SUCCESS INTEGRATED PRIMARY SCHOOL

PRIMARY SEVEN SCIENCE LESSON NOTES

TERM ONE

THEME	TOPIC	SUB-TOPIC
1. HUMAN BODY	a) MUSCULAR AND SKELETAL SYSTEM	i) <u>The skeleton</u> a) Meaning of skeleton b) Types of skeleton c) Description of each type i.e definition and examples
		ii) <u>Regions of the human skeleton</u> a) Axial skeleton b) Appendicular skeleton c) Definition of each and the parts that make them up
		iii) The human skeleton (structure) a) A well labeled diagram of the human skeleton b) Skeletal bones and their other names c) Functions of the human skeleton
		iv) <u>Bones</u>

		a) Definition of bones b) Types of bones c) Description of each type d) Importance of bones e) definition and examples
		v) <u>Joints</u> a) Definition of a joint b) Types of joints c) Examples of each types of joint d) Importance of joints
		vi) <u>Muscles</u> a) Definition of muscles b) Types of muscles c) Examples of each type d) Functions of muscles
		vii) <u>Posture</u> a) definition if posture b) Examples of posture c) Importance of good posture d) Disadvantages of bad posture
		<u>Diseases and disorders of the skeletal system</u> a) Diseases

		b) Signs and symptoms of each c) Prevention and control of each disease d) Disorder i) Fracture ii) Types of fracture iii) Signs and symptoms of each parts i) First Aid ii) Dislocation - Definition - Signs & symptoms - First Aid iii) Sprains and strains - Definition of each - Signs and symptoms of each - First Aid
		viii) Keeping the muscular and skeletal in a proper working condition
2. **MATTER AND ENERGY**	**ELECTRICITY AND MAGNESTISM**	i) Electricity a) Definition of electricity b) Atom i) Definition ii) Elements if an atom and their definitions c) Uses of electricity

		d) Advantages of using electricity e) Dangers or disadvantages of using electricity ii) Forms of electricity a) Current electricity - Definition - Types of current electricity i.e AC and DC iii) AC (Alternating Current) - Definition - Sources of AC iv) DC (Direct current) - Definition - Components if an electric circuit and their symbol - Diagram of a simple electric circuit - Functions of each component - Types of a circuit Electrical resistance - Definition - Measurement of electrical resistance - E.M.F - Measurement of E.M.F vi) Conductors and insulators of a wet cell

		- Advantages and disadvantages of using wet cell vii)Description of secondary cells - Examples of secondary cells - Difference between primary cells and secondary cells viii) An electric bulb - Parts of an electric bulb - Functions of each part - How an electric bulb works - factors that may fail an electric bulb fail to work ix) <u>Torch</u> - Part of a torch - Functions of each part - factors which may fail a torch to work - Other electric appliances x) <u>Short circuit</u> - Definition - causes - signs of short circuit - Advantages if short circuit - Ways of preventing short circuits xi) <u>Electric cells</u> - Definition - Types of electric cells

		- Description of each type of electric cells xii) <u>Parts of a dry cells</u> - Function of each part - Advantages and disadvantages of a dry cell xiii) <u>Parts of a wet cells</u> - Functions of each cell - Factors that affect the proper working xiv) <u>Devices connected to electricity</u> a) Dynamo i) How a dynamo works ii) Parts of a dynamo b) Generator i) How a generator works ii) Importance of a generator iii) How a generator can be made to produce more electricity c) Transformers - Uses of transformers - Types of transformers - How a transformer works

		d) Electric motors - How an electric motor works - Uses of electric motors - How an electric motor is made stronger xv) <u>An electric plug</u> - Cables used in a plug - Functions of each cable xvi) <u>Static electricity</u> - definition - description of static electricity - Lightning i. Formation of lightning ii. Dangers of lightning iii. Control measures of lightning iv. Advantages of lightning xvii) Differences between static electricity and current electricity xviii) Electric companies i) Examples of electric companies ii) Duties of each company iii) problems faced by electric transmission companies xix) Safety precaution to guard against dangers associated with electricity.

		<u>Magnestism</u> i) Definition of a magnet, magnetism ii) Magnetic materials - Definition - Examples iii) Non-magnetic materials - Definition - Examples iv) Types of magnets - Examples of each type of magnet v) Properties of magnets - Illustrations using diagrams vi) Magnestisation - Definition - Ways if making temporary magnets - Description of each method with clear illustration using diagrams Demagnetisation - Definition - Ways of demagnetization - Control of storing magnets - Application of magnets in our day today life

		a) Electric bell i) Parts of an electric bell ii) Functions of each part iii) How can an electric bell work?
ENVIRONMMENT	**ENERGY RESOURCE IN THE ENVIRONMENT**	1. <u>Resources and energy resources.</u> - Definition of each - Definition of environment - Types of environment - Components of each type of environment 2. <u>Types of resources</u> - Definition of each type of resources - Examples of each type of resources • Water as a resource • Sun as a resource • Air as a resource • Animals as a resource • Soil as a resource 3. <u>Energy resource</u> - Examples of energy resources - Energy resources from water - Energy resources from plants

		- Energy resources from animals - Energy resources from the sun - Energy resources from air (wind) - Energy resources from minerals 4. <u>Bio gas production</u> - Definition of biogas - Materials used to make biogas - Structure of a biogas digester - Uses of biogas 5. <u>Environmental conservation</u> - Definition - Ways of conserving:- a) Soil b) Wildlife c) Animals d) Plants e) Air f) Water 6. <u>Reasons for conserving the environment</u> -
THE HUMAN BODY	**Excretory system**	<u>Excretion and excretory organs</u> - Definition of excretory system and

		excretion - Examples of excretory organs - Importance of excretion to man <u>Kidneys</u> - Description of the kidney - Structure of the urinary system - Structure of the kidney - Functions of each part of the kidney - Functions of the kidneys to man - How the kidneys help to regulate body fluids, temperature - Diseases of the kidney Bilharzia - Causes, signs and symptoms - Control of bilharzia - Kidney stones - Kidney failure - Gonorrhoea - Nephritis - Ways of maintaining the proper working of the kidney <u>The Skin</u> Main parts of the skin Description of :- a) Epidermis layer

		b) Dermis layer - The structure of the skin - Functions of each part of the skin - How the skin performs its function - Functions of the skin to man - Diseases of the skin - Disorders of the skin - How to care for the skin <u>The liver</u> - Description of the liver - Functions of the liver to man - Diseases of the liver - Ways of caring for the liver <u>The Lungs</u> - What is respiration? - Body organs connected to the respiratory system - Structure of the respiratory system - Functions of each part <u>Alveolus</u> - Adaption of the alveolus to its function - Breathing mechanism in man i.e exhaustion and inhalation

		- Lungs as an excretory organ - Uses of the lungs to man - Diseases of the lungs - Maintenance of proper functioning of the lungs
ENVIRONMENT	**INTER DEPENDENCE OF THINGS IN THE ENVIRONMENT**	• <u>Environment</u> - Definition - Types of environment - Components of each type of environment • <u>Inter dependence</u> - Definition of; a) Interdependence b) Food chain c) Eco system d) Food web e) Habitat f) Bio mass - Formation of pyramid of bio mass • <u>Components of the food chain</u> - Description of each component of the food chain - Examples of food chains - Formation of the food web

		• <u>Interdependence of things in the environment</u> - How animal depends on plants - How plants depend on animals - How plants depend on other plants - How animals depend on other animals - How living things depend on non living things - How non living things benefit from living things
		• <u>Agroforestry</u> - Definition - Importance of agroforestry • <u>Types of tree species</u> - Examples of indigenous tree species - examples of exotic tree species - Advantages of indigenous trees over exotic ones - Differences between exotic trees and indigenous trees • <u>Growing trees and crops</u> - Selection of seeds for growing - Qualities of a good planting material • <u>A Nursery bed</u> - Definition - Preparation of a nursery bed

		- caring for seedlings in a nursery bed - Advantages of using a nursery bed - Transplanting procedures - Caring for crops in the garden - Description of the crop growing practices - caring for trees - Tree diseases and pests - Timely planting of trees - Selective felling of trees - Methods of harvesting trees - Description of each method - The advantages of each method of harvesting - Preparation of wood for different uses - Wood storage and seasoning - Wood lot project - Advantages of having a wood lot project in a school/home - Products from wood

PRIMARY SEVEN SCIENCE LESSON NOTES
TERM I

MUSCULAR - SKELETAL SYSTEM
THE SKELETAL SYSTEM

A system is a group of organs that work together to perform a specific body function.
A skeleton is a rigid supportive structure of the body of an organism.

The skeleton contains a non – living material made of calcium salts.
Bones can grow and change as a result of activities of the cells.

Types of skeleton

- ✓ Exo skeleton
- ✓ Endo skeleton
- ✓ Hydro – static skeleton

Exo skeleton

It is the type of skeleton where the hard tissue is formed mainly outside the body of an organism.

Examples of animals with exo-skeleton

i) Insects like grasshoppers, cockroaches

ii) Arachnids like ticks, spiders

iii) crustaceans like crabs, lobsters

iv) Myriapods like centipedes and millipedes

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

Endo skeleton

This is the type of skeleton where the hard tissue is found inside the body of an organism.
All vertebrates have an endo skeleton.
Examples of animals with endo-skeleton
Man, Goat, Cat, Sheep, Lion, Hen, Fish, Frog, Lizard
They have bony skeleton in their bodies.
NB: All mammals, reptiles, Birds, Fish and amphibians have an endo skeleton.

Hydro static skeleton
This is the type of skeleton with no hard tissues but instead the body is filled with a fluid under pressure to allow movement and give shape to the organism.
Examples of animals with hydro-static skeleton
Earth worms, snails, slugs, caterpillars, Star fish, Jelly fish

The human skeleton
This is the frame work of bones in the human body.
The human skeleton is made up of 206 bones in total.

The human skeleton is subdivided into two main regions namely:-

- ✓ Axial skeleton
- ✓ Appendicular skeleton.

Axial skeleton

This region consists of the vertebral column (spine or backbone), skull and rib cage.

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 namely; cervical region, thoracic region, lumber region, sacral region and coccyx region.

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. Lumbar 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.

ii) The rib cage – It 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.

iii) **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.

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 blade) and clavicle (collar bones)

✓ Pelvic (hip girdle) This is made up of 3 bones ie coccyx, sacrum and pelvis.

✓ The limbs. These include two upper limbs and two lower limbs

The upper limbs (arms)

These have three long bones each i.e humerus, radius and ulna.

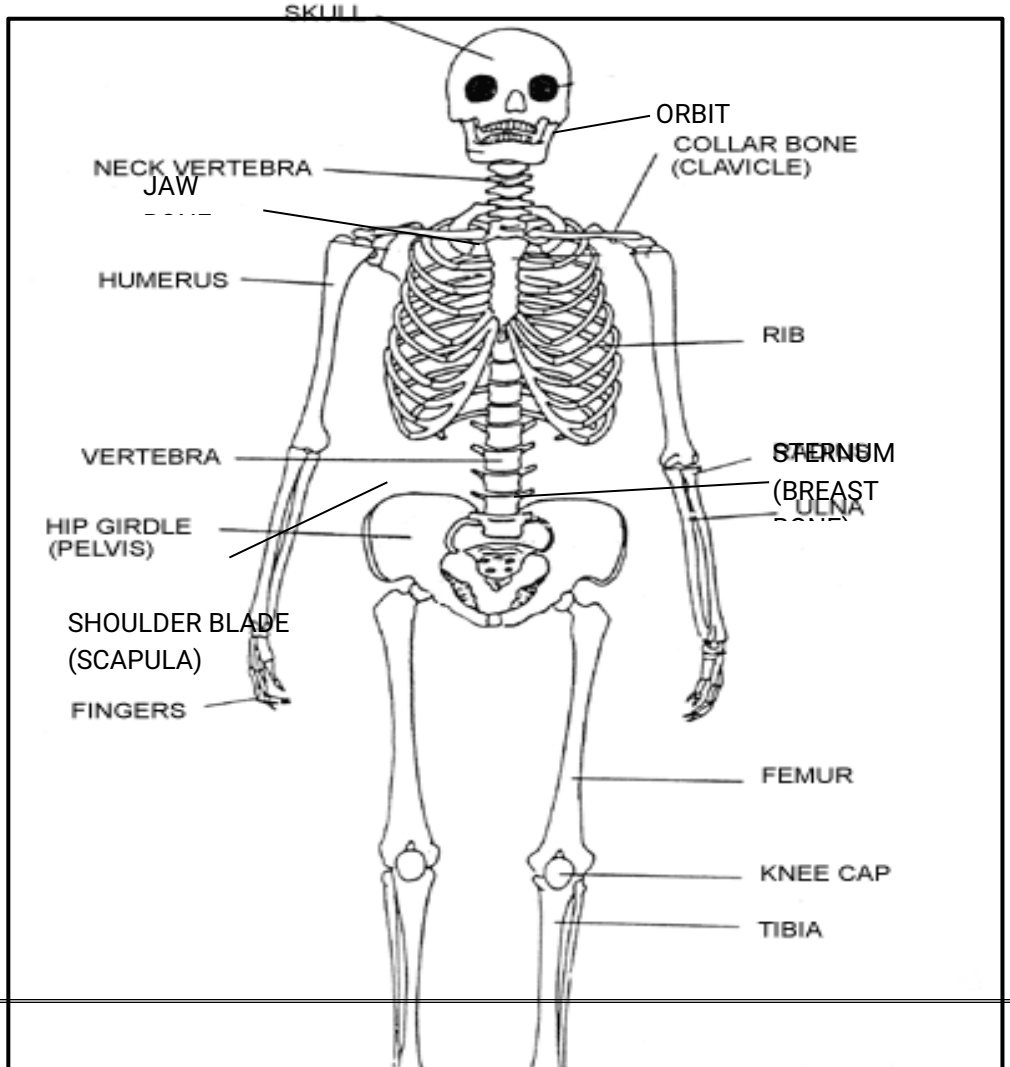
In each arm there are short bones such as carpals (8), metacarpals / bones of the hand (5) and phalanges / finger bones (14)

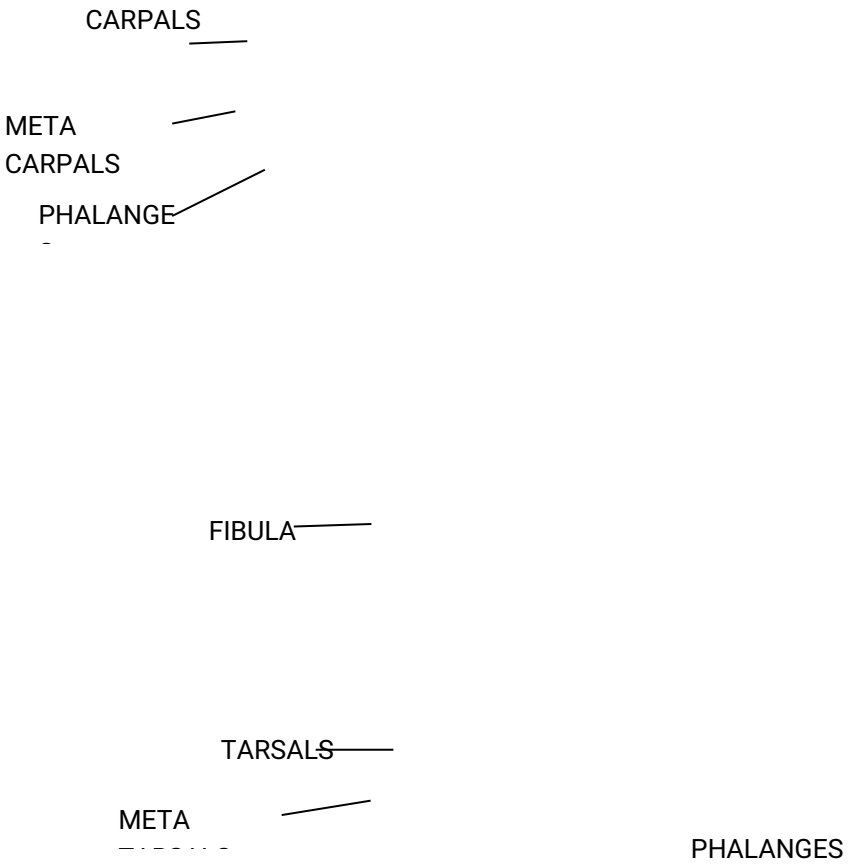
The lower limbs (legs)

These also have 3 long bones each i.e femur, tibia and fibula

In each side there is a patella / knee bone(1), tarsals / ankle bones (8), metatarsals / foot bones (5) and phalanges/toe bones (14).

STRUCTURE OF THE HUMAN SKELETON


SKULL
ORBIT
COLLAR BONE
(CLAVICLE)
NECK VERTEBRA
JAW
HUMERUS
RIB
VERTEBRA
STERNUM
(BREAST
HIP GIRDLE
(PELVIS)
SHOULDER BLADE
(SCAPULA)
FINGERS
FEMUR
KNEE CAP
TIBIA



Functions of the skeleton

- ✓ It gives support to the body.
- ✓ It allows body movement.
- ✓ It provides surface for attachment of muscles.
- ✓ It protects some delicate organs. e.g
    - The skull protects the brain
    - The eye sockets protect the eyes
    - The rib cage protects the heart and lungs.
    - The pelvis (pelvic girdle) protects the reproductive organs.
    - The back bone (vertebral column) protects the spinal cord.
- ✓ It contributes to the formation of blood cells

✓ It stores mineral salts like calcium and phosphorus

BONES

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

Types of bones

✓ Long bones

These bones are found in the arms and legs (limbs) eg femur, radius, fibula, ulna, tibia and humerus.

The femur is the longest and strongest bone in the body.

✓ Short bones

These are found in the last edges of the limbs.

These include the carpals, metacarpals, phalanges, tarsals, metatarsals, sternum and bones of the ear.

✓ Flat bones

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

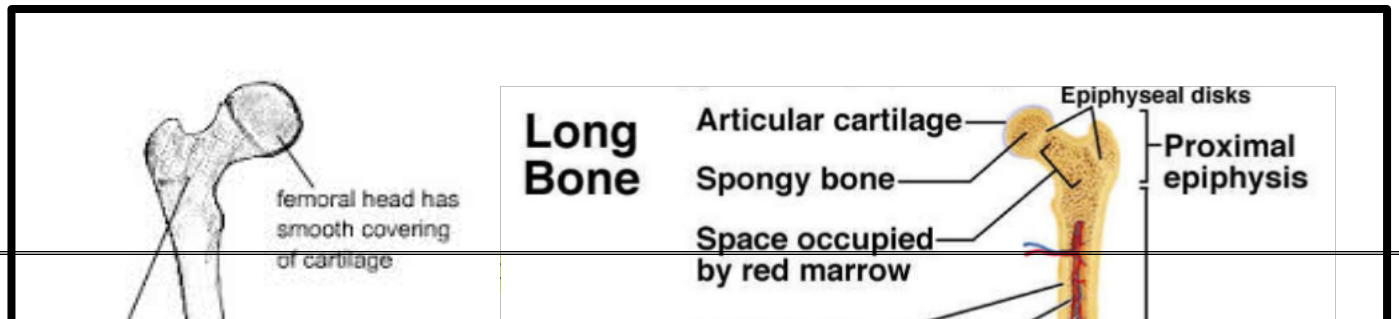
✓ Irregular bones

These include the vertebrae of the spinal column (vertebral column / back bone)

Functions of the bones

1. They manufacture blood cells i.e
   - ✓ White blood cells are manufactured in the yellow bone marrow of long bones.
   - ✓ Red blood cells are manufactured in the red bone marrow of short bones
2. They provide the surface area for attachment of muscles
3. Bones allow body movement (locomotion)
4. Bones store calcium and phosphorus

The structure of a bone



Cartilage

It covers the ends of the bone that moves.

It acts as a cushion to absorb shock when bones rub against each other.

It also reduces friction at the joint.

Yellow bone marrow

This is where white blood cells are manufactured. It contains fat cells.

Spongy bone

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

Hard bone

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

The hardest part of the bone is called Periosteum.

Bones and their other names.

- ✓ Skull – cranium
- ✓ Scapula – shoulder blade
- ✓ Sternum – breast bone
- ✓ Clavicle – collar bone
- ✓ Lower Jaw bone – mandible
- ✓ Upper jaw bone - maxilla
- ✓ Back bone – spine / vertebral column
- ✓ Pelvis – hip bone
- ✓ Tail bone – coccyx
- ✓ Patella – knee cap
- ✓ Femur – thigh bone
- ✓ Tibia – shin bone
- ✓ Foot bones – metatarsals
- ✓ Ankle bone – tarsals
- ✓ Toe bones - phalanges
- ✓ hand bones - carpals
- ✓ Finger bones - metacarpals

Joints

A joint is a place 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 are slippery and smooth to reduce friction at the joints.

Within the joint there is synovial fluid which helps to reduce friction.

This fluid also absorbs shock in case of an injury.

Types of joints:

- ✓ Movable joints
- ✓ Immovable joints

Movable joints

These joints allow body movement.

There are different types of movable joints i.e.

i) Hinge joint

ii) Ball and socket joint

iii) Gliding joint/plane joints/sliding joint

iv) Pivot joint

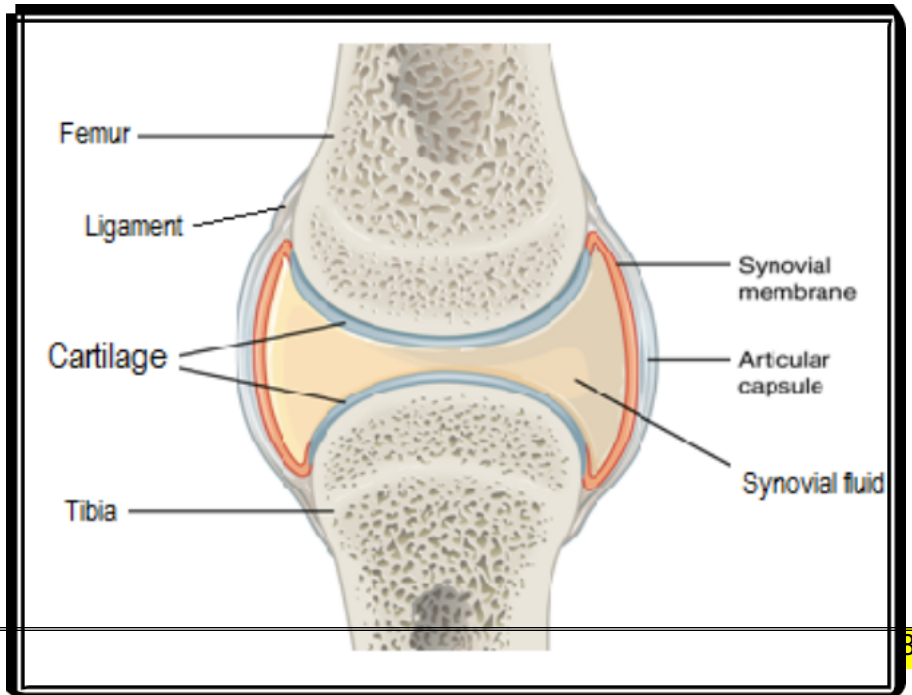
a) Hinge joints

These joints allow movement in one plane (They allow to and fro movement).

Examples of Hinge joint

They include the elbow joint, knee joint, joint of the jaw

Structure of a hinge joint (knee joint)



Functions of each part in the diagram.

i) Ligament: Joins a bone to a bone.

ii) Tendon: Joins a muscle to a bone.

iii) Synovial fluids: It reduces friction at a joint

iv) Cartilage:

- It reduces friction at a joint because it is smooth and slippery.
- It absorbs shock at a joint by acting as a cushion at the end of the bone.

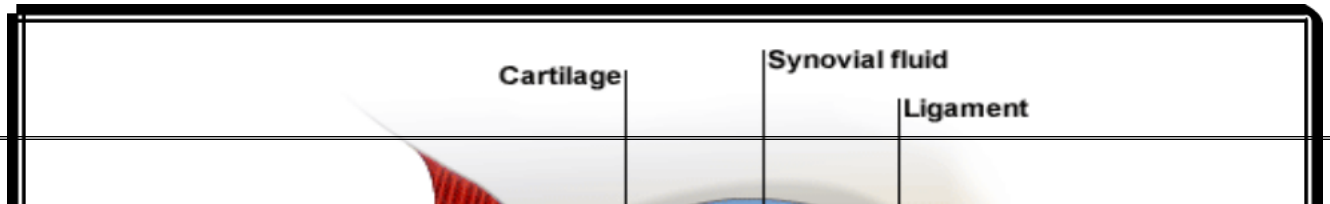
b) Ball and socket joints

These allow movement in all directions.

Ball and socket joints allow all round movement.

They include the shoulder joint and hip joint.

Structure of a ball and socket joint (Hip joint)



c) Gliding joints (plane joint) / sliding joints

These are formed by bones which move over surfaces of each other.

They allow limited movement in all direction.

They include the joints at the carpals of the wrist, tarsals of the ankle and the joints between the bones of the spine (vertebrae) ie ankle joint and wrist joint are examples of gliding joints.

d) Pivot joints

This is the type of joint that allows rotation of certain body parts on other parts.

These allow little movement in all directions.

These are found between the head and the neck. It exists between the axis and atlas bones.

They allow our heads to nod.

Immovable joints (fixed joints)

These do not allow any movement at all.

They include the suture joint of the skull.

Functions of the joints.

1. They allow body movement.
   - ✓ They enable us to perform different body activities like walking, dancing, clapping, chewing, nodding, bonding, turning, swimming, etc

MUSCLES

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

Muscles are attached to the bones by strong tissues called tendons.

Types of muscles

There are two types of muscles namely:-

i) Voluntary muscles (stripped muscles)

ii) Involuntary muscles (smooth muscles)

Voluntary muscles (Stripped muscles)

These are muscles that contract and relax at one's will.

These are muscles attached or joined to the bones i.e skeletal muscles.

These muscles form the bulk of the body.

They enable the body to perform different body activities.

