples of STD's

- ✓ HIV/AIDS
- ✓ Gonorrhoea
- ✓ Syphilis

- ✓ Lymphogranuloma
- ✓ Candidiasis
- ✓ Chancroid
- ✓ Genital herpes
- ✓ Genital warts
- ✓ Trichomoniasis

HIV/AIDS

HIV in full is human Immuno Deficiency Virus
AIDS in full is Acquired Immune Deficiency Syndrome
This is the most infection of all the STDs.
It is caused by the HIV virus

Ways through which HIV virus is spread

1. Through playing unprotected sex with an infected person
2. Through mother to child transmission
3. Through blood transfusion with infected blood
4. Through sharing sharp objects with an infected person.

Practices that may lead to HIV infection.

1. Circumcision
2. Skin tattooing
3. Sharing wires in some communities especially in Eastern Uganda.

Signs and symptoms of HIV/AIDS infection

1. Loss of body weight within a short period of time
2. Prolonged fever
3. Itchy skin rash
4. Prolonged dry cough
5. General body weakness
6. Oral thrush (White coating in the mouth)
7. Herpers zoster

Effects of HIV/AIDS infection

- ✓ AIDS lead to death of many people because it has no cure
- ✓ AIDS has led to loss of productive class of people in the community
- ✓ AIDS has caused a lot of worries, misery and hatred especially to the infected and affected ones. (Stigmatization)
- ✓ AIDS infection has caused some working groups to lose jobs and poor performance at work

Prevention of HIV/AIDS

- ✓ Having one life longer partner
- ✓ Avoid sharing skin piercing instruments
- ✓ Blood to be used for transfusions should be tested for HIV.
- ✓ Having an AIDS test with one partner before marriage

✓ Correct use of condoms during sexual intercourse

Note: Condoms do not give 100% safety but offer higher chances of safety against STDs

Gonorrhoea:

It is caused by a bacterium called gonococci or Neisseria gonorrhoea

Signs and symptoms in males

✓ Pain when urinating
✓ Smelly discharge of pus from the penis

In females

✓ Discharge of pus from the vagina
✓ Pain in the lower belly
✓ If not treated earlier, in pregnant women germs can easily affect the foetus's eyes hence blind babies.

Prevention and control of gonorrhoea

✓ Abstain from sex at early stages (Premature sex)
✓ Have regular medical check ups
✓ Married couples should avoid extra marital sex
✓ Get early treatment in case of discovered signs.

Syphilis

Syphilis is caused by a germ called spirocharete treponema pallidum

Syphilis develops in the body into three stages. Namely;

✓ Primary stage
✓ Secondary stage
✓ Tertiary stage

Primary stage

This stage occurs after 2 – 5 days after sexual intercourse.

Signs and symptoms

✓ Painless sores around the sexual organs
✓ In case they are not treated, they spread to the heart and brain.

Secondary stage

This shows up after 5 weeks and beyond.

Signs and symptoms

1. Painful rushers all over the body
2. Shores in the throat
3. Swollen joints and pain in the bones
4. The body becomes anaemic
5. Mild fever.

Tertiary stage

This happens between 5 – 20 years of the infection and difficult to heal.

Signs and symptoms

1. Big painful sores all over the body
2. Severe abdominal pain
3. Development of heart, brain and liver disorders
4. The victim may even become mad or insane
5. A lot of damage is done on the body system at this stage.

Note: If a pregnant woman has untreated syphilis, she can easily pass it to the unborn baby.

This type of syphilis is called congenital syphilis

Prevention of syphilis infection

- ✓ Get early treatment with antibiotics
- ✓ Go for regular medical check ups
- ✓ Abstain, use condoms for un trusted partners or be faithful to our sexual partners. (ABC)

Care for the reproductive organs

- ✓ Always maintain personal hygiene i.e regular cleaning of the sexual organs
- ✓ Avoid wearing dirty and wet clothing's especially around the sexual organs
- ✓ Abstain from sex to avoid contraction of the STDs
- ✓ Avoid sharing sharp skin piercing objects that may transmit STDs
- ✓ Married people should avoid extra marital sex to prevent the transmission of STDs
- ✓ Couples should go for HIV test before having sex in order not to get HIV/AIDS
- ✓ Practise ABC measures.

Note: A - Abstain from sex
B - Be faithful to your partner
C - Condom usage

Family planning and child spacing

Family planning is the use of birth control methods to plan when to have a child or not in a family.

Child spacing is the provision of adequate space between the births of a family's children

Importance of child spacing

- ✓ It promotes healthy growth of the children
- ✓ It promotes relaxation of the mother's body

Methods of family planning

Family planning methods are practices that help to prevent conception among women.

Categories of family planning methods

1. Artificial methods

These are methods that involve the use of man-made devices to control or prevent conception.

Examples

- ✓ Use of a condom
- ✓ Use of a diaphragm, use of intra – uterine devices
- ✓ Use of foams and jellies (Spermicides)
- ✓ Use of birth control pills and injections.

Note: All the above are said to be temporary birth control methods.

Permanent methods

Tuballigation

This is a surgical method which involves cutting of the oviducts and tying them through a surgical operation

Vasectomy:

This is a method which involves cutting of the sperm ducts and tying them through a **surgical operation.**

Advantages of using artificial methods of family planning:

- ✓ They are effective and well conducted
- ✓ They are convenient and time saving
- ✓ They are helpful in the control of some STDs such as use of a condom
- ✓ HIV infected mothers can easily live longer without child bearing.

Disadvantages

- ✓ Some, if not practiced well may destroy the ovaries and cause barrenness
- ✓ Some result into complete sterility in one`s life time
- ✓ They are expensive to many families.

2. Natural methods

- ✓ Abstaining from sex (Good for school going children)
- ✓ Withdrawal/coitus interruption menthol gametes with the female gametes
- ✓ Use of a calendar and rhythms. This involves studying ones menstrual cycle and having sex only when ovulation is likely not to take place.
- ✓ Prolonged breast feeding. This helps to delay the ovulation but it varies in women.

Advantages

- ✓ They are easy, cheap and convenient.
- ✓ They do not have complications.

Disadvantages

- ✓ They are not effective as the artificial methods.
- ✓ They require complete cooperation for both husband and wife.
- ✓ They require great amount of teaching and supervision.

Importance of family planning.

- ✓ It enables the mother to regain her health in preparation for the next pregnancy.
- ✓ It enables parents to have a manageable number of children in a family.
- ✓ It enables children to have enough basic needs.
- ✓ It checks on the population of a country.
- ✓ It helps in the control of unwanted pregnancies.

Reasons why some parents produce many children

- ✓ Ignorance about family planning methods.
- ✓ High infant mortality rate.
- ✓ Desire for a particular sex of a child.
- ✓ Cultural benefits and the need to show that one is sexually strong.
- ✓ Myths and misconceptions about family planning
- ✓ People think family planning methods lead to barrenness.

PIASCY MESSAGES

- ✓ AIDS has no cure.
- ✓ Abstain from sex
- ✓ Pre-marital sex is bad
- ✓ Boys and girls should see each other as friends but not sexual partners.
- ✓ Follow your religion to stay healthy.
- ✓ Stay in school until marriage.

TERM II

THEME : HUMAN BODY

TOPIC 7: EXCRETORY SYSTEM

Excretory system is a body system that deals with the removal of waste products from the body.

Excretion is the removal of waste products from the body.

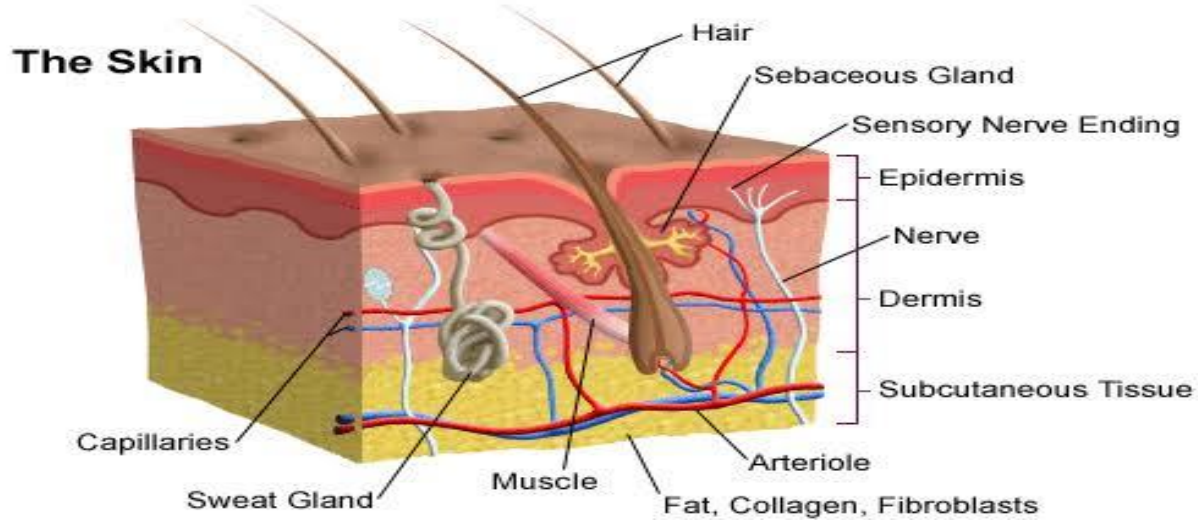
Organs of excretory system.

The body organs which carry out excretion are;

1. The skin.
2. The kidney.
3. The lungs.
4. Liver

THE SKIN

Illustration of the structure of the skin.



The skin is made of two main layers.

- ✓ Epidermis.
- ✓ Dermis.

The Epidermis:

This is the outer most layer / region of the skin.

The epidermis is made up of these layers.

1 Cornified layer.
2 The granular layer.
3 The Malpighian layer.

Cornified layer:

- ❖ It is found on the top surface of the skin.
- ❖ It consists of dead cells that resist damage and bacterial invasion.

Malpighian

- ❖ Is a layer of cells which divide actively to produce the epidermis.
- ❖ In this layer, there are pigments granules and melanin that determine the skin colour

Granular layer.

- ❖ Contains living cells that gradually give way to form the cornified layer.
- ❖ Increases resistance to damage and bacterial invasion.
- ❖ It reduces the loss of water by evaporation.

The dermis

This region is the inner most layer of the skin and it stores fats under it.

This region contains the following parts.

1. **Capillaries:** Supply food and oxygen to the skin and removes excretory products. Capillaries help in temperature control.
2. **Sweat glands:** Secretes sweat, sweat contains excess salts, urea and water.
3. **Sweat duct**: Is an opening / pore that lead sweat to the surface of the skin.
4. **Hair follicle**: Is a deep pit of granular and Malpighian layer cells that multiply to build hair.
5. **Sebaceous glands;** produce oily substances called sebum that keeps the skin water proof.
6. **Subcutaneous fat;** The fat layer beneath the skin act as a heat insulator that helps to control heat loss.
7. **Nerves** – Transmit impulses for heat, touch etc.

Functions of the skin.

1. Excretes salts, water and some urea.
2. Regulates body temperature.
3. Skin stores fats.
4. Makes vitamin D by the help of sun light.
5. Protects the body against germ infections.
6. Skin is the sense organ for feeling.

Body temperature regulation.

- ✓ Blood vessel vasodilate / widens allowing more blood to flow near the surface and more heat is lost by radiation.
- ✓ Sweat glands produce more sweat through which heat is lost by evaporation.
- ✓ Erector muscles relax causing hair to lie flat on the body to allow wind to easily sweep off heat.

On cold days.

1. Blood vessel narrow (vasoconstriction) and so blood is withdrawn from the surface limiting heat loss by radiation.

2. Decrease in sweat produce thus reducing heat lost by evaporation.
3. Through shivering, heat is produced by the contracting muscles.
4. Fats under the skin act as heat insulators.
5. Erector muscles contract causing hair to erect and trap air around the skin which act as an insulator to heat loss.
6. When hair erect, goose pimples appear on the skin.

Diseases of the skin.

The skin is commonly affected by diseases like;

1. Ring worm.
2. Scabies.
3. Athlete's foot
4. Leprosy.

Disorders of the skin

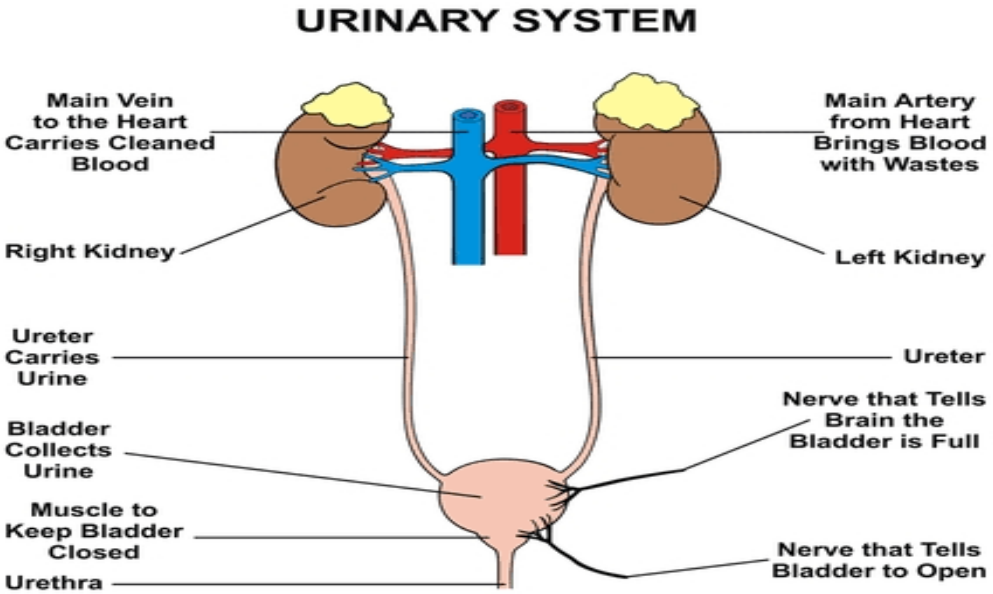
1. Dandruff
2. Pimples
3. Bruises
4. Cuts
5. Corns
6. Herpes zoster

Care of the skin:

1. Wash your body daily with warm clean water and soap.
2. Rub your body with a towel after bathing.
3. Wounds and cuts should be well covered with sterilized bandages.
4. Take exercises daily to keep it working in proper order.
5. Eat a balanced diet.

Urinary system

Urinary system is made up of organs that eliminate wastes from the body in form of urine.



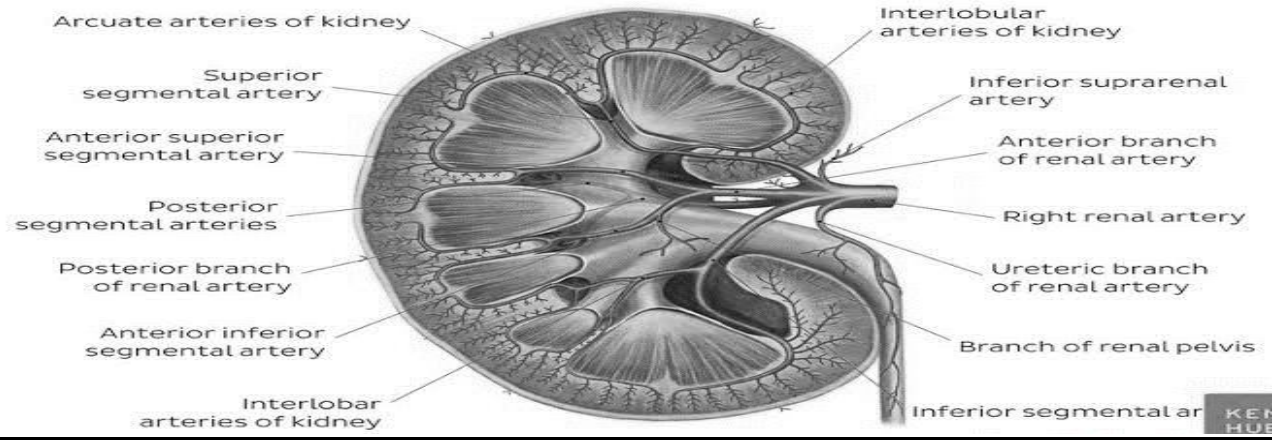
Other organs of urinary system.

1. Kidney
2. Ureter
3. Urinary bladder
4. Urethra

THE KIDNEYS

Kidneys are two brown bean shaped organs at the back of the abdominal cavity.

Illustration of the internal structure of the kidney.



Parts of the kidney and their functions.

1. **Renal artery:**
   Is a branch of aorta that supply oxygenated blood to the kidney.
2. **Renal vein:**
   Takes deoxygenated blood from the kidney to the vena cava.
3. **Cortex:** Blood is filtered to remove Urea, Uric acid, excess salts and water.
4. **Medulla**
   Is a region where selective re-absorption takes place by the nephrons.
5. **Pelvis**
   Urine is collected here from the numerous nephrons.
6. **Urethra:**
   Urethra is a passage of urine to the Urinary bladder.
   NB: Urine is formed through ultra-filtration and selective re absorption in the kidney
7. **The Urinary bladder:** Is an elastic and muscular sack that stores urine briefly.

Diseases of the kidney.

1. Cancer of the kidney.
2. Kidney failure.
3. Kidney stones.
4. Bilharzias

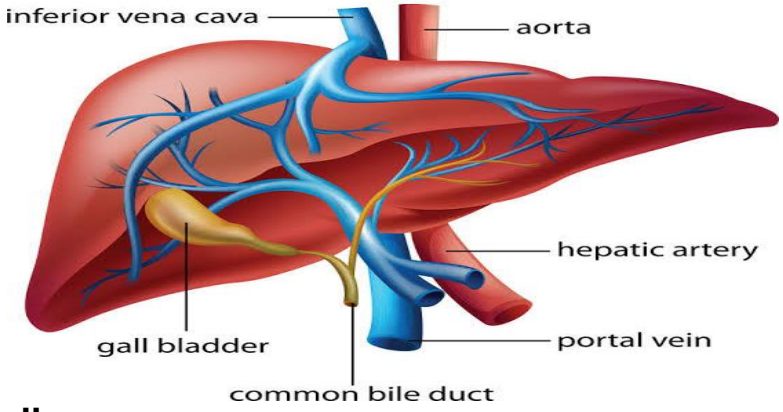
Waste products excreted by the kidney.

1. Uric acids.

2. Urea.
3. Excess salts.
4. Excess water.

THE LIVER

1. The liver is said to be the most important organ in the body because it performs many functions compared to other body organs.
2. The liver is a large reddish-brown organ below the diaphragm.
3. It is supplied with oxygenated blood by the hepatic artery.
4. The liver receives blood rich in digested food from the alimentary canal by the help of the hepatic portal vein.



Functions of the liver.

1. The liver regulates blood sugar.
   - ✓ Too much sugars and lack of enough sugar in blood causes **diabetes**.
   - ✓ The liver control sugar levels by the help of insulin.
   - ✓ Insulin is produced by the pancreases and help to stimulate the liver to remove glucose from blood by converting it into glycogen for storage.
   - ✓ The liver deaminates amino acids and convert them into carbohydrates.
   - ✓ Alcohol, poisonous substances and poisonous drugs produced during metabolism are ma de harmless by the liver through the process of detoxication.
2. It helps in the process of excretion.
3. Stores vitamins and mineral slats.
4. It helps in detoxication process.
5. It produces heat energy.

Diseases of the liver.

- Cirrhosis of the liver.
- Hepatitis.
- Liver abscess. These are boils which form pus in the liver.

Care of the liver

- Avoid taking too much alcohol.
- Have a balanced diet.
- Always have exercises to keep it in a good working condition.

THEME: MATTER AND ENERGY

TOPIC 8: LIGHT ENERGY

Energy – Energy is anything that enables man to do work.

LIGHT ENERGY.

Light is a form of energy which enables our eyes to see objects. Light is a form of energy which stimulates sense of seeing.

How we see objects.

- We see objects when they reflect light in our eye.
- Light travels from the objects to our eyes.
- Some objects give out their own light while others reflect light falling on them from other sources.

Sources of light.

- A source of light is an object which gives out light.

There are two types of sources of light.

(i) Natural sources of light.
(ii) Artificial sources of light.

Examples of natural sources of light.

1. The sun
2. The stars
3. Erupting volcanoes
4. Glow worms
5. Fire flies

Examples of artificial sources of light.

1. Electric bulbs
2. Torches
3. Lamps
4. Candles
5. Fires
6. Charcoal stoves.

These sources of light can either be luminous or non-luminous sourced of light.

Luminous sources of light

These are sources of light which emit (send) or produce their own light.

They are also called direct sources of light.

Examples of luminous objects.

1. The sun
2. The stars
3. Red hot charcoal

4. Fire flies
5. Hands and figures of some clocks and watches
6. Some kinds of rocks
7. Working filament of the bulb
8. Bulbs
9. Burning charcoal
10. Erupting volcanoes

NB:

Among luminous sources of light, some emit light when they are red hot. These sources are called incandescent sources of light.

Examples of incandescent sources of light.

1. The sun.
2. The stars.
3. Hot filament of bulbs.
4. Hot charcoal etc.

Non-luminous objects.

These are sources of light which do not emit their own light but just reflect light from another source.

They are also referred to as indirect sources of light or reflectors.

Examples of non-luminous objects.

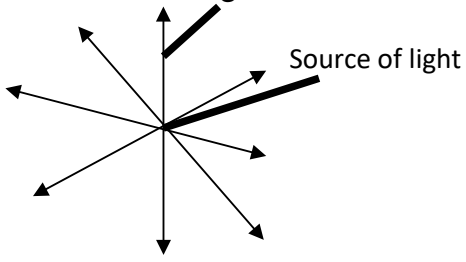
1. The moon
2. The planets
3. Plane mirrors

Importance of light.

1. Light enables us to see objects using our eyes.
2. Plants use sunlight to carry out photosynthesis.
3. Heat and light from the sun help the eggs of reptiles, amphibians and fish to hatch.
4. Our bodies use sunlight to make vitamin D.

Transmission of light (how light travel)

- Light travels in straight lines to all directions from the source.