Examples of voluntary muscles

i) Biceps muscles (Flexor muscles)

ii) Triceps muscles (Extensor muscles)

iii) calf muscles

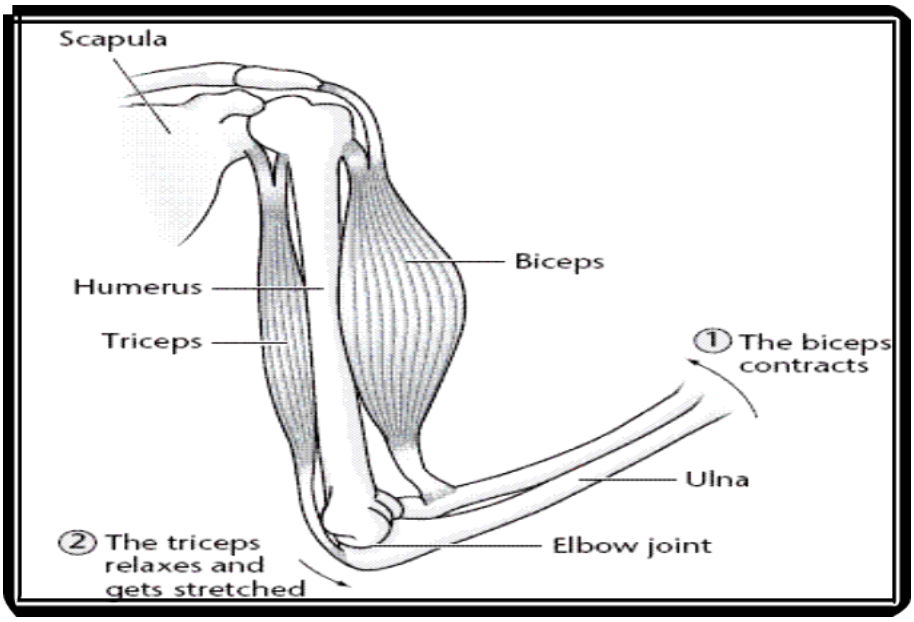
iv) Femoralis muscles

v) Masseter muscles

vi) Muscles of the cheek and neck

Characteristics of voluntary muscles

1. They are attached to bones.
2. They relax and contract at one's will/ their actions are controlled by he brain.
3. They are stripped or fibrous in nature.



Activities performed by voluntary muscles

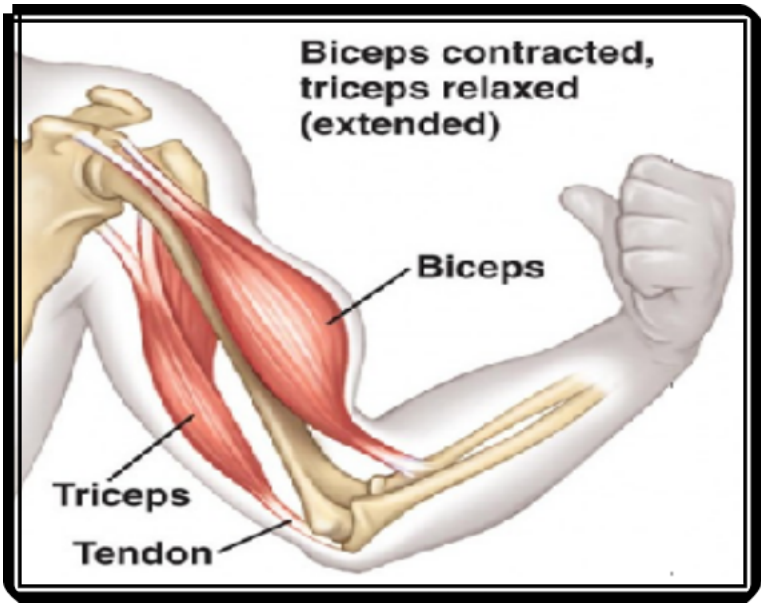
1. Running
2. Swimming
3. Clapping
4. Skipping
5. Bending
7. chewing
8. holding
9. dancing
10. yawning

6. Jogging

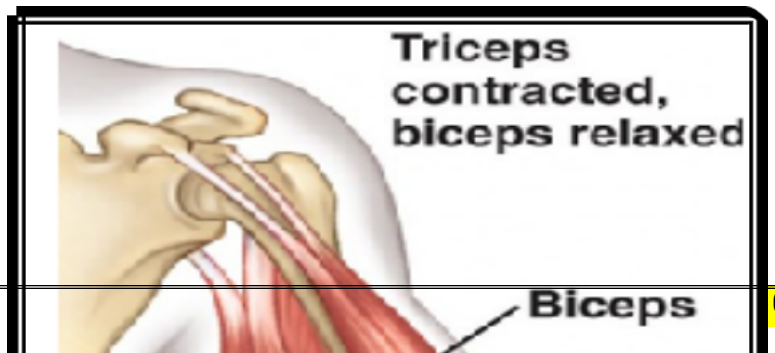
The biceps and triceps are called antagonistic muscles.

NB: Antagonistic muscles are muscles that work in pairs and have opposite effects on each other.

a) **Diagram showing how biceps and triceps behave during bending of the arm**



b) **Diagram showing how biceps and triceps behave during raising / straighter the arm**



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

Involuntary muscles

These are muscles which do not contract and relax at one's will.
They contract and relax automatically.
These muscles are not connected to the bones.
They do not contract and relax at one's will.(They are not controlled by the brain)

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. They are smooth

Examples of involuntary muscles

i) Muscles of the alimentary canal.

ii) Muscles of the reproductive system

iii) Muscles of blood vessels.

iv) Muscles of the heart

v) Intercostal muscles

vi) Diaphragm

vii) Muscles of the eye (intrinsic muscles and ciliary muscles)

Actions performed by Involuntary muscles

1. Blinking of the eye
2. Passing out of urine
3. Digestion of food
4. Breathing
5. Heart beat
6. Sneezing
7. Labour

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.

General functions of muscles

1. Muscles generate heat energy through body metabolism
2. They help in movement of the body
3. They give rigidity to the skeleton by preventing unnecessary movement of bones.
4. During tissue respiration, the muscles release heat to warm the body.
5. Muscles maintain body posture
6. They aid peristalsis along the alimentary canal
7. It helps to join bones in the body.
8. Muscles store food in form of glycogen

Posture

Posture is the way a person positions his or her body when performing an activity.

Types of posture

1. Good posture
2. Bad posture

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

How to promote good posture

1. Always sit properly without bending. (sitting in upright position)
2. By tightening the ankles and knees during movement.
3. By placing all the feet flat on the ground during movement
4. By putting all body weight on both buttocks when sitting
5. By keeping the backbone upright when walking, sitting or walking
6. Avoid twisting joints unnecessary when in bed

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 and elegant
6. It prevents chest and back pain
7. It allows flexibility of joints and muscles
8. It allows proper blood circulation

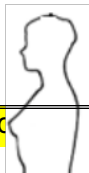
Bad posture

This is the improper positioning of one's body when performing an activity.

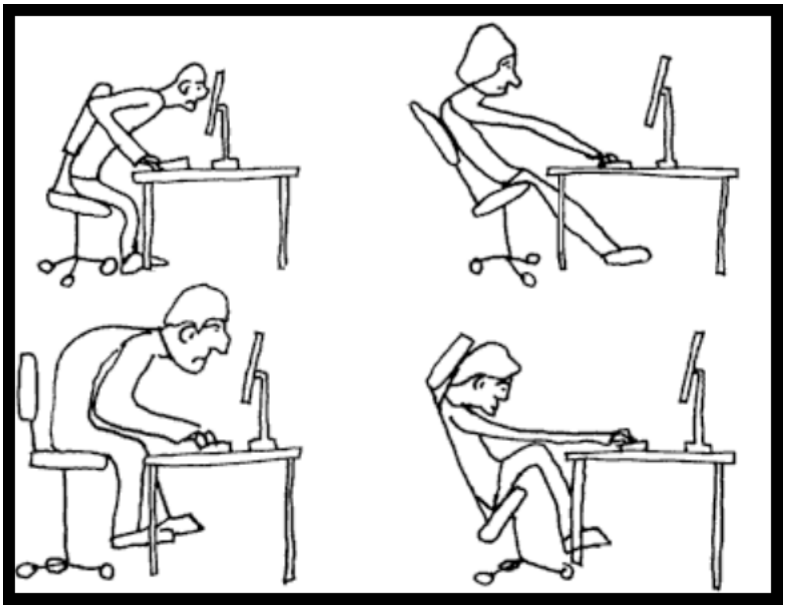
Activities that can lead to bad posture

1. Standing while bending forward.
2. Sleeping while bending some body parts
3. Sitting while bending forward, sideways or backward
4. Walking and running while bending forward
5. Supporting the head with a hand/hands when sitting

a) **Diagram showing good posture**



b) **Diagram showing bad posture**



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
6. It causes body weakness

Importance of body exercises

- They promote physical fitness

- They allow proper circulation of blood in the body
- They make the joints more flexible
- They reduce the level of fats in the body (They prevent obesity/reduce body weight)
- They strengthen bones and muscles
- They break fatigue
- They increase energy production in muscles
- They promote the proper functioning of the body organs and tissues
- They reduce the risks of getting heart diseases
- They ease food digestion

MUSCULAR DISEASES

These affect the muscles and they include:-

1. Tetanus
2. Leprosy
3. Yaws

SKELETAL DISEASES

These include the following;

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

1) Rickets

It is caused by lack of enough vitamin D and calcium in the body.

Signs and symptoms.

1. Weak bones especially limb bones. (of the arm and legs)
2. Poor teeth formation
3. Fractures are very common to the person with rickets.
4. Formation of ox-bow and knock - knee legs

Rickets can be prevented by feeding on foods rich in vitamin D, calcium and phosphorous.

2) Polio (poliomyelitis)

It is caused by virus.

The virus can cause paralysis or weakness of one or more limbs.

The virus is transmitted through drinking contaminated water

Polio is a water borne disease that affects the skeletal system.

It is also an immunisable disease that affects the skeletal system

Signs and symptoms of polio

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

Prevention of polio.

- ✓ All children below 5 years should be immunized with polio vaccine
- ✓ Proper disposal of human wastes.
- ✓ Drink properly boiled water.
- ✓ Washing hands with clean safe water before and after meals

3) Cancer of the bones.

4) Tuberculosis of the bones

- It is caused by bacteria called mycobacterium tuberculosis
- It spreads through inhaling contaminated air and through drinking unboiled milk from infected animals

Signs and symptoms.

- ✓ Prolonged dry cough
- ✓ Thick mucus
- ✓ General body weakness
- ✓ loss of body weight
- ✓ Pain in the backbone (spine)
- ✓ Fever
- ✓ Paralysis of the limbs
- ✓ Severe pain when one is bending

Prevention and control of tuberculosis.

- ✓ Immunization with BCG vaccine
- ✓ Isolation of infected persons
- ✓ Early treatment of infected persons.
- ✓ Drink boiled milk always.

5) Osteomalacia (softness of bones)

TETANUS

- ✓ It is caused by a bacterium found in the soil.
- ✓ The bacteria enter the body through fresh cuts and wounds.
- ✓ They attack muscles making then stiff and breathing becomes difficult.

- ✓ In new born babies, it can enter through the umbilical cord if cut with a dirty un-sterilized instrument like a razor blade or knife.

Signs and symptoms of tetanus

- ✓ Stiff muscles all over the body
- ✓ Spasms when touched
- ✓ The baby stops sucking the mother's breasts
- ✓ Difficulty in breathing

Prevention and control of tetanus

- ✓ Early immunisation with DPT vaccine
- ✓ Treatment of the infected people immediately
- ✓ Avoid using unsterilized skin piercing objects
- ✓ Wearing protective gadgets when operating in dirty environment

Leprosy

- ✓ It is caused by bacteria called mycobacterium Leprae
- ✓ It is spread through direct body contact with an infected person
- ✓ It attacks both muscles and bones
- ✓ It causes paralysis of the body
- ✓ It causes loss of fingers and toes.
- ✓ It causes runny eyes

<u>Prevention and control</u>

- ✓ Isolating infected persons
- ✓ Avoid sharing towels, basins, beddings with an infected person
- ✓ Treat early cases with antibiotics
- ✓ Avoid close body contact with an infected person

NB: Leprosy affects the following body systems.

i) The skeletal system

ii) The muscular system

iii) The nervous system

Disorders of the muscles and skeleton.

1) Fracture
2) Strains
3) Sprains
4) Dislocation
5) Cuts
6) Spinabifida (poor formation of the spinal cord)
7) Hernia
8) Burns
9) Wounds

Fracture

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

Types of fracture.

i) Simple fracture

ii) Compound fracture

iii) Green stick fracture

iv) Comminuted fracture

v) Depressed fracture

Causes of fracture

- Motor accidents
- Falling from a tree
- Playing rough games
- Running or walking carelessly
- Playing rough games

Simple (closed) fracture

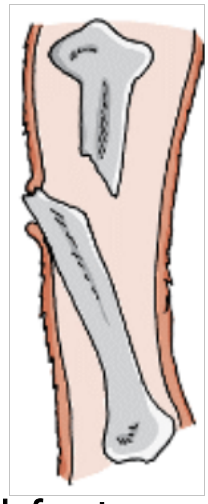
This is when a bone breaks at one point and remains inside the body (flesh).

The muscles and blood vessels may be damaged but the bone doesn't come out of the flesh.

Compound (open) fracture

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

The skin, muscle and blood vessels are damaged and bleeding occurs.



Green stick fracture.

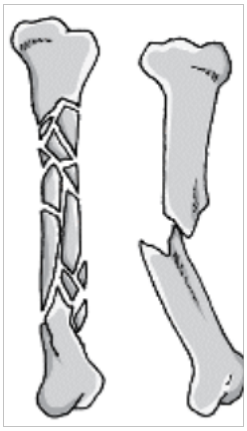
This is a type of fracture where the bone does not break completely or bends.

Part of the bone remains attached.

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

Comminuted fracture (Complicated fracture)

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



Depressed fracture

This is the type of fracture where the bone cracks inwards after a serious injury on it. It mainly occurs on the skull.

Signs of fracture

✓ Severe pain and tenderness on the site of injury.

✓ Failure to move the fractured part with ease.

✓ Bleeding of the wound in case of a compound fracture/comminuted fracture.

✓ In case of a compound fracture, the bone is seen out of the skin.

✓ Swelling and bruising of the fractured part

✓ The injured area may be shortened or may lie in an unusual position.

✓ The broken limb appears crooked.

First aid for fractures.

- ✓ Apply a splint to keep the broken bone in position.
- ✓ Tie with a bandage to stop bleeding in case of open fracture.

If the bones keep moving further injuries may occur.

An arm sling may be applied around the neck to support a broken arm.

✓ Take the patient to the nearest hospital.

Sprains and strains

A sprain is a torn or over stretched ligament / A sprain is an injury on a ligament.

A strain is a torn or over stretched muscle / A strain is an injury on a muscle.

Signs and symptoms of sprains and strains.

- ✓ Severe pain at the injured part.
- ✓ Sudden swelling and bruising of the injured part.
- ✓ Failure to move the affected part with ease.

First aid for sprains and strains.

- ✓ Use a firm bandage to support the affected part.
- ✓ Movement of the affected part should be stopped.
- ✓ In case of a sprained wrist/elbow, an arm sling should be applied for support.
- ✓ Take the patient to a doctor.

Dislocation

A dislocation is the displacement of a bone from its normal position at a joint.

Signs and symptoms a dislocation.

- ✓ Severe pain at the affected part.
- ✓ Sudden swelling and bruising of the affected part.
- ✓ Difficulty to move the affected part.
- ✓ Inflammation of the affected area.

First aid for dislocation

Tie the area with the dislocation with a bandage to prevent further movement of the affected part and rush the victim to the nearest hospital.

How to keep the muscular skeletal system healthy and in a good working conditions

- ✓ Eat a balanced diet.
- ✓ Always maintain a good posture.
- ✓ Take all children for immunization.
- ✓ Avoid playing rough games
- ✓ Have regular medical check-ups
- ✓ Carry out regular physical exercises.
- ✓ Wounds, cuts, sprains, fractures, strains and dislocations should be worked upon immediately.
- ✓ Treat all infections of the system immediately

TOPIC TWO

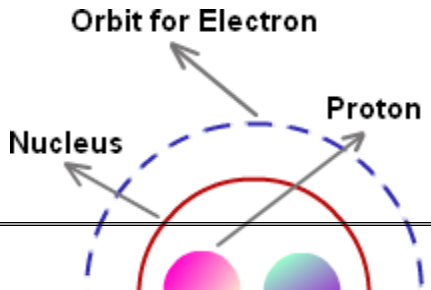
ELECTRICITY AND MAGNETISM

What is electricity?

Electricity is a form of energy produced by the flow of electrons. OR Electricity is a form of energy produced by electrical charges.

Electrons are negatively charged particles orbiting round an atom. Protons are positive charges found in the nucleus of an atom while neutrons are uncharged particles found in the nucleus of an atom.

Diagram of an atom



An atom is the smallest indivisible particle of matter that can take part in a chemical reaction.

Forms of electricity

- Current electricity
- Static electricity

Current electricity

It is the form of electricity which is produced when electrons flow from the source to another point through a conductor.

Types of current electricity

- Direct current electricity (DC)
- Alternating current electricity (AC)

Direct current electricity is the type of electricity which flows in only one direction, ie from the source to the appliance. It can be stored, but it cannot be stepped up or down.

Sources of Direct current electricity

- Dry cells
- Simple or wet cells
- Batteries or accumulators

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

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

Types of alternating current electricity and their sources

Types of electricity	Sources
Hydro electricity	Fast flowing water
Thermal electricity	Fossils fuels/burning fuels
Atomic electricity or Nuclear electricity	Uranium
Solar electricity	Sun
Geothermal	Hot springs

There are four forms of alternating current electricity

- Hydro electricity
- Thermal electricity
- Atomic electricity
- Solar electricity

a) Hydro electricity / Hydro electric power

This is a type of electricity got by the power of fast flowing water which turns the turbines. The turbines are connected to a generator which produces electric power. The kinetic energy in the fast flowing water is changed to electrical energy by the generator.

b) Thermal electricity

This is a type of electricity got by burning a fuel either coal or petroleum. Coal or oil contains stored chemical energy which changes to electrical energy.

c) Atomic electricity

This is the type of electricity got from burning uranium a radio active (mineral) dug from underground which stores chemical energy. Uranium is burnt to heat nuclear reactors so as to produce electricity.

d) Solar electricity:

It is the type of electricity got from the sun. It is got by using solar cells in solar panels which trap

heat and light energy from the sun. The heat energy and light energy is then sent to solar batteries, which convert it to electricity.

ELECTRIC CURRENT

Electric current is the flow of electric charge through a conductor.

Electric current can only flow through a complete circuit.

ELECTRIC CIRCUIT

What is an electric circuit?

- An electric circuit is a path through which electric current flows.

OR

- It is a path through which electricity passes. For electricity to flow, the circuit must be complete, i.e the path starts and ends at the source of electricity.

Illustration of a dry cell, bulb and conducting wire.

Simple circuit from a dry cell.

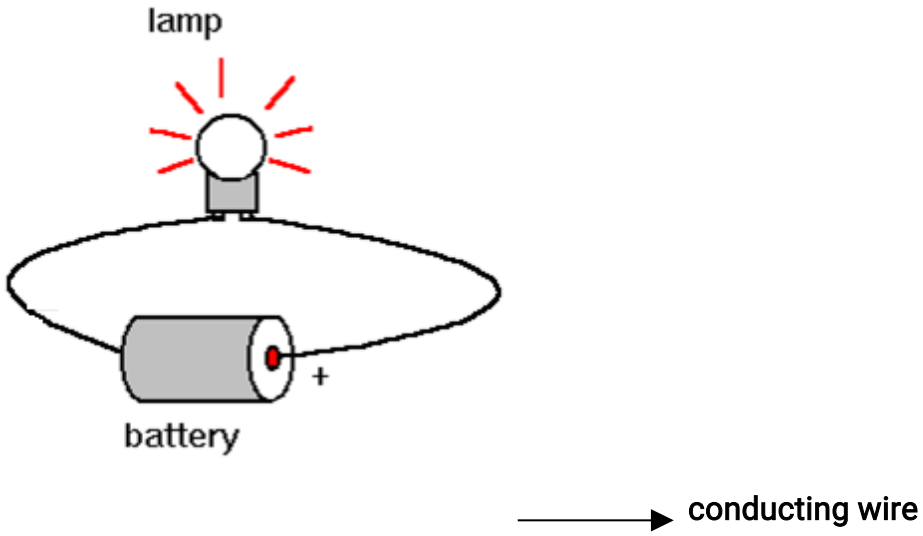


Illustration showing flow of electric current

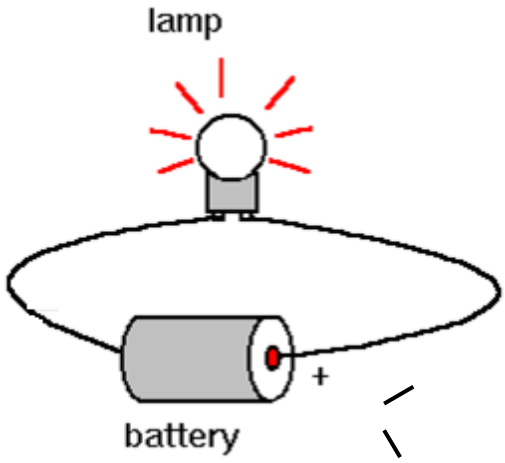
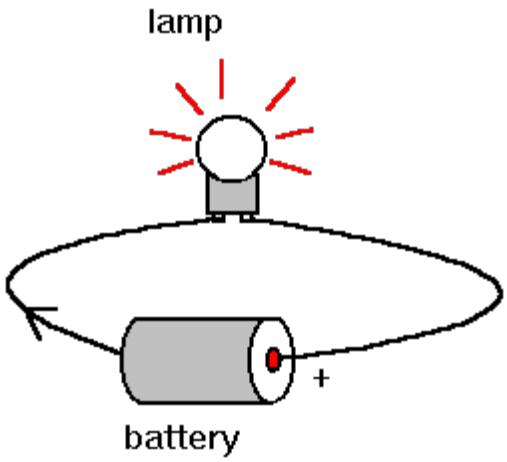


Illustration showing flow of electrons



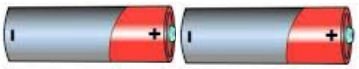
Note:

Current flows from the positive terminal to the negative terminal of a dry cell.

- Electrons flow from the negative terminal to the positive terminal of a cell.
- For current to flow easily, the positive terminal must be connected to the negative terminal if you are using more than one dry cell, eg
- 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).

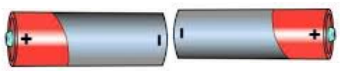
A

Current will flow



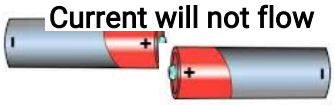
B

Current will not



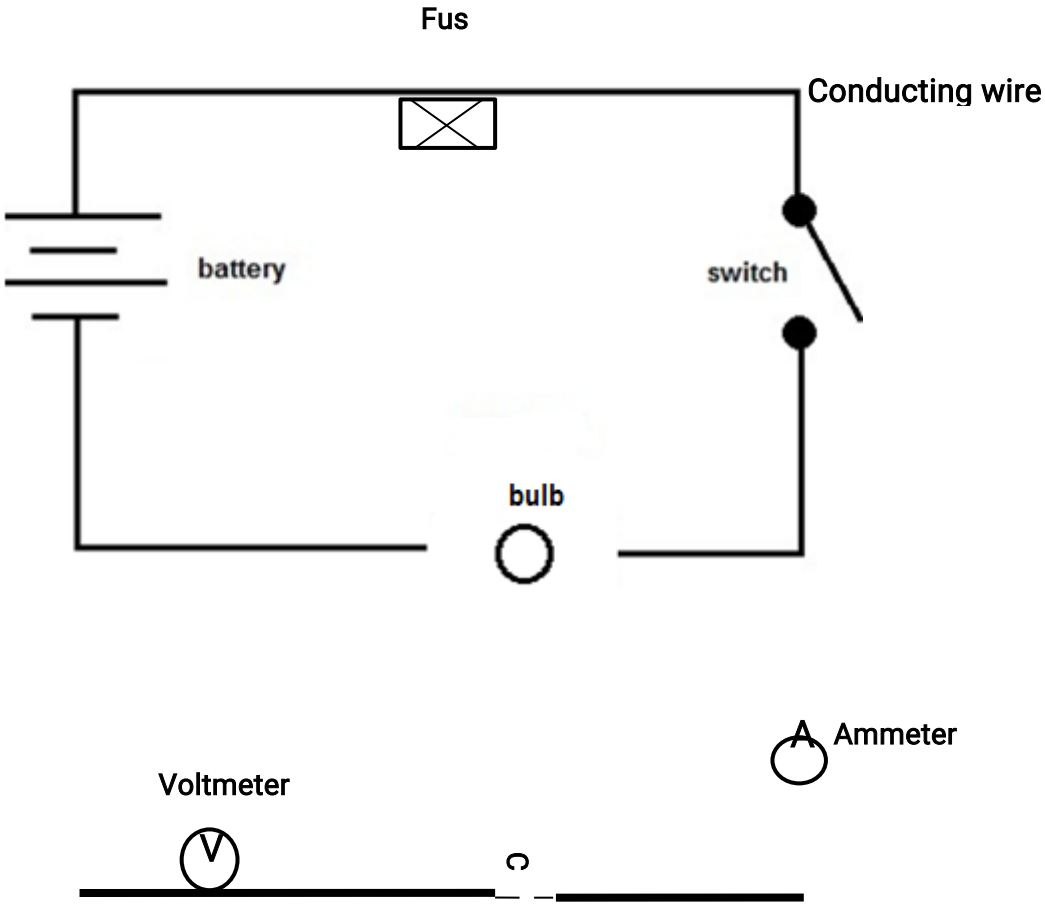
C

Current will not flow



Components of an electric circuit

- Conductor (wires)
- A fuse
- Source of electricity (batteries / dry cells)
- An appliance (bulb)
- An ammeter
- Voltmeter
- Switch



Functions of each part of the circuit

- **Ammeter**: It is used to measure electric current flowing through the current.
- **The switch**: it breaks or completes the circuit at one's will.

- **The bulb**: It produces light in a complete circuit. A bulb has the ability to change electric energy to heat then to light energy in case the circuit is complete.

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

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

- **Dry cells**
  - Produce electricity for the appliance.
  - Store electricity in form of chemical energy.
  - Convert or change chemical energy to electrical 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 a 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 very low melting point. So, it easily melts and breaks the circuit in case it heats up.

How does a fuse work?

A fuse melts and breaks the circuit if current that is greater than rated value flows through it.

This protects circuits and appliances from harm or damage.

Adaptation of a fuse for its function.

- It is made up of thin wire of solder that can easily melt and break the circuit.

Advantages of fuses

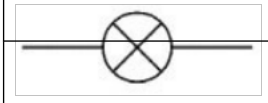
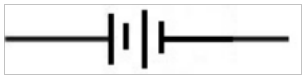
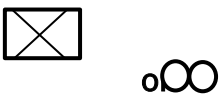
- Reduces the risks of electric fires in houses.
- They protect the delicate electric equipment (appliances) by breaking the circuit before it is damage.

Reasons why a fuse may blow or break.

- Aging of wires (old and weakened wires)
- Overloading the circuit
- Presence of a short circuit

- current over load through a circuit

ELECTRIC SYMBOLS

Symbol	Component
	Conducting wire
	Resistor
	Electric bulb
	Dry cell
	Battery
	Switch
	Ammeter
	Voltmeter
	Fuse

Electrical Resistance

- This is the opposition to the flow of current in an electric circuit. Any electric circuit opposes the flow of current and therefore produces heat.
- Electrical resistance is measured in units called Ohms by an instrument called Ohmmeter.
- The higher the resistance, the greater the amount of heat produced or the longer the wire, the greater the resistance.
- The filament of bulbs, water heating elements, elements of electric flat Iron, heating coils or electric cookers, ovens, etc are made of coiled wires to increases the resistance and give more heat.