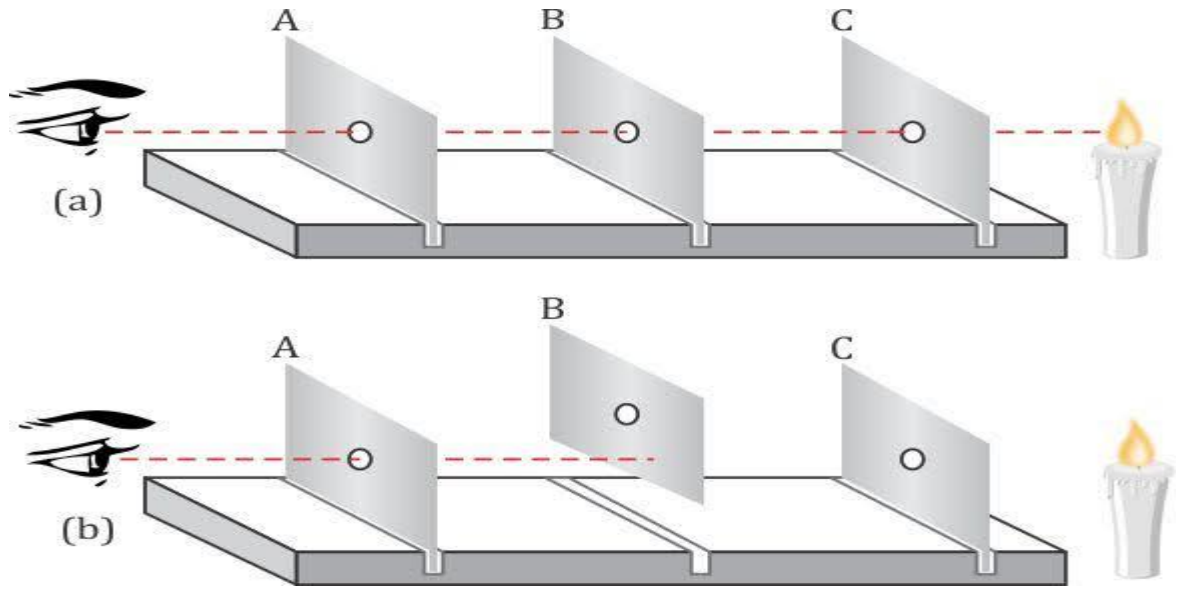


Experiments to show that light travels in straight lines.

Light travels in a straight line in any transparent medium e.g. glass, air, water and vacuum. We cannot see around corners behind corners because light travels in straight lines.

- The experiment above shows that light travels in straight lines.
- The three card boards have holes in their centre at exactly the same position.
- If arranged in a straight line, light travels through the holes from the candle to eye.
- When you shift one of the candles slightly, you will not see the light.

Experiment two.



In (i) when the cards are in straightline, light can be seen.

- In (ii) when a card is raised a little, light can't be seen.
- This is why we can't see around corners.

NB:

We hear sound around corners because sound travels in waves but we can't see around corners because light travels in straight lines.

Rays and beams of light.

A ray of light is a line along which light travels.
A ray of light is represented by an arrow.



A ray of light.

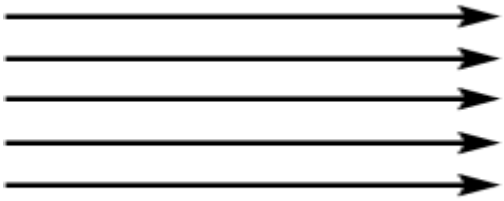
A beam of light

A beam is a group of light rays.
There are three types of beams of light.

(i) Parallel beams.
(ii) Diverging beams.
(iii) Converging beams.

(a) **A parallel beam**

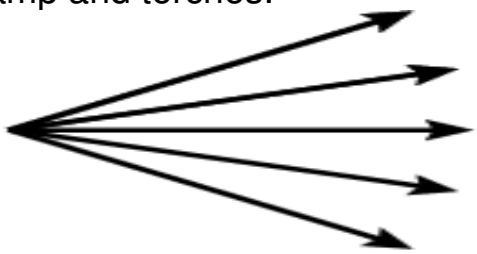
This is a type of beam where the light rays travelling from the source can not meet.



(a) Parallel beam

(b) **A diverging beam**

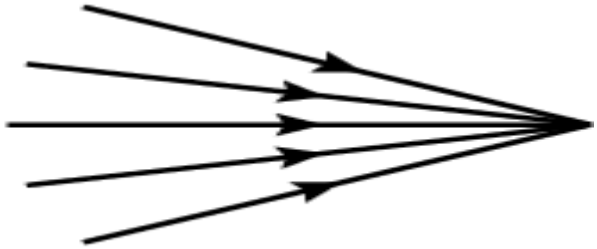
This is a beam where the light rays from the source spread out (diverge) e.g. car head lamp, bicycle head lamp and torches.



(b) Divergent beam

(c) **Converging beam.**

This is a beam of light where the light rays from the source come towards a point (converge).



(c) Convergent beam

Speed of light

The speed of light is about 300,000Km/s in air and vacuum.

Light travels faster than sound in air.
Examples to prove that light travels faster than sound.

- We hear thunder after we have seen lightning.
- At a race track, we see the flash of starter's gun before we hear the bang.
- The sound of an axe is heard after we have seen the axe strike when cutting.

Effects of light on different materials.

When light meets an object, one of the following will happen.

- Light can be absorbed, diffused or scattered.
- Light may be allowed through transmission.

Materials which affect light are grouped into:

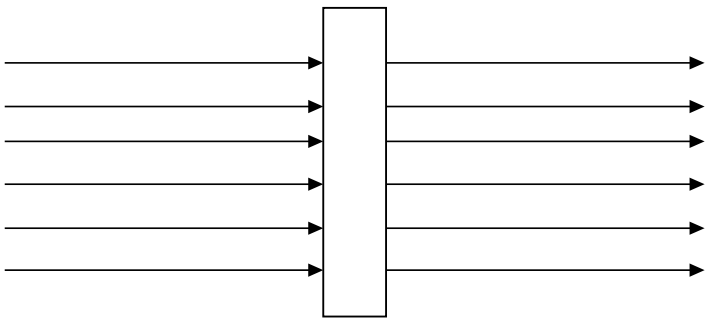
(i) Transparent objects
(ii) Translucent objects
(iii) Opaque objects

Transparent objects

These are objects which allow most of the light to pass through and we can see through them.

Examples of transparent objects.
Glass

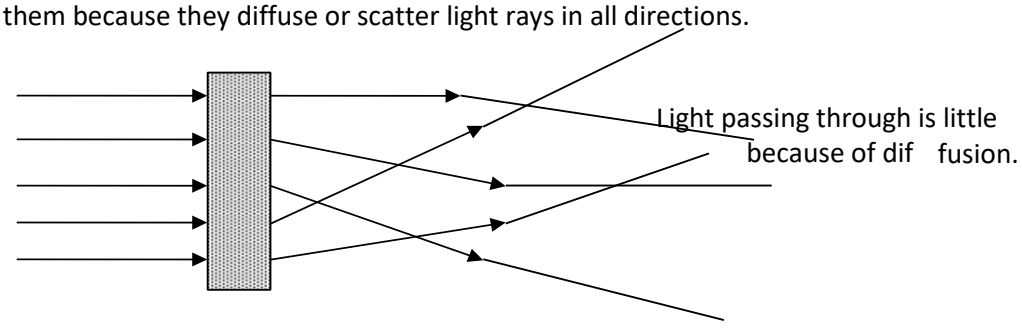
- Water
- Air etc.



Translucent objects

These are objects which allow some light to pass through but we cannot see through clearly.

We can not see through them because they diffuse or scatter light rays in all directions.



Examples of translucent objects:

1. Frosted glass.

2. Waxed paper
3. Cloth
4. Tissue paper
5. Light bulbs.

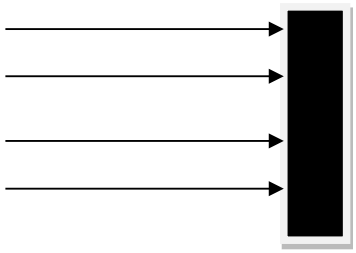
Opaque objects.

These are objects which don't allow any light to pass through them.

- We cannot see through them because light travels in straight lines.
- Opaque objects instead form shadows.

Examples of opaque objects.

- Wood
- Stones
- Metals.
- Walls.
- Bricks etc.



No light passes through.

Shadows

A shadow is a region of darkness caused by obstruction of light by an opaque object.

- When the source of light is a small point, a sharp complete shadow is formed called a total shadow or umbra.
- When the source of light is big, a total shadow called umbra is surrounded by half or partial shadow called penumbra.
- If the source of light is put further away from the opaque object, the shadow will be smaller.
- If the source of light is nearer the opaque object the shadow is bigger than the object.

Eclipse

An eclipse is a shadow formed by the obstruction of light by either the moon or earth.

The word eclipse means 'cut off'

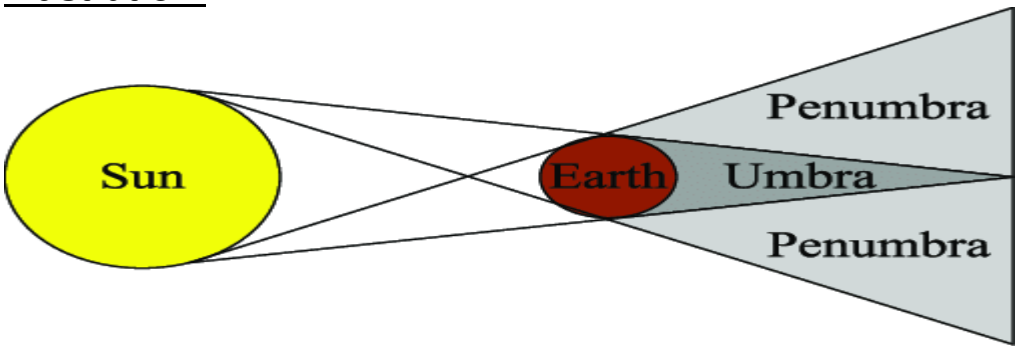
Note:

- The sun is stationary (in one place)
- The earth revolves round the sun on its fixed path called orbit.
- The moon revolves round the earth but its orbit is not fixed.

Eclipse of the sun-solar Eclipse.

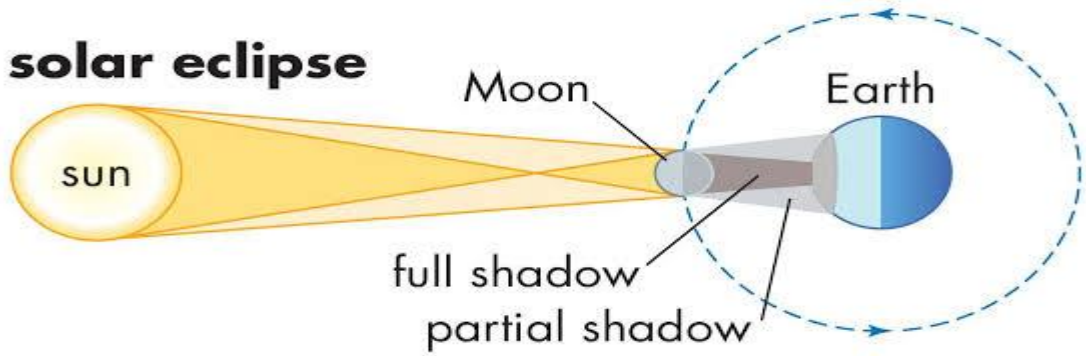
- It occurs when the moon comes in between the sun and the earth. • When this happens the sun casts the shadow of the moon onto the earth.

Illustration.

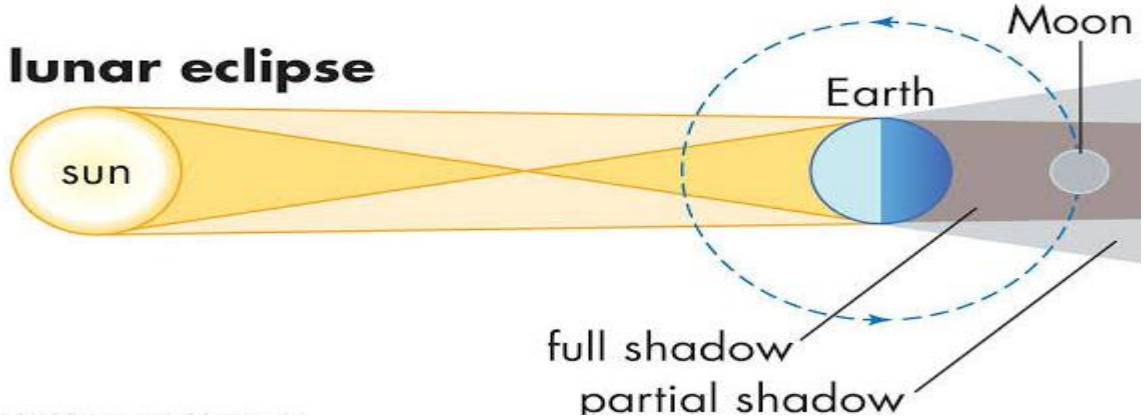


Annular eclipse of the sun.

- It occurs in the same way as the solar eclipse. But when the moon is far away from the earth and the umbra fails to reach the earth.
- When this happens the earth only receives the penumbra and the sun will be encircled by a ring.



The eclipse of the moon occurs when the earth comes in between the sun and the moon. This happens only when there is a full moon.



The moon is in total eclipse so it doesn't reflect any light.

Reflection of light.

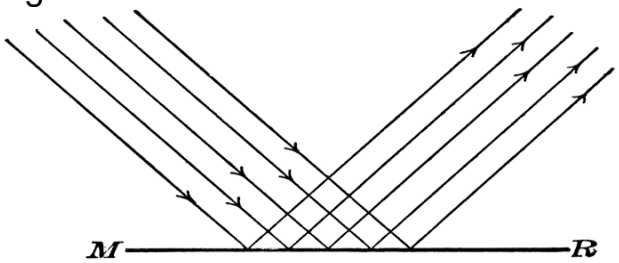
Reflection is the bouncing back of light rays when they strike a shining opaque object.

Types of reflection.

There are two types of reflection.

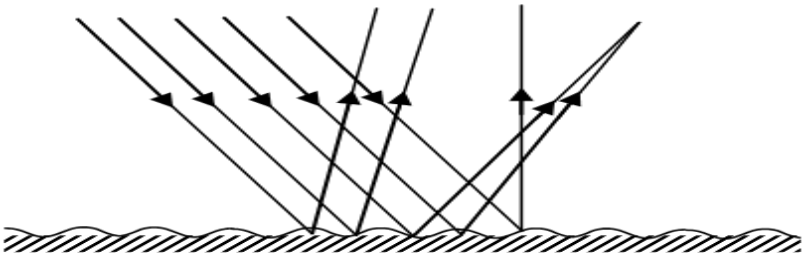
Regular reflection.

- Is the type of reflection where the beam of light is sent back in a definite direction.
- It is produced when light falls on a smooth shinny surface e.g. mirrors.
- We are able to view ourselves in plane mirrors because they are highly polished and give a regular reflection.



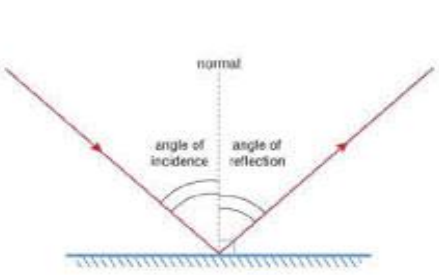
Irregular reflection.

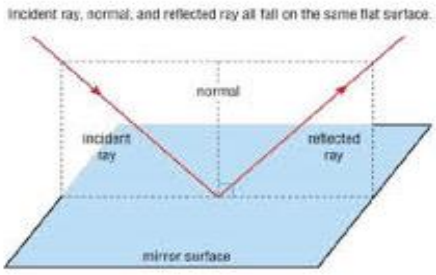
- Is a type of reflection where the beam is scattered and thrown back in all directions.
- Rough unpolished surfaces give irregular reflection (diffuse reflection)
- We are unable to see clear images on walls because they give irregular reflection.



Reflection principles and its laws

1. The angle of incidence equals the angle of reflection.
2. The incident ray (r_i), the reflected ray (r_r), and the normal all lie in the same plane





Laws of reflection:

- The incident ray, the reflected ray the normal at the point of incidence all lie in the same plane.
- The angle of incidence is equal to the angle of reflection.

NB: when the incident ray strikes the mirror at an angle of 90^0 the reflected ray takes the same route and this is called total internal reflection.

Qn:
The incident ray makes an angle of 60^0 to the mirror. What is the angle of reflection?

The normal makes 90^0 to the mirror

$60^0 + i = 90^0$.
$60 - 60 + i = 90^0 - 60^0$

$i = 30^0$.

< of incidence = < of reflection.
< of reflection $= 30^0$.

Reflection of light by different materials.

- Dark dull materials are good absorbers of light which is converted to heat.
- In hot weather people prefer white clothes and in cold weather they prefer dark clothes.
- A black dress appears black because it absorbs all colours and reflects none.
- White objects appear white because they reflect all colours and absorbs none.
- Green objects appear green because they absorb all the other colours and reflect only green into our eyes.

Image and Objects:

An image is a light picture.

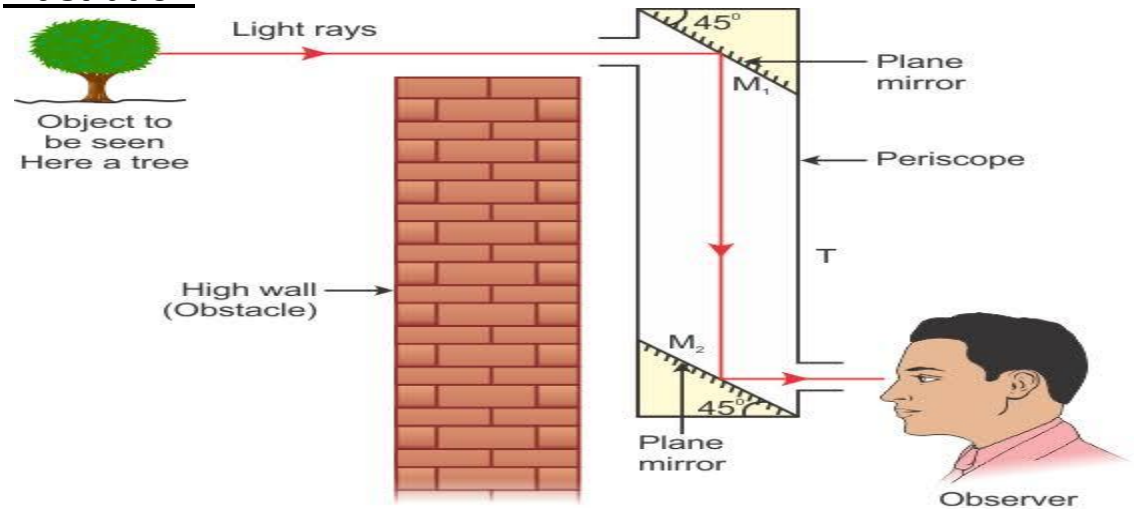
Characteristics of images formed by plane mirrors.

- The distance of the object from the mirror is the same as the distance of the image behind the mirror.
- The images are laterally inverted.
- The image is the same size as the object.
- The image is always upright / erect.
- The image is virtual i.e. cannot be cast on the screen.

Use of plane mirrors.

1. They are used to see certain parts of the body that we cannot see directly. E.g. behind the head.
2. They are used in periscopes.
3. A periscope is an instrument which consists of a tube with two mirrors fixed inside facing each other and inclined at 45^0.
4. The mirrors are parallel to each other.
5. A periscope is used to see around corners by soldiers in trenches and in submarines.

Illustration



Curved mirrors.

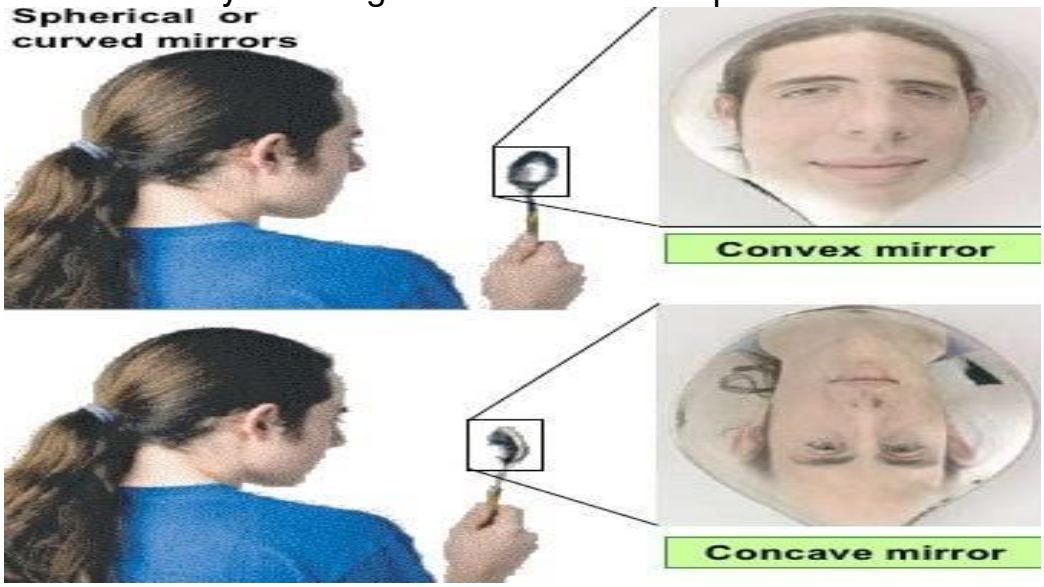
- These are mirrors which are sphere like in shape.
- They obey the laws of reflection.
- The different types of curved mirrors are made by silvering on one side.

Types of curved mirrors.

- There are two types of curved mirrors.
  (i) Concave mirrors
  (ii) Convex mirrors

(a) Concave mirrors (converging mirrors)

- It is made by silvering the outside of the sphere.



Characteristics of images formed by concave mirrors

- The image is larger than the object (magnified).
- They are erect (upright)
- They are laterally inverted.

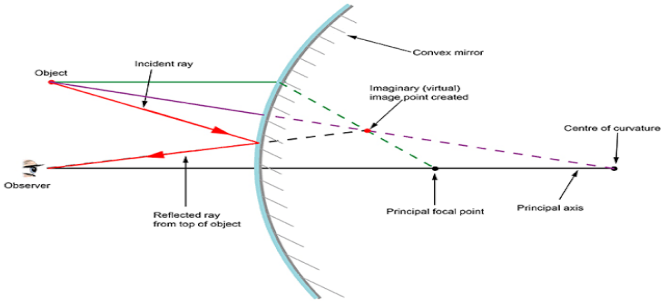
- They are virtual (i.e. Formed behind the mirror so they cannot be cast on the screen)

Uses of concave mirrors.

- They are used by barbers as shaving mirrors.
- They are used by dentists.
- They are used in search lights, electric torches, head lamps as polished and silvered concave metals
- They are also used in telescopes.
  Telescopes have large concave mirrors, which assist in focusing beams of light from heavenly bodies. Telescopes help in studying about the stars and planets.

Convex mirrors (Diverging mirrors)

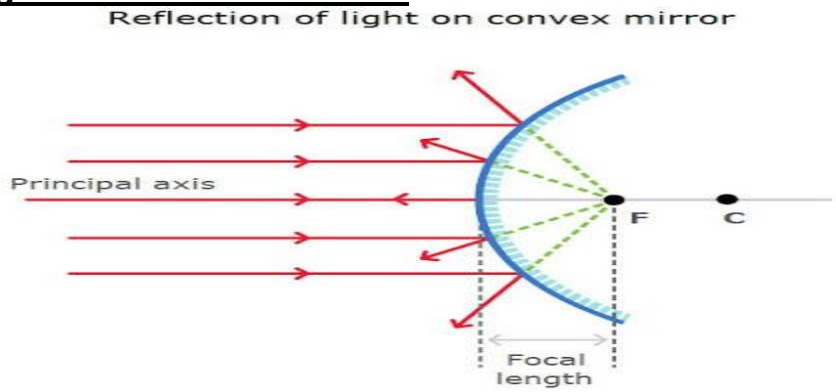
They are made by silvering the inside of the sphere.