Thinner and longer wires give or offer greater resistance while thicker and shorter wires have less resistance.

Therefore heat produced by long and thinner wires is greater than that produced by shorter and

thicker ones.

Electric Pressure / Electromotive Force (emf) / Electric voltage

Is the force that drives current through the resistance of the circuit.

Electric pressure is measured by an instrument called voltmeter and in units called volts. This means that the emf of our domestic electricity is 240 volts or the voltage of electricity consumed in our homes is 240 volts.

Conductors and insulators

Conductors or good conductors of electricity are substances which allow electricity or electric current to flow through them e.g

- All metals are good conductors of electricity. The order of conductivity from the best is silver, copper (Cu), aluminum (al), tungsten, nickel, zinc (Zn), lead (Pb), brass, Iron (Fe), Platinum, etc. Metals conduct electricity because they have mobile electrons.
- Silver is the best conductor but it is very expensive. This is why it is not commonly used to make electric wires and equipment. Most electric overhead cables are made of either copper or aluminum because they are cheaper.
- All salts in solution form eg sodium chloride in water.
- All acids eg Hydochloric acid, dilute sulphuric acid, nitric acid, etc
- Water (but not distilled water) why? It doesn't contain mineral salts.
- Wet wood

Note: All liquid conductors of electricity are known as electrolytes.

Electrolytes are substances that conduct electricity in their liquid form. Electrolytes conduct electricity because they have charged atoms called ions.

Insulators:

Insulators are substances, which don't allow electricity to flow through them.

- They can also be called bad conductors of electricity.

Examples include; rubber, paper, dry wood, plastics, dry cloth and air.

They don’t conduct electricity because they lack mobile electrons,

Importance of Insulators

1. They are used to make handles of flat irons and electrical gadgets to prevent electric shocks.
2. They prevent conductor from meeting to cause short circuits e.g for insulating electric cables.
3. They are used to make itens used in handling electricity e.g gloves and boots.

Short circuits:

- A short circuit is an electric path with low resistance to the flow of current.’
- The shorter the path, the less the resistance. So the flow of electricity is greater when the path is longer. When the path is shortened, the circuit is said to be short.

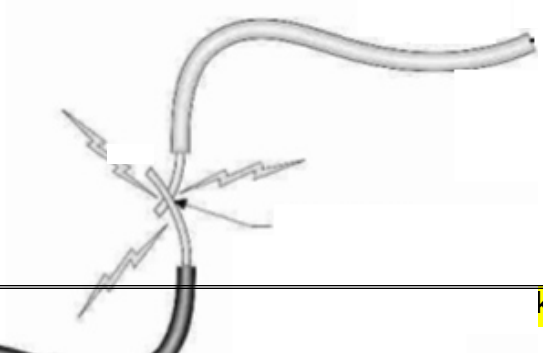
MAIN CAUSE OF SHORT CIRCUITS

- When the two uninsulated wires carrying current touch each other.
- The insulation may get destroyed with time and this may cause short circuit.

Causes / conditions and other causes which may lead to short circuits.

- Dampness or rain which spoils the insulation.
- Pushing metallic objects in the sockets.
- Aging or old wires
- Over loading the circuit.
- Damage made by rats or cockroaches to the insulation.
- A result of fault in the appliance like radio, cooker, electric flat Iron, etc.
- Poor wiring during electrical installation.

Experiment to show a short circuit



naked wires touching

insulated wire carrying electricity

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.

Signs of short circuits

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

Dangers of short circuit

- They cause buildings to burn.
- They cause fire which destroys property.
- They damage electric appliances

Prevention of short circuits

- Using properly insulated wires.
- Having electrical installations done by experts only.
- Having electrical repairs done by qualified personnel.

ELECTRIC CELLS

An electric cell is a device that produces electricity from a chemical reaction.

Types of Electric cells

There are two types of electric cells namely:

- Primary cells
- Secondary cells.

Primary cells: These are electric cells which produce electricity by chemical reactions and are not rechargeable.

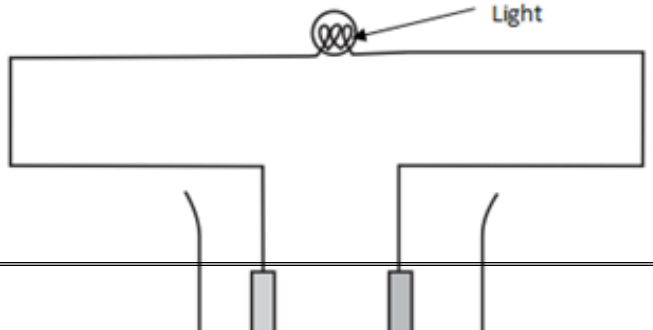
There are two examples of primary cells namely;

- Simple cells or wet cells
- Dry cells

Simple cells / wet cells

- A simple cell is an example of a wet cell.
- It was first discovered by an Italian Scientist called Alesandro Volta in 1800.
- A simple cell consists of a zinc plate and copper plate dipped in dilute sulphuric acid
- The zinc and copper plates are both called electrodes or poles. An electrode is a piece of metal placed in an electrolyte to conduct electric current.

An illustration of a simple cell



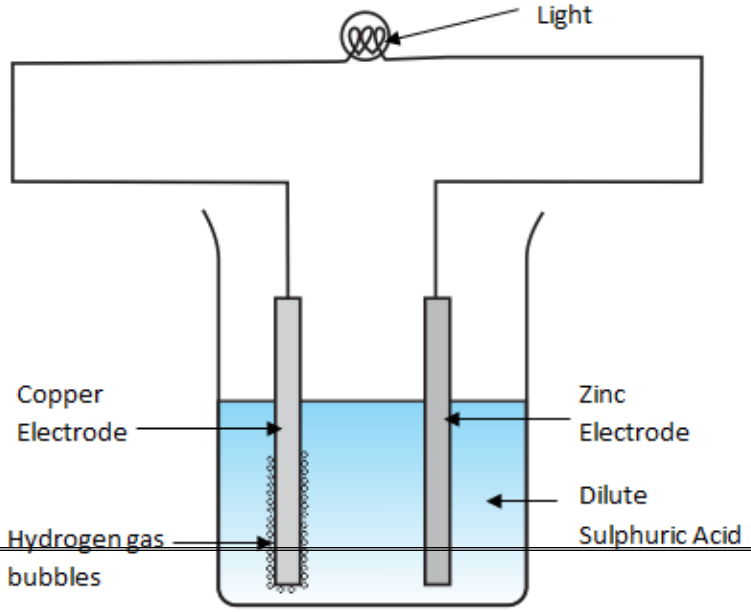
A simple cell is not efficient because of the factors namely

- Polarization
- Local action

Polarization

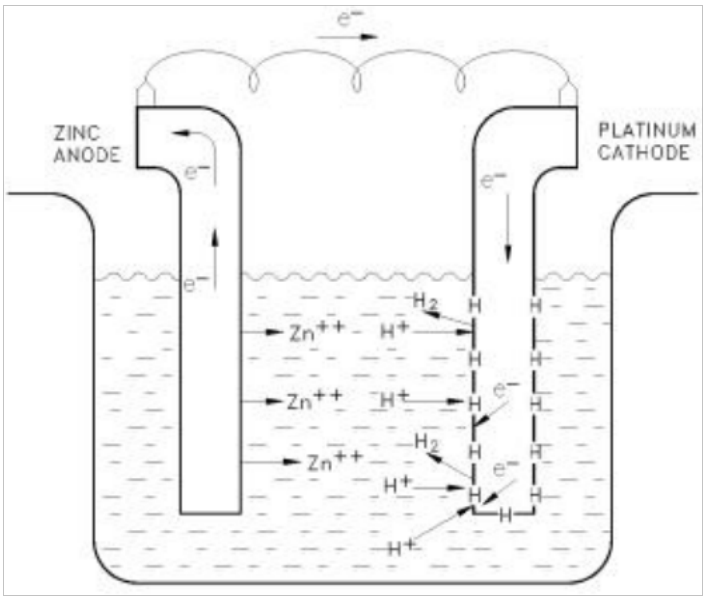
This is when bubbles of hydrogen gas cover the copper rod and stop the flow of electrons.

- If the bulb is connected across the cell, it begins to grow but after only a few seconds, it becomes dimmer and dimmer until it finally goes out. This is because polarisation sets back the Electromotive force, which is slightly less than 1 volt and also the gas insulates the copper plate.



Local action

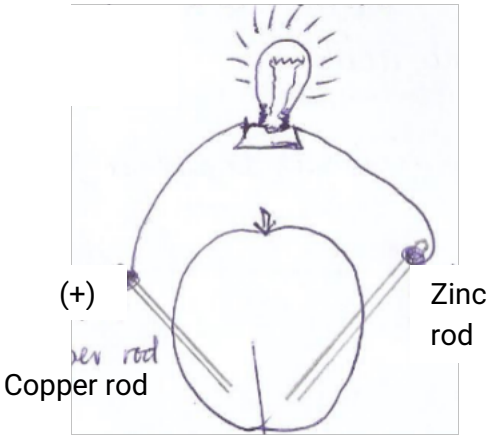
This is when bubbles of hydrogen are seen coming off the zinc plate. This is caused by the presence of the impurities in the zinc, like carbon, which sets up local cells at the zinc plate thus washing it.



A home made simple cell

This can be made from an orange, grape fruit or lemon.

Simple cells convert chemical energy into electric energy.



An electrolyte is a liquid conductor of electricity.

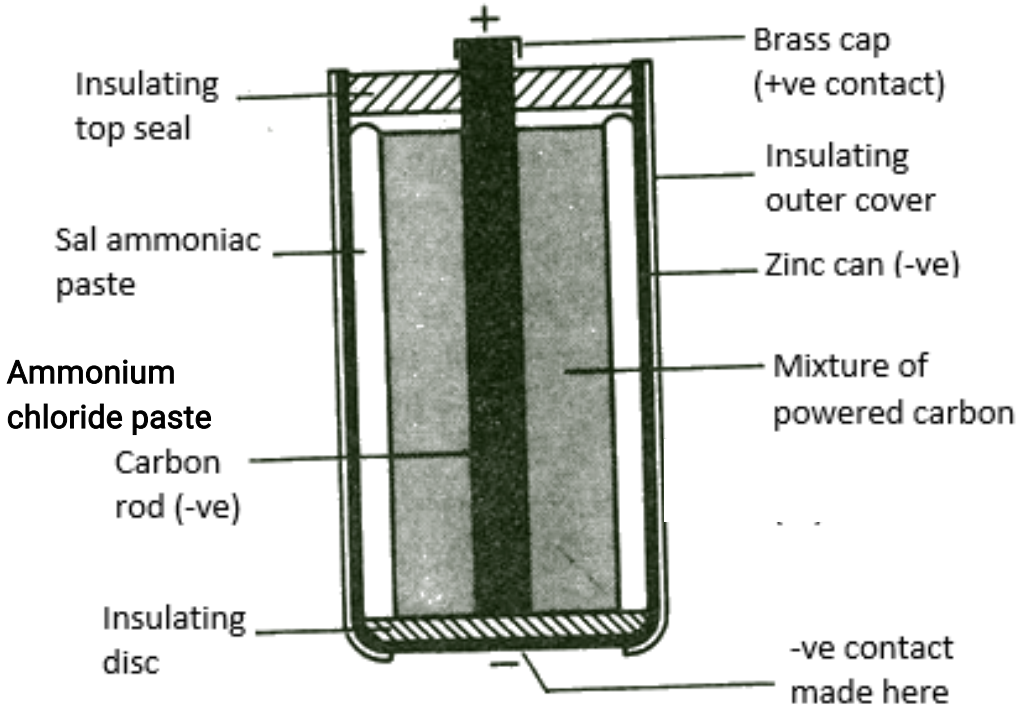
Examples of electrolytes

- Dilute hydrochloric,
- Dilute sulphuric acid

Demerits of simple cells

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

Structure of a Dry cell.



Zinc can (-

- A dry cell is an example of a primary cell.
- It has the capacity to produce an electric pressure or an electromotive force (emf) of 1.5 volts when still new.
- The electromotive force decreases as one continue to use it.

1. Calculating the voltage of dry cells.

Example

Calculate the voltage (emf) produced by 3 dry cells

3 dry cells

1 dry cell = 1.5V

3 dry cells = 3x1.5V

= 4.5V

2. How many dry cells are needed by a radio which uses 12 volts to operate.

   1 dry cell = 1.5V

   X = 12V

$$\frac{12}{1.5} = \frac{12x10}{1.5x10}$$

$$= \frac{120}{15}$$

= 8 dry cells

Functions of each part of a dry cell

a) **Brass cap** – the contact for the positive terminal.

b) **Pitch or top seal** – prevents ammonium chloride jolly from drying up.

c) **Ammonium chloride paste** – helps in the transfer of electrons.

d) **Electrolyte** – it is made up of powdered carbon and manganese oxide. The powdered carbon provides a partial conductor across the inside of a cell and;

- Reduces the work of the cell in moving electrons
- Reduces the internal resistance of a cell.
- Absorbs hydrogen.

The manganese oxide prevents build up of hydrogen gas around the carbon rod by changing it to water ie it oxidizes hydrogen. So manganese oxide is a polarizing agent. This is the reason why dry

cells leak when they are exhausted.

e) **Carbon rod** – it is the positive element and a non – metallic conductor of electricity found in a cell. Carbon rod is made up of graphite.

f) **Zinc can** – it acts as the negative element and it is the container in which the contents of the cell are put.

Energy change in a dry cell

Chemical energy changes to electrical energy when the circuit is complete,

A dry cell stores chemical energy.

Secondary cells

- These are cells which can be recharged by passing an electric current through them from either a dynamo or an alternating current.
- Secondary cells store electrical energy in chemical form.
- Secondary cells are also called storage cells or accumulators because they don't produce electricity of their own, they just store. Examples include a car battery or lead accumulator, which is always being recharged by a car dynamo.

ELECTRICAL APPLIANCES

These are devices that use electricity to function.

Electrical appliances that change electrical energy to heat energy.

Flat irons, oven, water heater, electric cooker, electric kettles, electric bulbs, fluorescent tubes.

Electric appliances that change electrical energy to light energy

- Electric bulb, Fluorescent tubes, electric torch

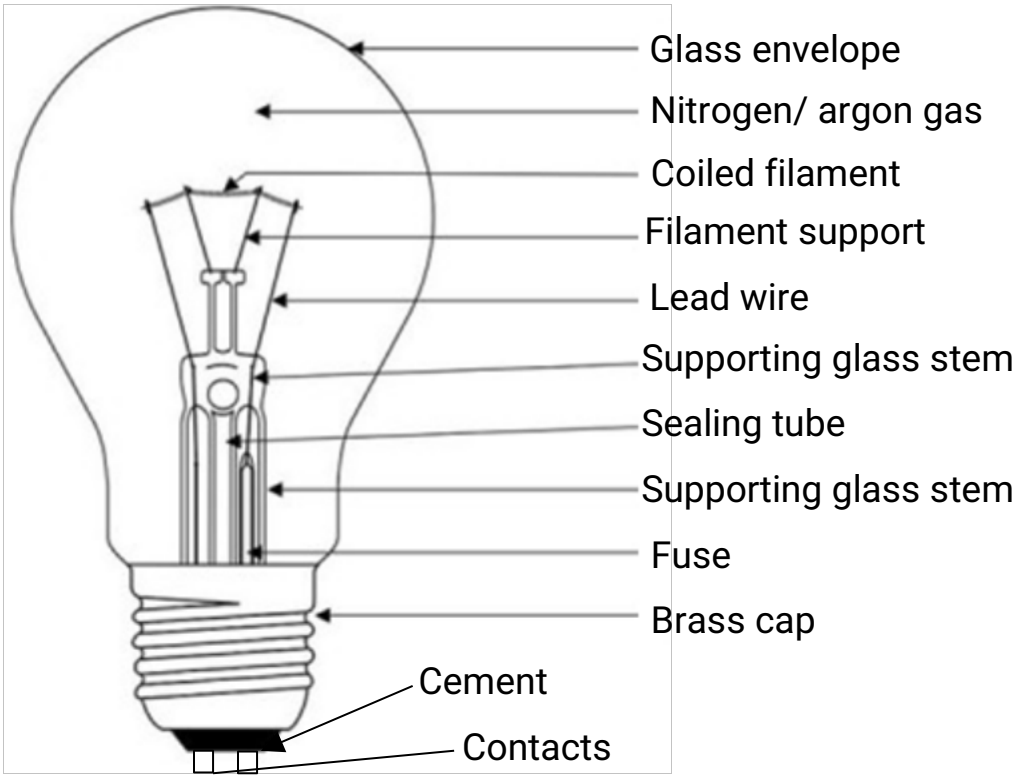
Electric appliances that change electrical energy to sound energy

- Electric bells, Radios, televisions, Gramophones, Projectors, DVD players

Electrical appliances that change to mechanical energy

- Washing machine, Sewing machine, Electric motor, Juice blender, Electric fan, Refrigerator

An electric lamp bulb



Adaptations of filament.

- It has a high melting point hence can burn to a high temperature.
- It is coiled to increase electric resistance

Functions of some parts of an electric bulb

a) **Brass cap** – enables the bulb to be fixed into the lamp holder.

b) **Sealing tube** – enables air to be removed from the bulb. This prevents the filament from combining with oxygen.

c) **Coiled filament** –

Tungsten is got from a mineral called wolfram.

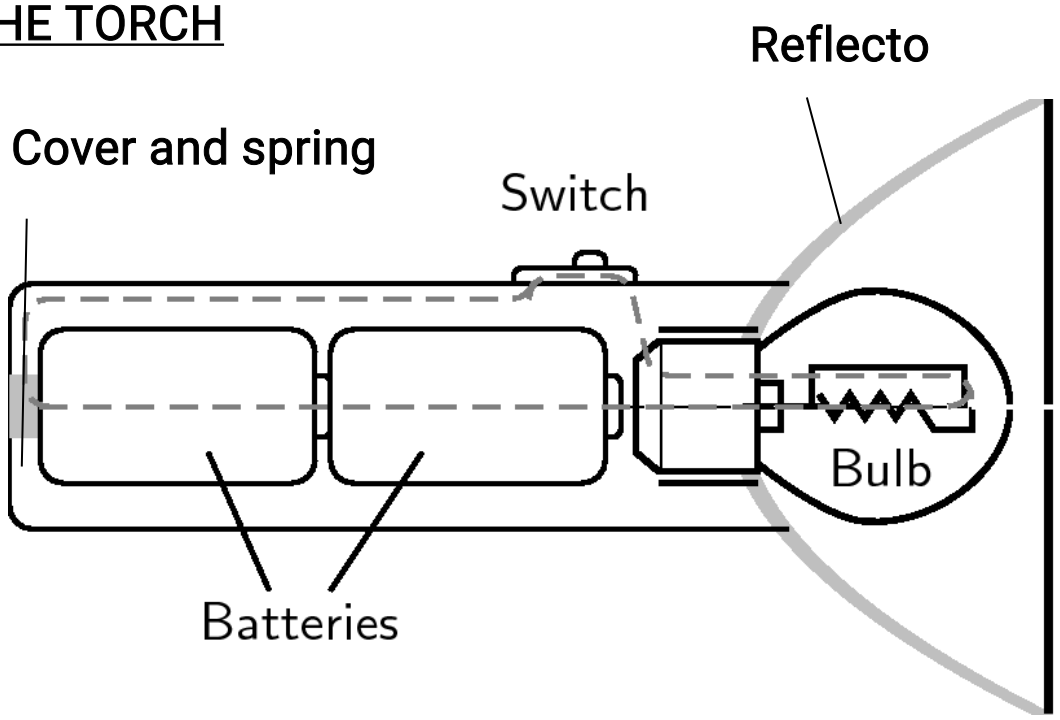
The filament changes electrical energy to heat energy and then light energy.

d) **Glass envelope** – it holds a mixture of two gases called argon and nitrogen.
   - Prevents the evaporation of tungsten and enables the tungsten to burn at a much higher temperature. The higher the temperature, the grater the electric heat converted into light.
   - It reflects light from the filament into a diverging beam since it is transparent.

e) **Supporting glass stem** – it holds the filament in position.

f) **Lead wires** – they transport electric energy to the filament.

THE TORCH



Dry cells

A torch uses dry cells. In most cases, the dry cells are placed in series. This torch works on the principle that electricity travels in a complete circuit.

Functions of some parts on a torch:

- Switch – breaks or completes the circuit at one's will.
- Bulb – changes electrical energy to heat energy and light energy.
- Dry cells – change stored chemical energy into electrical energy.
- Reflector – directs light into a diverging beam.
- Cover and spring – completes the circuit. They keep the dry cells tightly closed.

A torch may fail to work if;

i) The bulb is not fixed properly.

ii) The dry cells are not arranged properly

iii) The cover is not properly fixed.

iv) When the electric bulb filament is blown

v) When dry cells are exhausted

If it starts working properly and then later goes off, it may be because.

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

Merits / advantages of using electricity.

- It is easy to use compared to charcoal or firewood.
- It is quick so it saves time.
- It helps to conserve the environment by saving trees for firewood and charcoal.
- Neat and clean work is produced using electricity.

- It can easily transform into other forms of energy eg electric to heat, electric to light, electric to sound, electric to magnetic.
- It does not pollute the environment.

Uses of electricity to man

- It is used for cooking
- It runs machines e.g computers
- It is used for ironing clothes
- It is used for providing light
- It is used for security

Demerits / disadvantages of using electricity

- It causes fire out breaks
- It shocks and kills people once used carelessly
- Poor people can't afford paying bills, so it is expensive.

Devices connected to electricity:

a) **Generator** – it produces electricity by changing mechanical energy in form of kinetic energy to electrical energy. This is done by rotating coils of wires in a strong magnetic field.

A generator can be made to produce more electricity by

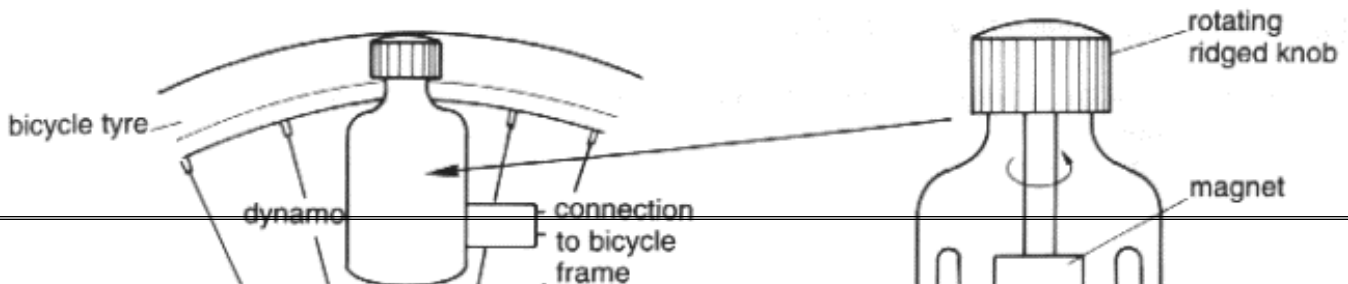
- Increasing the number of turns in the coils.
- Increasing the magnetic field.
- Increasing the speed of rotation.

b) **Dynamos**

A dynamo produces electricity by converting mechanical energy in the form of kinetic energy of a rotating coil into electrical energy.

A small simple kind of dynamo is found on a bicycle and bigger ones on vehicles. Those in vehicles, help in recharging the batteries.

A bicycle dynamo



Electric motors

They change electrical energy to mechanical energy

Uses of motors

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

Static electricity (Frictional electricity):

It is a form of electricity in which electrons don't move i.e static means not moving or stationary.

- It has two static charges

- The positive and negative charges.
- The positive and negative charge attracts each other while positive and positive or negative and negative charges repel each other. Like charges repel each other while unlike charges attract each other.
- Static electricity is produced by friction. It is called frictional electricity because it is produced by rubbing of insulators.

Note:

Static is always made when insulators are rubbed together.

- One insulator gains electrons and becomes negatively charged while the one which loses electrons becomes positively charged.
- Different charges, (positive and negative), attract each other while some charges, negative and negative or positive and positive repel each other.
- Static electricity is also called stationary electricity.
- The negative charges are called electrons while the positives are called protons.

Differences between static and current electricity

Static	Current
Occurs in insulators e.g plastics	Occurs in conductors e.g metallic objects
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

- It is a form of static electricity in nature.
- 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.
- When a positively charged cloud meets a negatively charged cloud, attraction occurs and a huge spark passes between the two clouds.
- 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.

- 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 to vibrate producing a continuous noise called thunder.

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.
- It causes destruction of plants and animal life

Advantages of lightning

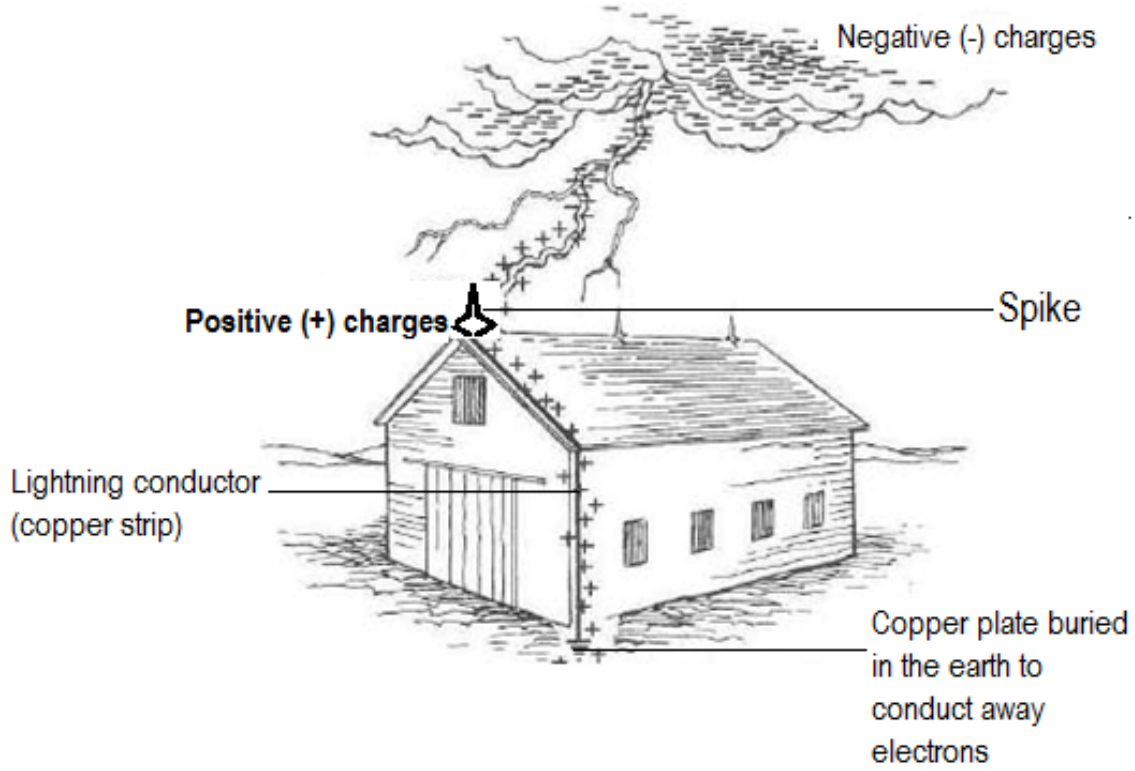
- During lightning, nitrogen is transformed into nitrates and fixed into the soil.

Prevention of lightning:

To prevent this, install a lightning conductor or lightning arrestor is on the tallest point of the building.

It consists of a spiked rod attached to a long copper or aluminum rod, one end of which is buried in the earth.

If lightning strikes the building, it passes harmlessly through the rod and into the earth.



How lightning conductors protect building from lightning

- They absorb lightning charges and passes them to the ground before causing harm.

Other ways of controlling dangers brought by lightning.

- Keeping indoors during thunder storm
- Avoid taking shelters under trees during storm
- Wiring of rubber shoes when walking out during rain storm
- Switching off electrical appliances during a rain storm.

Rules governing electricity – the Nevers

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

ELECTRIC PLUG

Each electric circuit in the building is connected to the socket.

Modern sockets have got three holes and use three pin plugs.

a) The top hole is the largest and forms the earth connection.

b) The lower left hole forms the neutral wire connection.

c) The lower right hole forms the live wire connection.

And it is through those holes that electricity is transmitted backward and forward to an appliance.

Types of plugs

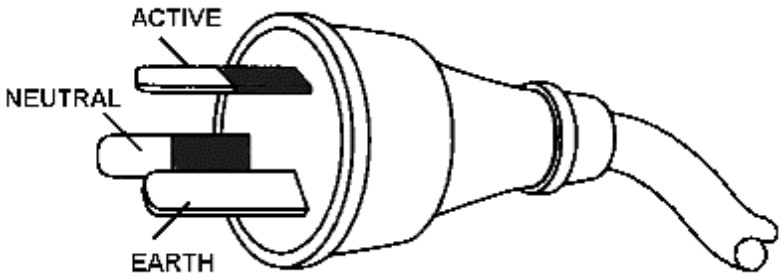
i) Two pin plug

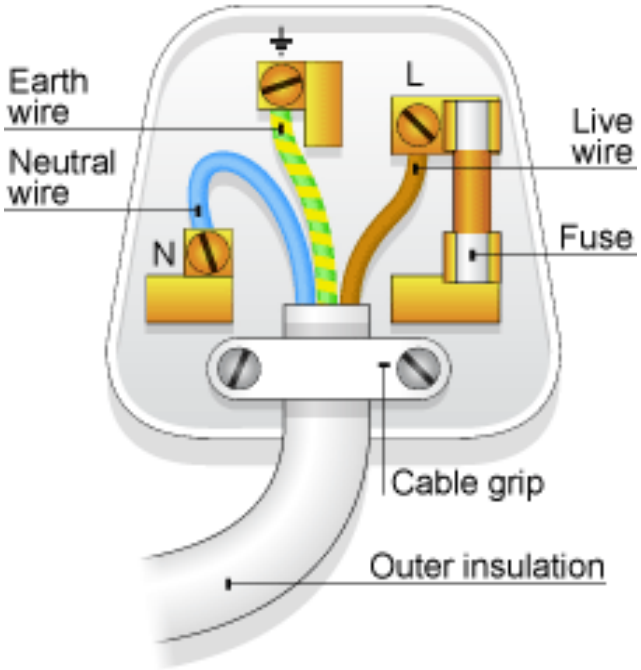
ii) Three pin plug

Two pin plug

The two pin plug has only neutral and live wire connection.

Three pin plug





- Most plugs have got three rectangular pins which fit in the holes in the socket.
- Each pin must be attached to electric wire from an appliance.
- Each wire is covered with insulating material of its own colour.

Cables used in three pin plug

LIVE WIRE

This is an electric cable that carries electricity to the appliance.

It is always covered **red** or **brown.**

NEUTRAL WIRE

This is an electric cable that carries electricity back to the source.

It is usually coloured **black** or **blue**.

EARTH WIRE

This is an electric cable that misuses excess current by transporting it to the ground to prevent electric shocks.

It is usually coloured **Green** or **Yellow**.

The three pin plug also contains a cartridge fuse which melt and breaks the circuit if current flowing in it is too much.

MAGNETISM

A magnet is a piece of metal which has the ability to attract other magnetic materials / substances.

Magnetic materials are substances which are attracted by a magnet.

Examples include, steel, nickel, cobalt and iron.

Non – magnetic substances are those materials or are substances which are not attracted by a magnet e.g copper, lead, plastic, aluminium, paper, rubber, etc,

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

OR

Is the ability of a magnet to attract other magnetic substances.

Types of magnets

There are two types of magnets namely;

- Natural magnets
- Artificial magnets

Natural magnets:

- Earth
- Lodestone

The Earth

It is the natural magnet because it has the magnetic North and South pole. This is why a freely suspended bar magnet points in the north pole and south pole direction. The north pole of the earth attracts the south pole of the suspended magnet.

Lodestone:

It is a magnetic ore which occurs naturally on earth. It was first seen in Magnesia which is now Malaysia.

It has the North pole and South pole and when it rests, it points in the North to South direction. (N –

S)

Artificial Magnets

They are divided into two namely

- Permanent magnets
- Temporary magnets

Permanent magnets

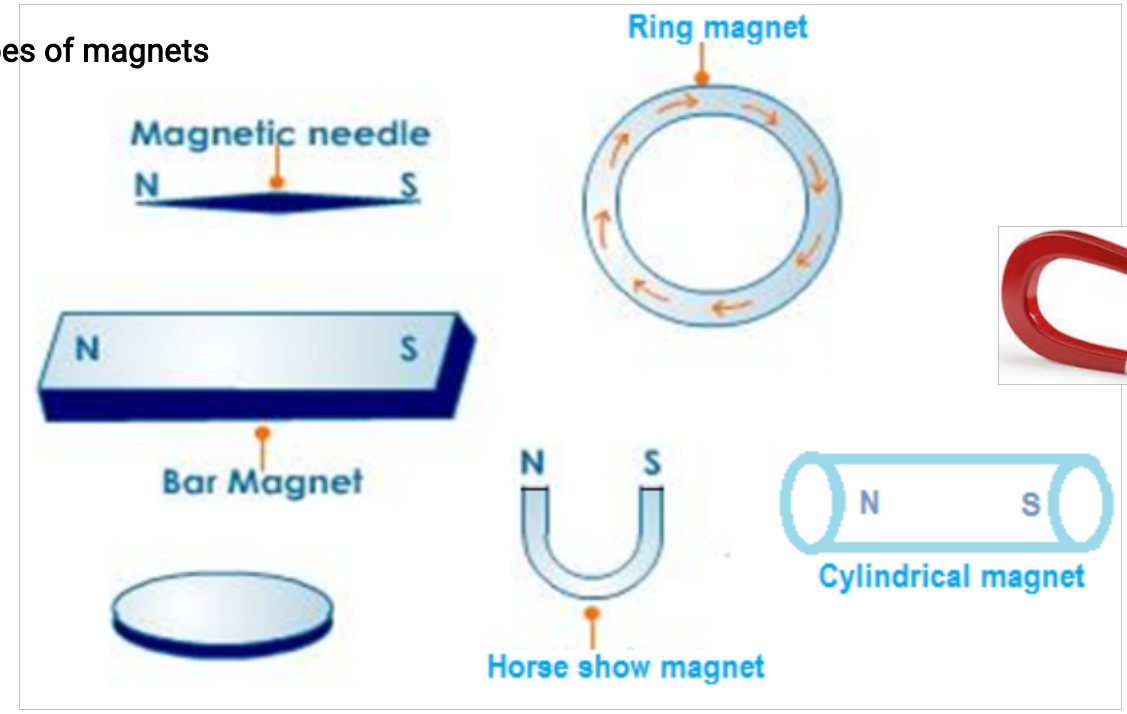
- They are made of man from steel and other strong magnetic alloys.
- They keep their magnetism for years provided they are carefully stored and handled properly.

Examples

a) Bar magnets

This is a bar uniform cross – section. The cross – section may be rectangular or cylindrical.

Shapes of magnets



Temporary magnets:

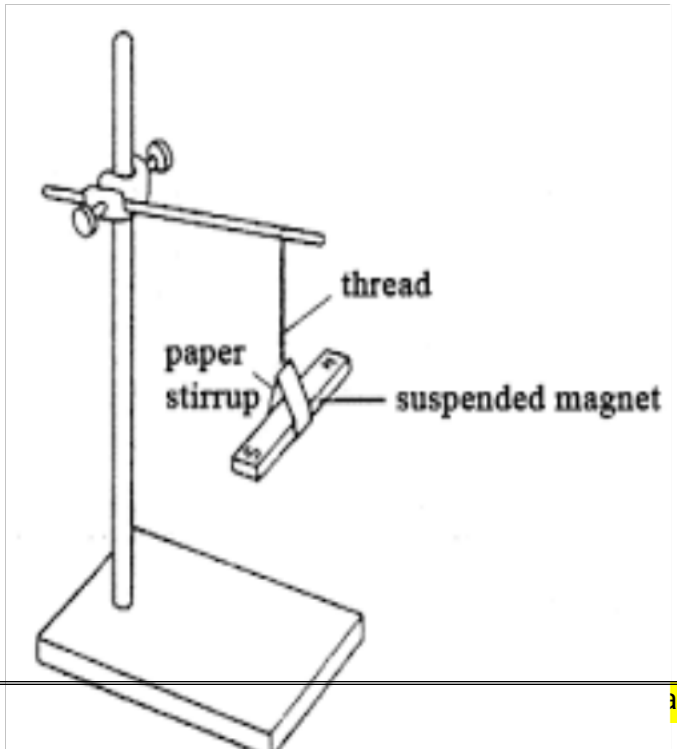
- They are those that lose their magnetism very easily.
- They lose their magnetism as soon as electricity making them become magnetized is withdrawn.
- They are mainly made from iron for example electro magnets.

Electromagnets

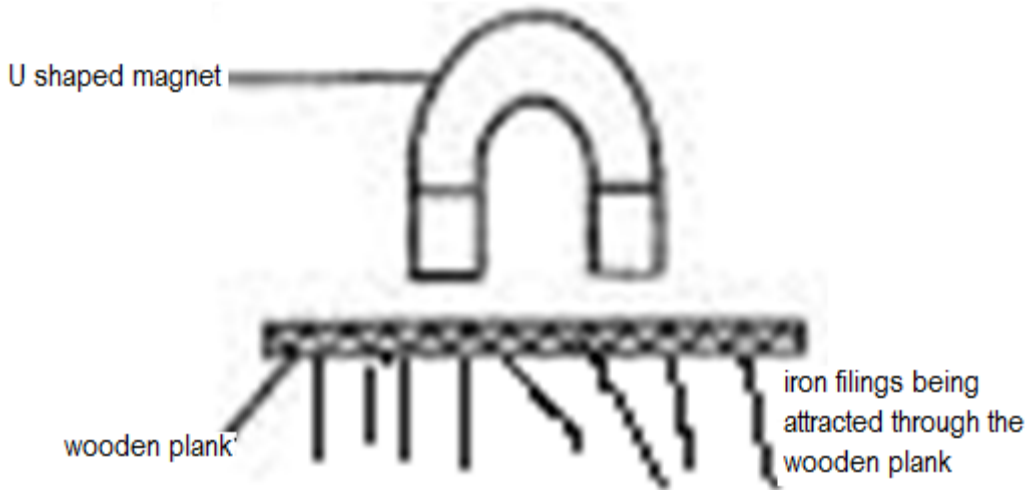
- They are temporary magnets
- They are made by using soft iron in a solenoid. The iron becomes magnetized when an electric current passes through the coil.
- If the current is switched off, the iron loses its magnetism.
- Electro magnets are usually very powerful but they can be made even stronger by:-
  a) Increasing the number of turns in the coils.
  b) Increasing the voltage in the electric force.

Properties of a magnet with illustrations

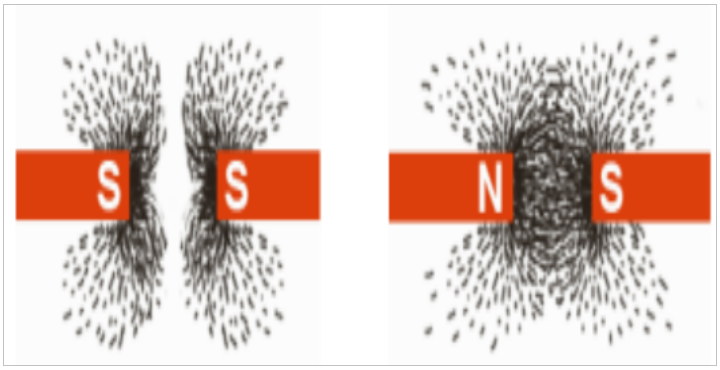
- A freely suspended magnet will always point in the north and south direction.
- A freely suspended magnet rests pointing North – South direction (N – S)



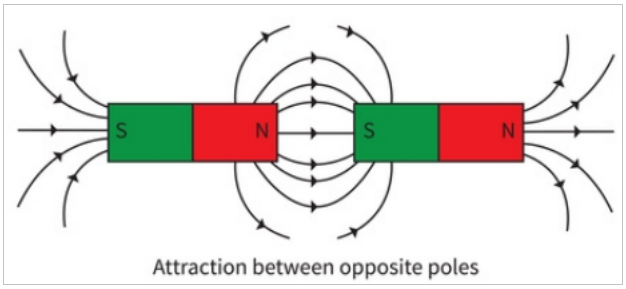
- Magnetism can pass through non – magnetic substances.



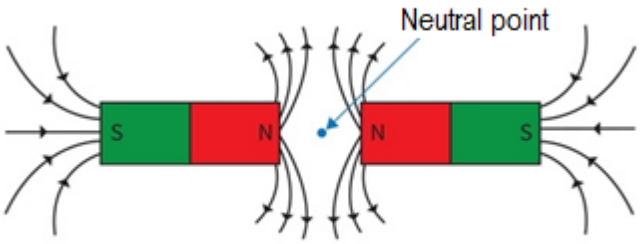
- Magnetism is concentrated in the ends or the attraction of a magnet is greater in its ends (poles). Magnetism is strongest at the poles of a magnet.



- The law of magnetism states that like poles repel while unlike poles attracts, i.e (North and South attract), North and North) or (South and South repel).



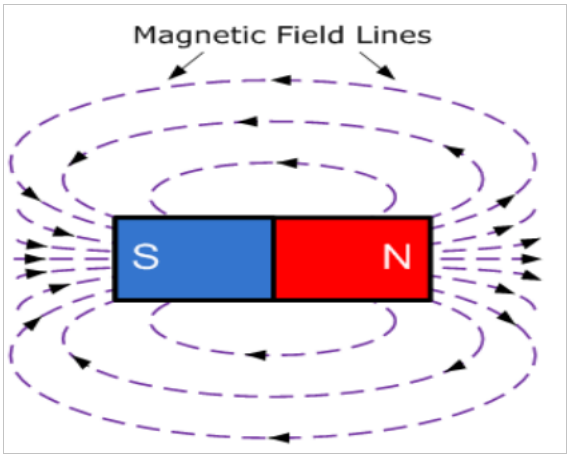
Attraction between opposite poles



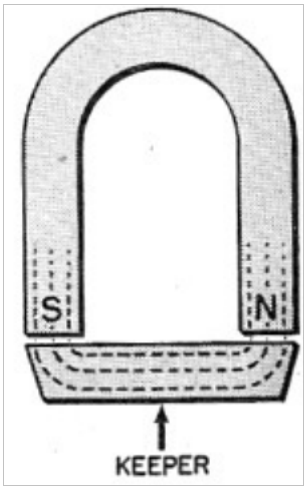
Repulsion between like poles

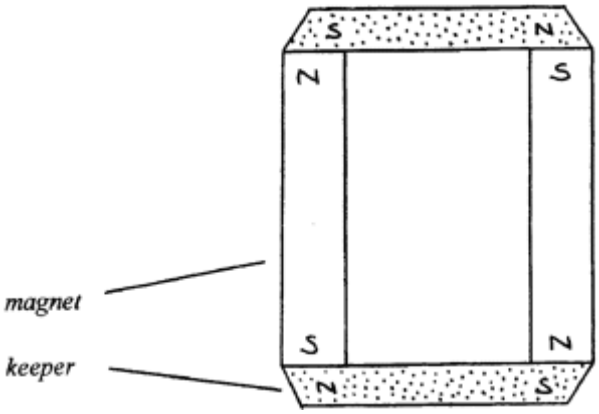
- Lines of force in a magnetic field run from north pole to south pole of a magnet.

  A magnet field is any region around a magnet in which the lines of force act.

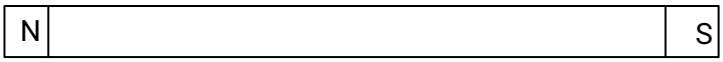


- Magnets become weaker with age. This can be prevented by using iron keepers to absorb magnetism and help to preserve its strength. In case of bar magnets, the unlike poles must be arranged near each other.





- A magnet will always maintain its pole, regardless of how many times it may be broken into pieces i.e the two portions gain opposite poles or unlike poles on either sides.



Properties of Iron and Steel

Iron	Steel
It makes temporary magnets	It makes permanent magnets.
It easily loses magnetism by induction	It keeps magnetism by induction.
It is easily induced.	It takes long to be induced.

Methods of making magnets

There are basically four methods or ways of making magnets namely;

i) Stroking method (single stroke and double stroke method)

ii) Induction method

iii) Electrical method

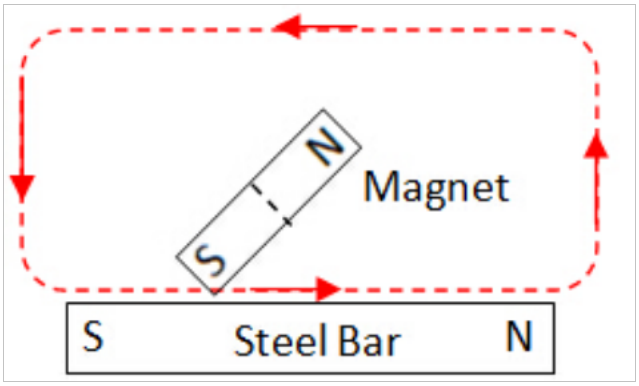
STROKING METHOD

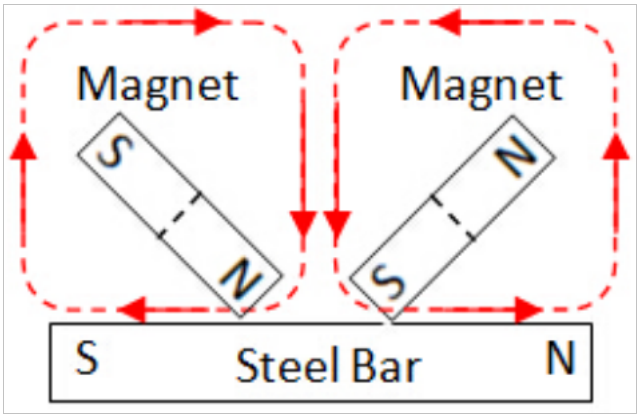
This is done by stroking a magnetic substance with another magnet in the same direction with the same pole of the magnet. The end of the magnetic substance last touched or stroked becomes the opposite pole of the magnet used.

Double touch method / double stroke method:

- 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.

Single stroke method **Double stroke method**



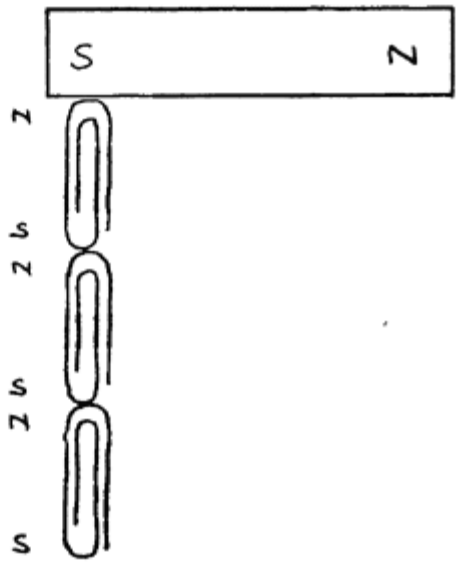


THE INDUCTION METHOD

- 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.

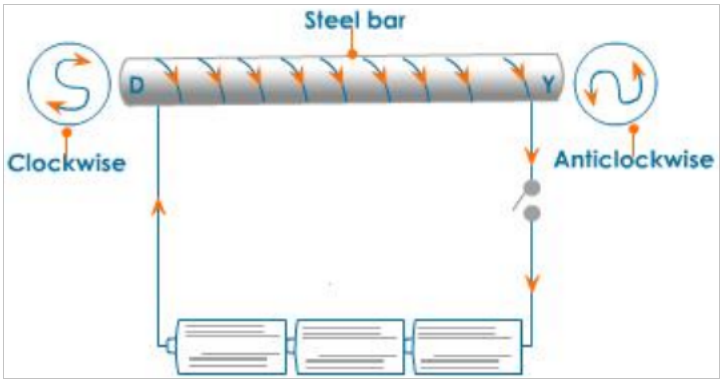
Note: The new magnets are known as <u>induced magnets.</u>

iron paper clips



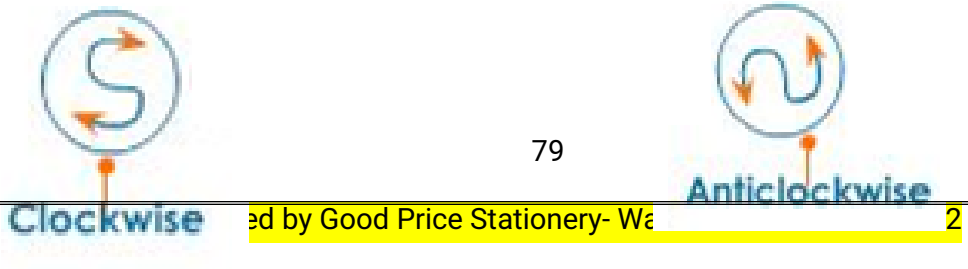
THE ELECTRICAL METHOD

- 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>



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 pole</u> and if it flows anti – clockwise, the end acts like a South pole.



Ways of making the electro magnet stronger

1. Increasing the voltage
2. By increasing the number of coils around the soft iron

Demagnetization

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

This can be done in the following ways:

- Placing a magnet inside a solenoid through which alternating current is flowing.
- Keeping a magnet in East to West direction and then hammering it.
- Hammering a magnet.
- Heating / boiling in water / leaving it in sunshine for a long and then allow it to cool.
- Any rough treatment like boiling (constant dropping on the floor)
- Keeping the poles together for a long time.
- Leaving a magnet to rust.

WAYS OF PREVENTING DEMAGNETISM

i) Painting magnets to prevent them from rusting.

ii) Storing magnets using iron keepers

iii) Storing magnets when they are facing in the North to South direction

iv) Storing magnets with unlike poles together

v) Keeping magnets far from heat.

Uses of magnets

- They are used to pick up pins, needles or any other magnetic substances.
- Used in hospitals to remove iron fragments from eyes, wounds, etc.
- Keeps doors of cabinets and refrigerators closed.

- Magnets hold kitchen knives, spoons, etc. onto the walls.
- They are use in compasses in aeroplanes and submarines to find direction.
- Used in earpieces and telephone receivers.
- Used in generators in the production of electricity.
- Used in loudspeakers and microphones.
- Used by watch repairer, cobblers and shoe makers to hold tinny nails.

Uses of Electromagnets

- They are used in electric bells
- Powerful electro magnets are used in cranes to lift iron steel.

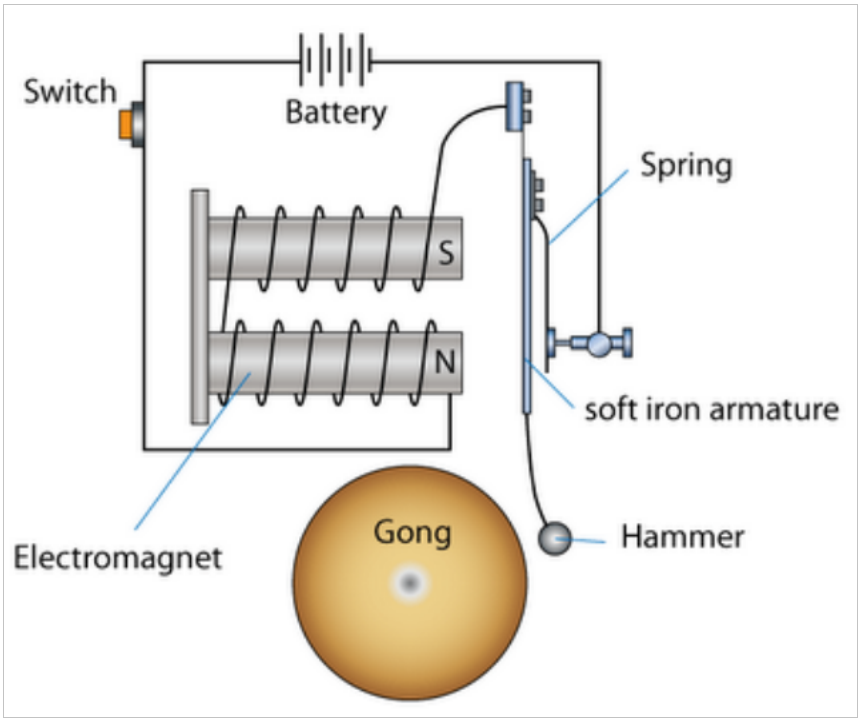
Self Testing Exercise 2

1. What is an electric current?
2. What is the difference between static electricity and current electricity?
3. Name any one source of electricity.
4. Why is plastic used to cover electric wires?

Appliances that use magnets

1. An electric bell
2. Refrigerators
3. Generators
4. Electric motors
5. Radio canette
6. Microphones
7. Loud speakers
8. Transformers
9. Electric metres
10. Telephone receivers

AN ELECTRIC BELL



How an electric bell works

- When the switch is closed, current flows through the circuit and the soft iron ore (solenoid) becomes magnetized by electricity.

- The electro magnet then attracts the soft iron armature near it which comes along with the hammer and the hammer hits the going to make it produce sound.

- When the circuit is broken or incomplete, the magnet becomes demagnetized and creates a gap between the contract screw and the spring metal on the soft iron armature.

TOPIC THREE

ENERGY RESOURCES IN THE ENVIRONMENT

What is a resource?

A resource is any component of the environment that man uses to satisfy his needs.

What is an energy resource?

It is any component of the environment that man uses to produce useful energy.

Energy is the ability to do work.