Characteristic of images formed by convex mirrors.

- The image is smaller than the object – diminished.
- The image is upright – erect.
- The image is laterally inverted.
- The image is virtual – behind the mirror.

A beam of light on a convex mirror.



Use of convex mirrors.

1 They are used as a driving mirror on vehicles.
2 They form upright images.
3 They give a wide view of the distant object.

4 They are used in super markets to see what customer do.
5 Security mirrors in bus and cars.

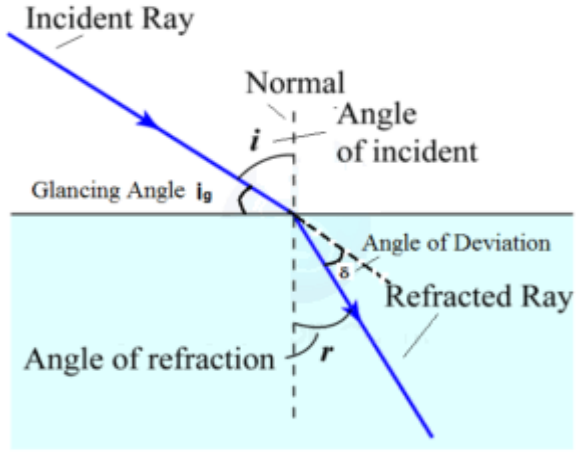
Refraction of light.

Refraction is the bending of light as it passes from one transparent medium to another.

e.g

- ✓ From air to gas
- ✓ From air to water.
- ✓ From glass to water.

Refraction is caused by change in speed of light as it passes from one transparent medium into another which have different densities.



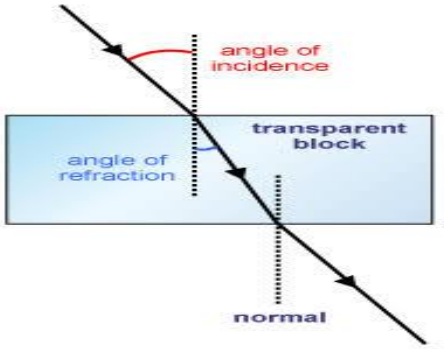
Note

When a ray of light passes from one medium to a more optically dense medium, the ray bends towards the normal and vice versa is true.

The law of refraction

- The incident ray and the refracted ray are on opposite side of the normal.
- The incident ray, the refracted ray and the normal all live in the same plane.

Refraction of light through a glass block / prism.

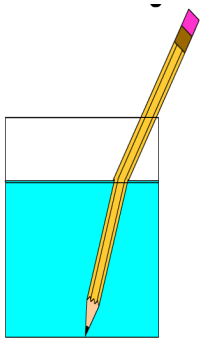


Effects of refraction.

(i) A swimming pool appears shallower than its real depth because of refraction. This is seen by placing a stone in a glass, and then view it from the top.

A ruler or stick partly dipped at an angle into some water in a glass appears bent or broken due to refraction.

(ii) Refracted stick fixed vertically and partly dipped in water appears to be shorter than its real length.



Light bends inwards because the speed of light is slower in water

(iii) A mirage is an optical illusion caused by the bending of light rays due to layers of air having different densities and temperature e.g. sheet of water seen on a high way during a hot day. It appears like a pool of water seen ahead on the road on a hot day.

Effects of mirages.

- Mirages may lead to accidents on high ways.
- Mirages cause false images along high ways in deserts.

(iv) Words under a glass block appear to be raised on a different line from those away from the glass because of refraction.

LENSES

A lens is a transparent material with curved side capable of refracting light.
The curved surfaces of a lens help to bend or refract light passing through the lens.

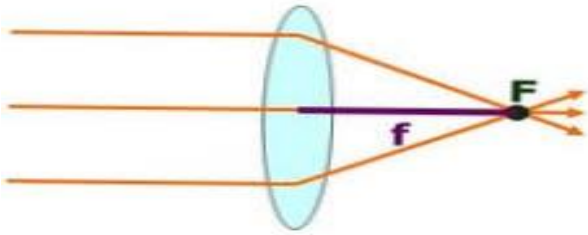
Types of lenses.

There are two types of lenses.

(i) Convex lens.
(ii) Concave lens.

Convex lens (converging lens)
Is a lens which is thicker in the middle and thinner at the edges.

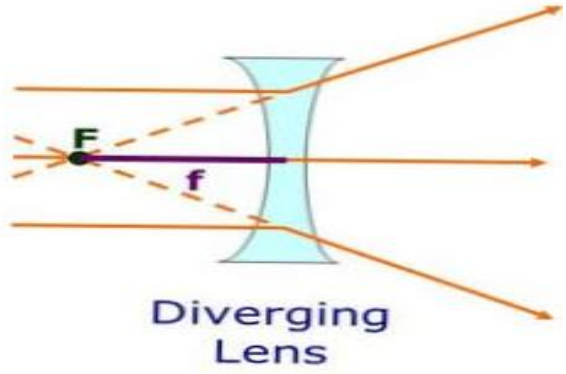
Illustration.



- When a parallel beam strikes a convex lens comes together at a point in front of the lens.

Concave lens (diverging lens)

- This is a lens which is thinner in the middle and thicker at the edges.



NB: The converging meniscus and diverging meniscus are used in spectacles. When a parallel beam of light reaches the concave lens it spreads outwards after passing through the lens.

Uses of lenses.

1. Lenses are used in photographic cameras.
2. Lenses are used in microscopes used by doctors to see germs.
3. Used in spectacles worn by people with eye defects.
4. Used as magnifying glasses.
5. Used in projectors which focus information on film slides into big pictures on the screen.
6. Used in binoculars to see distant things in magnification. In general lenses are used in optical instrument.

Optical instruments.

Optical instruments are instruments which use either lenses, prisms, plane mirrors or curved mirrors.

Examples of optical instruments.

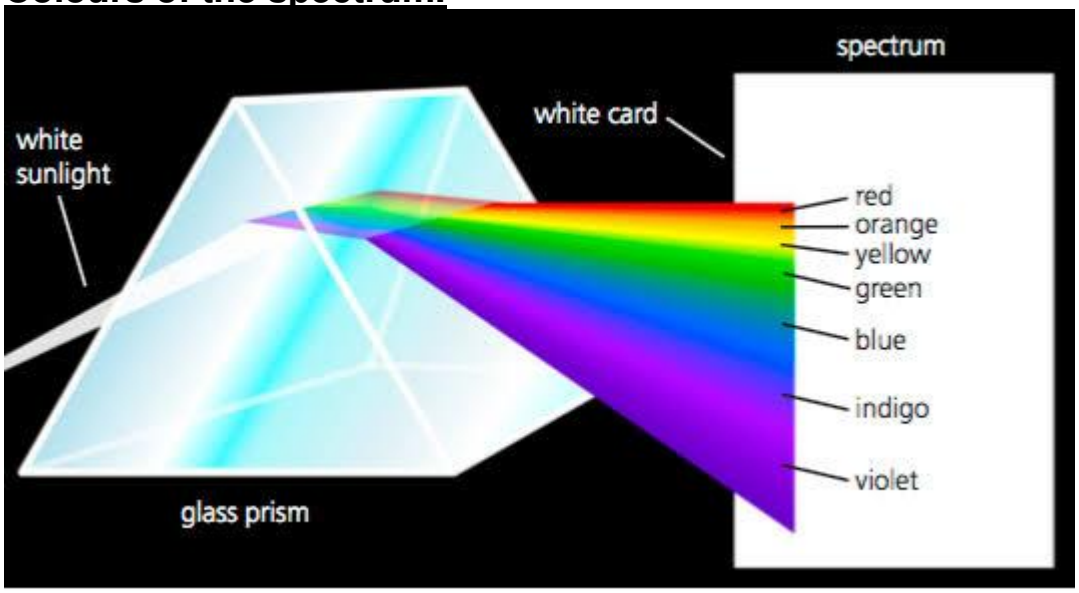
1. Cameras
2. Microscopes
3. Spectacles
4. Magnifying glasses
5. Telescopes
6. Binoculars
7. Projectors

Dispersion of light.

Dispersion of light is the splitting of white light into the seven colours of the spectrum.

- Dispersion of light is due to refraction of light.
- A spectrum is a band of seven distinct colours.
- A spectrum is formed when white light is split by the act of a prism.
- A prism is a device that splits white light into seven colours.
- An example of a natural light spectrum is a rain bow.

Colours of the spectrum.



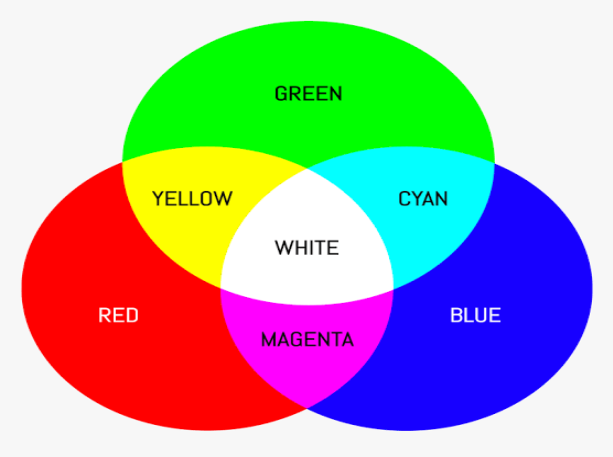
Primary colours and secondary colours.

A primary colour is one that cannot be obtained by mixing other colours e.g. red, blue and green.
A secondary colour is colour made by mixing two primary colours e.g. yellow, magenta, peacock blue pr cyan.

How to make secondary colours.

- Red + green = Yellow.
- Red + Magenta = white.
- Blue + yellow = Cyan or peacock blue.

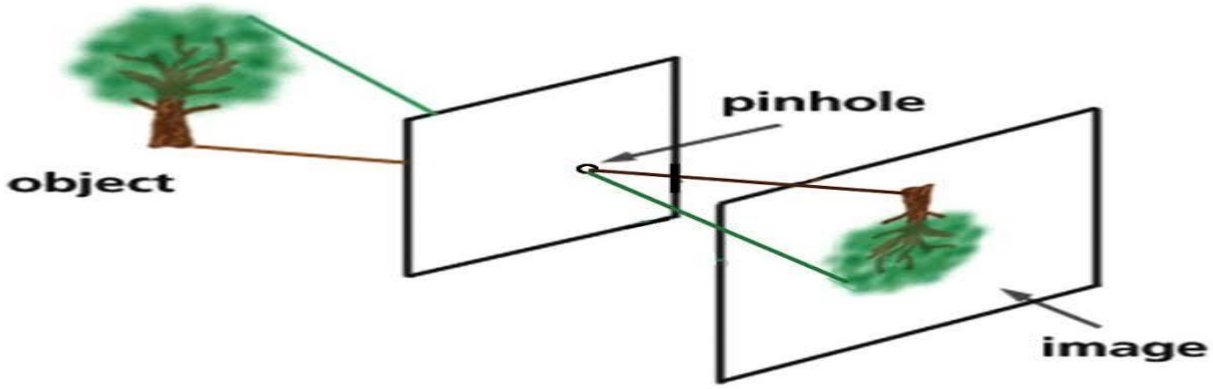
Illustration:



White is a universal colour.

A pin hole camera

A pinhole camera works on the principle that light travels in straight lines. That is why an inverted image is formed on the screen.



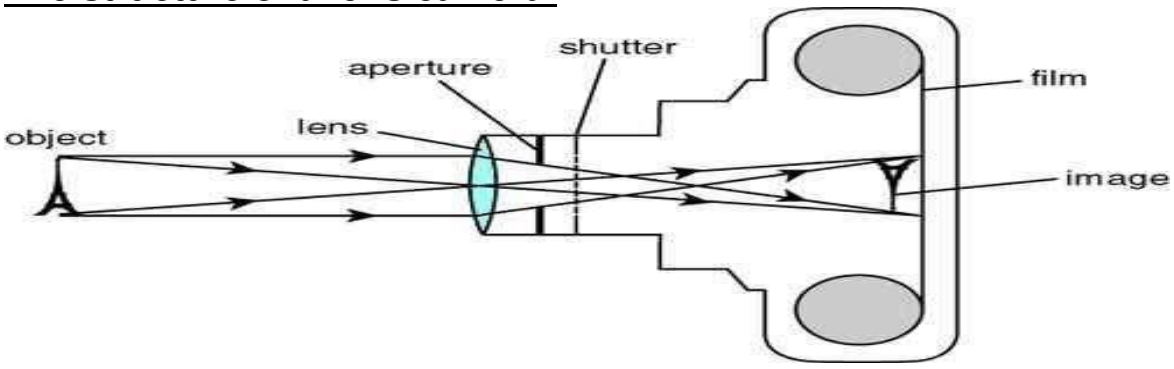
Characteristics of images formed by a pinhole camera.

- The image is diminished – smaller than the object.
- The image is inverted – upside down.
- The image is real i.e. it can be cast on the screen.

The lens camera:

- A camera is an optical instrument because it uses a convex lens.
- It consists of a light proof box with five functional parts. i.e. the lens, diaphragm, shutter, film and focusing ring.

The structure of a lens camera.



Functions of each part.

- **The film** – Is a light sensitive piece of paper on which an inverted image is formed.
- **The diaphragm** – It regulates the amount of light energy that has been allowed into the lens. It has the aperture (a circular hole) which can be changed according to the amount of light required.
- **The lens** – the lens focuses the image on the film. The film works as a screen. The camera uses a convex lens.

- **The shutter** – The shutter uncovers the aperture for a fraction of a second thus admitting light into the camera. This exposes the film.
- **The focusing ring**. This adjusts the distance of the lens from the film i.e. moving the lens forward or backward.

How the camera works

- Light is allowed into the camera by the lens, diaphragm and shutter, it falls on the film and the film is exposed.
- The exposed film is removed from the camera in a dark place and put a certain chemical to develop it. The result of developing is a negative.
- It is called a negative because the bright parts of the object photographed appear dark and the dark parts appear bright.
- The negative is printed to give a positive (photograph) which has the same shades as the object.

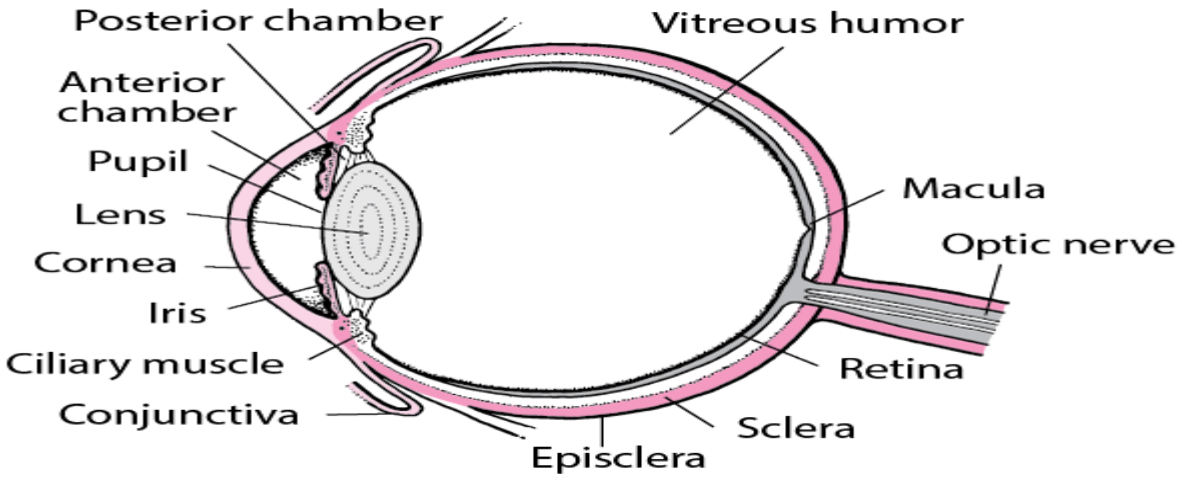
Characteristics of images formed by a camera.

1. The images are real.
2. The images are inverted.
3. The images are diminished.

The Human Eye

The eye is an organ of sight.
It is spherical in shape and enclosed in a socket of the skull called the orbit.

The structure of the eye.



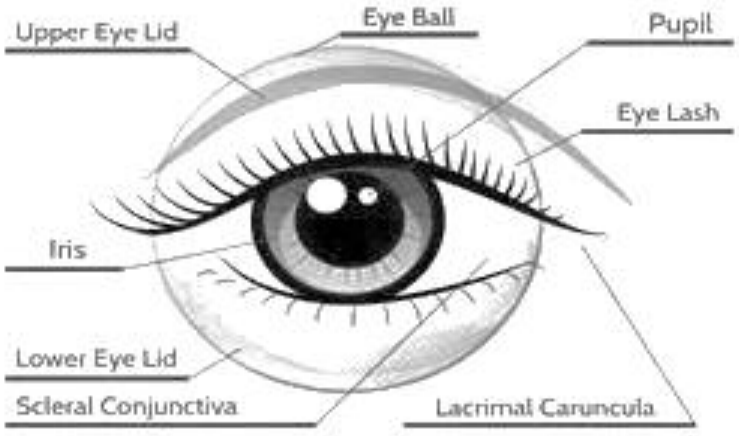
- **Retina.**
  - This layer contains light sensitive cells called rods and cones.
  - Human being see clearly during day because they have more cones than rods.
  - Cones help in day light and colour light.
  - Rods help in dim and night vision.
  - It is on the retina when the images are formed.

- **Fovea (yellow spot)**
  - It has the highest concentration of cones.
  - It gives accurate interpretation of the image and is where the sharpest image is formed.
- **Blind spot.**
  - This spot doesn't have any light sensitive cell.
  - It is where the optic nerve leaves the eye and also where blood vessels and nerves join the optic nerves.
- **Lens**
  - Refracts light rays and focus the image on the retina.
- **Suspensory ligament**
  - Holds the lens in position by attaching it to the ciliary body.
- **Aqueous and virtuous humour.**
  - These are salt solutions, sugar solution and proteins in water.
  - They refract light to produce an image on the retina.
  - They help to maintain the shape of the eye.
- **The optic nerve**
  - Transports nerve signals to the brain for interpretation.
- **Eyelashes.**
  - They help to trap large air borne particles.
- **Tear glands.**
  - They lie under the eyelids.
  - They secrete a solution of sodium hydrogen carbonate and sodium chloride (Tear).
  - They have an enzyme which kills bacteria.

NB:

The eye has the ability to focus near and far objects on the retina by changing the shape of the lens. This focusing of near and far objects by the lens is called accommodation.

Front view of the eye



Functions of parts of the eye.

1. **The eyelids.**
   - They cover and protect the eye.
   - Blinking can be voluntary or by reflex action.
   - Blinking distributes a fluid (tears) over the surface of the eye to prevent it from drying.
   - Tears clean up the eye and kills some germs which enter the eye.
2. **Conjunctiva.**
   - Is a thin layer which lies inside the eyelid.
   - It is kept moist and clean by a slow continuous stream of liquid from the tear glands.
3. **Sclerotic.**
   - It is a tough non-elastic coat around the eyeball.
   - It supports and maintains the shape of the eyeball.
4. **Cornea.**
   - It is a transparent part of the sclerotic. It helps to refract and converge light.
5. **Choroid**

- It has a dense net work of blood capillaries supplying food and oxygen to the eye.
- It is pigmented black to reduce internal reflection of light within the eye.

6. **Iris**

It regulates the size of the pupil and controls the amount of light entering the eye. It also determines the colour of the eye.

- **Pupil.** Admits light into the eye.

Characteristics of images formed by the eye.

1. The images are real.
2. The images are inverted.
3. The images are diminished.

Similarities between the eye and camera.

The human eye	The photographic camera
1. Image falls on the light sensitive retina 2. Has a convex lens. 3. It is covered by a black layer choroid. 4. Iris controls the amount of light by regulating the size of the pupil. 5. The image is real, inverted and diminished. 6. The eyelids keep out light. 7. The ciliary muscles determines accommodation of the lens.	1. Image falls on alight sensitive film. 2. Has a convex lens. 3. It is covered by a light proof box. 4. The diaphragm controls the amount of light by regulating the size of the aperture. 5. The image is real, inverted and diminished. 6. The shutter keeps out light. 7. Focusing ring determines the distance of the lens from the film.

Difference between a human eye and camera.

The human eye	The photographic camera
1. Distance between the lens and retina is fixed. 2. Shape of lens easily to focus at different distances. 3. Lens is soft and elastic. 4. Image is focused by making lens thicker. 5. Aqueous and vitreous humour refracts light. 6. The iris adjust itself.	1. The distance between the lens and film changes. 2. The shape of the lens does not change. 3. The lens is hard. 4. The image is focused by moving lens. 5. Only the lens refract light. 6. The diaphragm can be adjusted.

Eye defects

- It is the inability for an eye to focus certain distance normally.
- **Cause**
  - The eye ball being too long or eye lens being too thick.
  - This causes the image from distant objects be brought to focus in front of the retina.
  - Short sightedness can be corrected by wearing spectacles with diverging lens (concave lenes).

Eye strain.

- Abnormal shape of the eye ball.
- Abnormal shape of the lens.
- Colour blindness.

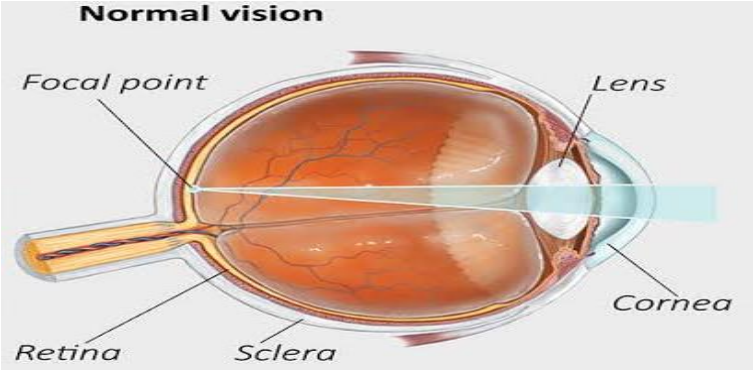
<u>Examples of eye defects.</u>

- There are four eye defects in common in humans namely.
  a) Short sightedness (myopia)
  b) Long sightedness (hypermetropia)
  c) Old age sight (presbyopia)
  d) Astigmatism.

- **Short sightedness**
  Short sightedness is a condition when a person can only see near objects clearly but cannot see distant objects.