Types of energy resources

i) Renewable energy resources
ii) Non renewable energy

Examples of Renewable energy resources

plants, animals, sun, wind, water

Examples of non renewable

Minerals

Examples of energy resources

- Plants
- Animals
- Mineral
- Sun
- wind
- Water

Water as an energy resource

- Fast flowing water can be used to generate hydro electricity.
- Tides can be used to generate tidal energy.

- Steam can be used to drive steam boats and engines.

Energy resources from water

- Hydro electricity
- Stream energy
- Tidal energy

a) **Hydro electricity**

This is the type of electricity produced from the power of fast flowing water.

How hydro electricity is produced

Running water is used to turn turbines which in turn drive generators to produce hydro electricity.

b) **Steam**

Steam is produced when water boils and evaporates.

Steam possesses kinetic energy.

How steam is useful

- Steam can be used to drive steam boats and ships.
- Steam is used to run nuclear reactors being heated by uranium to produce electricity.

Tidal energy - This is the energy got from regular rise and fall of water level in large water bodies.

- Sometimes goes down and raises up

This is caused by attraction of the moon and the sun and the earth.

When water rises above the sea shores it is trapped and falls into reservoir which is used to turn turbines.

ENERGY RESOURCES FROM MINERALS

PETROLEUM / CRUDE OIL

Petroleum / crude oil is an energy resource dug from underground.

It was formed from animals which lived millions of years ago and decomposed, sunk down due to the changes in the earth, crated a lot of heat and pressure on them which causes them to change into oil.

- Out of petroleum, fuels like petrol, diesel jet fuel and kerosene or paraffin are obtained through the process of fractional distillation in a refinery.

  Different fuels vapourise (boil) at different temperatures.

- From petroleum we get chemicals used to make plastic, polythene sacks, Vaseline, ink cosmetics, detergents, shoe polish, tooth paste, synthetic rubber, alprine, grease lubricants, drugs, dyes, insect cides, paints, ferterlizers, etc.

- When mining petroleum natural gas is extracted first from petroleum, purified and put in gas

  cylinders ready for cooking and lighting.

Coal

This is a plant fossil fuel dug from under ground and it was formed from plants millions of years ago as large forest got buried deep in ground due to land movements of the earth. Due to heat and pressure over them they changed it to coal. Coal burns to produce heat.

USES OF COAL

- It is used as fuel in steam engines and locomotives.
- It is used in the processing of iron ore/
- It is used in the making of tar for surfacing roads.
- It is used for (coal gas) cooking, lighting and heating houses warm in arctic regions.
- It gives chemicals for drug making, dyes, fertilizers, perfumes, paint, explosive and antiseptics, etc.

URANIUM

- It is a mineral dug from underground
- It appears in many countries including DRC in Africa.

- It is also a fuel because it is used to produce electricity in nuclear power station.
- The electricity produced by burning uranium is called atomic or nuclear electricity.
- Uranium is also used to make atomic or nuclear bombs.
- It is also used as fuel in nuclear powered submarines.

ENERGY RESOURCES FROM MINERALS

Petroleum, Natural gas, Coal, Uranium

GEOTHERMAL ENERGY

This is the energy got from hot springs. Hot springs discharge water heated by natural processes with the earth.

Hot springs are also called thermal springs.

Hot springs originate when surface water which results from rain / snow sinks into the ground and is heated by hot rocks under the ground producing steam which turns the turbines to produce electricity.

Examples of such hot springs in Uganda are on top of mt Elgon and Kitagata in western Uganda.

ENERGY RESOURCES FROM PLANTS

Through photosynthesis, plants use sun light to make food and change it into chemical energy and store in wood.

- When we burn wood with limited oxygen charcoal is obtained.
- Fire wood is a good source of heat and light energy.
- We obtain wood from plants for different purposes ie local medicines, laboratory, drugs to cure diseases, wood for furniture, etc.
- Biogas production.

Energy resources from plants

- For food

- For wood fuel
- For biogas production

HOW TO CONSERVE PLANT RESOURCES

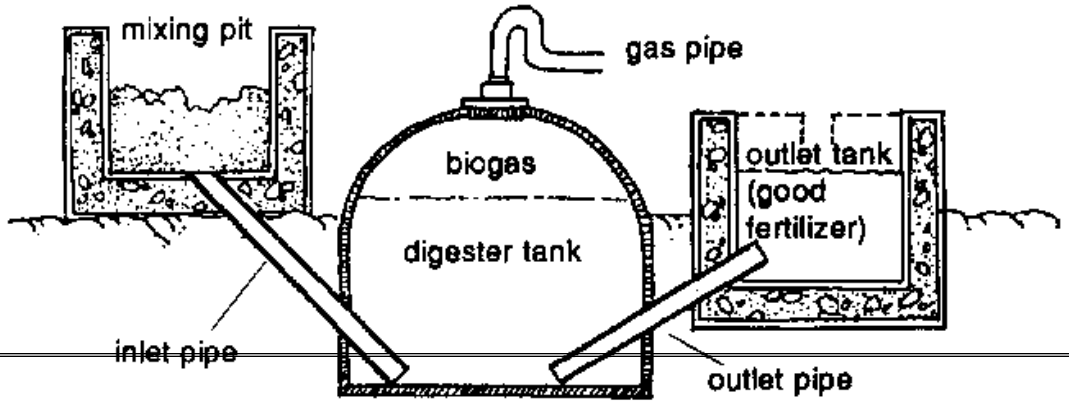
- Plant young tree to replace those cut ie.
- Cut one and plant 10 or more
- Forests should be gazzeted and protected.
- Fuel serving charcoal and fire wood stoves should be utilized or used.
- Charcoal, fire wood and timber dealers should be restricted and licensed.
- Use of alternative sources of energy
- Educate people about the advantages of plants

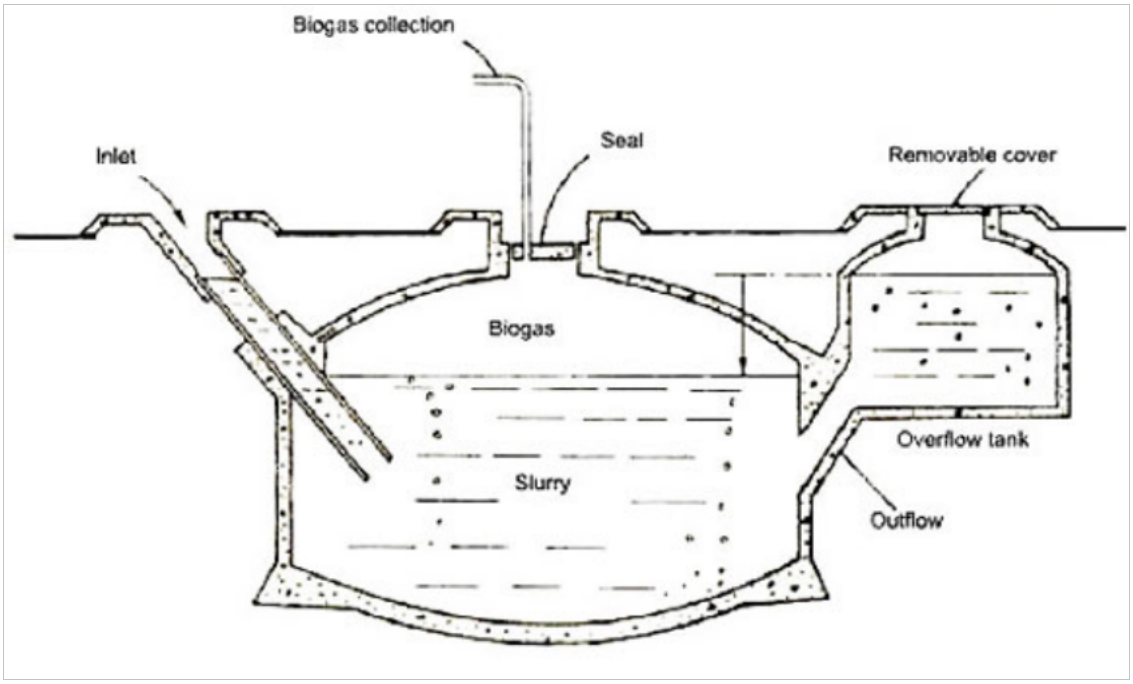
ENERGY RESOURCES FROM ANIMALS

- Oxen in many parts of Africa are used for ploughing and pulling carts with goods.
- Donkeys also plough and transport heavy loads.
- Some animals provide meat as a food energy resource.
- Biogas production from animals droppings which are fermented with the help of anaerobes, placed in a properly sealed container buried under ground without oxygen called biogas digester.
- Biogas (methane) is used for cooking, lighting, etc.
- Biomass means the amount of living material found in an area (animal matter / plants) which can be used to produce biomass fuel.

Energy sources from animals

- for food
- for transport and ploughing land (labour provision)
- for biogas production





Materials for making biogas

- Animal dung
- Animal urine
- Plant materials
- Kitchen refuse

Uses of biogas

- To produce heat for cooking
- For lighting rooms
- For heating rooms

Advantages of bio gas

- It is cheap
- It doesn't pollute the environment
- Materials are readily available in the environment

ENERGY RESOURCES FROM WIND

Air is a mixture of gases while wind is moving air.

Wind is useful in the environment and it is a very good source of energy.

- Unlike the earlier sailors on the east African coast who used dhows for transport, wind used to drive wind mills and wind mills are connected to turbines which are also connected to generators that produce electricity.
- Wind mills are also used to turn water pumps and draw water from underground.
- Wind is used in winnowing millet, sorghum, rice to remove chaff from it.
- Wind drives away bad smell within the environment

NB: **Wind energy is a renewable form of energy**.

ACTIVITY

Write down any four merits and demerits of wind to man.

TERM TWO

MACHINES

What is a machine?

A machine is any device that simplifies work

Ways how machines simplify work

1. They reduce the effort used for doing work
2. By increasing the speed of doing work
3. By changing the direction of the force applied
4. By increasing the efficiency of doing work

TYPES OF MACHINES

1. Simple machines
2. Complex machines

COMPLEX MACHINES

These are machines made up of many parts and require technical skills of operation.

Examples of complex machines

1. Aeroplanes
2. Bicycles
3. Motorcycles
4. Cars

SAMPLE MACHINE

A simple machine is a machine made up of few parts and doesn't require technical skills to use it.

Examples of simple machines

i) See saw
ii) Knife
iii) Hoe
iv) Panga
v) Pair of scissors
vi) Wheel barrow
vii) Nails
viii) Ladder
ix) Stair case

WORK

Work is the product of force and distance moved.

Work done = Force X Distance

- Force is measured in Newtons
- Distance is measured in Metres
- Work is measured in Joules or NM

A joule is the amount of work done when a force of 1 Newton moves through a distance of 1 metre.

FORCE:

Force is a pull or a push on the object.

NB: 1kg ≅ 10N

WEIGHT

This is the gravitational force exerted on an object by the earth.

Weight is measured in Newtons

POWER:

Power is the rate at which work is done.

Power is measured in Watts.

MASS

Mass is the quantity of matter contained in an object.

Calculating work done

1. Calculate the work done by John pushing a wheel barrow using a force of 10N through a distance of 3 metres.

   Solution

   W.D = F X D

   F = 10N

   D = 3M

   W.d = F X D

   W.d = 10N X 3M

   W.d = 30 Joules

2. Calculate the work done by a boy who pushed a log of 300kg through a distance of 20 metres.

   W.D = F X D

   F = ?

   D = 20 metres

   F = M X a

   F = 3000N

   W.d = FXD

   W.d = 3000N X 20M

   W.d = 60000 Joules

3. What amount of work is done by Jane who ran 400m using a force of 70N
   W.d = F X D
   F = 70N
   D = 400M
   W.d = F X D
   W.d = 70N X 400M
   W.d = 28000 Joules
4. Calculate the force required to lift the log of 600kg.
   F = M X a
   F = 600 x 10
   F = 6000N

5. Calculate the force required by a man to carry a block through a distance of 2 metres to have 50 joules of work done.
   Solution
   F = ?
   D = 2M

   W.d = 50 joules

   W.d = F X D

   50 = F X 2

   $$\frac{50}{2} = \frac{2F}{2}$$

   25 = F

   ∴ F = 25N

Simple Machines and Friction

VOCABULARY

- **Friction** **Force**
- **Nuisance** **Moments**
- **Mechanical advantage** **Wedges**
- **Inclined Plane** **Axles**
- **Screws**

FRICTION

- Is the force that opposes movement of objects.

Types of friction

1. **Static friction**: It is found in objects which are fixed in one position.
2. **Sliding or rolling friction**: It is found in moving objects.
3. **Viscosity friction**: This occurs in liquids and gases.

Properties of friction.

i.There is more friction with rough surfaces than with smooth or slippery ones.
ii.The greater the load, the greater the friction force (weight increases friction)
iii.Whenever friction occurs heat is produced.

Friction as a useful force in our daily life.

1. It helps in moving and stopping vehicles.
2. It helps when writing.
3. It helps when sharpening objects.
4. It helps when walking.

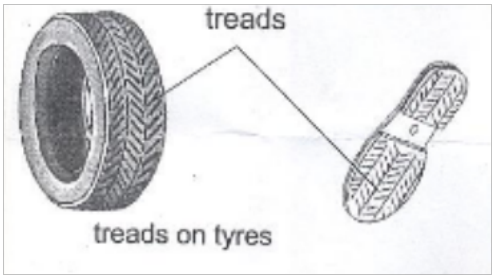
5. It helps in lighting match sticks.

Friction as a nuisance force/ disadvantages.

1. It wears away things e.g. shoe soles, parts of engines.
2. It hinders work as it makes us use a lot of force.
3. It produces unnecessary heat and noise.

How to increase friction.

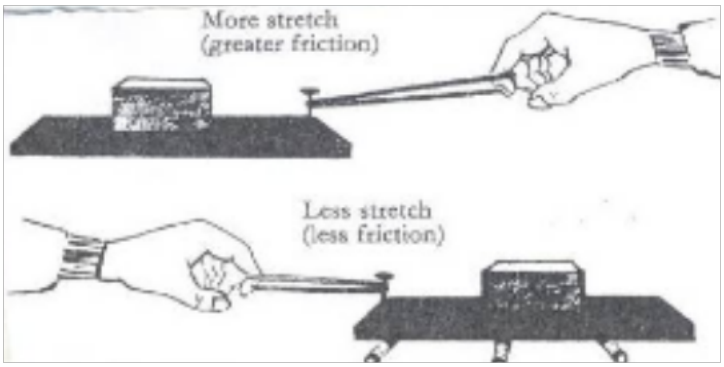
i. Making smooth surfaces rough.
ii. Putting treads on vehicle tyres / on shoe soles.



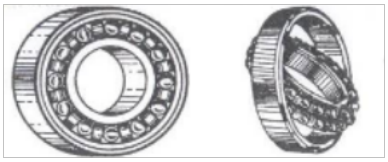
iii. Putting spikes on sports boots.
iv. Putting grips on handles of bicycle.

How friction can be reduced.

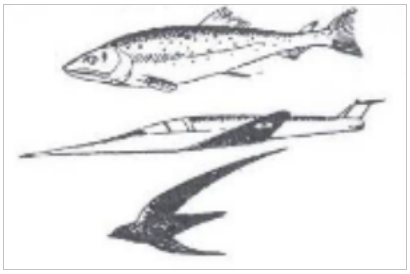
i. **Using rollers**; they decrease areas of contact between moving parts.

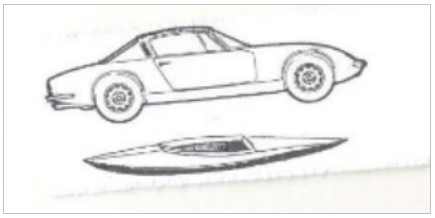


ii. **Using ball bearings**; these are round metallic balls they reduce friction by keeping moving parts separated.



iii. **Lubricating**; This involves using oil or grease.
Oil and grease are referred to as **lubricants**.
iv. Stream lining objects like planes, cars





v. Making rough surfaces smooth.

Questions.

1. State a brief meaning to the term friction.
2. In one way explain how friction can be increased on a slippery surface.
3. Write down any two advantages of friction in our lives.
4. Why is friction said to be a nuisance force?
5. Why are some objects stream lined?
6. State any two items that are stream lined?

WEEK SIX LESSON 1 AND 2
MACHINES

It is a device that simplifies work.

How do machines simplify work

1. By changing the direction of force.
2. By reducing the effort required to do work
3. By increasing the speed of work.

Types of machines

1. Simple machines.
2. Complex machines.

A complex machine

It is a machine that is made up of many parts and simplifies work.
When two or more simple machines (tools) are put together a complex machine is made

Examples of complex machines

Tractor, Bicycle, Sewing machine, Car, Aero plane etc.

Simple Machine.

It is a device that is made up of few parts and simplifies work.

Examples of simple machines.

A hoe	See saw	Claw hammer	Nut cracker.	Human arm.	Nut cracker.
A wheel barrow	Pincers.	Water pump	Sugar tongs.	Spade.	Sugar tongs.
A pair of scissors	Crow bar.	Bottle opener	Fishing rod	Ladder.	Stairs.

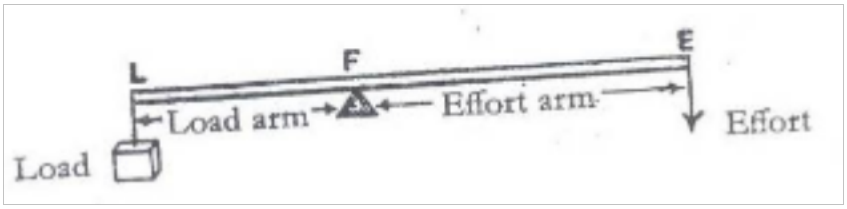
Classes of simple machines.

1. Levers
2. Inclined planes/slope
3. Pulleys.
4. Screws.
5. Wheel and axle
6. Wedges

Levers

Is a stiff rod that turns on a fixed point called a pivot or fulcrum.

Parts of a lever



1. **Effort:** is the force exerted on a machine to overcome the load.
2. **Load / resistance:** it is the weight of the body to be lifted.
3. **Fulcrum or Pivot:** is the turning point of a machine.

4. Load arm is the distance between the fulcrum and the load.
5. Effort arm is the distance between the fulcrum and the effort.

WEEK SIX LESSON THREE AND FOUR

Classes of levers.

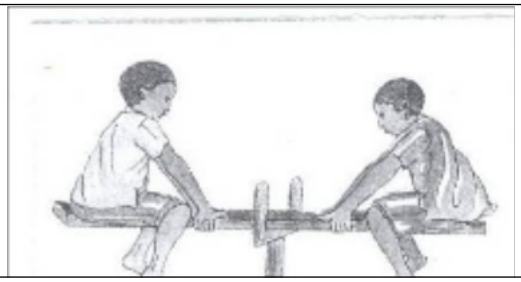
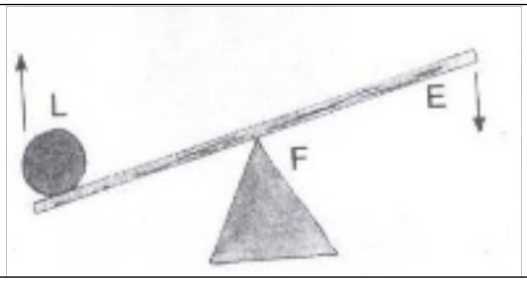
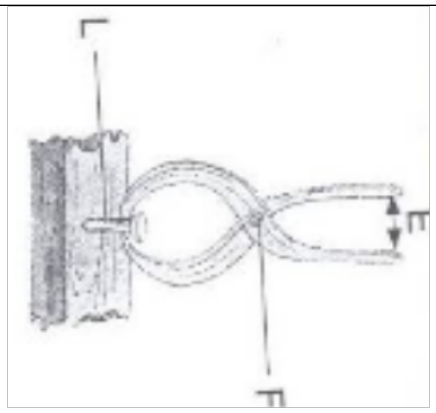
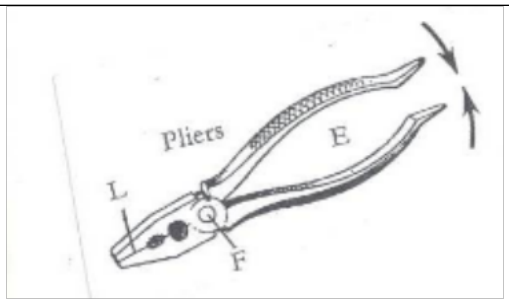
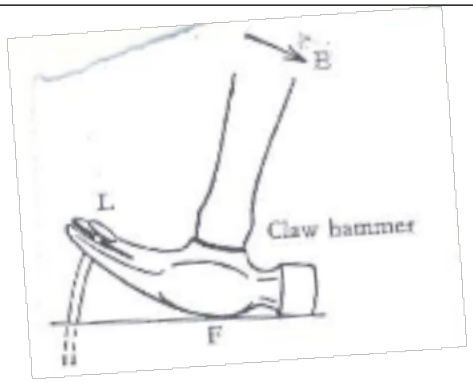
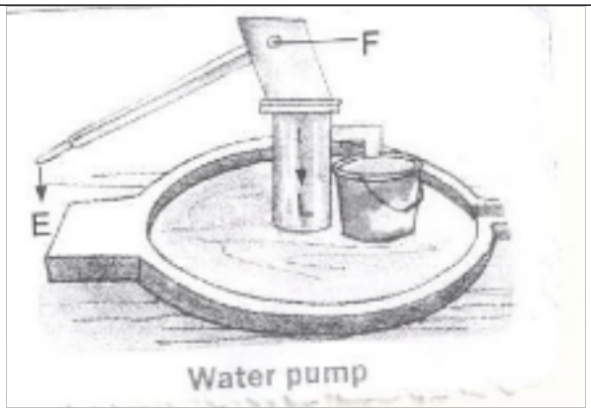
There are three classes of levers depending on the position of the fulcrum(f), Load(l) and effort(E)

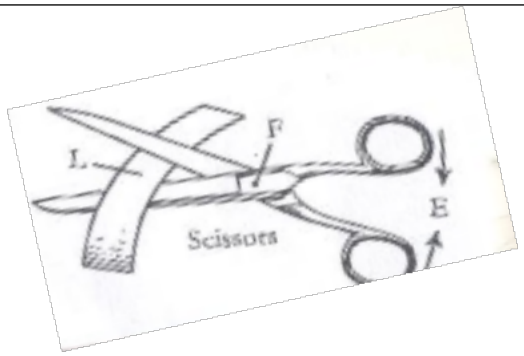
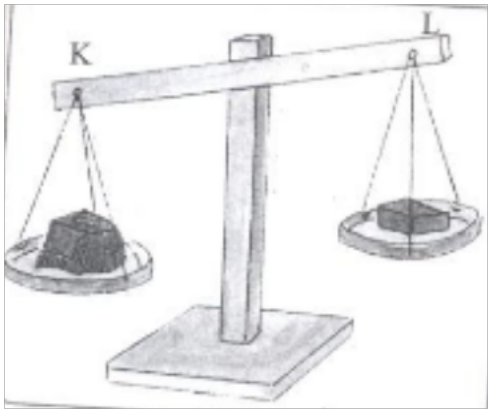
First class levers

Fulcrum/pivot is between the load and effort

In this class, the effort arm is longer than the load arm.
The longer the effort arm, the smaller the effort applied.
The advantage of the first class lever is that less effort is used.

Examples of first class levers.

1	See saw	5	Crow bar
			
2	pincers	6	pliers
			
3	Claw hammer	7	Water pump
			

4	scissors	8	Lid opener
			
9	scales		
			

<u>Second class lever</u>

Load is between the **fulcrum** and **effort.**

The fulcrum and the effort are on either side. (FLE OR ELF)

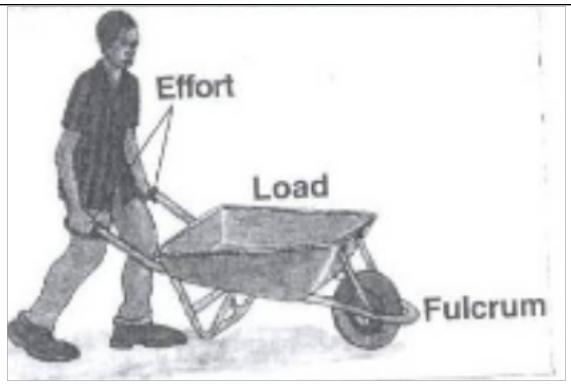
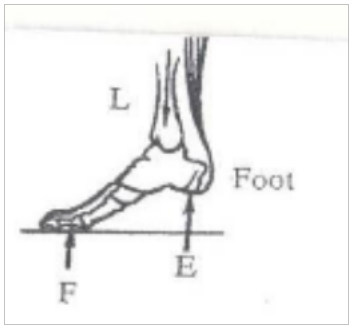
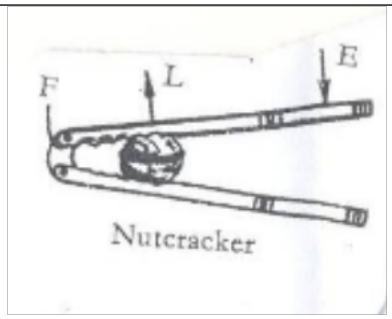
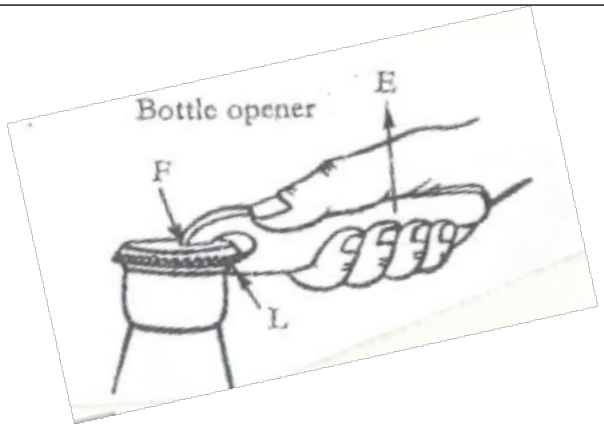
The load is closer to the fulcrum than the effort

The effort applied is smaller compared to the load.

First and second class levers are referred to as force multipliers

<u>Examples of second class levers.</u>

1	Wheel barrow	3	Human Foot

			
2	Nut cracker	4	Bottle opener
			

Questions.

1. Write down any two examples of each of the following.

   a) 1st class lever b) second class lever

2. State any one advantage of using first class lever?
3. Draw one any two items in 1st class lever.
4. How are machines important in life?
5. State any two ways in which machines are able to improve on the efficiency of a machine

WEEK SIX LESSON FIVE AND SIX

Third class levers

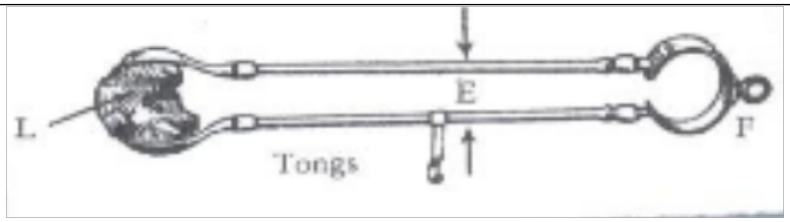
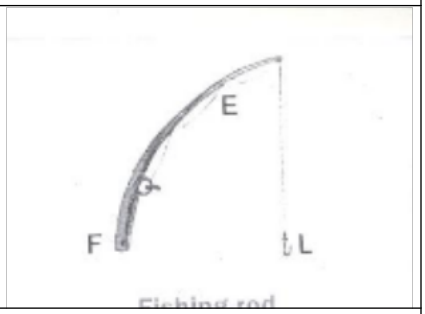
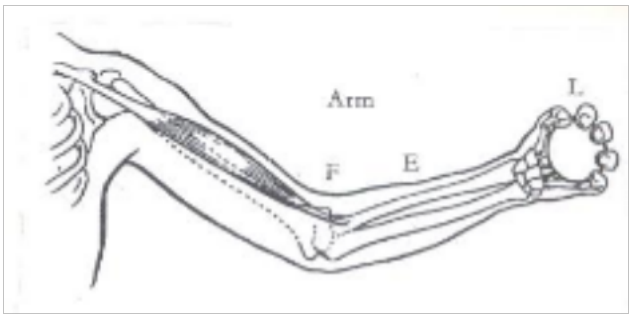
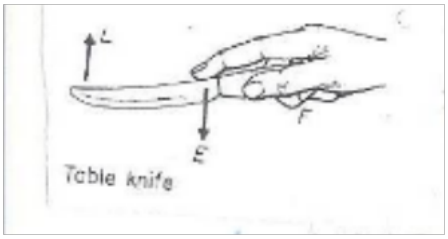
Effort is between fulcrum and load

The fulcrum and the load are on the either side. (FEL)

The effort is closer to the pivot than the load
The effort used is greater than the load.
Third class levers are referred to distance multipliers.

The advantage of using this class is that the effort moves through a shorter distance

Examples of third class levers

1	Sugar tongs	3	Fishing rod.
			
2	Human arm.	4	Spade.
			
5	Table knife	6. Tweezers	
			

N.B

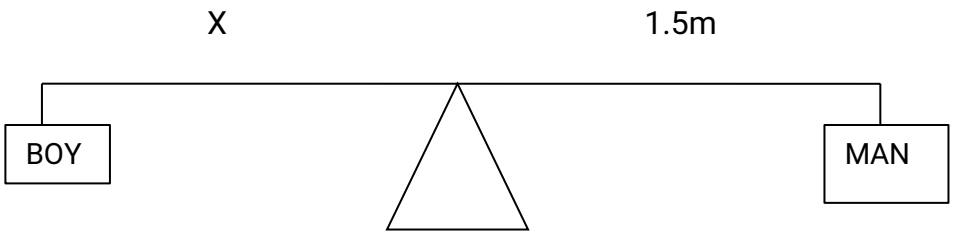
The formula PLE or FLE can help to determine the class of lever

The principle of moments. (The law of the lever)

The load force multiplied by the load arm is equal to the effort force multiplied by the effort arm.// it states that clock wise moments are always equal to anti-clock wise moments

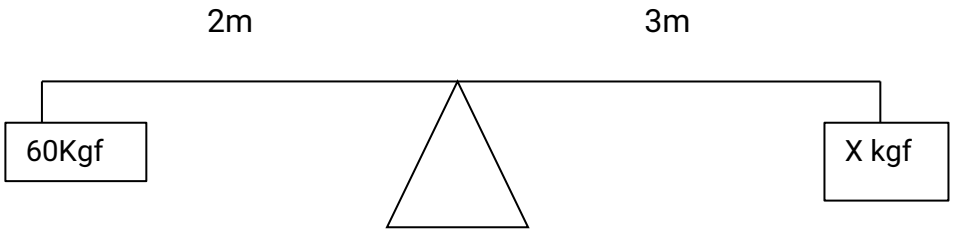
Examples

1. A man weighs 60 kgf. He sits 1.5 metres from the fulcrum of the see saw. How far from the fulcrum will the boy whose weight is 30 kgf sit in order to balance the man.
   Let the man be the effort and the boy be the load.
   Let the load be x metres.



Load x Load arm = Effort x effort arm.
30Kgf x X =60kgf x 1.5m
$\frac{30x}{30} = \frac{90}{30}$
x =3 metres

2. A boy weighing 60kgf sits 2 metres away from the fulcrum of the see saw.
A girl sits on the other side at a distance of 3 metres from the fulcrum in order to balance the see saw. Find the weight of the girl.



Let the boy be the effort and the girl the load.
Let the girl's weight be y
Then, Load x Load arm=Effort x Effort arm
y x 3m =60Kgf x 2 metres.
$\frac{3y}{3} = \frac{120}{3}$
y = 40kgf

3. A weight of 120 grams at a distance 3cm from the fulcrum is balanced by a weight of 30g on the other side. Find the distance from the 30kg weight to the fulcrum.

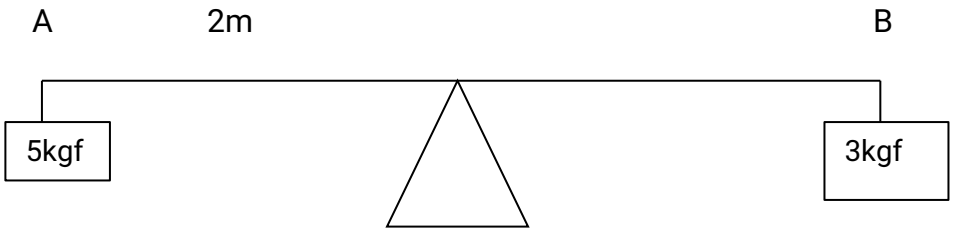
Take 120kgf as the effort and 30kg as the load.
Let y be the distance of the load from the fulcrum.
Then Load x load arm=Effort x Effort arm.

$$30 \times y = 120gf \times 3cm$$

$$\frac{30y}{30} = \frac{360}{30}$$

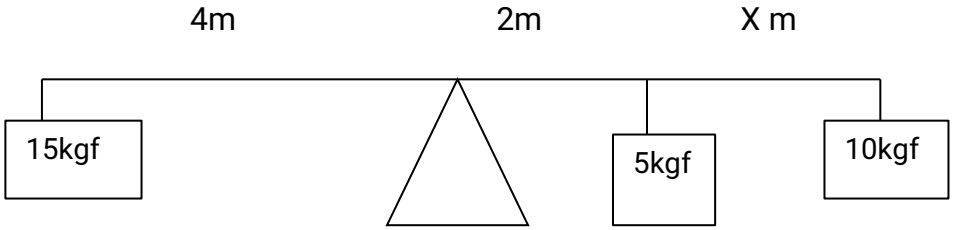
$$y = 12cm$$

4.Using a see-saw shown below, find the length of the wooden plank AB.

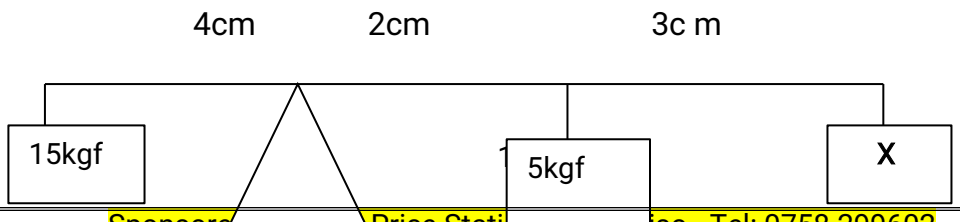


WEEK SIX LESSON SEVEN AND EIGHT

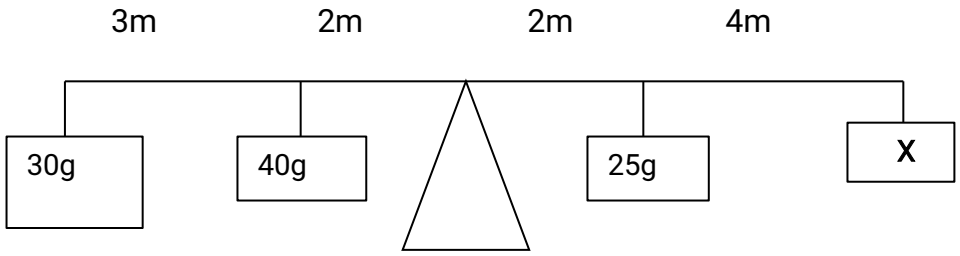
1.Find the value of X



2. Find the weight at X



3. Find the weight at X



WEEK SIX LESSON NINE AND TEN

The inclined plane (slope)

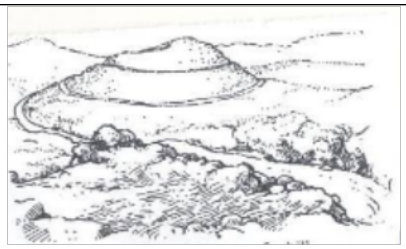
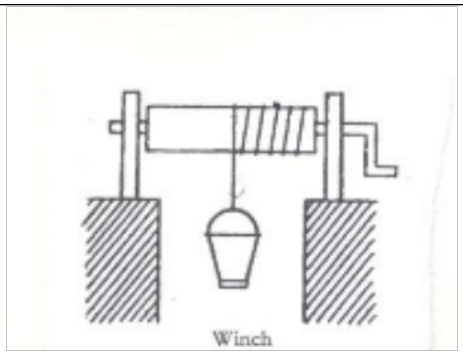
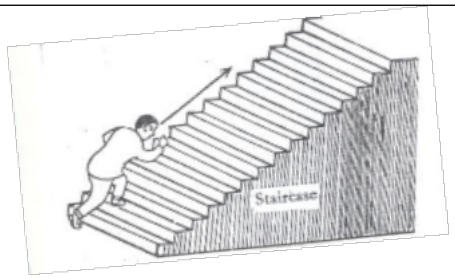
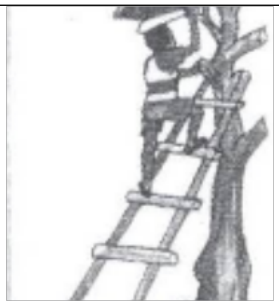
An inclined plane is a slanting surface.

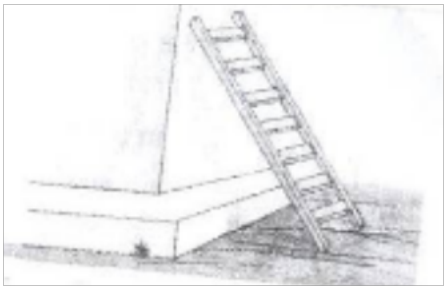
Importance of an inclined plane.

- It enables heavy loads to be raised using a lesser effort.

Examples of inclined plane

1	Winding road	3	Winch

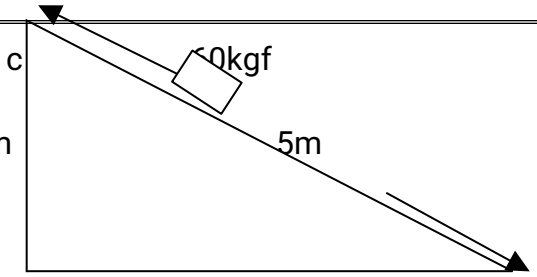
			
2	Stairs/ steps.	4	Ladders
			



Mechanical Advantage of machines.

Mechanical Advantage is the ratio of the load to effort. i.e. M.A = Load/effort.
M.A is the number of times a machine simplifies work.
M.A has no units since it is a ratio.
Friction lowers M.A.

Example;
John used a slope to raise a load of 60kgf from the ground to the higher level as shown below.



Work out the following

The effort distance

=5m

The load distance

=4m

Work done

W=FXD

M.A= Load

Effort

= Distance effort moves

Distance load moves

= 5

4

Work

Work is a product of force and the distance moved.

Work=Force x Distance moved.

Work done by the effort=effort x effort arm.

Work done by the load= load x load arm.

The unit of work is a joule.

The unit of force is the Newton.

The standard unit of distance is the metre.

1 kgf = 10N

1 joule(of work) is done when one newton (of force) moves through one metre(of distance)

1 joule=1 N x 1 m

1 joule=1 Nm

Questions

From comprehensive science book seven.

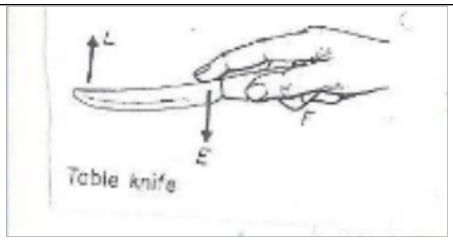
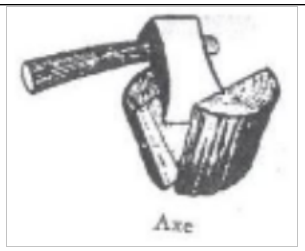
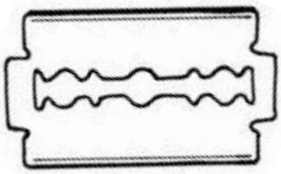
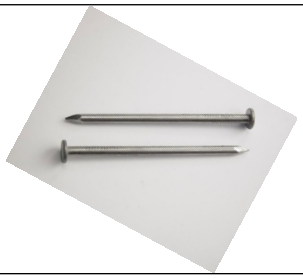
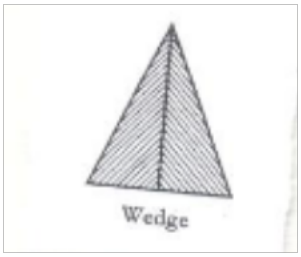
WEEK SEVEN LESSON ONE

WEDGES

A wedge is a cutting tool. It is double inclined plane/slope.

Examples of wedges

1	Knife edge.	**5**	Axe blader

			
2	Hoe	6	Razor blade
			
3	Nail.	7	Needle.
			
4	A wedge 		

LESSON TWO

SCREWS

DIAGRAM SHOWING A SCREW.

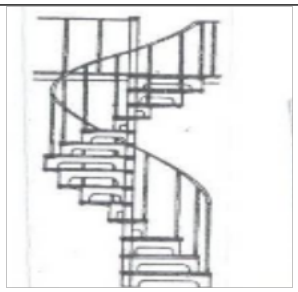
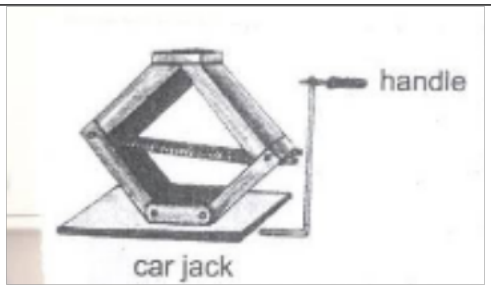
A screw is an inclined plane wound round
We use it to make our work easier.

USES OF SCREWS

1.Lifting very heavy things e.g. screw jack.
2. It makes movement upstairs easier e.g. using a spiral staircase

3. Used to fasten things together.

EXAMPLES OF SCREWS

1	Spiral staircase	3	Screw jack
			
2	Screw nails 		

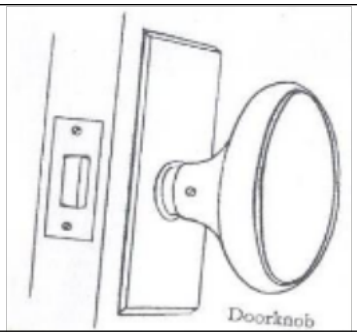
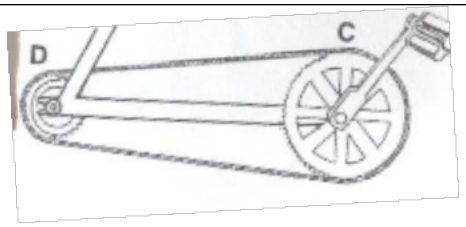
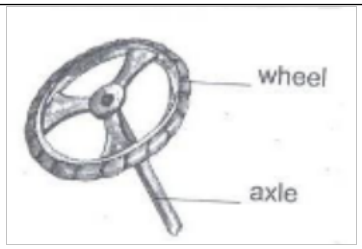
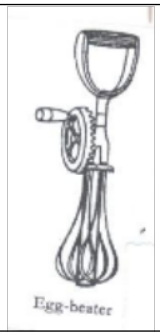
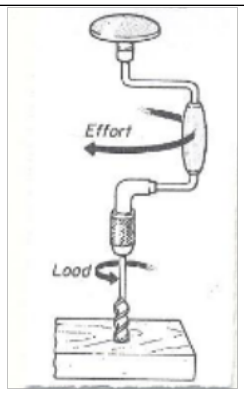
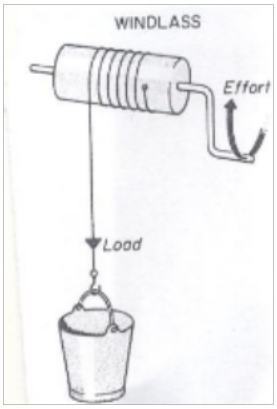
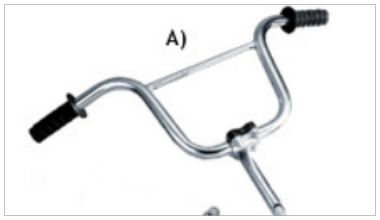
WEEK SEVEN LESSON THREE

Wheel and axle

An axle is a rod passed through a wheel.
The wheel rotates on an axle.

Examples of devices that use wheels and axles.

1	Door Knobs	5	Pedal wheels

			
2	steering wheel	6	Egg beaters
			
3	Screw drivers	7	Brace
			
4	Windlass 		Handles of a bicycle. 

USES OF WHEEL AND AXLE

1. Drawing water from underground tanks using windlass/winch.
2. Drilling holes in wooden materials using the brace
3. Turning screws to fix things together using a screw jack.

4. It helps in loosening the screws.
5. Preparing eggs for frying using egg beaters.

Questions

1. **Give any two examples of each of the following:**
   a) **Wheels and axles**
   b) **screws**
2. **How are screws important to people?**
3. **Give any two uses of screws.**
4. **Give any two examples of screws.**
5. **How are inclined planes important to human beings?**

WEEK SEVEN LESSON FOUR AND FIVE

PULLEYS

A pulley is a wheel with grooved rim that rotates freely about an axle through a centre.
A rope or chain passes over the pulley and is prevented from slipping by the grooved

The frame which holds the pulley is called block.

IMPORTANCE OF PULLEYS.

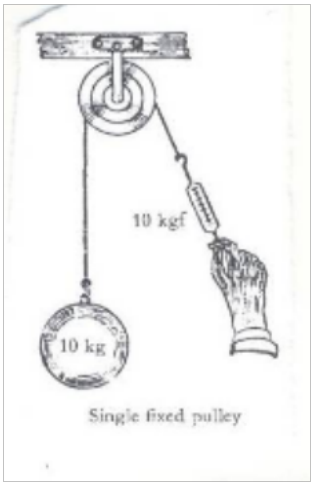
1. They help in lifting objects from the lower level to higher level.
2. They help in lifting heavy loads during building.
3. They help in off loading heavy vehicles.
4. They help in towing vehicles.
5. They are used to raise flags on the poles.
6. Help to move window curtains.

TYPES OF PULLEYS.

1. Single fixed pulley
2. Single movable pulley.
3. Block and Tackle system.

SINGLE FIXED PULLEY.

The effort applied is equal to the load.
It changes the direction of force
Boy applying the down ward force, work becomes easier.
The M.A of a single fixed pulley is one (1).

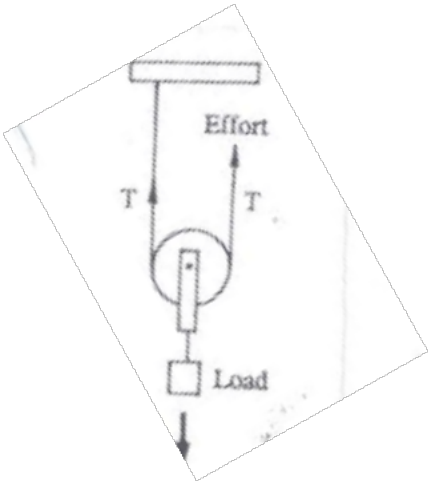


Example;
If a load of 30kgf is to be raised using a single fixed pulley, find the effort needed
M.A =1
L=30kgf
E=??
M.A = load/Effort
1 = 30/E
E x 1 = 30
E = 30kgf.

LESSON SIX

SINGLE MOVABLE PULLEY
It is supported on two ropes.
The rope is pulled up wards.
The pulley moves with the load.
Each of the ropes share a half of the effort needed.
The rope moves twice as far as the load.
The M.A advantage of single movable pulley is 2 (two)

Effort applied is half the load force. (It reduces the effort needed)



Example. If a load of 30kgf is to be raised using a single movable pulley, Find the effort needed.

M.A = 2
L = 30kgf
E =??
M.A = L/E
2 = 30/E
2 x E = 30
2E = 30
2 2
E =15kgf.

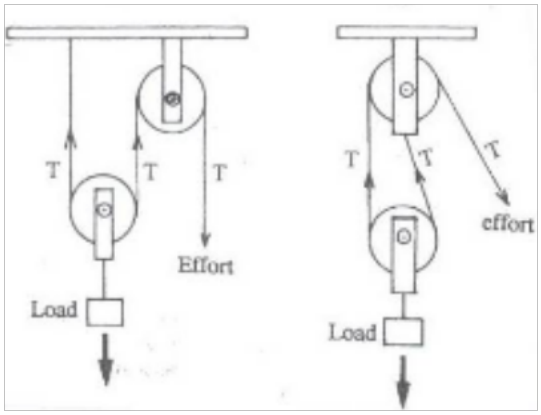
DIFFERENCES BETWEEN FIXED AND MOVABLE PULLEY

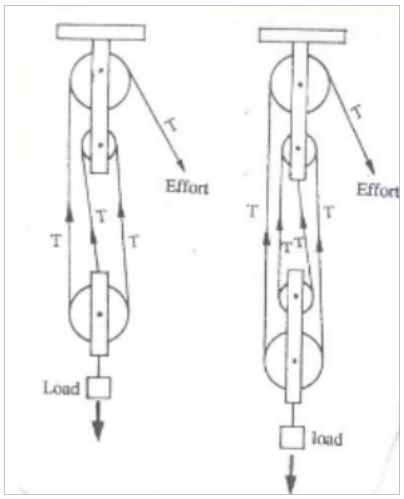
Fixed pulley	Movable pulley
Work is done faster	Work is slower
Change direction of force	No change of in direction of force
Force used is equal to the load.	Effort applied is half the load force.

WEEK SEVEN LESSON SEVEN

BLOCK AND TACKLE SYSTEM.

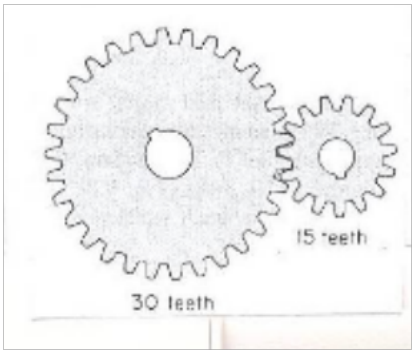
It does work more easily because it is a combination of both fixed and movable pulleys.
It changes direction of force.
It reduces effort needed.
The ratio of load to Effort is determined by the number of pulleys.

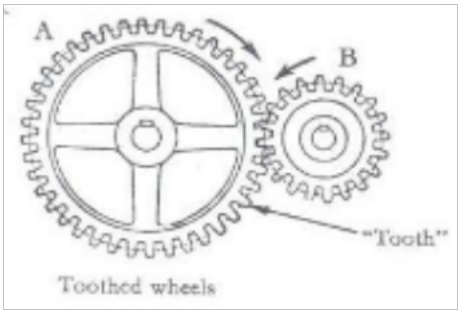




GEARWHEELS/COG WHEELS OR TOOTHED WHEELS

A gearwheel is a special form of the wheel
It has teeth around its edge.
These teeth interlock with the teeth of another gear wheel.
When one turns it causes the other one to turn.





If A has 30teeth and B has 15 teeth, how many rotations does B make in one revolution?
30divided by 15
=2 turns.

Questions.

1. Give any two types of pulleys.
2. How are pulleys important at school?
3. Calculate the Mechanical Advantage of a machine that needs an effort of 20kg to over come a load of 60 kg.
4. State one difference between a single fixed pulley and a single movable pulley.
5. Cite any two importance of the rope on a pulley.

TOPIC FIVE

EXCRETORY SYSTEM.

- Excretion is the removal of waste products of metabolism from the body before they become toxic.
- Excretory system is a body system that deals with the removal of metabolic waste products from the body.

NB: Metabolism is a complete set of chemical reactions that occur in living cells.

Organs of excretory system and the waste products

Organ	Waste product

The skin	Sweat
The kidney	Urine
The lungs	Carbondioxide
Liver	bile pigment

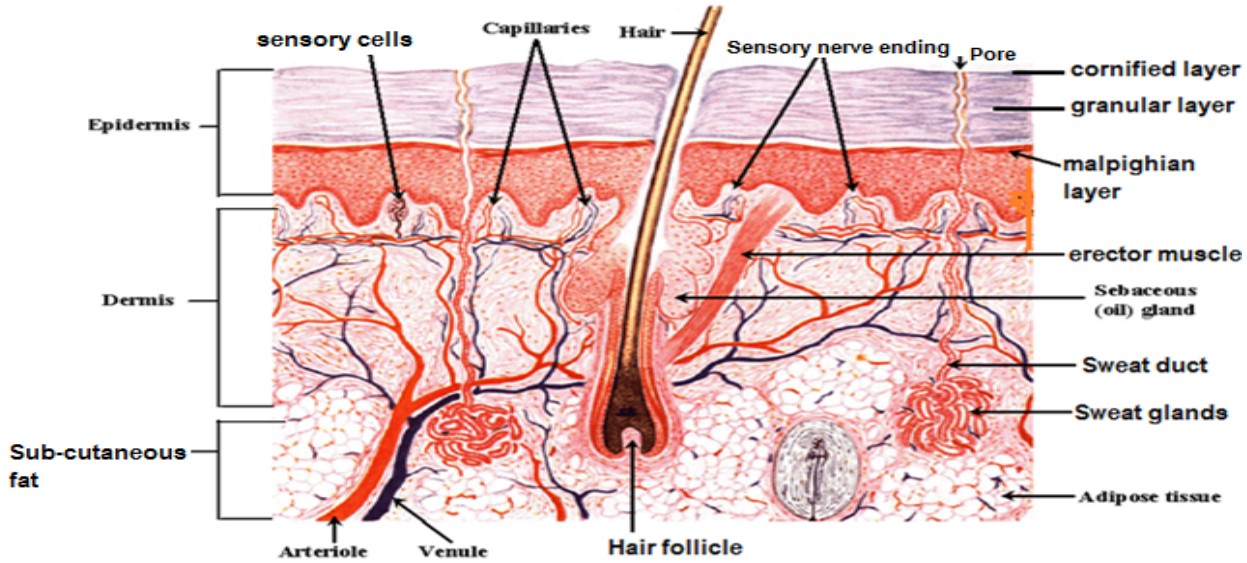
Importance of excretion

1. It makes our body to get rid of waste products
2. Purifies blood in our bodies
3. makes our body clean
4. Promotes proper functioning of the body systems.