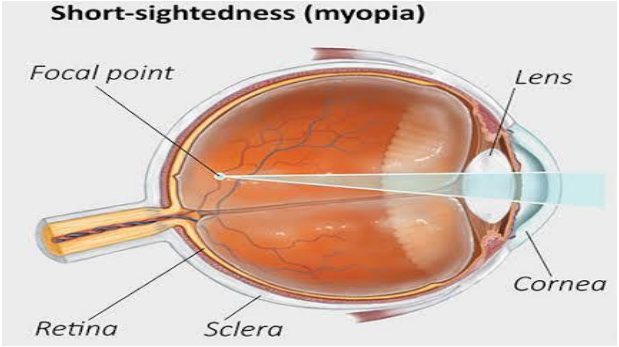
<u>Normal eye sight.</u>

Both near and distant objects can be focused on the yellow spot on the retina.



Short sightedness (myopia)

This occurs when the eye ball is longer than the normal or when the lens is too thick and the objects close to the eye can be focused properly but the point of focus for distant objects is Infront of the retina.



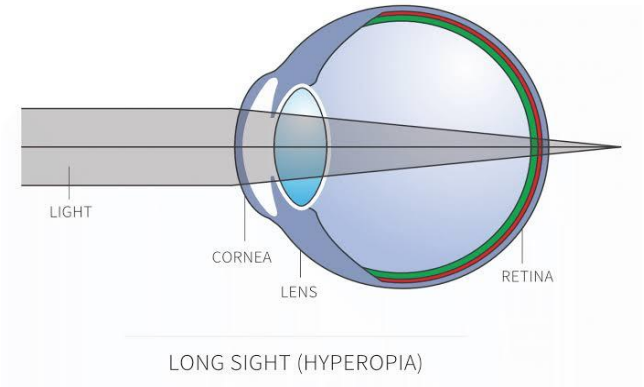
Correction of short sightedness.

Short sightedness is corrected by wearing spectacles with diverging lenses (concave lenses).

Long sightedness:

Long sight is a condition when certain people can see distant objects clearly but can not see near by objects.
Small or short eye ball or too thin eye lens.
The above causes the image from close objects be brought to focus behind the retina.

Illustration



This occurs when the eyeball is shorter than the normal or when the eyeball is small or the lens is too thin.
Distance objects can be focused properly but the point of focus for close objects is behind the retina.

Correction of long sightedness

Long sightedness is corrected by wearing spectacles with convex lenses.

Old age sight (presbyopia)

When the lens loses its elasticity it can no longer change in shape.
It becomes suitable for only distant vision (long sight). Old age sight people usually require reading glasses which have converging lenses. This happens in old age above sixty years.

Astigmatism.

It is the most common of all eye defect.
It is caused by the surface of the cornea not being perfectly smooth or spherical.
This result is blurred vision.
Astigmatism is corrected by wearing spectacles with cylindrical lenses.

DISEASES OF THE EYE

Conjunctivitis.

- It causes the swelling of conjunctiva.
- It is caused by gonorrhoea.

There are three types of conjunctivitis.

1. Acute conjunctivitis.
2. Chronic conjunctivitis.
3. Gonorrhoea conjunctivitis.

Signs of conjunctivitis

1. The white part of eye becomes pink.
2. Watery discharge from the eyelid with mucus and pus.
3. Scratching and burning sensation in the eyelid.
4. Looking at light cause pain.

Trachoma

Caused by bacteria.

- It is highly contagious and infectious disease.
- It is common in places with poor hygiene and overcrowding where water is scarce and people don't wash hands and their eyes.

How trachoma spread

1 By houseflies.
2 Sharing hands wit an infected person.
3 Sharing of the same basin with an infected person.
4 Shaking hands with another infected person.

Signs and symptoms

1 Redness and itching on the eye.
2 Watery discharge from the eyelids.
3 Swelling of the eyelids.
4 Pain while looking at light.

River blindness.

- It is caused by a tiny filaria worm (onchocerca vulvulus).
- It is carried by a small hump known as a black fly or simulium fly.
- This fly breeds in fast flowing rivers.

Signs and symptoms

- Itching skin rashes.
- Severe skin itching.

Prevention and control.

- Spraying using insecticides against the adult fly.
- Treatment of the infected person.

Other diseases.

Blepharitis.

- This is an inflammation of the margin of the eyelid.
- The eyes itch and burn and swell.

Cataracts.

- This is when the lens of the eye becomes grey and opaque.
- They are caused by an injury or continued exposure of the eye to high temperature.

Glaucoma.

- Caused by increased internal pressure of fluids.
- It can come about by itself or progress from another diseases.

Iritis.

The swelling caused by other diseases or injury to eye.

Sty

- This is a small inflammation on the eyelid. It looks like a small boil.
- It is usually a sign of poor general health, anaemia or diabetes.

Corneal ulcer.

It is caused by an injury to the cornea.

Night blindness

Care of the eye.

- Don't rub your eyes with dirty fingers.
- Don't strain your eyes by reading;
  a) Very small prints with too little or direct sunlight.
  b) In moving vehicles.
  c) In wrong postures like in bed.

- Don’t expose your eyes to very bright or glaring light.
- Always wash your eye with clean water and soap, every morning and evening.
- Never look directly at the sun, it may spoil your retina.
- If there is anything wrong with your eyes visit an eye specialist.
- When reading use a correct distance of about 30cm.
- Don’t share towels or clothes with people who have sick eyes.

THEME:MATTER AND ENERGY

TOPIC 9: ELECTRICITY AND MAGNETISM

Electricity

- Electricity is a form of energy produced by the flow of electrons.
- **Electrons** are negatively charged particles of an atom.
- **An atom** is he smallest possible unit of matter that can take part in a chemical change.
- Atoms link together to form molecules.

What is an electric current?

An electric current is a flow of electrons through the conductor. We measure electric current by use of an ammeter which gives units in amperes (amps)

Use of electricity

Electricity is used in;

1. Lighting.
2. Cooking.
3. Operating machines.
4. Heating.
5. Protection / security fences.

Advantages of using electricity

1. It is quick or fast to use.
2. It is clean and smokeless.
3. It is environmentally friendly.
4. It is easy to operate.

Dangers or dis-advantages of using electricity.

- It can shock and kill.
- It can burn property.

Types or forms of electricity

There are two types of electricity

1. Static electricity
2. Current electricity

Static electricity.

- This is the type of electricity where electrons do not flow.
- Static electricity is produced by friction between insulators.
- Lightning is an example of static electricity in nature.

Examples of static electricity.

- Lightning in nature.
- Rubbing insulators against each other.

Lightning and thunder

1. Lightning is caused when clouds become heavily charged with static electricity by means of friction.
2. This is when positively charged clouds rub against negatively charged clouds.
3. When positively charged clouds meet negatively charged clouds, a huge spark of light is seen and this is what we call lightning.
4. During lightning the surrounding air becomes strongly heated, expands and contracts suddenly which causes a vibration that produces sound called thunder.
5. The continuous noise is due to the echoes.
6. Lightning is seen before thunder is heard because light travels faster than sound in air.

Advantages of lightning in nature.

- It converts atmospheric nitrogen into nitrates for plants to use.

Dangers caused by lightning.

- It damages buildings.
- It can cause fires.

Prevention of dangers caused by lightning.

1. Install lightning conductors on tall buildings.
2. Avoid standing under tall trees during a rain storm.
3. Avoid swimming in open water during rain.
4. Always put on rubber shoes.

Current electricity.

- Is the type of electricity where electrons flow through a conductor.

Types of current electricity.

- They are two types of current electricity:-

1 Direct current electricity (DC).
2 Alternating current electricity (AC).

Direct current electricity.

This is the type of current electricity which flows in only one direction, that is from the source to the appliance.

Sources of direct current.

1. Dry cells
2. Simple or wet cells
3. Accumulators

Alternating current electricity.

Is the type of current electricity which flows in both directions, that is forward and backward.

It can be stored in form of direct current electricity and it can be stepped up and down

Sources of alternating current electricity.

1. **Hydro-electricity:**

- This is the electricity produced by the powerful running water.
- At a power station, kinetic energy of moving water turns turbines which are connected to generators that produce electricity.
- Hydro-electricity can also be produced by tides along coasts.

2. **Thermal electricity:**

- Is the type of electricity produced by burning fuel, coal or oil which contain stored chemical energy.

3. **Atomic electricity:**

- Is the type of electricity produced by burning atomic uranium mineral.

4. **Solar electricity:**

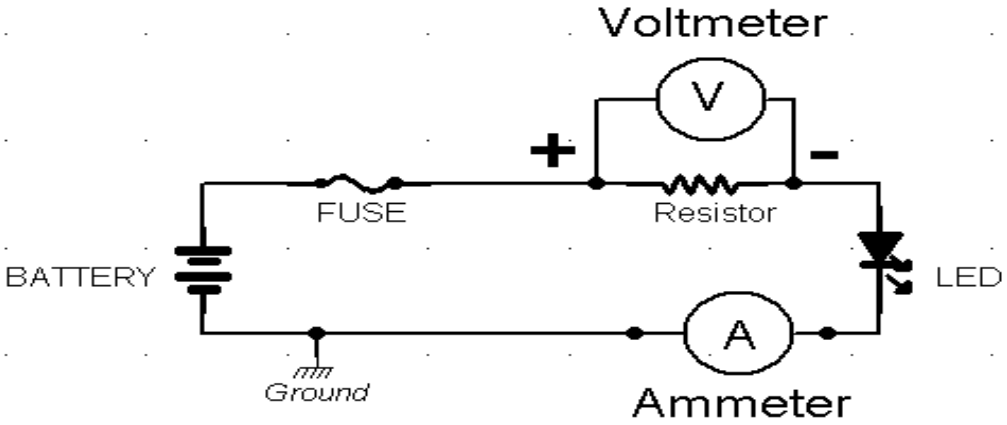
- Is the type of electricity got from the sun.
- It is got by using solar cells which trap heat and light from the sun that are sent to solar batteries to produce electricity.

5. **Geo-thermal electricity:**

- Is the type of electricity produced by steam from hot springs.

AN ELECTRIC CIRCUIT

- An electric circuit is a complete path through which an electric current flow.
- Current is the flow of electrons.



Parts of an electric circuit and their uses:

Ammeter: Measures electric current in a circuit.

Conducting wires: Is a medium for conducting current from the source to the appliance.

Switch: Completes or breaks the circuit at ones will.

Fuse: Is a safety device which breaks the circuit in case of too much current flow.

Battery: Stores chemical energy that is changed to electric energy when the circuit is complete.

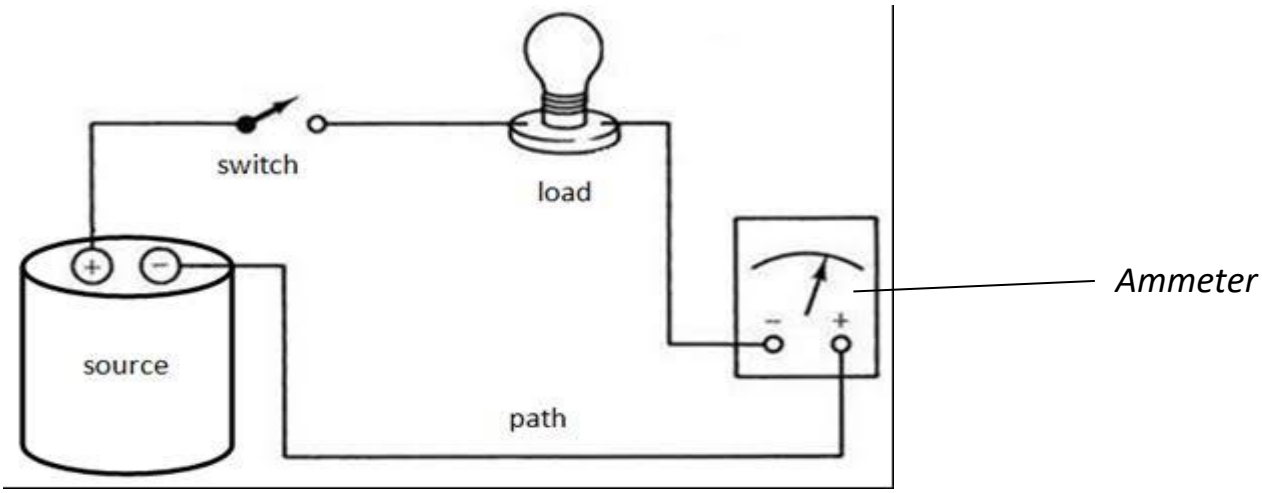
- The bulb has the ability to change electric energy to heat and light energy.

NB:

- In a simple electric circuit, electricity / current flows from the positive terminal to the negative terminal.
- Electrons flow from the negative terminal to the positive terminal.
- For current to flow easily, the positive terminal must be connected to the negative terminal if you are using more than one dry cell, e.g
- Electricity will flow if the dry cells are connected in series as shown in (a), but it will not flow as shown in (b) and (c).

Component of an electric circuit

- Dry Cell.
- Switch.
- Conductors/ wires
- Fuse.
- Light bulb
- Ammeter
- Voltmeter



Functions of each part of the circuit

- **Ammeter**: It is used to measure electric current or flow of current.
- **The switch**: it breaks and complete the circuit at one's own will.
- **The bulb**: Once the circuit is complete, the bulb produces light. A bulb has the ability to change electric energy to heat then to light energy.

The bulb will stop lighting if any of the following takes place:

1. When the filament burns out or if it blows.
2. When the fuse blows, burns out or breaks.
3. When the dry cells become exhausted.
4. If it is not fixed properly.
5. If the dry cells are not arranged properly.
6. If the circuit isn't complete.
7. If the conductor / wire isn't connected properly,

Dry cells

- Dry cells produce electricity for the appliance.
- It store electricity in form of chemical energy.
- It convert or change chemical energy to electric energy once the switch is closed or pressed.
- The cells must be arranged in series in that the positive terminal meets the negative.

A fuse

- It is safety device which breaks the circuit in case of too much flow of current.
- It is simply a wire made of an alloy of tin and lead (solder)
- The alloy has a low melting point. So, it easily melts and breaks the circuit

How does a fuse work?

A fuse wire melts and breaks the circuit if current is greater than rated value flows through it.
This prevents large current from harm or damage.

Advantages of fuses

1. Reduces the risks of electric fires in houses.
2. They protect the delicate electric equipment (appliance) by breaking the circuit before damage is done.

Reasons why a fuse may blow or break.

1. Old and weakened wires
2. Overloading the circuit
3. Presence of a short circuit
4. Too much flow of current from the source.

Energy changes in a circuit

- When the circuit is complete, chemical energy in a dry cell is changed to electricity.
- In a bulb, electricity is changed to heat and then heat to light energy.

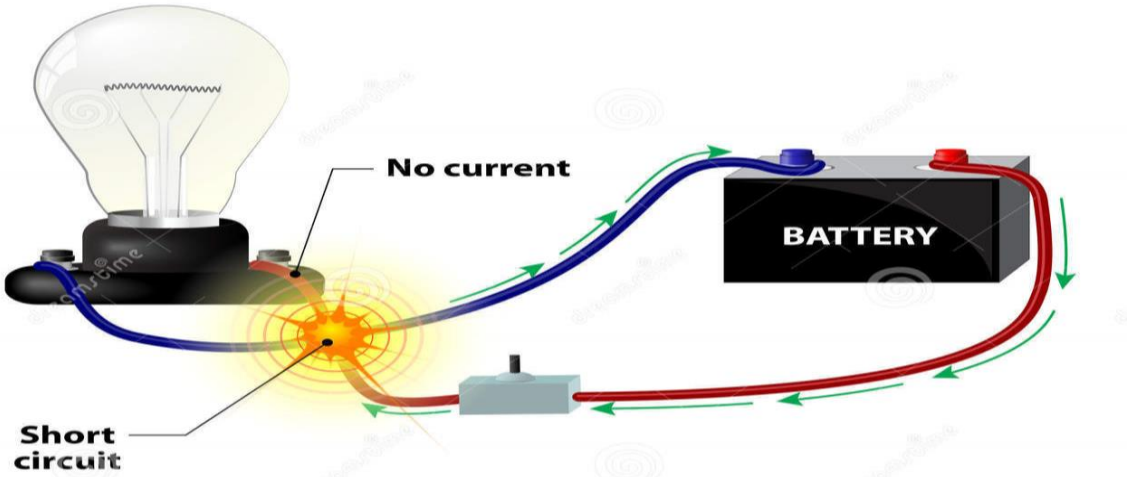
Types of a circuit

(a) **Parallel circuit**: Is one in which all positive terminals are connected by one conductor and all negative terminals are connected by one another.
(b) **Series circuits:** Is one in which the positive terminal of one cell is connected to the negative terminal of another cell to form a battery.

SHORT CIRCUITS

- Is a path of electricity with low resistance to electric pressure.
- Is a short path taken by electricity
- A path with low resistance to flow of current.

An illustration about a short circuit



When the switch is closed, the bulb doesn't light up.
The match stick instead lights up showing a short circuit which produces heat and fires sometimes.

Causes of Short Circuits

1. Dampness or rain which spoils the insulation.
2. Pushing metallic objects in the sockets.
3. Age of too old wires.
4. Over loading the circuit.
5. Damage made by rats or cockroaches to the insulation.
6. Use of faulty electrical appliances
7. Pouring water in electric appliances.
8. Poor wiring during electric installation.

Signs of short circuits

1. Over heating in the circuit.
2. Too much or little flow of electricity in the circuits.
3. Some electric appliances may give electric shock.
4. Some electric appliances may fail to work.

Dangers of Short Circuits.

- Short circuits may cause fire that may destroy property.
- Short circuits lead to destruction of electrical appliances.

How to Prevent Short Circuits

1. Using properly insulated wires.
2. Having electrical installations done by experts only.
3. Having electrical repairs done by qualified personnel.
4. By use of insulators

Insulators / conductors:

Conductors

Conductors are substances which allow electricity to flow through them.

Examples (Liquid conductors / Non-metallic conductors)

1. Water
2. Acids
3. Alkalis
4. Carbon
5. Wet wood

Examples of metals that conduct electricity

1. Silver is the best conductor of heat but it is very expensive
2. Copper
3. Lead
4. Iron
5. Zinc
6. Tungsten

Note :

1. Distilled water doesn't conduct electricity because it lacks mineral salt.
2. Copper is commonly used because it is cheaper
3. Silver is not commonly used because it is expensive.

NB : Application of conductors

- When cooking
- Ironing

Insulators

Are materials which do not allow electricity to flow through them

Examples

1. Rubber
2. Glass
3. Plastic
4. Dry clothes
5. Dry wood

NB : They protect users from electric shock / circuits.

Electric cells:

Electric cells a device that stores and produces electricity.

There are two types of electric cells.

(a) Primary cells.

(b) Secondary cells

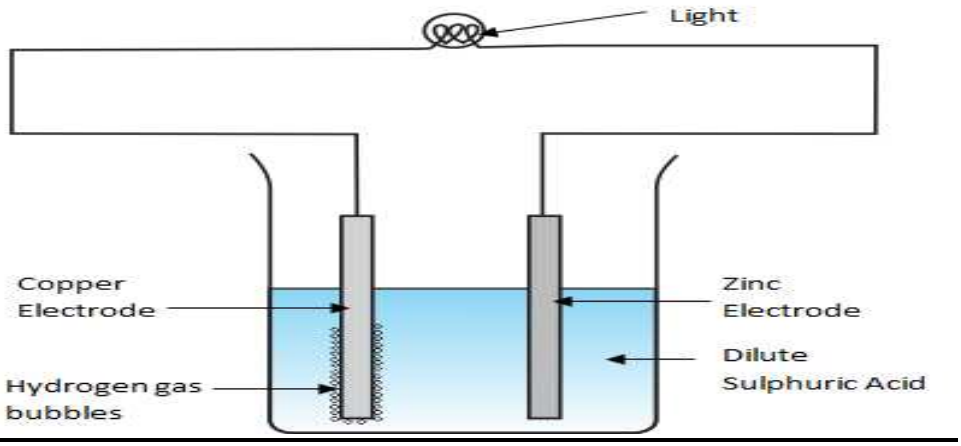
Primary cells

- These are cells that cannot be recharged once they are used up.

Examples of primary cells

- Simple cells or wet cell.
- Dry cell.

Parts of a simple cell. (diagram)



1. **Copper rod:** It acts as the positive terminal (Anode)
2. **Zinc plate:** It acts as the negative terminal (cathode)
3. **Dilute sulphuric acid:** Acts as an electrolyte .

An electrolyte is a liquid that allows electricity to pass through e.g. Lemon juice, salt solution, sulphuric acid, water etc.

- *A simple cell is not efficient because of two factors.*
  (a) Polarization.
  (b) (b) Local action

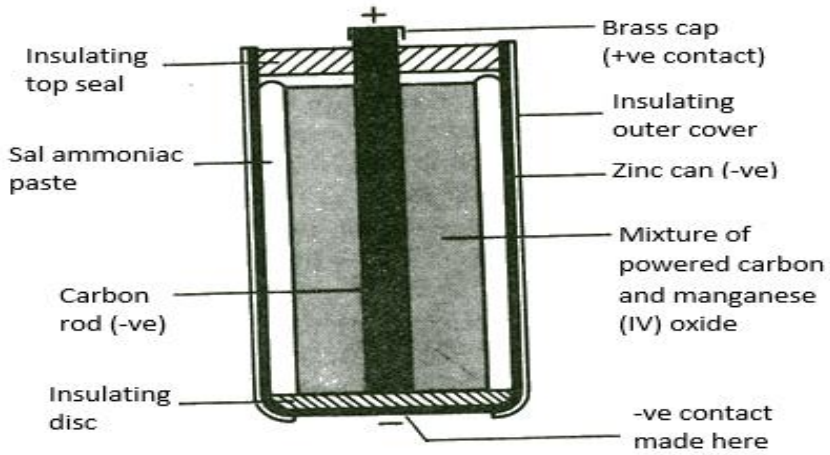
Polarization is when bubbles of hydrogen gas cover the copper rod stopping the flow of electrons.

Local action is when bubbles of hydrogen gas are seen coming off the zinc plate.

Disadvantages of simple cells.

- It is bulky.
- It can only be used in upright position.
- It produces electricity for a short time.

Dry cell (diagram)



Brass cap – the contact for the p[positive terminal

Pitch or top seal:

- Prevents ammonium chloride jelly from drying up.

Ammonium chloride paste:

- Helps in the transfer of electrons.

Electrolyte:

✓ It is made up of powdered carbon and manganese oxide.
✓ The powdered carbon provides a partial conductor across the inside of a cell
✓ It reduces the work of the cell in moving electrons
✓ Reduced the internal resistance of the cell.
✓ Absorbs hydrogen.

Manganese oxide

- Prevents a build up of hydrogen gas around the carbon rod.
- It is a depolarizing agent.
- Depolarization leads to leaking of cells when exhausted.

Carbon rod:

- Is a non-metallic conductor of electricity found in a dry cell.
- It is made form graphite.

Zinc can:

- It acts as the negative terminal.

Secondary cells:

- These are cells which can be recharged once exhausted.

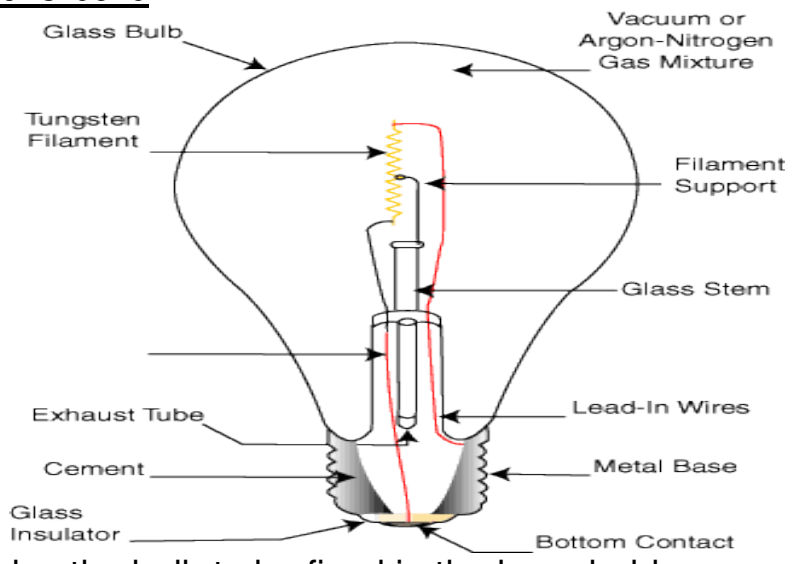
Examples of secondary cells

- Lead acid battery
- Telephone batteries.

An electric bulb.

- Is an electric appliance that changes electricity to heat and light energy.

Parts of an electric bulb



Brass cap: Enables the bulb to be fixed in the lamp holder.

Sealing tube: Enables air to be removed from the bulb and this prevents the filament from combining with oxygen.

Coiled filament:

- The filament changes electrical energy to heat and then light energy.
- The filament is coiled to increase resistance to electric pressure.
- The filament is made up tungsten which has a high melting point.
- Tungsten is got from a mineral called wolfram.

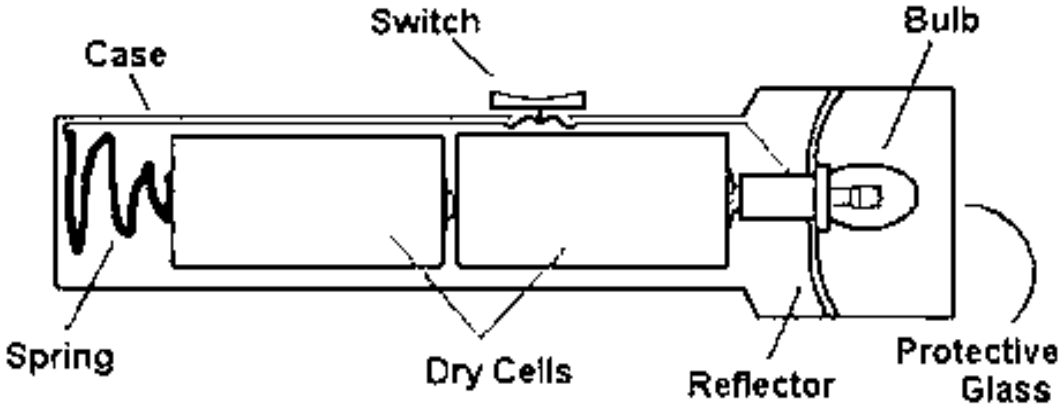
Glass bulb

- Holds a mixture of two gases. Argon and Nitrogen.
- These gases prevent the evaporating of tungsten.

An electric torch:

A torch uses dry cells. In most cases, the dry cells are placed in series.

Parts of the torch



1. **The switch**: Breaks and completes the circuit at a user wish.
2. **The Bulb**: Changes electric energy into heat and heat to light energy.
3. **The battery (dry cell)** : changes the stored chemical energy to electric energy.
4. **The reflector**: The reflector directs lights into a diverging beam
5. **The case and springs**: Completes the circuit and also keeps the dry cells tightly closed.

However, the torch may fail to work if;

1. The bulb is not fixed properly.
2. The dry cells are not arranged properly
3. The cover is not properly fixed.
4. When the dry cells are wrongly arranged.
5. When the dry cells are used up.
6. When the bulb is blown.
7. When some parts of the torch are rusted.
8. When the used bulb has a higher voltage than the used torch.

If it starts working properly and then later fails.

- The bulb could have blown
- The dry cells could have become exhausted

Merits / advantages of using current electricity.

1. It is easy to use compared to charcoal or firewood.
2. It is quick so it saves time.
3. It helps to conserve the environment by saving trees for firewood and charcoal.
4. Neat and clean work is produced using electricity.
5. It can easily transform into other forms of energy e.g electric to heat, electric to light, electric to sound, electric to magnetic.
6. It does not pollute the environment.

Demerits / disadvantages of using electricity

1. It causes fire
2. It shocks and kills people once used carelessly
3. Poor people can't afford paying bills, so it is expensive.

Equipment / appliances which use electricity in our homes

- Telephone receiver, radio receiver, flat iron, television set, juice blender, electric kettle, water heater, micro wave oven.

Calculation of voltage:

- One dry cell has a voltage of 1.5V.
- To calculate the voltage of an electric appliance, you multiply the number of dry cells by 1.5 volts.

Plugs and sockets:

There are two types of plugs, i.e. a two-pin plug and a three-pin plug.

Three pin plugs

- Three pin plugs are used in flat irons, cookers, water, heaters, coils, hot plates, electric kettles etc.



Wiring a three-pin plug / cable / grid.

- Neutral wire, coloured black or blue takes back the current to the source.
- Live wires usually red or brown brings current from the source.
- Earth wire green or yellow minimizes any electric leakage or excess current and also prevents us from being shocked. (diagrams)

Devices connected to electricity:

(i) Generator:

- A generator produces electricity by changing mechanical energy in form of kinetic energy to electric energy.
- This is done by rotating coils of wire in a strong magnetic field.

How to make a generator produce more electricity:

1. Increasing the number of turns in the coil.
2. Increase the magnetic filed.
3. Increasing the speed of rotation.

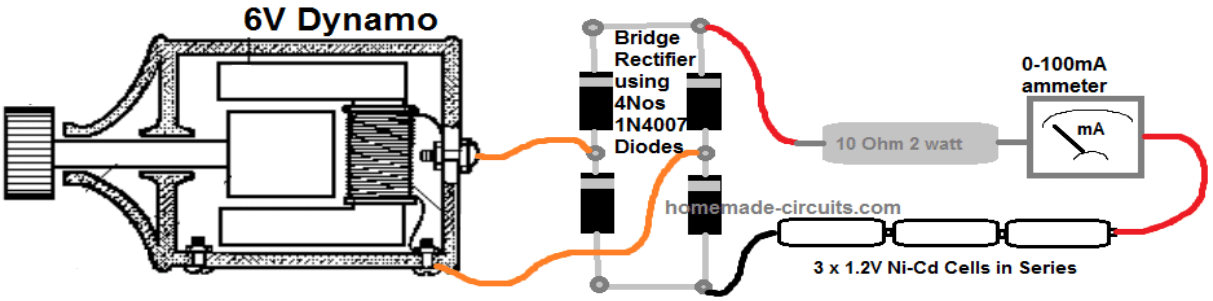
(ii) Dynamos.

A dynamo produces electricity by converting mechanical energy in the form of kinetic energy into electric energy.

- An example of a dynamo is found on a bicycle and bigger ones on vehicles.

Those in vehicles help in charging the batteries.

A bicycle dynamo



Electric motors

Electric motors are the reverse of generators and dynamos. Generators and dynamos use mechanical energy to produce electricity while motors use electric energy to produce mechanical energy.

Uses of motors

1. They start engines of cars
2. They move buses / trains
3. They are used in lifts, vacuum cleaners, egg beater, electric sewing machines, radio cassettes, etc.

Static electricity:

Static electricity is a form of electricity in which electrons don't move

Static means **not moving or stationary**.

1. It has two static charges, positive and negative charges.
2. The positive and negative charges.
3. The positive and negative charge attracts each other while positive and positive or negative and negative repel each other.
4. Like charges repel each other while unlike charges attract each other.
5. Static electricity is produced by friction.

Note:

Static is always made when insulators are rubbed together.

1. One insulator gains electron and becomes negatively charged while the one which loses electrons becomes positively charged.
2. Different charges, (positive and negative), attract each other while some charges, negative and negative or positive and positive repel each other.
3. Static electricity is also called stationary electricity.
4. The negative charges are called <u>electrons</u> while the positives are called <u>protons.</u>

Differences between static and current electricity

Static	Current
It occurs in insulators i.e plastics	It occurs in conductors i.e metallic cables
The charge is on the surface of the insulator	The charge is inside the conductor.
The charge doesn't flow from one point to another	The charge flows along the conductor i.e the entire conductor is filled with the charge.
Static electricity has both protons and electrons active.	Current electricity has only electrons active.

LIGHTNING

1. It is a form of static electricity.
2. It is sometimes referred to as a form of electricity in nature.
3. It is caused when clouds become heavily charged with static electricity by means of friction between the clouds and big masses of air in space. The clouds may be charged either positively or negatively.
4. When a positively charged cloud meets a negatively charged cloud, attraction occurs and a huge spark passes between the two clouds.
5. This spark may sometimes pass to the ground, which we call lightning or the electrons may jump from the clouds to the earth or from the earth to the clouds.
6. During this passage of lightning, the surrounding air becomes strongly heated and expands suddenly and then contracts quickly as is cools, the air is thus set vibrating producing or continuous noise is due to echoes.

Effects of lightning:

- ✓ Can cause damage to buildings.
- ✓ Can set things on fire e.g trees and buildings. So it is not advisable to stand under trees when it is raining because lightning may strike the tree.

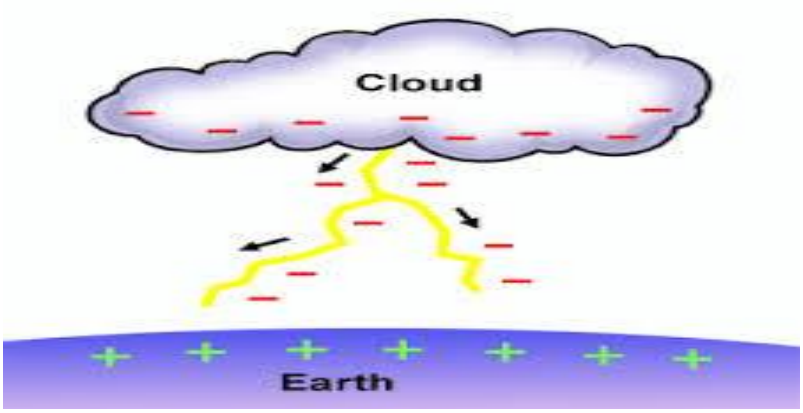
Advantages of lightning

- ✓ During lightning, nitrogen is transformed into nitrates and fixed into the soil.

Prevention of lightning:

1. Lightning usually strikes the tallest point.

2. To prevent this, a lightning conductor or lightning ancestor is used on the tallest point of the building.
3. It consists of a spiked rod attached to a long copper or aluminium rod, one end of which is buried in the earth.
4. If lightning strikes the building, it passes harmlessly through the rod and into the earth.



Rules governing electricity – the Nevers

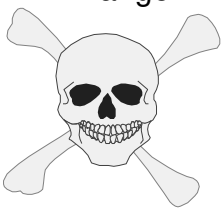
1. Never touch a switch with wet hands because water conducts electricity.
2. Never over load connections
3. Never put anything in the fuse box or meter box.
4. Never connect an electric appliance you're not sure of.
5. Never touch an electric plug while bare footed
6. Never stand under trees when it is raining, lightning may strike the tree.
7. Report to UMEME offices near you for any broken mains or hanging wires or ring 185 across all networks.

Safety precautions in handling electricity / electrical appliances

1. Switch off electrical appliances incase of a problem
2. Do not touch live bare electric wire.
3. Never throw objects on the main power line
4. Have all electric repairs done by experts
5. Never operate electrical equipment with wet hands.
6. Never push metallic objects into electric sockets.

Illustration showing dangers of electricity

Danger



Hatari

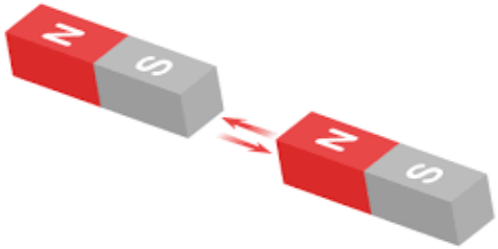
MAGNETISM

Magnetism is a force in a magnet that has the ability to push or pull magnetic substances

Magnet

A magnet is a piece of metal with the ability to attract magnetic substances
A magnet is made up of two poles named the North pole and south pole.

Illustration



Magnetic substances are materials which are attracted by a magnet.

Examples of magnetic materials

1. Iron
2. Steel
3. Lead
4. Cobalt

Non-magnetic materials are materials which are not attracted by magnets

Examples of non-magnetic materials

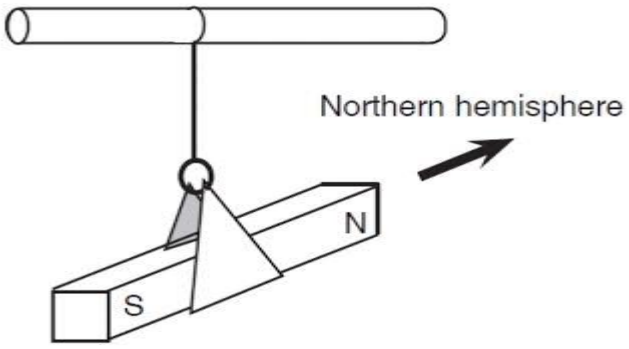
1. Rubber
2. Plastic
3. Paper
4. Cloth
5. Wood

Magnetism is the property of a magnet, which enables it to pull or push other magnetic substances or materials

Magnetism is the ability of a magnet to attract other magnetic substances.

The illustration of properties of magnets

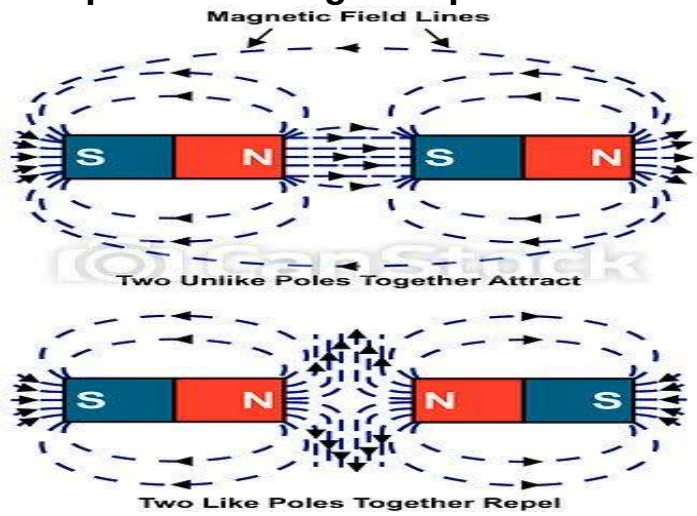
1. **A freely suspended magnet faces in the North – south direction**



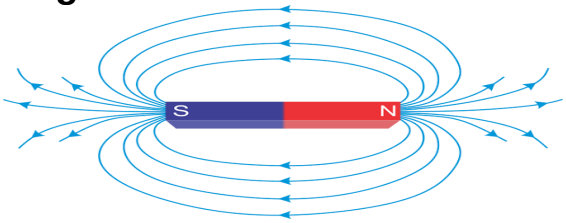
2. **Magnets are strongest at poles**



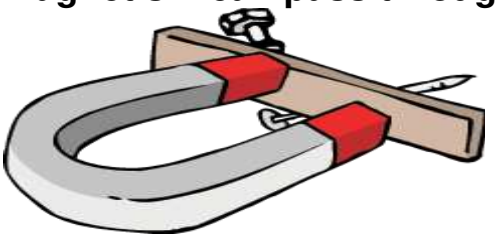
3. **Like poles of a magnet repel while unlike poles attract each other**



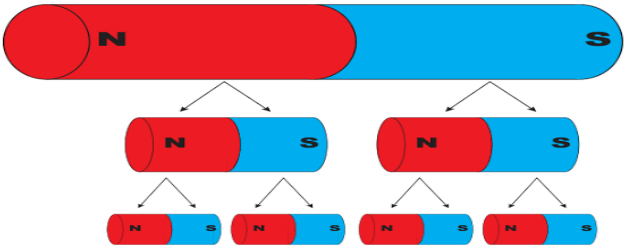
4. **Magnetic lines of force run from North pole to south pole**



5. **Magnetism can pass through a non-magnetic material**



6. **When a magnet is broken into pieces each piece becomes an independent magnet.**



Types of magnets

1. Natural magnets
2. Artificial magnets

Natural magnets:

1. These are magnets that exist on their own without a man making them
2. They are:

(a) Lodestone (Magnetite)
(b) The earth

Artificial magnets:

These are magnets made by man.
They are named according to their shapes.

These include;

1. Horse shoe magnet
2. Bar magnet
3. Needle magnet
4. Cylindrical magnets
5. Electro magnets.

Types of artificial magnets

These are:

Temporary magnets.

Are magnets which lose their magnetism easily e.g electro magnet

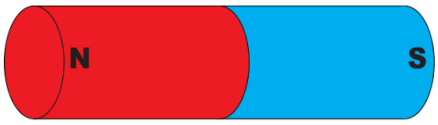
Permanent magnets.

Permanent magnets retain their magnetism for a long time.

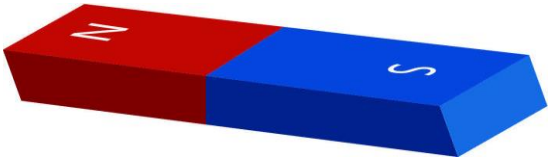
Examples of permanent magnets

1. Horse shoe
2. Bar magnet
3. Cylindrical magnets
4. Needle magnet

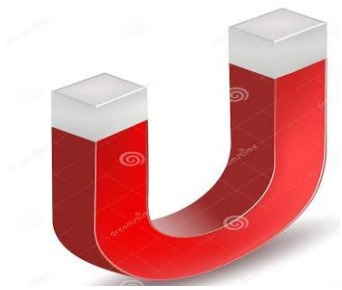
a) Bar magnets



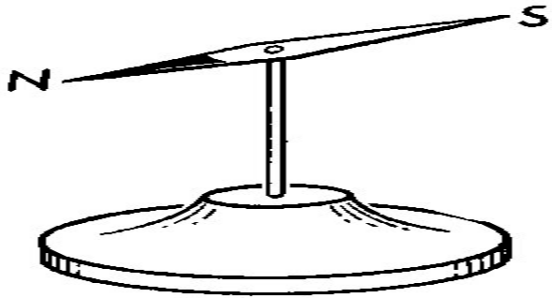
Cylindrical magnet



Rectangular bar magnet



b) Horse shoe magnets



(iii) Compass needle/magnet needle

Terms used in magnetism:

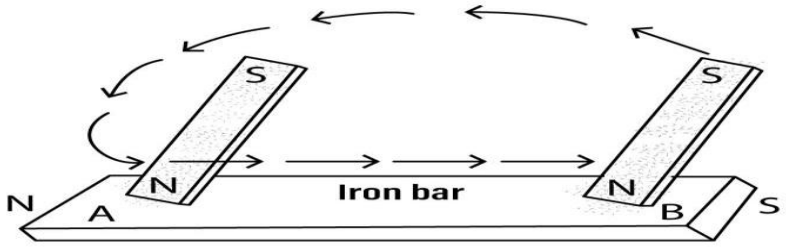
6. **Poles of magnets**: These are the ends of a magnet
7. **Magnetic field**: This is an area around a magnet where the force of magnetism is formed.
8. **Magnetic lines of force**: These are lines around a magnet through which magnetism runs from North to South pole. (illustrations)

Ways of making magnets.

1. Stroking method
2. Induction method
3. Electrical method

Single touch method

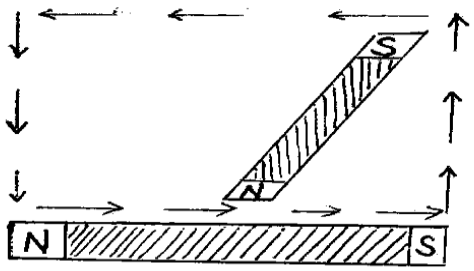
This is done by stroking a magnetic substance with another magnet in the same direction with the same pole of the magnet. The end of the magnetic substance last touched or stroked becomes the opposite pole of the magnet used.

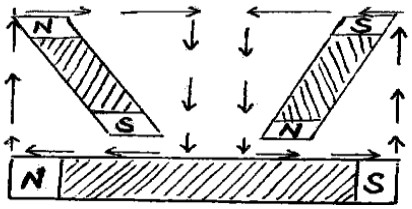


Single touch method

Double touch method / double stroking:

- This method is done by stroking using two bar magnets.
- Unlike poles and opposite direction must be kept and followed.
- Still opposite poles are produced at the point last stroked.





The induction method:

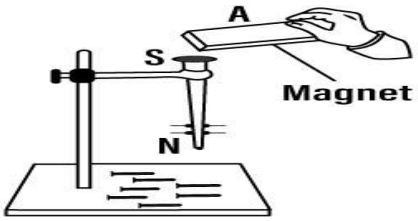
This is achieved or done by attaching a magnetic substance (steel bar) on to a permanent magnet.

The magnetic substance becomes magnetized by induction. The unlike poles are immediately formed to the ends of the magnet.

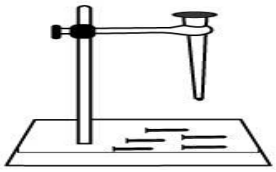
Note: the new magnets are known as <u>induced magnets.</u>



No pin clings to the nail



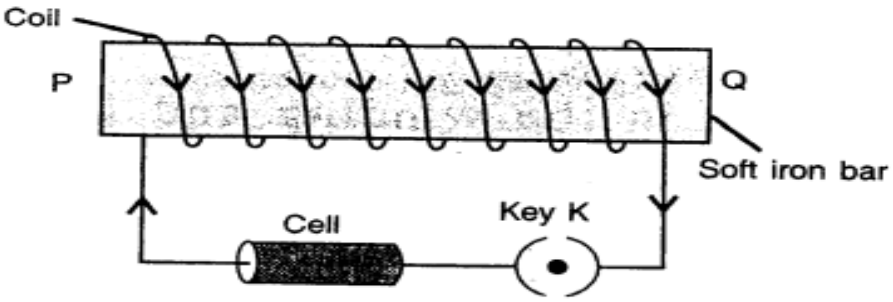
Some pins cling to the nail


On removal of the magnet, pins fall down

The electrical method

This is done by placing a steel or iron bar in a coil of wire called a solenoid and electric current passed through the coil.

This is the best method of making magnets, but the magnets made by this method are called <u>electro magnets.</u>



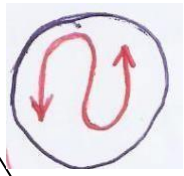
Making a bar electromagnet

The polarity of an electromagnet can be found using the following rule;

If current flows clockwise, the end where current enters the solenoid, becomes the <u>North</u> <u>pole</u> and if it flows anti – clockwise, the end acts like a South pole.