THE SKIN

- The human skin is the largest organ of the body.
- It covers most parts of the body.
- It is a sense organ for feeling
- The skin removes sweat from the body which cools the body.

Illustration of the structure of the skin.



The skin is made of two main layers.

(a) Epidermis.
(b) Dermis.

The Epidermis:

- This is the outer most layer / region of the skin.
- The epidermis is made up of three layers.
  (i) Cornified layer.
  (ii) The granular layer.
  (iii) The Malpighian layer.

Cornified layer:

- It is found on the top surface of the skin.
- It consists of dead cells that offer resistance to 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.
     They secrete sweat.
  3. The Sweat duct. Is an opening / pore that lead sweat from the sweat glands 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; These produce an oily substance called sebum that keeps the skin water proof and soft.
  6. Sub-cutaneous 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, pain, pressure from the skin.

Functions of the skin.

- It excretes sweat
- It regulates body temperature.
- It stores fats in the adipose tissue.
- It makes vitamin D by the help of the sun.
- It protects some body organs against germ infections and mechanical damage.
- It is a sense organ for feeling.

BODY TEMPERATURE REGULATION

ON HOT DAYS

- 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.

- Blood vessel narrow (vasoconstriction) and so blood is withdrawn from the surface limiting heat loss by radiation.
- Decrease in sweat produce thus reducing heat lost by evaporation.
- Through shivering, heat is produced by the contracting muscles.
- Fats under the skin act as heat insulators.
- Erector muscles contract causing hair to erect and trap air around the skin which act as an insulator to heat loss.
- When hair erect, goose pimples appear on the skin.

Diseases of the skin.

- Chicken pox
- Leprosy
- Scabies
- Skin cancer (cancer of the skin)
- Ezcema
- Measles
- Yaws
- Swimmer's itch
- Scurvy
- Ring worm infection
- Acne
- Boil
- Herpes zoster
- Athletes foot disease
- Impetigo
- Candidiasis
- Pellagra
- Beri beri

Fungal diseases of the skin

- Ring worm infection
- Athletes foot disease
- Candidiasis

Viral skin diseases

- Mumps
- Measles
- Chicken pox
- Herpes zoster

Bacterial skin diseases

- Eczema
- Leprosy
- Scabies
- Boils
- Impetigo
- Acne

Disorders of the skin

- Corns, Burns, Scalds, Cuts, Scars, Tattoos

1. RING WORM INFECTION

This is a fungal contagious skin disease.

How ring worm infection is spread.

- Having direct body contact with an infected person.
- Sharing clothes, beddings and towels with an infected person

Signs of ringworm infection

- Severe itching of the skin
- Falling off of the hair on the skin
- Red round patches on the skin

NB: Ring worm infection can reduce protection of the skin after causing damage to the dermis of the skin.

Ways of preventing ring worm

- Avoid sharing clothes, beddings, towels and combs with infected persons.
- Observe personal hygiene
- Seek for early medical treatment
- Use a fungal cream called apele

2. ATHLETE'S FOOT

This is an infectious disease caused by fungus.
It is spread through sharing stockings and shoes with an infected person.

Signs of athlete's foot

- Itching of the skin between the toes
- Blisters appear between the toes
- White skin between the toes
- bad smelling toes and feet
- Cracks of the skin between the toes

Ways of preventing athlete's foot

- Wash your feet regularly with clean water and soap and dry them properly.
- Soak the shocks in fungicides before using them
- Put on loose shoe to allow circulation of air
- Change stockings regularly

3. SCABIES

This is an infectious contagious disease caused by itch mites.

How scabies is spread.

- Having direct contact with an infected person.
- Through sharing towels, handkerchiefs, clothes, sponges with infected persons.

Signs of scabies

- Itching of the skin at night
- Rashes all over the body
- Watery swellings on the skin

Ways of preventing the spread of scabies

- Avoid sharing clothes, beddings, towels, sponges and handkerchiefs with an infected person.
- Iron your clothes and beddings to kill the parasites.
- Smear the body with Sulphur ointment.
- Observe personal hygiene by bathing regularly

4. LEPROSY

This is a disease of skin and nerves. It is caused by bacteria called micro bacterium leprae.
A person suffering from leprosy is called a leper.

How leprosy is spread

- Through direct body contact with infected person.
- Through sharing clothes, towels and beddings

Signs of Leprosy

- Paralysis and deformation of toes and fingers
- Incurable wounds
- Loss of body sense for feeling
- White patches on the skin

Ways of preventing the spread of leprosy

- Isolate people with leprosy
- Observe personal hygiene by bathing regularly

5. IMPETIGO

This is a skin disease caused by bacteria.
It is spread through direct body contact with an infected person.

Signs of impetigo

- Itching of the skin
- Reddish small spots on the skin
- Blisters on the skin
- Yellow cuts of the skin

Ways of preventing Impetigo

- Observe personal hygiene
- Avoid sharing towels and beddings with an infected person.

Care of the skin:

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

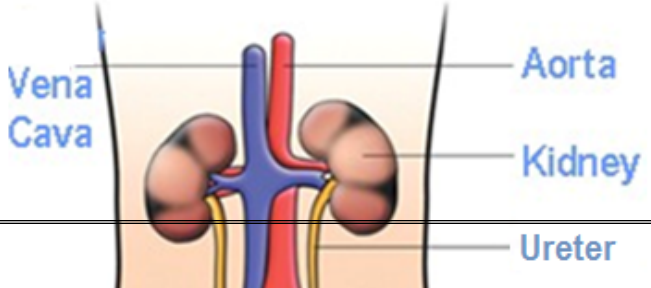
URINARY SYSTEM

Is made up of organs that eliminate wastes from the body in form of urine.

Other organs of urinary system.

- Kidney
- Ureter
- Urinary bladder
- Urethra

STRUCTURE OF URINARY SYSTEM



THE KIDNEY

- Kidneys are reddish brown bean shaped structure located at the back of the lower abdomen.
- The kidney belongs to the system called the urinary system.
- The chief or main function of the kidney is to filter blood by removing the nitrogenous substance from it.
- The kidney is connected to the aorta by the renal artery which supplies it with oxygenated blood.
- It has got the renal vein which carries the de-oxygenated blood from the kidney to the heart through the venacava.
- Water is lost form the body in form of urine, sweat and faeces. The kidney also removes the Nitrogenous substances from the blood.
- The kidney also removes excess water and mineral salts from the body. It regulates the amount of water, mineral salts and sugars in the body.
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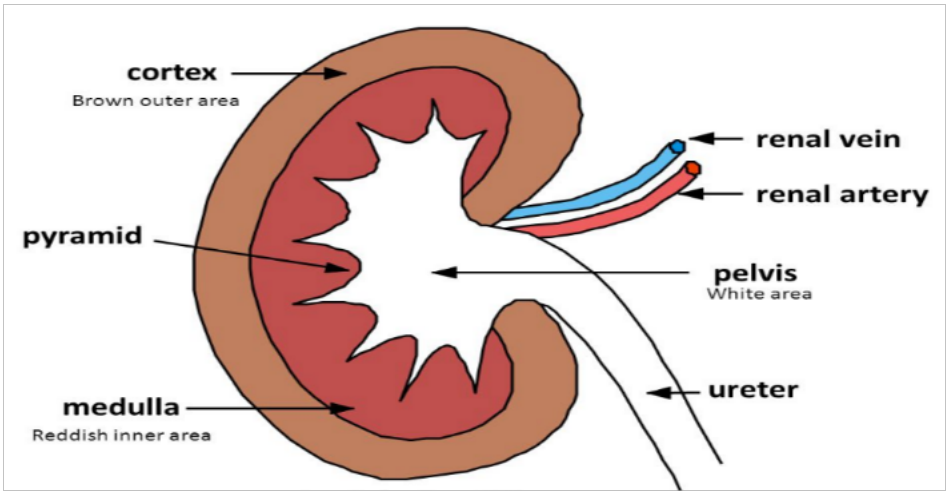
THE STRUCTURE OF THE KIDNEY



Renal artery: It supplies the kidney with the oxygenated.
Renal vein: It transports deoxygenated blood from the kidney to the venacava.
Ureter: It is a long tube which transports urine from the kidneys to the urinary bladder for storage.

Or: It leads urine to the urinary bladder for storage.
Urinary bladder: It stores urine before it is passed out of the body.
Sphincter muscles: These are muscles that open and relax to control the amount of urine leaving the urinary bladder.
Urethra: This is a tube that passes out nitrogenous substances or urine from the urinary bladder.

THE FUNCTIONS OF EACH PART OF THE KIDNEY

1. Cortex:
   This is the dark outer most layer of the kidney that is responsible for filtering blood by removing the nitrogenous substances.

   Filtration of blood takes place in the cortex of the kidney in the special part called glomerulus which is surrounded with a cup like structure called Bowman's capsule which is surrounded by a dense network of blood capillaries.

2. Medulla
   This is the lighter inner part of the kidney where the selective re-absorption of the nitrogenous substances like water and sugar (glucose) that are still needed by the body takes place in the kidney.

3. Pyramid:
   This absorbs the urea and other nitrogenous substances from the medulla for storage in the kidney.
4. Pelvis:
   This is where urine is first collected from and stored before being led to the urinary bladder.
5. Ureter:
   This is a tube which leads urine to the urinary bladder for storage.

NB: The reproductive system and urinary system are collectively called Urogenital system.

FUNCTIONS OF THE KIDNEY

1. The kidney filters blood by removing the nitrogenous compound from it.
2. The kidney removes excess water and mineral salts from the body.
3. The kidney regulates the amount water, salts and sugar in the body.
4. The kidney excretes urea from the body.
5. The kidney maintains the concentration of blood in the body.

OSMOREGULATION

This is the process by which the kidney regulates the levels of mineral salts and water in the body.
Nitrogenous substances
These are poisonous substances with a component of nitrogen that are removed from the blood by the kidney.
Examples of the nitrogenous substances.

1. Ammonium compounds
2. Mineral salts
3. Urea
4. Uric acid

Components of urine

1. Uric acid
2. Inactive hormones
3. Mineral salts
4. Urea

5. Glucose
6. Poisonous drugs
7. Ammonium compounds

NB:

- People urinate more frequently on cold days than hot days because there will be less sweating and therefore most in the human body will be passed out in form of urine.
- People pass out yellowish urine on hot days because the high body temperatures make the mineral salts in the urine to become more concentrated.
- People pass out greenish urine on some occasions as a result of having a lot of glucose in their bodies.

DISEASES OF THE KIDNEY

1. Kidney failure
2. Kidney stones
3. Bilharzia
4. Gonorrhoea
5. Nephritis
6. Cancer of the kidney

Bilharzia

This is the water borne caused by blood flukes or worms called schistosoma worms spread by the fresh water snail.

Bilharzia is spread through drinking un boiled water.

Signs of bilharzia

1. Mild fever
2. Severe pain in the lower abdomen
3. Passing out urine with blood strains

Ways of preventing the spread of bilharzia

1. By drinking properly boiled water
2. By avoiding urinating in the water sources

Kidney stones

This is caused by obstruction of the pelvis by the small stones as a result of salt solidifying from them.

- These stones are made of calcium salts.
- It is prevented by surgical operation of the kidney

Kidney failure

This occurs when the kidney fails to regulate the amount of water and mineral salts in the blood.

Signs of kidney stones

1. Severe pain in the lower abdomen

2. Severe pain at the base of the penis in men
3. Difficulty in passing out of urine
4. Drops of bloods are seen in the urine as one passes out the first drop.

CANCER OF THE KIDNEY

This occurs between the age of 45 years and 60 years. It starts with the appearance of blood in the urine.

- It causes severe pain in the lower abdomen
- It causes blood stains in urine
- It is prevented by surgical operation

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. 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 salts.
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.

THE RESPIRATORY SYSTEM.

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

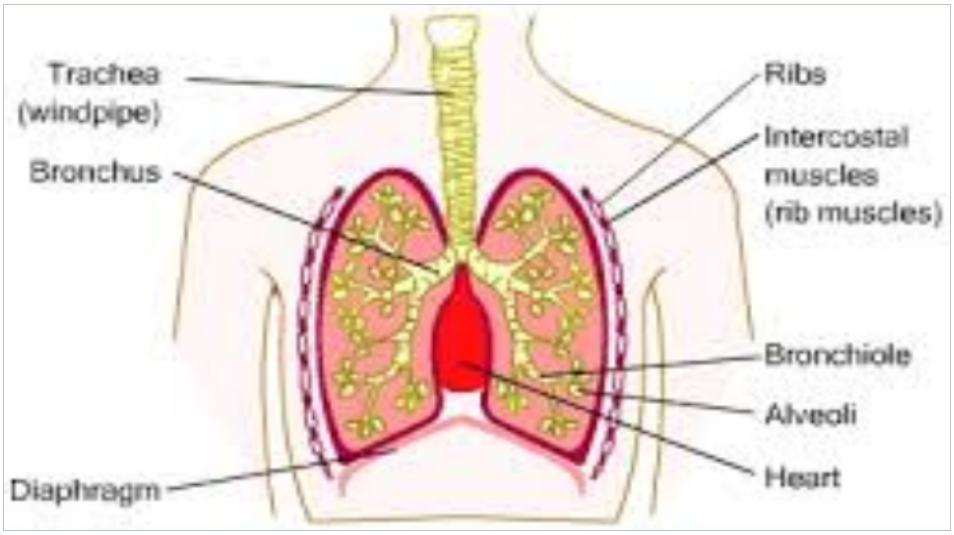
Types of respiration.

- 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 carbondioxide.

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 carbondioxide 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.

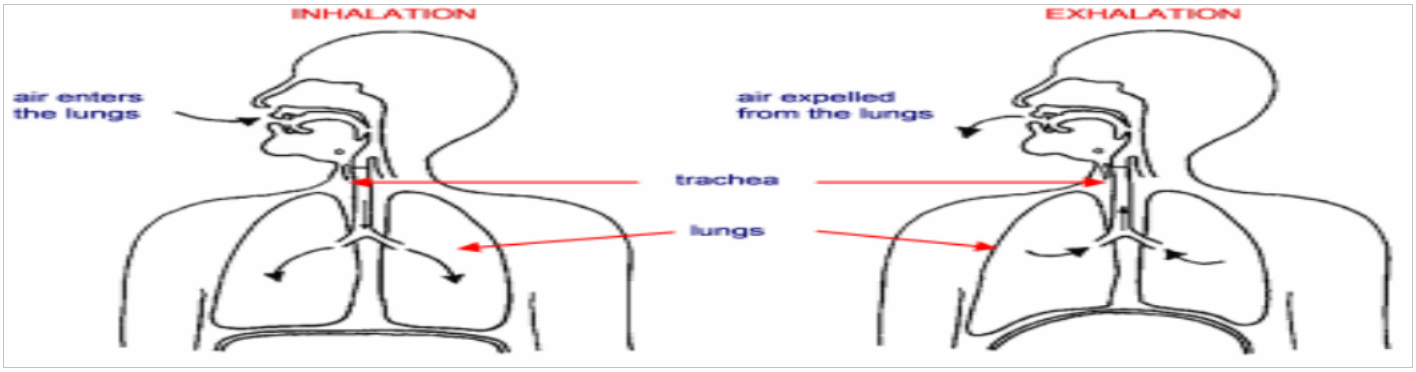
COMPOSITION OF AIR BREATHED IN AND OUT.

Type of air	Inspired air	Expired air
Oxygen 0_2	21%	16%
Carbondioxide Co_2	0.03%	4%
Nitrogen N_2	78%	78%
Water vapour	Less	More
Rare gases	0.97%	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 carbondioxide 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 nobody 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 nobody reactions required it to occur.

Mechanism of breathing (expiration and inspiration)



Inspiration:

- The volume of the chest and lungs increase.
- The diaphragm and the intercoastal muscles contact.
- The ribs go up and out wards.
- The lungs expand.
- The stomach enlarges and swells.

Expiration:

- The volume of the chest and the lungs decrease.
- The ribs go down wards and in wards.

- The diaphragm and intercoastal muscles relax.
- 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:
- Hiccups.
- Sneezing.
- Choking.

Diseases.

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

MATTER AND ENERGY

LIGHT ENERGY

Light is the form of energy that stimulates the sense of seeing. OR
Light is the form of energy that enables us to see objects.
- Light is detected by the sense of seeing
- Light is called a form of energy because it enables us to do work

NB: We see things around us because light **from them** is reflected into **our eyes.**

Uses of light energy
- Light enables us to see objects
- Light enables man to photograph objects using cameras
- Sunlight enables plants to make their own food through photosynthesis
- Light from the sun enables the skin to make vitamin D.

SOURCES OF LIGHT
What is a source of light?
A source of light is any object that can produce light.

There are two main sources of light i.e.

1. Natural sources of light
2. Artificial sources of light

1. Natural sources of light

Natural sources of light are objects that produce their own light without the consent of man.

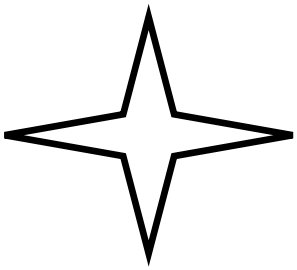
Examples of natural sources of light

i) The sun
ii) Stars
iii) Erupting volcanoes
iv) Glow worms
v) Fire flies
vi) lightning

Note:

The moon is not a source of light because it doesn't produce its own light but it reflects light from the sun.

Diagrams

		
Sun	**Star**	**Erupting volcanoes**

2. Artificial source of light

Artificial sources of light are man-made objects that produce light.

Examples of artificial sources of light.

i) Torches
ii) Burning candles
iii) Electric bulb
iv) Red hot charcoal
v) Lenten lamp
vi) Pressure lamp

Diagrams

Electric bulb Electric torch

Burning candle

lamp

Note:
Some sources of light are luminous objects and others are non luminous objects.

1. LUMINOUS OBJECTS

Luminous objects are objects that produce and emit their own light.
They are also called direct sources of light.

Examples of luminous objects

- Sun
- Glow worms
- Burning candles
- Red hot charcoal
- Erupting volcanoes

2. NON LUMINOUS OBJECTS

Non luminous objects are objects that emit light produced by other sources.

Examples of non luminous objects

- moon
- mirror
- planets

INCANDESCENT OBJECTS

Incandescent objects are objects that produce and emit light when they are hot.

Examples of incandescent objects

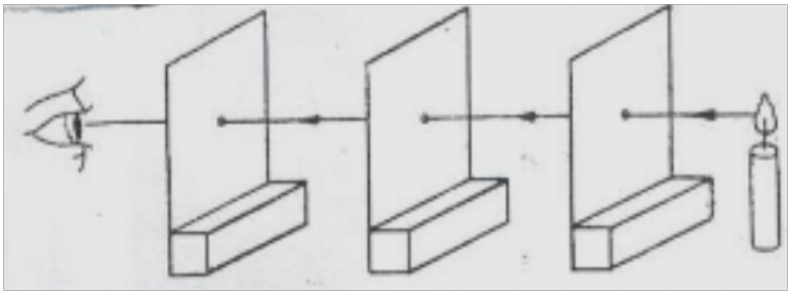
1. Sun
2. Burning candles
3. Red hot charcoal
4. Erupting volcanoes
5. Filament of an electric bulb

PROPERTIES OF LIGHT

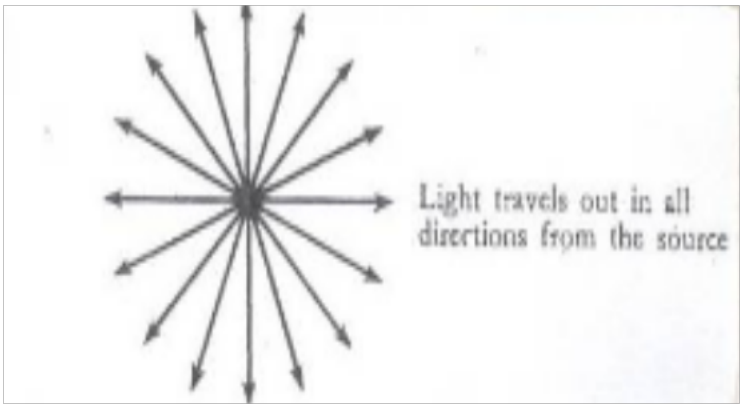
1. Light travels in straight line from the source
2. Light travels from a source in all directions.
3. Light can be reflected
4. Light can be refracted
5. Light travels through a vacuum

Illustrations showing propagation/properties of light.

1. Light travels in a straight line

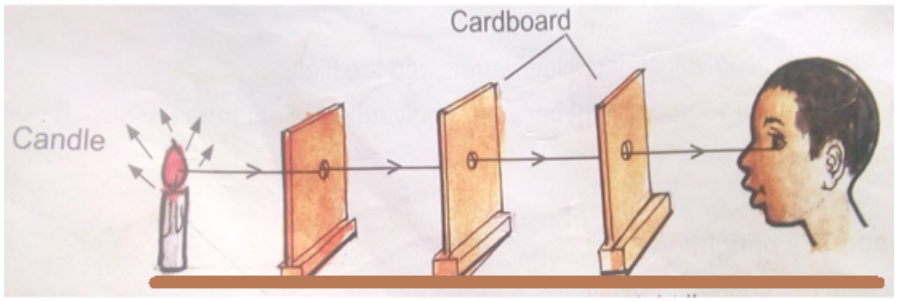


2. Light travels from a source in all directions.



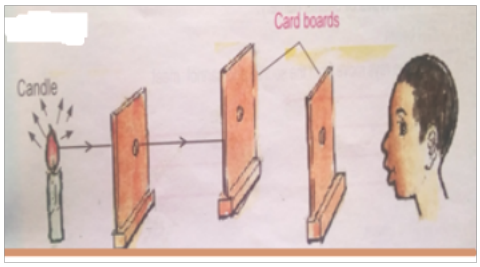
Experiment to show that light travels in a straight line.

A



- Get three card boards with holes in the middle and arrange them in a straight line.
- Light the candle and then observe at the end as shown on the diagram above
- Hence, when the card boards are properly arranged, you will see the light through the holes

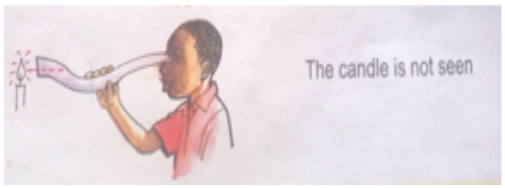
NOTE: The arrangement of card boards matter, so if they poorly arranged then you will not see the light as shown below.



B

- In diagram B, one can also use a straight pipe/ tube to carry out the experiment that shows that light travels in a straight line.

NOTE: If the tube is not straight one may not see light as shown below

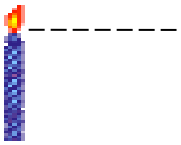


We can't see light in corners because it travels in straight lines.

Evaluation activity

1) What is light?
2) What is a source of light?
3) Name the two main types of sources of light.
4) In three ways, explain how radian affects us when we stand in sunshine.
5) Briefly state the difference between luminous and non luminous sources of light.
6) Write down any fur uses of light I everyday life.
7) Identify any two things you will need in order to see.
8) Briefly explain how light travels from the source.
9) In the space below, draw well labeled diagrams to show that light travels in a straight line.
10) (a) A pupil bent a plastic/rubber tube as shown in the diagram below. What do

you think will happen to the observer at the other end of the tube?



Observer's eye

b) Give a reason for your answer in 4(a) above.

RAYS OF LIGHT

A ray is a straight path taken by light.

OR A ray is the direction taken by light

A ray is represented with an arrow to show the direction.

BEAMS OF LIGHT

A beam is a group of light rays traveling in the same direction.

Types of beams

There are three types of beams namely:

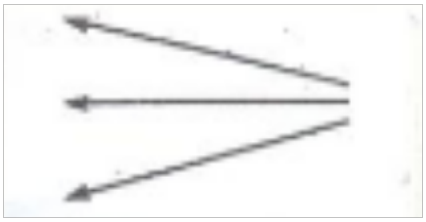
i. Parallel beam

This when the rays move from the source in a straight line without meeting

OR

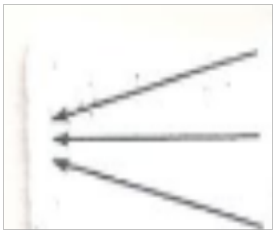
ii. Divergent beam

The is when the rays spread out or diverge from the source, e.g. head lights bicycle lead lamps and torches produce diverging beams.



iii. Convergent beam

This is when the rays come towards a point



EFFECTS OF DIFFERENT MATERIALS ON LIGHT.

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

a) Light can be absorbed, diffused or scattered

b) Light can be bounced back or reflected

c) Light may be allowed to go through or transmitted

Materials can be grouped into the following categories

1. Transparent objects 2. Translucent objects 3. Opaque objects

✓ **Transparent objects**

These are materials that allow all light to pass through them

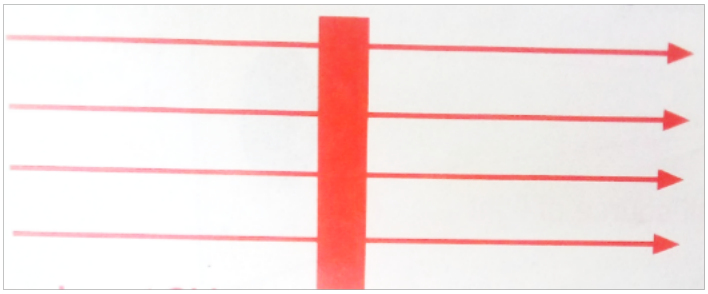
Examples of transparent materials

1. Clear glass

ii. Clear still water

iii. Air.

Illustration



All the light rays pass through

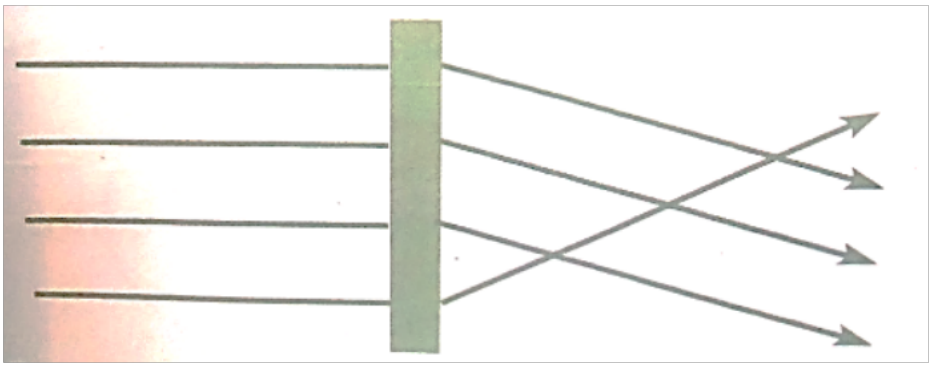
✓ **Translucent materials**

These are objects which allow little light to pass through them.
We can't see through translucent objects because they scatter light passing through them.