Clockwise

Demagnetization


Anti-clockwise

Demagnetization

Demagnetization or demagnetizing is a way of making a magnet to lose its magnetism

Ways of destroying magnets (demagnetization)

1. By strong heating.
2. By hammering / hitting.

3. By leaving the magnet in an East-west direction for a very long time.
4. Leaving magnets in water to rust.
5. Keeping magnets without iron keepers.
6. Keeping magnets with similar poles together for a long time.
7. Passing it through alternating current voltage several times.

Ways of protecting magnets against demagnetization.

1. By painting them to prevent them from rusting.
2. Keeping them in iron keepers.
3. Storing them while facing in the north-south direction.
4. Storing them with unlike poles together.
5. Protecting them against strong heat.

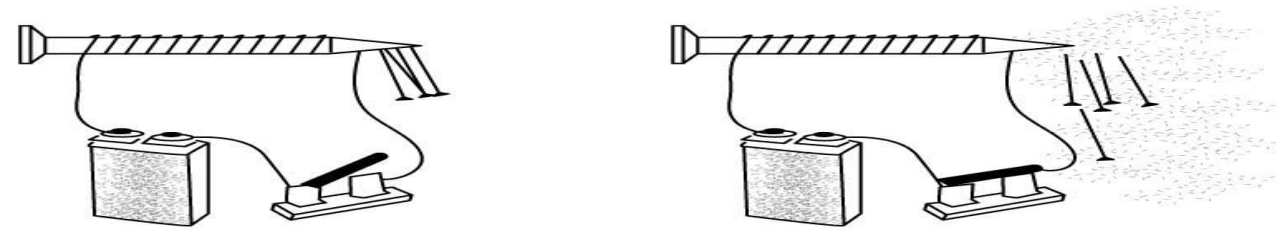
Uses of magnets

1. They are used to pick up pins, needles or any other magnetic substances.
2. Used in hospitals to remove iron fragments from eyes, wounds, etc.
3. Keeps doors of cabinets and refrigerators closed.
4. Magnets hold kitchen knives, spoons, etc. onto the walls.
5. They are use in compasses in aeroplanes and submarines to find direction.
6. Used in earpieces and telephone receivers.
7. Used in generators in the production of electricity.
8. Used in loudspeakers and microphones.
9. Used by watch repairer, cobblers and shoe makers to hold tinny nails.

Electrical method

Electrical method is a method where current is used to make a magnet. The magnet made is called an electro magnet.

Illustration



a. Iron nail behaves like like a magnet

b. Iron nail no longer behaves like a magnet

Magnetizing by using electric current

Ways of increasing the strength of an electro magnet

1. Increasing the voltage
2. Increasing the turns in the solenoid

Advantage of using an electro magnet.

- Its strength can be increased

An electromagnet can be demagnetized by passing it through alternating current.

Examples of equipment that use electro magnets

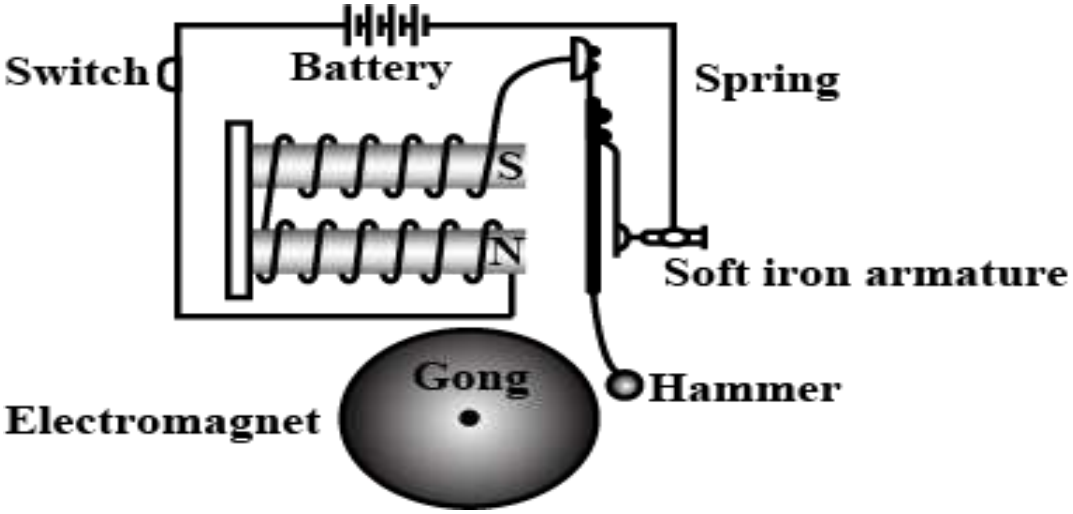
1. Electric bell
2. Sound amplifiers
3. Generators

Use of electric magnets

1. It is used in lifting heavy metallic scrap during smelting
2. Used in electric bells

Electric bell

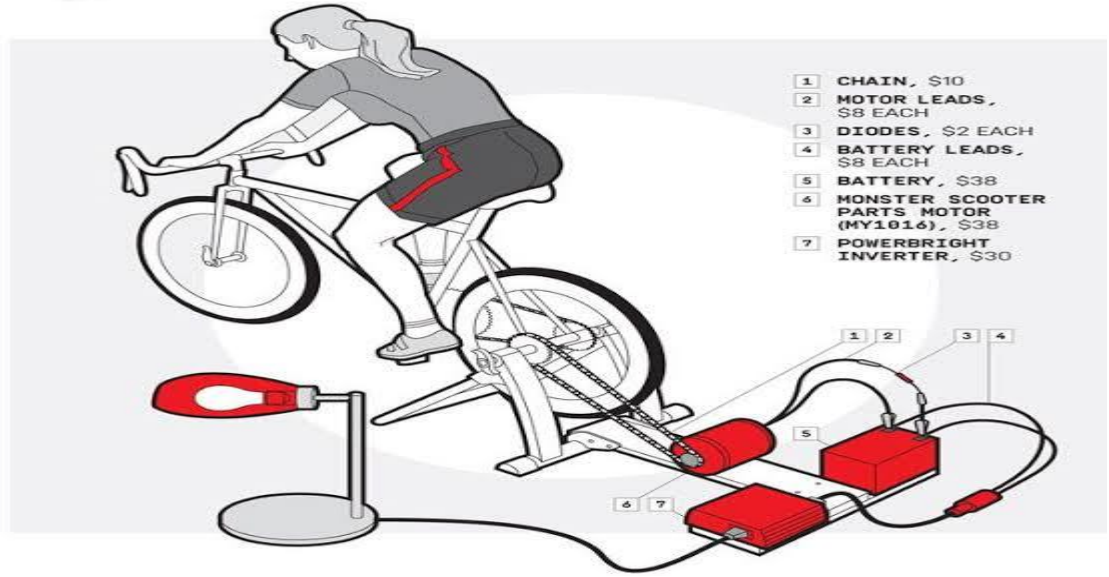
An illustration of an electric bell



Generating electricity using a dynamo

1. A dynamo is an electrical generator which produces electrical energy in form of direct current
2. It converts mechanical energy to electrical energy.
3. It helps in production of electricity when the magnet is made to rotate.
4. Dynamos are found in bicycles and vehicles

Illustration



THEME: MATTER AND ENERGY

TOPIC 10: SIMLPE MACHINES AND FRICTION

What is a machine?

- A device or tool used to simplify man's work.

How do machines simplify work?

- By reducing the forced used to do a piece of work.
- Changing the direction of forces.
- Increasing the speed of doing work.

Types of machines.

The two types of machines are

a) **Complex machines**

Complex machines are these made of many component parts and need training to use them. E.g tractor, sewing machine.

b) **Simple machines** – these with few parts and do not need special training to use them. e.g knife , panga , hoe

Common terms used in machines.

(i) Work:- is a product of force and distance moved by the load.
Work can also be defined as the result of any action requiring energy.
Work done = force x distance.
Work is measured in units called joules

(ii) Force: is a push or pull exerted on an object. Force measured in Newtons (N).
NB: 1kg = 10N.

(iii) Power: Is the rate at which energy is changed from one form to another i.e. rate of doing work. Power is measured in units called watts (W) or Kilowatts (KW).
NB: 1KW = 1000w.

(iv) Mass: is the quantity of matter contained in a body. Mass is measured in grams.

TYPES OF SIMPLE MACHINES.

What are the main groups of simple machines?
The six main groups of simple machines are;

(i) Levers
(ii) Inclined plane (The slope)
(iii) Wedges
(iv) Screws
(v) Pulleys
(vi) Wheels and axle

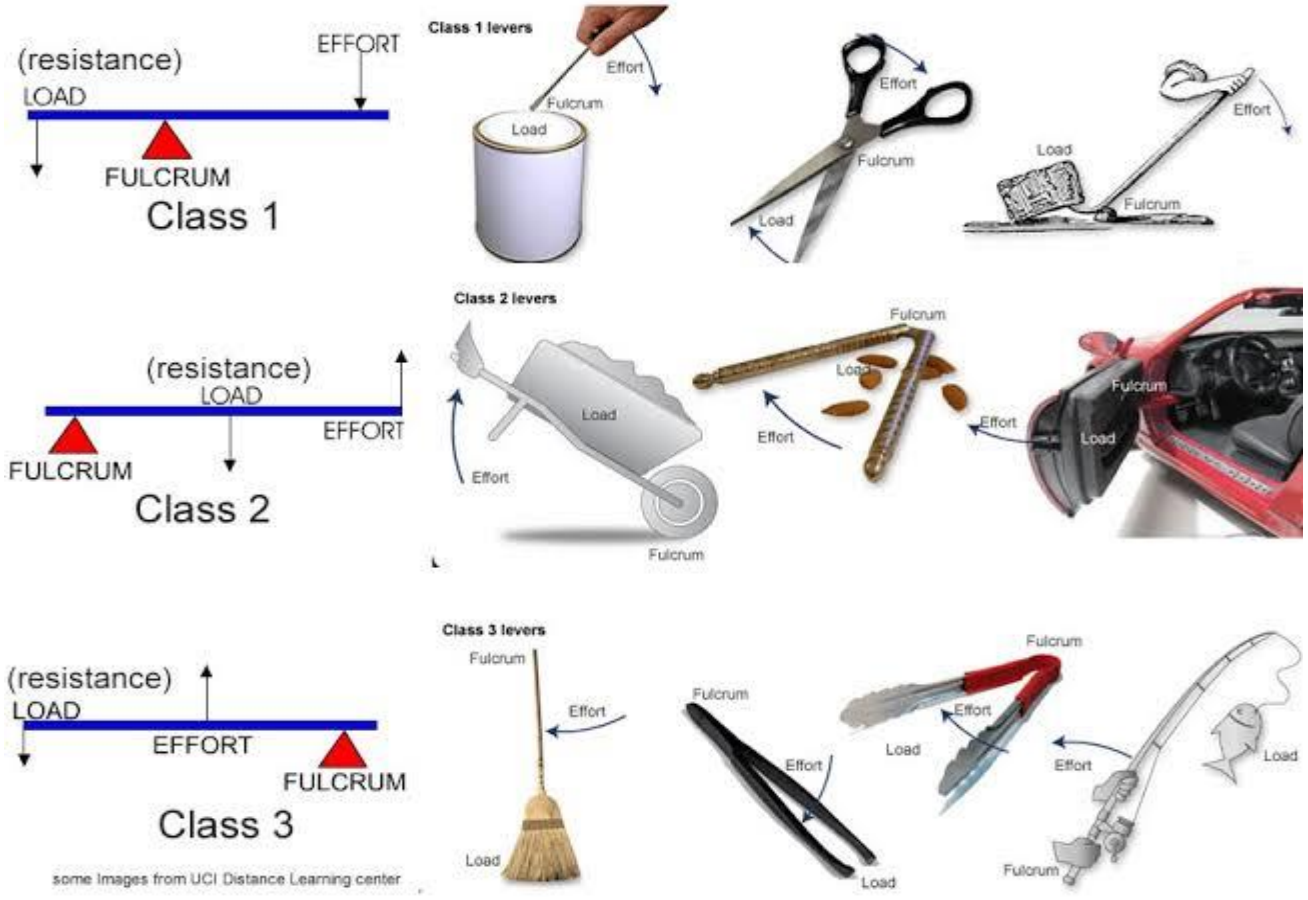
a) LEVERS

What is a lever?

- Rigid Bar (rod) turning freely at a fixed point called pivot (fulcrum).
- Name the main parts of a lever.

The main parts of a lever

1. **Load (L)** – the force (weight) that is to be overcome.
   - some times load is called **resistance**.
2. **Effort (E)** – the force we exert (apply) when using a lever.
3. **Fulcrum (F)** is a fixed turning point.
4. **Effort arm** – the distance from effort to the fulcrum.
5. **Load arm** – is the distance from load to the fulcrum.



CLASSIFICATION OF LEVERS

- Levers are grouped according to position and arrangement of load, fulcrum and effort.
- They are classified into three groups, namely;
  1. First class lever.
  2. Second class lever.
  3. Third class lever

- The classes are determined basing on the force that lies between the other two.

<u>FIRST CLASS LEVERS</u> (**EFL / LFE**)

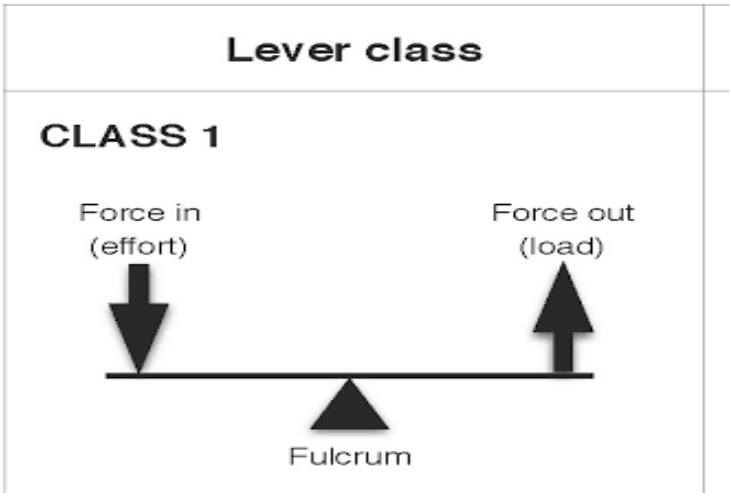
This is where the fulcrum lies between the load and effort.

Examplesof first class levers are;

1. Crow bar.
2. scissors
3. Pliers
4. See saw
5. Lid opener
6. Beam balance

- **How do first class levers simplify work?**

- By reducing the load arm and increasing effort arm so that less force is used.
- Load and effort move in different directions.



NB : A pair of scissors and pliers are called double lever because they have two stiff rods with one turning point

<u>SECOND CLASS LEVERS</u> (PLE/ ELP)

- This is where the load is placed between the pivot (fulcrum) and effort.
- **What are the examples of 2nd class levers?**
  (i) Wheelbarrow
  (ii) Human foot
  (iii) Bottle opener
  (iv) Oar of a boat
  (v) Nut cracker.

How does a second-class lever simplify work?

- Makes load and effort move in the same direction.
- Reduces the load arm and increases effort arm so that less effort is used.

THIRD CLASS LEVER

- This is the lever where the effort lies between the load and fulcrum.

Examples of third-class levers.

1. Pair of tongs
2. Pair of tweezers
3. Human arm
4. A spade when in use
5. fishing rod
6. A hoe in use

What is the advantage of using a third-class lever?

- The effort moves through a shorter distance.

MOMENTS

What is a moment?

- This is the turning effect of a force about a point.
- A force acting on a point left of the pivot tends to turn it anti clockwise while a force acting on the right tends to turn the lever clockwise.
- For the lever to balance or be in equilibrium, the left side moments must be equal to the right-side moments.

The Law of levers

- The sum of clockwise moments equals the sum of anticlockwise moments. OR the product of clockwise moments is equal to the products of anticlockwise moments i.e. Load X Load arm = Effort x Effort arm.

Worked examples on levers

- A man weighs 80kg and sits 4m away from the pivot of a sea saw. Where will his wife who weighs 60Kgs sit in order for them to balance?

Solution:

Load = 80Kg
Load arm = 8m

Load x Load arm = Effort x Effort arm
80 x 4m = 60 x X

Effort = 60Kg

320 = 60x

Effort arm = X m

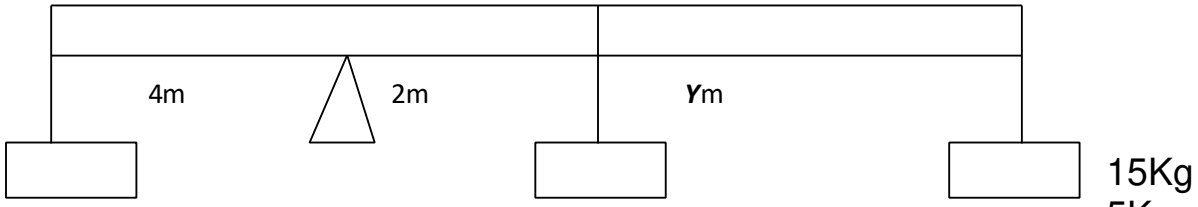
$$\frac{\cancel{320}^{16}}{\cancel{60}_{3}} = \frac{\cancel{60x}^{1}}{\cancel{60}_{1}}$$

$$\frac{\cancel{16}}{3} \quad 5\tfrac{1}{3} = X$$

1

The wife should be $5\frac{1}{3}$m away from the fulcrum.

Example 2.
Calculate the value of Y needed to balance the scale.



(L x LA) = (Ex EA) + (E x EA)
(15 x A) = (5 x 2) + (10 x (2 + y))

60 = 10 + 20 + 10Y

60 = 30 + 10y

60 - 30 = 30 - 30 + 10y
= 10y

30

$\frac{30}{10} = \frac{10y}{10}$

3 = y

Y = 3m

Exercise

Terms used with machines
Mechanical advantage (MA)

- This is the number of times a machine simplifies a given work.
- MA is the ratio of load to effort i.e.

MA = Load
Effort.

NB: If the MA of machine is greater than 1 less effort is used. Whereas when the MA is less than one a lot of effort is needed.

Worked example:

An effort of 40N is applied to a lever to overcome a load of 200N.

Calculate the MA of the machine.

Solution: MA = $\frac{\text{Load}}{\text{Effort}}$

$= \frac{200N}{40N}$

$= 5$

NB: It means work becomes five times easier to do.

2. VELOCITY RATIO: (VR)

- This is the ratio of the distance effort moves to distance moved by the load.

VR = DME i.e. $\frac{\text{Distance Effort}}{\text{Distance load}}$

moves DML moves.

The velocity ratio of a lever is the ratio of length of effort arm / Length of Load arm

3. EFFICIENCY OF A MACHINE

The efficiency of a machine is the ratio of the work output to work input of a machine.

Efficiency of a machine is always expressed in % and is normally less than 100 due to friction.

- The output is the work done on the load by the machine.
- The input is the work done by the effort on the machine.

How can the efficiency of a machine be improved?

- Replacing and repairing worn out parts.
- Regular oiling (lubrication) to minimize friction.

$$\textit{Efficiency} = \frac{\textit{output}}{\textit{Input}} \times 100.$$

Example: By using a machine, an effort of 30N was moved through a distance of 15m to raise a load of 120N to a height of 3m. Calculate the efficiency of the machine.

Efficiency $= \frac{\text{Load x Load distance}}{\text{Effort x Effort distance.}} \times 100.$

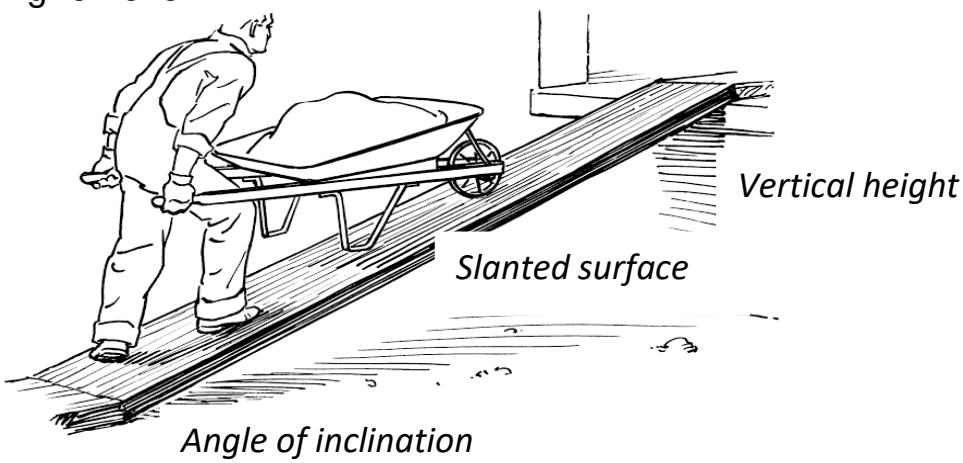
$= \frac{120N \times 3m}{30N \times 15m}$

$= \frac{4}{5} \times 100.$

$= 80\%$

INCLINED PLANES /SLOPES.

- An inclined plane is a sloping (slanting) surface connecting a lower level to a higher level.



- The vertical height of the inclined plane is the distance moved by load while the slanting surface is the distance moved by the effort.

How do inclined planes simplify work?

By increasing the length of the plane and reducing the angle of inclination.

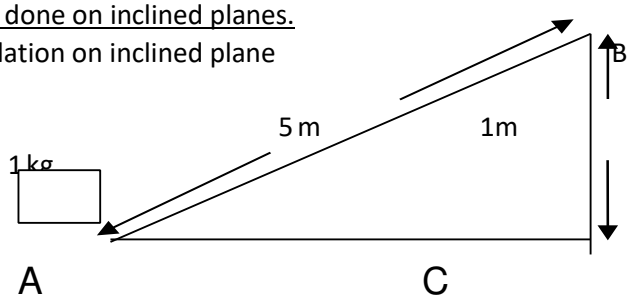
Give the examples of inclined planes. (illustrate them)

- Stair case (steps)
- • Winding road (uphill).
- Ramp

A ladder leaning against the wall.

Work done on inclined planes.

Calculation on inclined plane



Calculate the work done if the load is moved from A to B.

Work done = force x distance
= 10N x 1m
= 10Joules

Velocity ratio = $\frac{DEM}{DLM}$

= $\frac{5m}{1m}$

Velocity ratio = 5

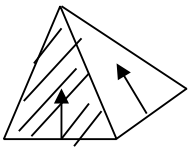
Uses of inclined plane.

- Loading heavy goods onto Lorries.
- Climbing tall buildings.
- Helps vehicles ascend (climb) steep hills.
- For builders to carry materials to higher levels.

WEDGES

What is a wedge?

- A wedge is an inclined plane with two sloping surfaces i.e. double inclined plane.



Examples of wedges, illustrate them. (diagrammatically)

1. An axe
2. A panga
3. Bullet
4. Knife
5. Scissors
6. Nails
7. Chisel

Uses of wedges:

1. For splitting logs of wood
2. For cutting objects.
3. For sewing
4. For digging

SCREWS.

A screw is an inclined plane wound round a rod.

Illustration.



Examples of machines that use screws

1. Bolts and nuts
2. Bottles lids
3. Motor car jack
4. Spiral stair cases.

Uses of screws

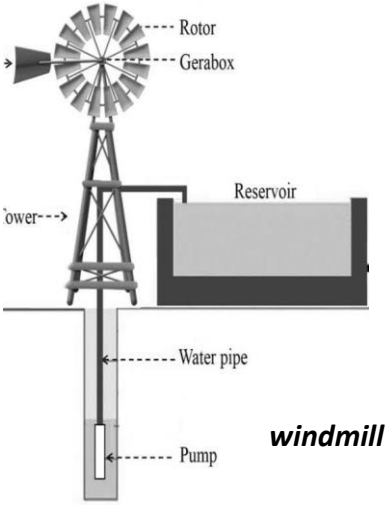
1. Car screw jack is sued to lift vehicles.
2. To hold two or more things together.
3. To drill holes in wood or metal.
4. To tighten bottle tops.

WHEELS AND AXLE

These are machines composed of two rotating wheels fixed together.
The wheel is fixed on a small wheel called axle or shaft onto which it rotates.

Examples of wheel and axle machines.

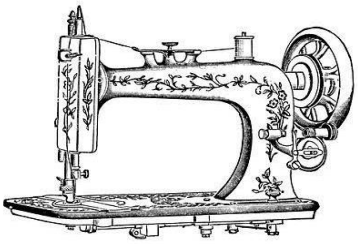
- Car steering wheel.
- Handle of bicycles.
- Pedal and chains of bicycles
- Door knobs
- Windlass.
- Sewing machine
- Windmill



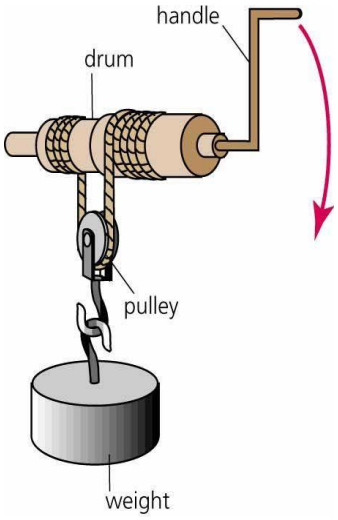
windmill



Bicycle handle



Sewing machine



windlass

Application of wheels and axle in daily life.

- Used in windlasses to draw water.
- Sprocket wheels and chains used driving bicycles.
- Car steering wheels.
- Door knobs used to open doors.

GEARS AND BELT DRIVES.

- Gears are special forms of wheels with teeth around their edges.
- They are sometimes called **cog-wheels or toothed wheels**.
- If teethed-wheels are connected with chains / belts they move in the same direction.
- When cog-wheels are joined together, the teeth interlock.
- As one wheel rotates, it turns the other but they move in opposite directions.

Examples of machines that use gear wheels

1. Watches
2. Gear boxes
3. Motor cycles
4. Bicycles
5. Electric toys
6. Bulldozers

Advantages of using gear wheels

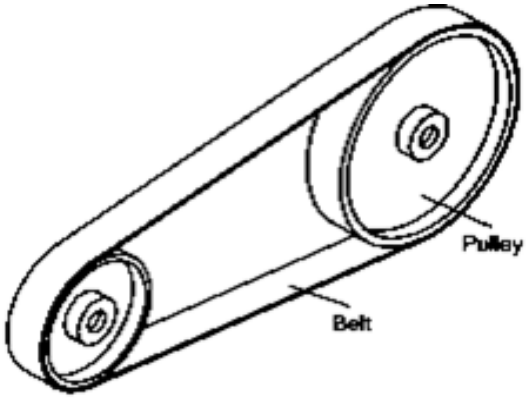
1. They help to multiply force.
2. They change the direction of movement (rotation)
3. They multiply the speed of rotation
4. They can slow the speed of rotation.

Drive belts:

- Drive belts transmit motion from one wheel to another.
- Both wheels move in the same direction.
- If a driven wheel has 48 teeth and the driving wheel has 12 teeth, the driving wheel will make 4 revolutions in each single revolution of the driven wheel.

Examples of machiness that use drive belts.

- Bicycles.
- Sewing machines.
- Grain mills.
- Cooling fan of car radiators.
- Conveyor belts – that move things from one place to another as in escalators, bottling line in factories, moving luggage in air posts etc.



Drive belts



windmill

PULLEYS:

What is a pulley?

- A freely rotating wheel with a grooved rim.
- A rope / chain passes over the grooved rim.
- The groove prevents the rope from sliding.
- The frame to which the pulley is fixed in called a block.

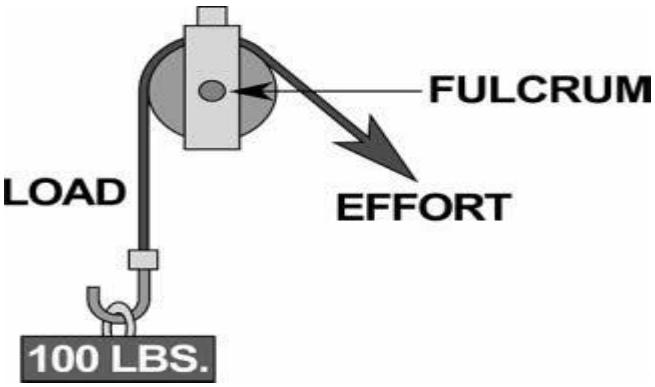
Three types of pulleys

1. Single fixed pulley
2. Single movable pulley.
3. Block and tackle / multiple/ fixed movable pulleys

a) <u>SINGLE FIXED PULLEY</u>.

In a single fixed pulley, the block in attached to a frame and only the wheel moves.

A single fixed pulley acts as a first-class lever, with the axle at the centre as a fulcrum.



A single fixed pulley changes the direction of force.

- By pulling down wards it is easier to raise an object.
- It has a mechanical advantage of one.

Question: Find the effort applied to pull a load of 50kgf using a single fixed pulley.

$$MA = \frac{L}{E} \qquad MA = 1$$

$$L = 50kg$$

$$1 = \frac{50kgf}{E} \qquad E = ?$$

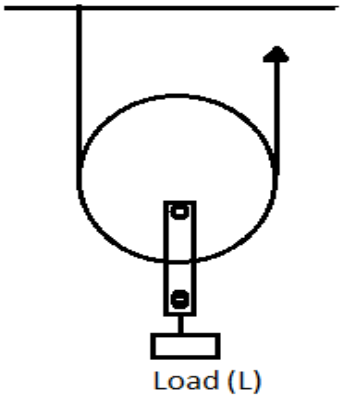
$$E \times 1 = \frac{50}{E} \times E$$

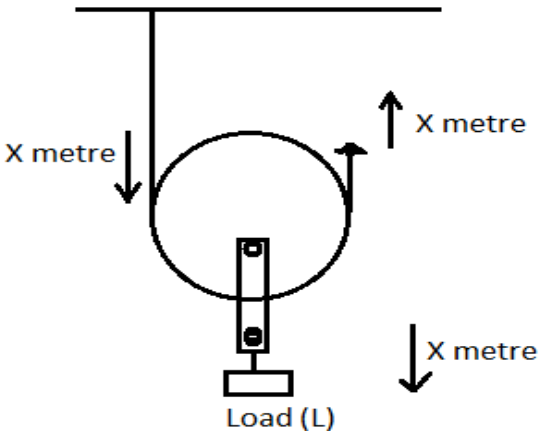
$$E = 50Kgf$$

The force needed to lift the load is the same as the load.

b) <u>SINGLE MOVABLE PULLEY.</u>

- In a movable pulley, the whole pulley block moves along the rope.
- It does not change the direction of force, both load ad effort move in the same direction.
- It has a mechanical advantage of 2.
- The effort needed is half the load.





Qn: What force will be needed to raise a load of 50kgf using a single movable pulley.

MA = 2 MA = $\frac{L}{E}$ 2 x E = $\frac{50}{E}$ x $\frac{E}{2E}$ = $\frac{50}{2}$

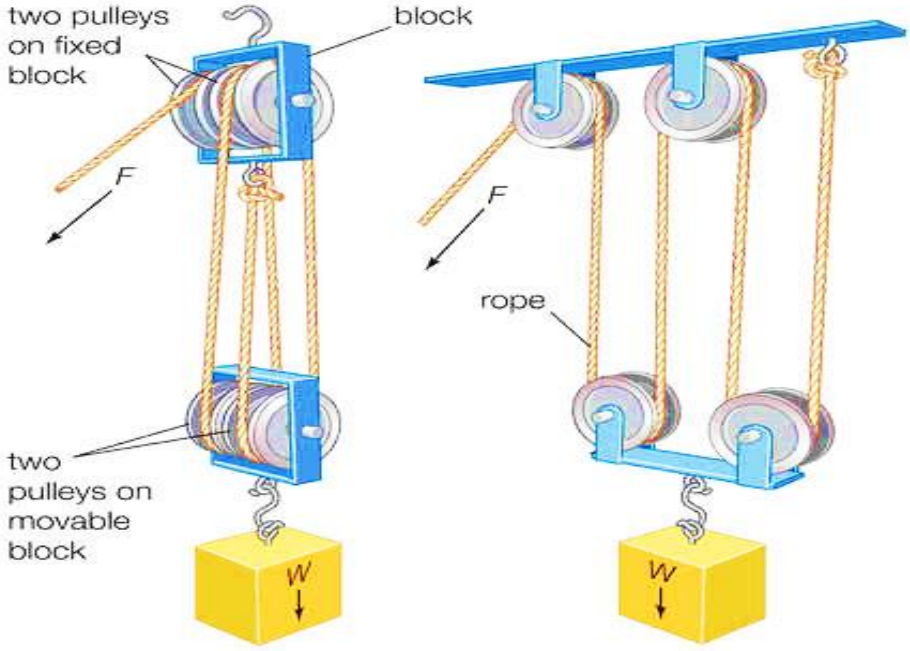
L = 50Kgf $\frac{1}{E}$ $\frac{1}{1}$ $\frac{25}{1}$

E = ? 2 = $\frac{50}{E}$ E 25Kgf

- Single movable pulley acts as a second-class lever with the fulcrum and effort at either side of the wheel.

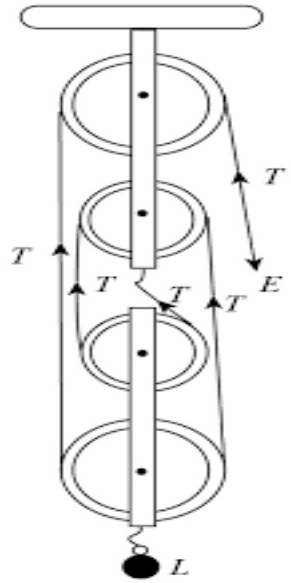
Double pulley system (combined fixed and movable pulley)

This is the type of pulley system composed of movable parts



BLOCK AND TACKLE

- This is the type of pulley system which consists of several movable pulleys and several fixed pulleys



The mechanical advantage of a block and tackle is determined by the number of wheels in the block.

Uses of pulleys in daily life.

1. They are used by break down vehicles to pull stranded vehicles.
2. They are used in lifts / elevators.
3. They are used on cranes to lift and load heavy loads.
4. They are used in scaffolds by painters to paint tall buildings.
5. They are use on flag poles to raise flags at school.
6. They are used in curtain boxes to draw curtains.

FRICTION

Friction is the force that tends to oppose motion between objects.

Types of friction:

- **Static friction** is the friction between two surfaces which are trying to move but have not yet started moving.
- **Dynamic friction** is the friction between two surfaces when one is moving over the other.
- **Viscosity friction** is the friction in liquids and gases.

Advantages of friction as a useful force

Friction helps us in:-

1. Walking without sliding.
2. Movement of vehicles.
3. Lighting a match stick.
4. Braking of moving vehicles.
5. Climbing trees.
6. Writing using a pen.
7. Grinding corn, grain, flour etc.
8. Washing clothes.

The demerits (disadvantages of friction as a nuisance force.

1. Friction reduced the speed of movement.
2. Reduces the efficiency of machines.
3. Causes unnecessary heat in machines.
4. Causes wear and tear of things.
5. Delays work.
6. Makes one use a lot of effort.

Ways of increasing friction.

1. By putting treads on tyres or shoes.
2. Putting grips on handles of objects.
3. Putting spikes or studs on playing or sports shoes.
4. Making surfaces rough.
5. Putting tarmac on road surfaces.

Ways of reducing friction.

1. Making rough surfaces smooth.
2. Oiling or greasing (lubrication) of moving parts.
3. Using ball bearing.
4. Using rollers.
5. Streamlining the bodies of moving vessels.

THEME:THE ENVIRONMENT

TOPIC 11: INTERDEPENDENCE OF THINGS IN THE ENVIRONMENT

Environment

Environment is man and his surroundings

Components of the environment

1 Plants
2 Animals
3 Water bodies
4 Air
5 Soil

NB : Plants and animals are examples of organic

Components of the environment

1. **Biotic** / **Non physical environment** is the type of environment which consists of living things e.g plants , Animals , Human beings , Bacteria and viruses.
2. **Abiotic** / **physical environment i**s the type of environment which consist of non-living things e.g Soil, Water ,Air

NB : All compliments of the environment depend or each other mostly for survival.

Interdependence

This is a situation where living things depend on each other so as to survive.

This is a situation where living things depend on non-living things.

How animals depend on plants

1. Animals depend on plants for food.
2. Animals depend on plants for shelter / habitat
3. Animals depend on plants for herbal medicine.
4. Animals depend on plants for oxygen

How plants depend on animals

1. Plants get carbon dioxide from animals
2. Plants obtain manure from animals
3. Animals helps in pollination of plants
4. Animals help in seed and fruit dispersal

How animals depend on other animals

1. Animals depend on other animals for protection for those that move in herds
2. Some animals get food from other animals e.g scavengers
3. Some animals use other animals for transport.

How plants depend on other plants

1. For support
2. Plants depend on other plants as habitat
3. Some plants provide shade to other plants
4. Segumious plants fix nitrogen in the soil which is used by other plants.

How animals depends on non living things

1. Insects live in soil as habitats
2. Birds use space to fly and hunt for food
3. Some animals use stones for construction
4. We breathe in air (oxygen) for respiration
5. Animals drink water to survive

How plants depend on non living things

1. Plants obtain food from the soil
2. Plants use water and carbon dioxide as raw materials for photosynthesis
3. Plants depend on wind for pollination and dispersal

How non-living things depend on living things

1. For protection against soil erosion (plants) protect soil against erosion
2. Bacteria help in soil formation

Food chain

A food chain is the way how organisms in an environment get their food.
A food chain is the flow of energy from one organism to another
A food chain is the feeding relationship between organism in the environment

Illustration

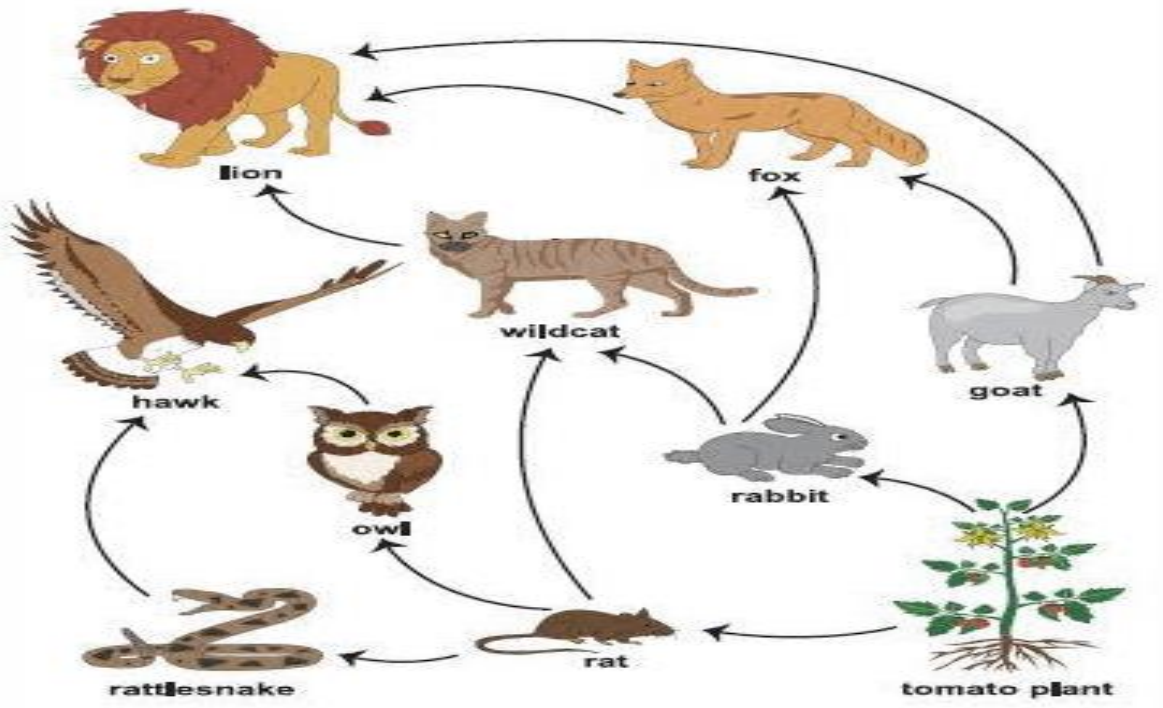
Grass → Goat → Leopard → Bacteria

Grass represents the producer
Goat represents primary consumer
Leopard represents secondary consumer
Bacteria represents decomposer

1. **Producer** is an organism that make food
2. **Primary consumer** is an organism that feeds directly on a producer.
3. **Secondary consumer** is an organism that feeds on a primary consumer. They are mainly carnivorous
4. **Decomposer i**s an organism that causes decay / rotting

Food web

Is a more complicated relations of how organisms in an environment obtain their food.



NB : **Eco system** - Is a community of organisms in a habitat.
Habitat - Is a home of an organism in the environment.

GROWING CROPS AND TREES

AGRO-FORESTRY

- Is the growing of crops keeping livestock and planting trees on the same farm.

Importance of agro-forestry.

1. Trees planted in agro-forestry are source of wood fuel.
2. Agro-forestry promotes soil fertility.
3. Trees planted in agro-forestry provide shade to animals and other food crops.
4. Agro-forestry is a source of double income to the farmer.
5. trees are source of herbal medicine to people and animals
6. Trees planted are source of timber and other building materials
7. Trees planted in agro-forestry purify air in the environment by absorbing carbon dioxide and realizing oxygen.
8. Trees planted in agro-forestry help in rain formation.
9. Fruit trees and crops provide food to farmers.
10. Crops and trees residues are source of food to livestock.
11. Trees planted in agro-forestry control soil erosion

Breeds of trees

1. Indigenous trees
2. Exotic trees

Indigenous trees:

These are trees whose origin is Africa.

Examples of indigenous species of trees.

1. Mvule
2. Mangoes
3. Jack fruit.
4. Musizi
5. Ennongo
6. Mutuba (ficus tree)

Characteristics of indigenous trees

1. They produce hard wood
2. They are resistant to harsh weather conditions
3. They have low growth rate
4. They form thicker canopies

Exotic trees:

These are trees which are introduced in the Africa from outside countries.

Examples of Exotic trees.

1. Cypress
2. Gingko
3. Pine
4. Cedar
5. Podo
6. Eucalyptus
7. Fir

Characteristics of exotic trees

1. They have faster grow rate
2. They produce soft wood
3. They are less resistant to harsh weather condition
4. They are highly affected by tropical tree diseases.

Selection of planting materials

• Trees grow from seeds or cuttings.

Quality of good seeds for planting.

1. The seeds should have a high germinating rate.
2. They should be free from pests.
3. They should be free from diseases.
4. They should not be broken.
5. They should be obtained form healthy parent tree.
6. They should be of reasonable size depending on the variety.

Starting a tree nursery bed.

The following should be present:

1. Poles
2. Hoes
3. Watering jug

4. Polythene papers.
5. Dry grass.
6. Water source.
7. Seeds or cuttings.

Procedures or preparing a nursery bed for trees.

1. Clear and dig up the area.
2. Add compost manure to the soil you have dug up.
3. Put seeds in the soil.
4. Construct a shade and cover it with grass.
5. Watering should be every evening to allow water stay in the soil for long.

Care for seedlings.

1. Constantly water the seedlings.
2. Remove any weeds.
3. Spray the seedlings to control pests.
4. Thin out the diseased or those infected with pests.
5. Fence off the nursery bed to protect it against animals.
6. Hardening off should be done when about to transport the seedlings.

Transplanting:

- Transplanting is the transfer of seedlings from the nursery bed to the main garden.
- **Transplanting is done in the evening because of the following reasons.**
  - Reduce the rate of transpiration.
  - Control watering or wilting.
  - Give roots time to set in and start absorbing water.
  - Reduce evaporation of water from the soil

Ways of caring for trees

This can be done through.

1. Slashing.
2. Spraying with herbicides.
3. Planting cover crops.
4. Mulching.
5. Mechanical weeding using a hoe.
6. Uprooting.

Weeding

- It refers to the removal of unwanted plants from the garden

Mulching

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

- This helps to conserve moisture in the soil.

Pruning

- This is the removal of excessive, unproductive, diseased and damaged branches and leaves of a plant.

Advantages of pruning

1. It reduces hiding places for pests.
2. It allows plants to get enough sunlight.
3. It reduces overcrowding and creates space for the plant to grow.
4. It helps wind to easily move through the trees without breaking them.
5. Pruning should be done towards the end of a dry season to allow easy recovery of the tree at the beginning of the rainy season.

Thinning.

This is the removal of excess seedlings from the garden.

Advantages of thinning.

1. It removes hiding places for pests.
2. Creates space for plants to grow bigger.
3. Reduces over crowding.
4. Reduces competition for nutrients.

Pests and diseases control in trees.

- These should be controlled mainly by spraying.

Disadvantages of pests.

1. Some pests eat and destroy the trees.
2. Some pests spread the diseases to crops.
3. Pests reduce the quality of yields.
4. Pests reduce the speed at which the trees grow.
5. They increase the cost of production since pesticides are brought to control them.

Spacing of trees

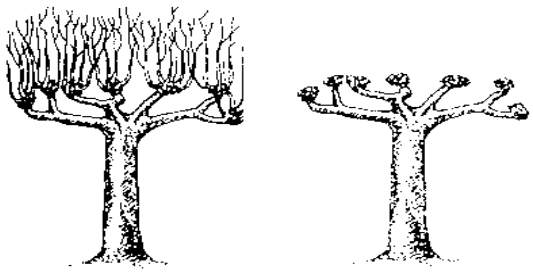
- This means planting trees at a desired distance from each other.
- Different trees require different spacing.
- Spacing depends on the type of trees whether machine or human labour is going to be used.

Methods of harvesting trees

(1) **Pollarding**

- This is the cutting off of the tip or the top of the tree.
- It encourages the branches below to grow thicker.
- When practiced on trees like mangoes, they produce more and better fruits.

An illustration about pollarding



(2) **Lopping**

- This is the cutting off of the side branches from the trunks.
- Mature branches are harvested as the tree continues to grow.

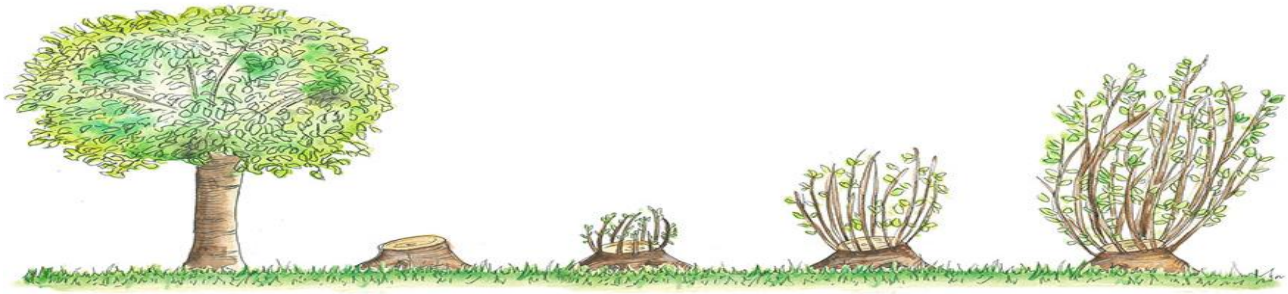
Diagram of a lopped tree



3. Coppicing

- The cutting off the trunk of a tree leaving only a short stump to grow shoots.

Illustration of coppicing.



Selective felling of trees

- Cutting down selected trees while others are left to grow. New trees are panted in the spaces left by the fallen trees.

Preparing wood for different uses

- Timber for building and furniture is sowed into plants of specific sizes.
- They are placed together on flat surface to ensure they remain straight.
- Wood for firewood needs to be split and allowed to dry because wet wood does not burn well. Splitting wood allows water to escape and evaporate easily to allow drying process.
- Wood meant for fencing and electricity poles should have their barks removed and chemicals used for treatment. This prevents attacks from pests and diseases.

Storage of wood

- Wood like timber should be stored in a cool dry place to avoid warping or bending.
- Timber should be properly seasoned that is, allowed to dry in a cool dry place and chemicals applied.

  Fire wood should be stored in a dry place to avoid getting damp.

a) **Wood for firewood**
Wood is split using the axe, a panga and stored in the dry place for cooking.

b) **Wood for timber**

- Trees are cut into logs which are later split into small pieces using a hand saw or sewing machine.
- The timber got is kept under shade, the shade is called seasoning.
- The timber shouldn't be dried under direct sunshine because it causes warping of wood.

Wood warping

This is the twisting of the wood shape due to direct drying of wood under sunshine.

Combining agro-forestry with animal husbandry.

Advantages

1. Trees provide shade to animals.
2. Trees provide fencing materials.
3. Trees provide oxygen and use up carbon dioxide.
4. The trees help to control soil erosion.
5. Some trees provide food to the animals.

Starting and managing school / home wood lot project

Wood lot

This is a small area that has been set a side for growing trees.

Importance of the wood lot project

1. Trees provide firewood for cooking
2. Trees help to conserve soil and water.
3. Trees provide timber for building and making furniture.
4. Trees are a habitat for many insects , small mammals
5. Trees help to purify air

Factors to consider when starting a wood lot project

1. Selection of multipurpose trees , species
2. Drought resistant varieties
3. Trees that mature faster in a short time

Record keeping

A record is any written document of the past farm activity.

Record to keep shows

1. Type of crops you intend to grow with trees
2. Type of trees to be grown
3. Number of trees to be planted
4. Spacing of trees and crops
5. The time you have spent to raise the trees and crops
6. Time seeds spend in the nursery garden time.

TERM III

THEME: THE ENVIRONMENT

TOPIC 12: RESOURCES IN THE ENVIRONMENT

Environment

Environment means all things that surround man.

Components of environment

1 Land/soil
2 Water
3 Animals
4 Air
5 Plants

Land.

Land is made up of soil, rocks and minerals

Many activities of human beings are done on land and they include;

1. Crop growing
2. Rearing animals
3. Construction of buildings
4. Recreation
5. Mining of minerals

Water:

This includes surface and underground water

Surface water includes lakes, rivers, wells, streams and ponds

Areas with a lot of water in the soil (water logged are called wet lands (swamps)

Animals and plants

Animals and plants can be found on land and in water, animals include

- Vertebrates
- Invertebrates

Plants make the vegetation cover on land

Air

Air surrounds the earth and make up the atmosphere

Components of air include

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

Resources are things that are needed by people to satisfy their needs (wants)

Types of resources

1. Renewable resources
2. Non – renewable resources

Renewable resources

These are resources that can be replaced by natural process. e.g

1. Air
2. Plants
3. Animals
4. Soil
5. Water
6. Sun

Non- renewable resources

These are resources that cannot be replaced by any means, once they are used up. e.g,

1. Oil
2. Coal
3. Minerals
4. Natural gas

Groups of resources

- Living resources
- Non – living resources

Living resources

These are resources which have life like

- Plants
- Animals

Non living resources

These are resources which do not have life e.g

- Soil
- Water
- Sun
- Minerals
- Fossil fuels

Note: Resources can be classified according to common characteristics

Classification of resources

1. **Common resources. (Global resources)**

These are resources that are used by every one and belong to nobody. They exist in plenty and extend beyond boundaries e.g water air sun

2. Inexhaustible resources.

These are resources that will not be exhausted.

a) Wind energy
b) Rainfall
c) Tidal power
d) Solar energy

3. **Exhaustible resources.**

These are resources which people use and can be exhausted

Examples of exhaustible resources

- ❖ Minerals
- ❖ Plants
- ❖ animals

4. **Recyclable resources**.

These are resources that do not get destroyed or lose value through use. They can be reprocessed and then re-used many times.

Examples include

- ❖ Metallic scrap
- ❖ Waste papers
- ❖ Polythene papers
- ❖ Plastic scrap materials

Harvesting of resources.

Harvesting of resources means acquiring or getting resources from the environment.

Sun.

- ➢ It is the single natural source of energy.
- ➢ It produces light and heat energy

Importance of heat energy.

- ➢ It is used by plants to carry out photosynthesis. During this process, sun light is trapped by the help of chlorophyll. The food made by plants is called starch.
- ➢ Sun light helps to dry crops after harvesting
- ➢ Heat from the sun is used for preserving food e,g fish meat etc Heat from the sun is used to generate solar electricity.

Solar energy

- ➢ This is energy radiated by the sun
- ➢ Solar energy can be trapped and converted into electricity

Devices used to trap solar energy

- ✓ Solar cooker
- ✓ Solar drier
- ✓ Solar cell (solar panel)

Solar water heater

It is used for heating water in homes

How it works:

- ✓ It reflects sun rays towards a black hot plate
- ✓ The reflector is kept at an angle to receive the sun rays
- ✓ The sun rays are reflected toward a blackened plate that absorbs and radiates the heat out of it.
- ✓ When water in a container is placed on this plate it begins to boil.

Solar drier

- ✓ It helps to dry crops e.g maize, beans etc
- ✓ Heat from the sun goes in through the top glass but it's not radiated out.
- ✓ Ventilator pumps are used to blow air over the crops.

Solar panels.

- ✓ These are special types of plates made of solar cells that convert some light energy into electricity.
- ✓ Solar cells are used in sate lights, space stations and other places where electricity is not available.
- ✓ Solar cells provide power for running calculators, watches, lighting rooms and running radios.

Diagram of solar water heater, a solar heater and a solar drier

Air and wind.

Air is a mixture of gases
Wind is moving air

Uses of air

1. Oxygen is used during germination
2. Oxygen is used for respiration
3. Carbon dioxide is used in photosynthesis by green plants to make starch.
4. Carbon dioxide is a raw material in industries used to make liquefied carbon dioxide used to extinguish fire.
5. Carbon dioxide is used to preserve bottled drinks e.g soda.
6. Nitrogen is used in the formation of proteins in plants
7. Nitrogen helps to make the soil fertile in form of nitrates
8. Rare gases (neon, argon, krypton, xenon, helium) are used in the making of electric bulbs

How man affects air

1. Burning produces smoke and carbon dioxide that cause air pollution
2. Heavy industrialization causes air pollution
3. Spraying dangerous chemicals causes air pollution.

Uses of wind

1. It dries clothes
2. It is used in winnowing seeds
3. For running dhows and other boats which sail on water
4. Wind energy runs mills to generate energy

Water

- Water is made of two hydrogen atoms and one oxygen atoms (H_2O)
- The main source of water is rain
- Wetlands, lakes, rivers, swamps springs, under ground water tables are also sources of water

Importance of water

1. Running water can be used in the generation of hydro electricity
2. Water bodies are used for transport
3. Water is used to mix soft drinks
4. Water is used for irrigation of crops
5. Water sources are a source of fish
6. Water is used by plants in the process of photosynthesis
7. Water is used domestically for cooking and washing.

How water can be polluted.

- **Silting.** Is the deposition of eroded soil particles into water sources. This leads to death of aquatic life
- **Dumping of industrial wastes in water**. These wastes contain chemicals that contaminate the water bodies.
- Building of latrines near water bodies that can cause water contamination
- Dumping of house refuse in water sources.

Soil

It is a natural medium in which plant roots grow

Importance of soil

- ✓ It provides plants with nutrients for growth
- ✓ It provides raw materials for building
- ✓ Clay soil is used for making models and pottery materials.
- ✓ Soil is used in decorating houses as it has different colours and texture.

Rocks and minerals

The mineral may be of metallic or non – metallic substances

Metallic minerals include gold, silver, platinum, copper, zinc and lead.

Non-metallic minerals may contain

- ✓ Calcium carbonate
- ✓ Sodium
- ✓ Chloride
- ✓ Silicate

Importance of rocks and minerals.

- ✓ Provide raw materials for making industrial and domestic equipment as well as tools
- ✓ Provide raw materials for building houses and roads
- ✓ Metallic minerals are used in the manufacturing of machines used in factories.

Fossil fuels

Fuel is anything that burns to produce energy eg heat and light energy

Fossils, are animal or plant remains that have turned into fuel resources.

Fossil fuel include;

Coal
Petroleum
Natural gas

Coal

1. It's a product of plant remains
2. It provides thermal electricity when burnt
3. It is used to make dyes Petroleum.
4. It is a liquid fossil fuel from animal remains
5. It is a common resource for power to run engines and electric generators

Products from petroleum.

1. Petrol
2. Diesel
3. Paraffin
4. Lubricating oils
5. Grease
6. Tar used on roads
7. Plastics

Living things as resources

These include plants and animals in our environment

Plants (Importance of plants)

Some plants give us plant fibres e.g cotton, sisal, jute and linen
Cotton and linen are used to make clothes while sisal and jute are used to make ropes and sacks
Some plants are used to make herbal medicine to cure certain diseases.
Some plants are used as food

Note: synthetic fibre (artificial fibre) are:

- Rayon
- Nylon
- Terylene
- Acrilon
- Cashmilon

Arlon

- Rayon is silk made from wood pulp or crushed wood and cellulose from cells of plants
- Nylon fibres are made from plastic
- Nylon can be used for making clothes, ropes, fishing nets and fishing lines Animals.
- Some animals give us animals' fibres e.g wool mohair and silk.
- Merino sheep gives us wool used to make cloth, blankets, carpets, bed sheets etc

- Silk worms give us silk
- The skin and hide from domestic animals are for making bags, shoes, belts
- Horns from cattle are used to make glue and buttons
- Bees give us honey and wax.

Wild life:

Wild life refers to plants and animals that live and grow on their own.

Some of these animals and plants have been extinct or are endangered because of increasing demand for their products e.g Crocodiles for their skins Elephant for their tusks

Rhinos for their horns

Importance of wild life

1. Some mammals and birds are a source of food
2. Some animals and birds are used for cultural heritage by some countries and tribes
3. Plants provide wood for fuel and timber
4. Forests help in the formation of rain
5. Earn foreign exchange for the government through tourist attraction.

Conservation of resources

Conservation of resources means utilizing the limited resources sparingly with special consideration for future generation

New technologies developed to preserve natural resources include

a) Use of clean alternative sources of energy e.g exploiting solar energy, running water, geothermal energy to generate electricity.
b) Use of renewable sources of energy, some refuse from plant material and animal waste have been exploited as resources to provide fuel, light and heat energy e.g sugarcane and cotton seeds residues are used as fuel.
c) Metal wastes, garbage and plastic materials can be recycled and used instead of new materials. This saves volumes of new raw materials.
d) Substituting plastics for metals, using plastics in place of metals in manufacture of radios, television and some car parts cut down metal consumption.
e) Soil conservation. This is the maintaining of soil fertility by practicing good methods of farming.
f) Controlling the destruction of wetlands.
g) Air conservation.
   This means the way of reducing and avoiding air pollution. This can be done through,
   Passing the industrial fumes and gases through a fine spray of line
   Using catalytic converters to reduce fumes from petrol engines of cars.
h) Water conservation. Avoid dumping industrial wastes in water sources.
   Building of latrines near water sources should be stopped. Avoid using poison to catch fish
   Avoid reclaiming wetlands

Conservation of wild life;

1. Banning of poaching
2. Control over fishing
3. Take care of animals in national game parks and game reserves
4. Some rare animals should be caught and let to bleed in the wild life centre

THEME: THE COMMUNITY POPULATION AND FAMILY LIFE

TOPIC 13: POPULATION AND HEALTH

Population

Population is the total number of organisms in an area.

Human population

Human population Is the total number of people living in an area.

Health

This is the state of complete physical , mental and social well being.

Common sickness in a home

1 Diarrhoea
2 Dysentery
3 Cholera
4 Malaria
5 Kwashiorkor
6 Typhoid
7 Relapsing fever
8 Polio

Causes of common sickness at home

1 Poor sanitation
2 Poor personal hygiene
3 Poor nutrition (malnutrition) or inadequate food supply
4 Inadequate water supply.
5 Lack of enough physical exercise
6 Alcoholism and drug abuse
7 Living in polluted areas
8 Ignorance about some health practice (habit)

Inadequate water supply

It refers to a condition when water is not enough to meet people daily domestic needs.

Causes of poor water supply.

1. Drought
2. Floods
3. Wars
4. Overpopulation
5. Silting

Solutions / how to overcome inadequate water supply

1. Government should provide clean safe water.
2. Protection of wetlands and water catchment areas
3. Educating people about the importance of protecting water sources.

Effect

- Leads to spread of water cleaned and diarrhoeal diseases.

Poor sanitation

Poor sanitation is the general dirtiness of a place where we live or stay.

Causes of poor sanitation

1. Poor disposal of human wastes
2. Poor disposal of rubbish
3. Sharing a house with animals
4. Poor drainage in a home
5. Blockage and bursting of sewerage system
6. Over crawling in a home

Diseases associated with poor sanitation

1. Diarrhoea
2. Dysentery
3. Malaria
4. Cholera
5. Typhoid
6. Bilharzias

Solution / How to control poor sanitation

1. Using latrines and toilets to dispose human waste.
2. Proper disposal of rubbish
3. Draining stagnant water
4. Treatment of sewage before being disposed off
5. Animals should be kept in separate house with people

Effects of poor sanitation

1. Easy spread of diarrhoeal diseases
2. Multiplication of vectors and germs
3. Easy contamination of water sources.

Inadequate food supply (Food insecurity)

Food insecurity is a condition when the food available is not enough to meet the daily nutritional needs of the people in an area.

Causes of inadequate food supply.

1. High population increase
2. Laziness
3. Low level of technology
4. Ignorance of good modern farming methods
5. Prolonged drought
6. Floods
7. Wars
8. Poor soils (infertile soils)
9. Poor attitude towards farming
10. Crop pests and diseases

Crop pests and diseases

Food security

Is a condition when the food available is enough to meet the daily nutritional needs of people in an area.

Solutions to inadequate food supply (ways of promoting food security)

1. Promotion of family planning
2. Provision of soft loans to farmers to increase productivity
3. Giving irrigation facilities to people.
4. Protection wetlands to control floods
5. Growing crops which are resistant to crop pests and diseases
6. Growing crops which are resistant to harsh weather conditions. (drought)
7. Sensitizing school children on the value of agriculture
8. Hold workshops to sensitize people on better methods of farming.

Anti – social behaviour

These are habits or acts which are not acceptable in a society

Examples of anti social behaviour

1. Telling lies
2. Bullying
3. Stealing
4. Arson
5. Fighting
6. Smoking
7. Alcoholism
8. Avoiding school (Truancy)
9. Child prostitution
10. Drug abuse
11. Raping
12. Wandering (running away from home)
13. Abortion

Causes of anti social behaviour

1. Over strictness by parents or teachers
2. Pampering of children
3. Failure to enforce rules in a community
4. Poor social environment
5. Peer influence
6. Ignorance of society rules / laws
7. Unfulfilled expectations

Note :

1. **Juvenile** is a young person below 18 years.
2. **Juvenile delinquency** are acts / behaviours committed by a young person and are punishable by law

How to control anti social behaviours

1. Punishing children for wrong behaviour
2. Equal treatment among children
3. Encouraging elders to set good examples of children
4. Through guidance and counselling
5. Encouraging children to do developmental activities in their free time

Sexual deviations

✓ These are abnormal sexual practices

These are sexual behaviours that are not accepted in the community.

Examples of sex deviations

1. Bestiality
2. Masturbation
3. Homosexuality
4. Oral sex
5. Lesbianism
6. Incest

Causes of sexual deviations

1. Peer influence
2. Exposure to pornography
3. Poverty
4. Ignorance on dangers of sex deviations
5. Drug abuse

Ways of avoid sexual deviations

1. Having good friends
2. Joining good educative clubs
3. Avoid watching and reading pornographic materials
4. Providing proper guidance and counselling
5. Encouraging sex education to youth in school and at home

Activities that promote health in a community

Care for homes

This can be done

- Proper disposal of wastes
- Drain stagnant water
- Providing good nutrition
- Treating of the sick
- Supply of clean water

Health survey.

- This is a way of gathering information about the health status of a family or community.

Information gathered during a health survey.

1. Kind of food people eat.
2. Kind of houses people use.
3. The health facilities in an area.
4. Sanitation in the area.
5. Immunization coverage.
6. Food security in the area.

Importance of health surveys.

1. They help in planning by finding out what health facilities area in the area.
2. They help to find out the sanitation and latrine coverage in an area.
3. They help to find out the immunization coverage of the population in an area.
4. They help to find out if people has safe water in the area.
5. They help to find out information on food security in an area.

Health Education:

- This is the knowledge which deals with the health concern and general being of individuals families and communities.
- Health education is very important because it helps people, families and communities to address health concerns.

Importance of health education.

1. It helps one to value the importance of good health.
2. It helps people to maintain good health through personal, family and community hygiene.
3. It helps people in preventing the spread of simple diseases which would affect the society.
4. It helps people to be easily mobilized in case of disease out break e.g. cholera.
5. It reduces poor traditional beliefs about diseases.

Information on population.

Kind of information gathered about population.

1. Demography.
2. Housing information.
3. Immunization.
4. Available health services.
5. Food security.

DEMOGRAPHY.

- This is the study of the population.
- It takes into account the number of births, deaths, marriages and common diseases in a place at a given time, factors that cause change in the population e.g. Migrations, wars, job opportunities etc.

Importance of demography.

1. It helps the government to know population of various areas.
2. Helps the government to determine the population structure.
3. Helps the government to know the birth and death rates.
4. It helps the government to plan for its population.

Housing information

- The information gathered includes; type of homes, their size, ventilation, Number of people who live in them and their strength.
- This helps to know the quality-of-life people live in an area.

Immunization:

- The information gathered include; the number of children immunized, the ages of the children and the disease immunized against.

Available health services.

Information gathered include:-

1. The number of dispensaries, health centres and hospitals in the area.
2. Public and private health centres.
3. Services offered in the health centres or hospitals e.g. X-ray, family planning, counselling and guidance, antenatal and postnatal care services.
4. The number of doctors, nurses, lab technicians, trained birth attendants (Tba's) etc working in a health centre.

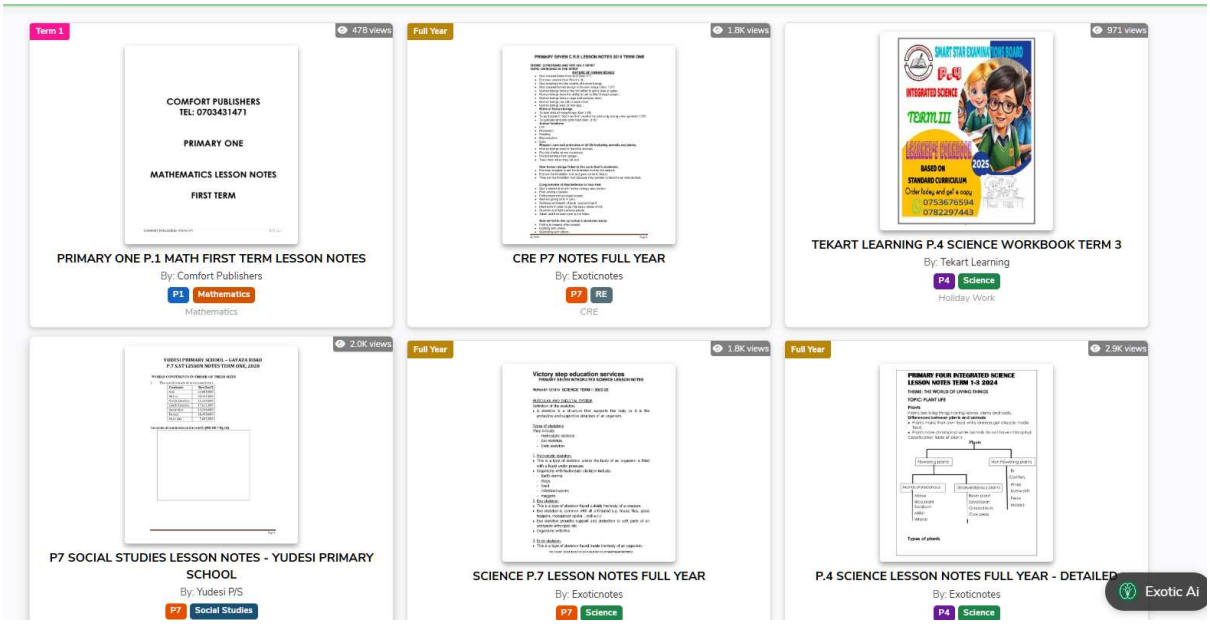
School health club

This is a group of school members who come together to improve health of people in a school

Activities of a school health club

1. Peer education on HIV / AIDS , sanitation , good nutrition
2. Carrying out debates on the topics of health-related activities
3. Organizes health parades
4. Sensitization of the public on health issues
5. Promoting physical education , sanitation
6. Designing health rules.
7. Keeping records on different health activities
8. Recitation of poems on health-related problem.

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