<u>Examples of translucent materials.</u>

1.Frosted glass
ii. Ground glass.
iii. Coloured glass.
iv. Oiled paper.
v. Smoky air.
vi. Thin cloth.
vii. Tracing paper.

Illustration



Little light passes through translucent objects because of diffusion

<u>Effects of translucent objects on light</u>.

They allow little light to pass through them.
They diffuses the light

- ✓ **Opaque objects**
  An opaque object is that which does not allow any light ray to go through it.
- ✓ We cannot see through them because light travels in straight lines so opaque objects instead cast shadows.

Examples of opaque objects

1. A wall.
2. A hard paper.
3. Wood.
4. Stones.
5. Human Body
6. Metals.

Effects of opaque objects in light

They obstruct light and form shadows.

ACTIVITY

1. State any two sources of light.
2. Name three type of beams
3. How is the sun useful to human beings?
4. Draw an illustration to show the effect of translucent materials on light.
5. Why is it important to keep our body organs used for seeing clean?

SHADOWS

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

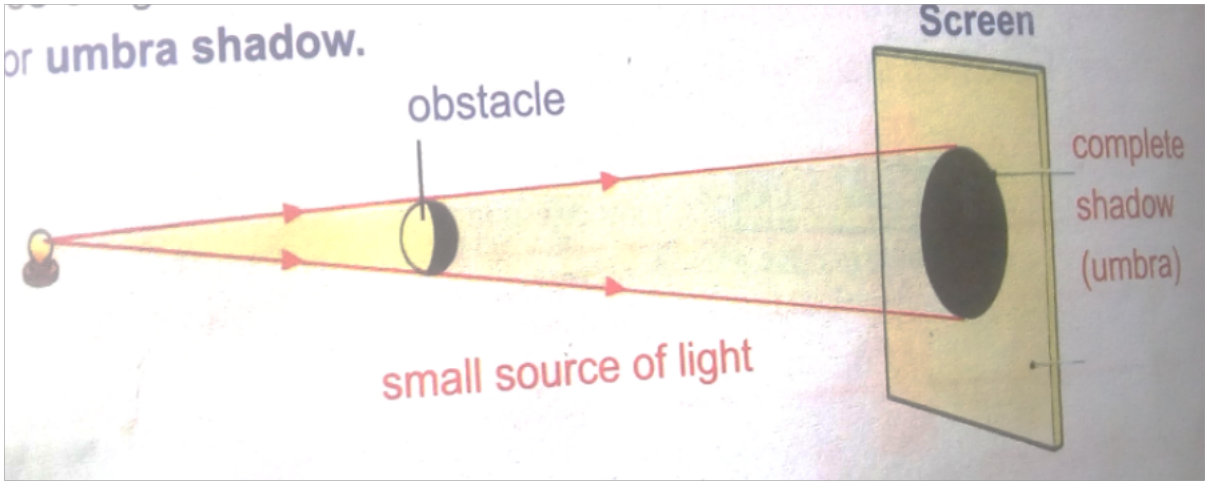
Types of shadows

There are two types of shadows namely;

i. Umbra shadow or total shadow
ii. Penumbra shadow or partial shadow

Formation of shadows

a) When the source of light is small ,a sharp complete shadow is formed and this is called **total shadow**.

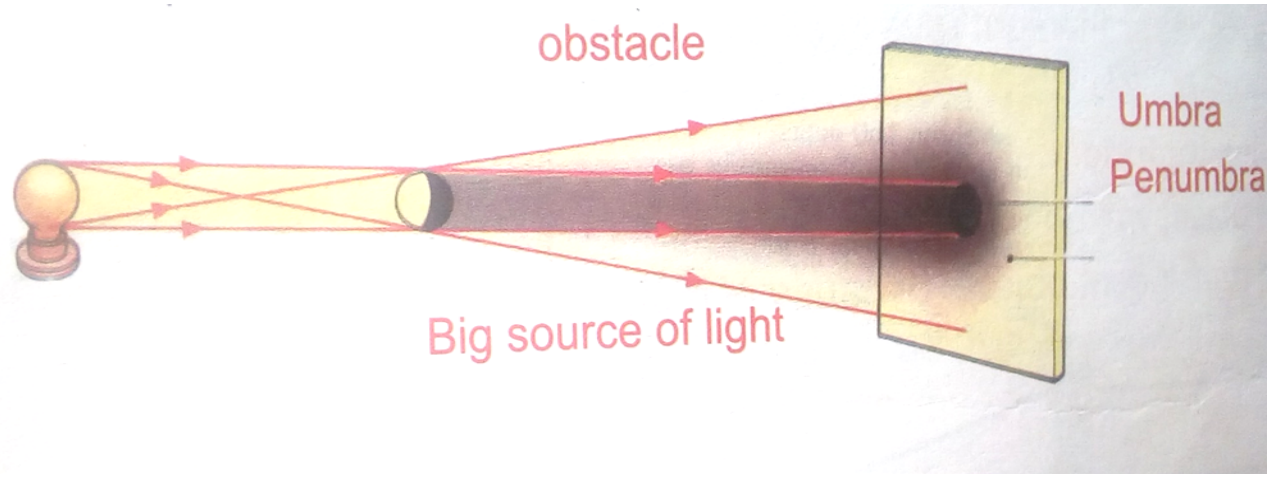


b) A shadow formed from a source of light bigger than a point.

Each point on the source produces its own shadow

All these shadows overlap to give a single shadow.

This single shadow has a darker inner portion and less dark outer portion



Parts of a shadow

i. **Umbra**- It is the darker part of a shadow.

It is formed by total obstruction of light

ii. **Penumbra**- It is the lighter part of a shadow.

Penumbra is formed by partial obstruction of light.

Factors that determine the size of the shadow formed.

1. The size of an opaque object

2. The size of the source of light
3. The angle at which light strikes the opaque object
4. The distance of the light source from the opaque object

NOTE

- Shadows are shorter and smallest at noon time because the sun is over head an object.
- Shadows are longer and bigger in the evening and morning time because the sun strikes the objects on the sides.

Illustrations to show shadows at different time of the day

Importance of shadows

- They enable man to tell direction
- They enable man to determine time
- They enable man hide away from the enemies
- They provide shade to man

Dangers of shadows

- They make plants grow tall, thin and weak

- ♣ They are hiding places for dangerous animals and vectors
- ♣ They cause fear to children
- ♣ They make us unable to see objects clearly

Activity

1. How are shadows formed?
2. Why are shadows appear shorter at noon time?
3. How is umbra different from penumbra?
4. What are translucent objects?
5. Why is a wall said to be an opaque objects?
6. State the effect of transparent objects on light rays.
7. Why is lighting seen before thunder is heard during rain storm?

ECLIPSE

- An eclipse is a natural shadow formed when the light from the sun is obstructed by the moon or the earth.
- An eclipse is the disappearance of light from the sun due to obstruction of the moon or the earth.

HOW ECLIPSE IS FORMED

An eclipse is formed when the sun, moon and earth are in straight line.

- The earth takes 365 days to spin around the axis or the orbit.
- The moon takes 29 days to move around the earth.

TYPES OF ECLIPSE

1. Solar eclipse (Eclipse of the sun)

2. Lunar eclipse

3. Annular eclipse

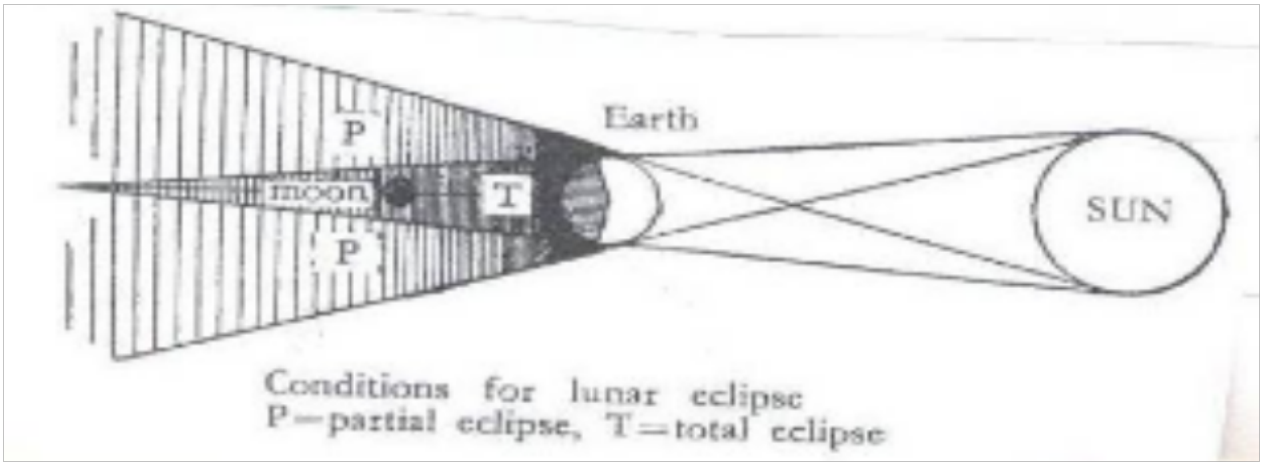
1. **SOLAR ECLIPSE** (Eclipse of the sun)

   Solar eclipse is the type of eclipse formed when the moon is in between the earth and sun.

   Formula

See	Me	Enemy
S	M	E

Diagram



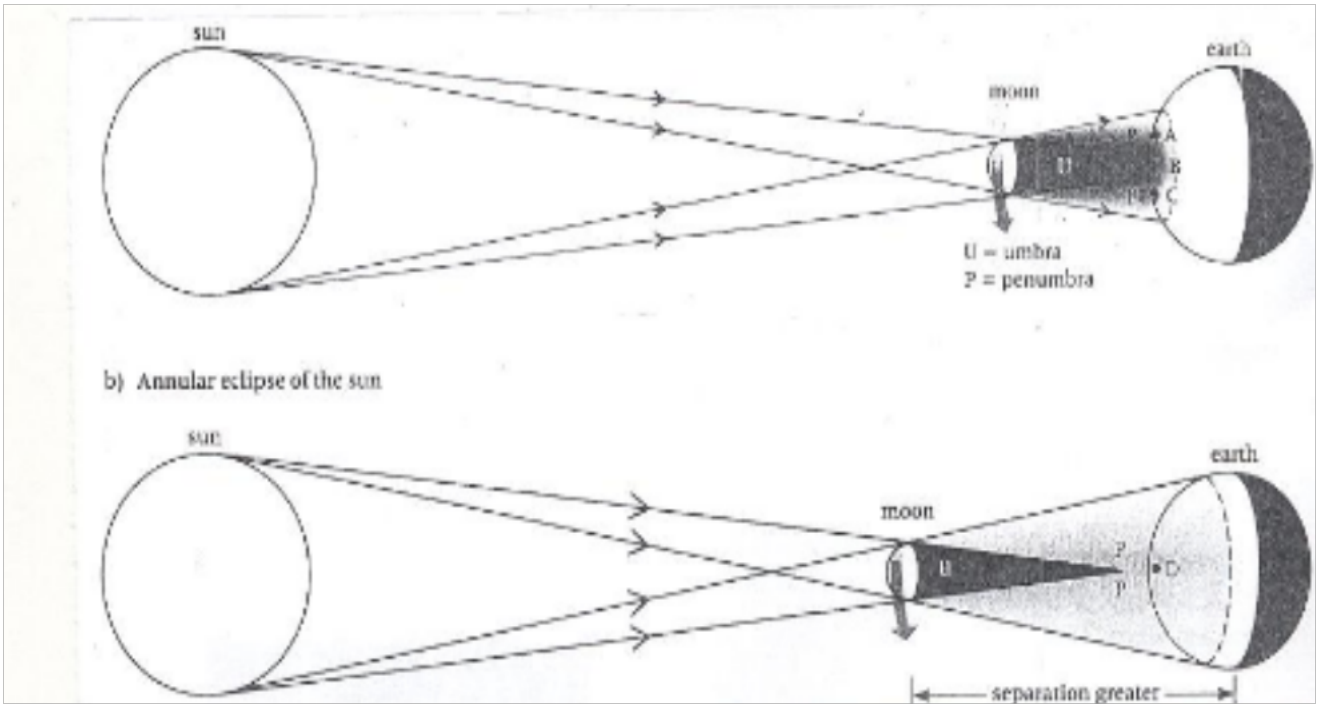
Conditions for lunar eclipse
P—partial eclipse, T—total eclipse

2. **LUNAR ECLIPSE**

   This is the type of eclipse formed when the earth is in between the sun and the moon (SEM)

   - Here the light from the sun is blocked by the earth forming a shadow on the moon.

Illustration



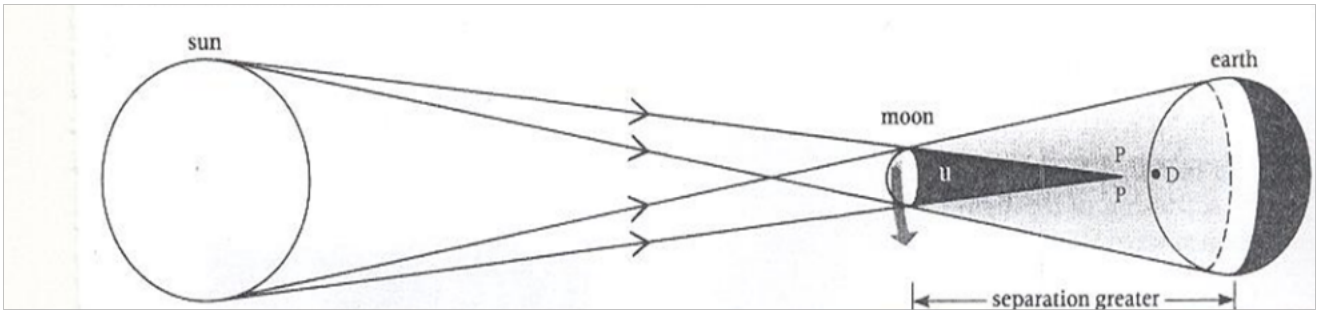
ACTIVITY

1. Write down the two types of eclipse

2. How is a lunar eclipse formed?

3. How are shadows important in our daily life?

4. Use the diagram below to answer the questions that follow



a) Name the parts labelled U and P

SOLAR SYSTEM

It is made up of **8** planets, 31 satellites, comets, meteors and asteroids.

The sun is the centre of the solar system

PLANETS

Planets are large heavenly bodies moving around the sun in the sky.

- These planets are kept in the sky by the force of gravity between them.

The 8 planets are:-

1. Mercury
2. Venus
3. Earth
4. Mars
5. Saturn
6. Jupiter
7. Uranus
8. Neptune

Note

Pluto: is no longer a planet because it takes more than one year to move around the sun.

Planets in their order of arrangement from the sun

1. **Mercury**

- This is the smallest planet
- It is the brightest among planets
- It is sometimes called evening star
- It is full of carbondioxide

2. **Venus**

- This is fourth planets. It is the brightest.

3. **Earth**

- This is the fifth largest planet where human beings live.
- It has oxygen to support life

4. **Mars**

- This is the third smallest planet.
- It is also full of carbondioxide

5. **Saturn**

- This is the second largest planet
- It contains hydrogen gas
- It has got a belt in the middle

6. **Jupiter**

Is the biggest planet in the universe.

7. **Uranus**

- Is the fourth largest planet in the universe
- It contains ammonia and helium gas

8. **Neptune**

- This is the third largest planet in the universe
- It contains biogas (methane)

9. **Asteroids**

- These are large number of belt rocks orbiting in the belts between mars and Jupiter.
- They are sometimes called minor planets

10. **Meteor**

- These are burning particles in the space caused by too much friction.
- These are sometimes called shooting stars

11. **Comets**

These are small materials moving giantly in the orbit in the space with bright light.

12. **Galaxy**

This is the collection stars in the sky.

13. **Plough**

This is the group of seven stars that were used by navigators to find direction of different places.

14. **Astrology**

This is the study of heavenly bodies.

15. **Astronaut**

These are people who are trained in the space to study about heavenly bodies.

REFLECTION OF LIGHT

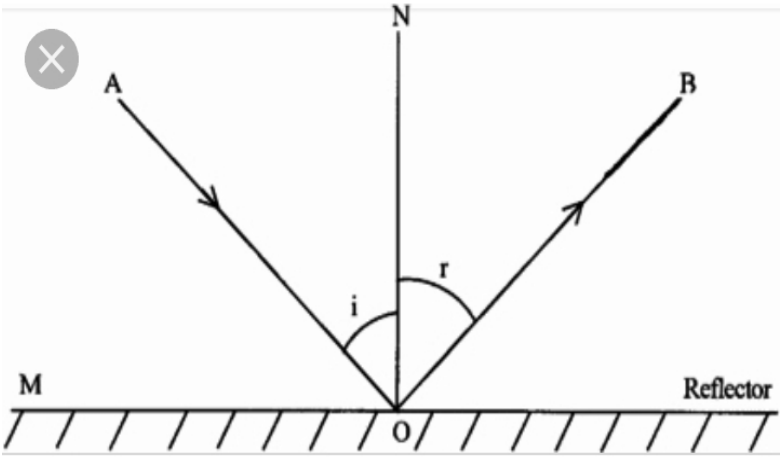
What is reflection of light?

Reflection of light is the bouncing back of light rays from a shiny surface.

Reflection of light occurs on the shining surface and smooth polished surfaces.

Reflection of light causes formation of images

Diagram showing reflection of light



AO - Incident ray

OB - Reflected ray

NO - Normal

MOR - Reflecting surface

Li - Angle of incidence

Lr - Angle of reflection

<u>Definition of each</u>

1. **Incident ray**

This is the ray of light that strikes the reflecting surface.

2. **Reflected ray**

This is the ray of light that is bounced off from the reflecting surface.

3. **Normal**

This is the ray of light that strikes the reflecting surface at an angle of 90^{o} and it is reflected back in the same way.

4. **Angle of incidence**

This is the angle formed between the incident ray and the normal line.

5. **Angle of reflection**

This is the angle formed between the reflected ray and the normal line.

Types of reflection

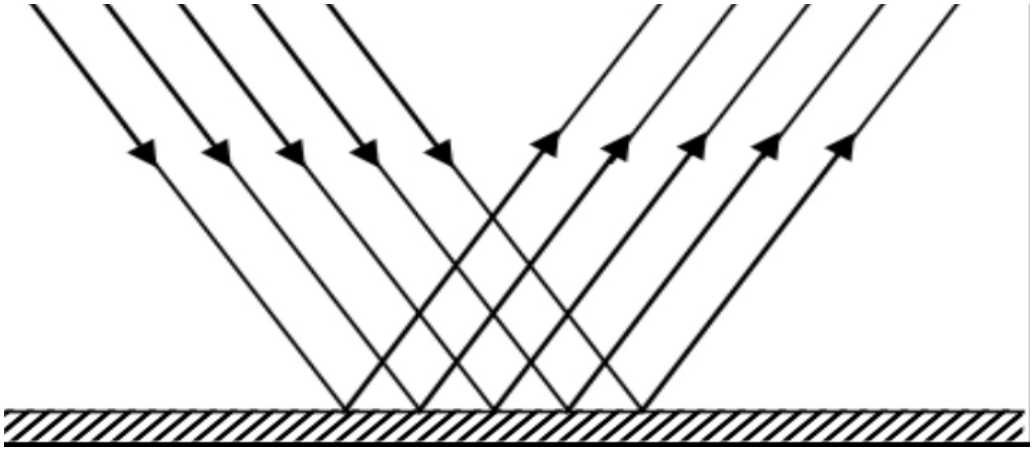
1. Regular reflection (uniform reflection)

2. Irregular reflection (Diffuse reflection)

1. **Regular reflection**

Regular reflection is the type of reflection which occurs on the smooth shiny or polished surface.

In regular reflection, the angle of incidence is equal to angle of reflection (Li = Lr)



Note:

In regular reflection, clear images are formed because the light is bounced back by a smooth polished surface.

2. **Irregular reflection**

Irregular reflection is the type of reflection where light rays are bounced back by a rough shining surface.

Rough shining surface make light rays to scatter in different directions and this makes the images formed to be unclear.

Note:

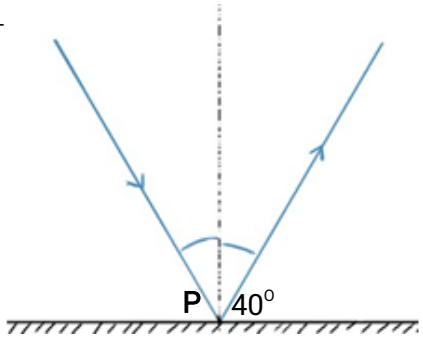
In irregular reflection, the angle of incidence is not equal to angle of reflection (Li = Lr)

LAWS OF REFLECTION

1. The angle of incidence is equal to the angle of reflection.
2. The incident ray, the normal line and the repeated ray all lie on the same point of incidence and on the same plane.

Calculating angles of light reflection

Example 1



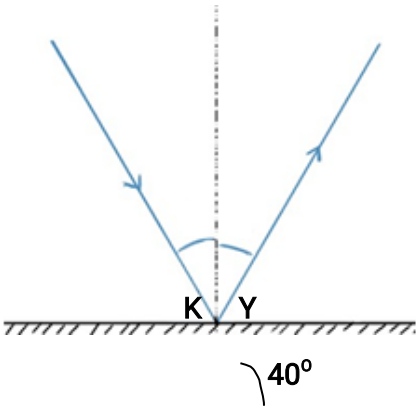
From the law of reflection

Li = Lr

P = 40°

Example 2

Calculating angle marked K.



K + 40° = 90

K + 40° - 40° = 90° - 40°

K + 0 = 50°

K = 50°

Calculating angle marked Y.

Activity:

1. How is reflection of light useful to man?
2. Which type of reflection occurs on the smooth polished surface?
3. State one law of light reflection.
4. What happens to the ray of light that strikes the mirror at an angle of 90^{o}?
5. Calculate the unknown angles in each case below.

REFLECTION OF LIGHT BY DIFFERENT MATERIALS

1. White paper / white cloth/surface reflects more light more than brown one.
2. Two pieces of clothes (white and black) when put under sun for sometime and when touched, the black one was hot and white one was not hot because black clothes absorbs heat and white one reflects heat.
3. A black material appears black because it absorbs all colours and reflects none.
4. A white material appears white because it reflects all colours and absorbs none.
5. All other objects with different colours like red, orange, green, blue, pink, appear their colours because they absorb all other colours and reflect their colours.

IMAGES

An image is a light picture formed after reflection of light rays.

Types of images

1. Real images
2. Virtual images

1. **Real images**

   Are images which can be cast/formed on the screen.

2. **Virtual images**

   Are images which cannot be cast/formed on the screen.

Types of mirrors

1. Plane mirrors
2. Curved mirrors

PLANE MIRRORS

These are mirrors with a reflecting surface.

Characteristics/properties of images formed by plane mirrors

- They are of the same size
- They are laterally inverted
- They are of the same distance behind the mirror like the objects infront of the mirror
- They are virtual (formed behind the mirror)
- They are erect (up right)

Uses of plane mirrors

- Used in periscopes to see around corners
- Used as dressing mirrors by people
- Used in salons as sharing mirrors
- Used by dentist

PERISCOPE

- A periscope is a device/instrument which is used to see objects around corners like behind walls, trees, mountains and hills.
- Plane mirrors in periscopes are placed facing each other at an angle of 45^{o} and parallel to each other.
- The rays of light from the object are then reflected at an angle of 90^{o} as seen below.

Uses of periscopes

1. Used by soldiers in sub marines to see their enemies on the surface of water.

2. Used by soldiers in wars to see their enemies

3. Used by spies to see around corners without being noticed

CURVED MIRRORS

These are mirrors with curved surface.

Types of curved mirrors

1. Concave mirrors (Converging mirrors)

2. Concave mirrors (Diverging mirrors)

1. Convex mirrors (Diverging mirrors)

These are mirrors which curve inwards.

They are thin in the edges and thick in the middle.

A is the focus point and AB is the principle focus.

Characteristics of images formed by the convex mirrors

- They are virtual
- Images formed are diminished (smaller than the object)
- Images formed are erect/up right

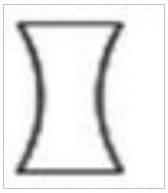
Uses of convex mirror

- Used in supermarkets
- Used as driving mirrors on vehicles because they give erect images and a wide field of view.

Concave mirrors

These are mirrors which are curved inwards.

They are thick at the edges and thin in the middle.



reflecting surface

Concave mirror

Concave mirrors converge light rays as shown below.

A = Focus point

AB = Principal focus

Characteristics of images formed by concave mirrors

- Images are magnified / larger than the objects
- They are virtual
- They are erect

Uses of concave mirrors

- They are used by dentists to see teeth during extraction of a spoilt tooth
- They are used as search lights and head lamps of vehicles
- They are used in telescopes for focusing heavenly bodies

REFRACTION OF LIGHT

Refraction of light is the bending of light rays as they pass from one transparent medium to another.

CAUSES OF REFRACTION

1. Difference in densities through which light travels.
2. Change in speed of light rays as it passes from one transparent medium to another.

Note the following

1. The greater the density the lower the speed of light rays.
2. Light rays travel faster in air than in water
3. Light rays travel faster in glass than water
4. The amount of refraction depends on the density of a medium

Speed of light in the different medium

1. Vacuum = 300,000km/sec
2. Air = 299,300km/sec
3. Glass = 198,000km/sec

When light is travelling from a greater dense medium to a lower dense medium i.e air to glass. Light rays bend towards the normal line as seen below.

Li = Angle of incidence

Lr = Angle of refraction

Note:

The refraction ray bends towards the normal line because the speed of light rays were reduced as light passed through Air and water.

ii) Light rays from air to glass

REFRACTION OF LIGHT BY A GLASS PRISM

A glass prism is a thick transparent glass which refracts light rays.

Law of refraction

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

Effects of light refraction

1. A pencil / ruler appears bent when put in water due to refraction of light rays.

2. Refraction makes swimming pools appear shallower than their real depth.

3. It makes fish deep in water appear nearer than the surface of water.

4. Refraction makes words under the glass prism appear raised.

5. Refraction causes dispersion of light rays resulting into a spectrum

6. Refraction causes mirage on tarmac roads and sand in deserts

Disadvantages of light refraction

1. It causes accidents on roads due to formation of mirage on tarmac roads.

2. It causes near drowning and colouring in swimming pools as it makes them appear shallow.

SPECTRUM

- Spectrum is a band of seven colours

- A natural spectrum is the rainbow

The seven colours are

	Colur		**Formulae used**		
1.	**Red**	R	Rebecca	Richard	Robert
2.	**Orange**	O	Of	Of	Okello
3.	**Yellow**	Y	York	York	Your
4.	**Green**	G	Gave	Gave	Girl

5.	**Blue**	B	Betty	Betty	Betty
6.	**Indigo**	I	In	In	Is
7.	**Violet**	V	Vain	Volley ball	Vomiting

Causes of spectrum

Caused by dispersion of light rays by the glass prism.

Dispersion

- Is the splitting of white light to form a spectrum

Dispersion of light occurs after refraction of light

Formation of the spectrum by a glass prism

A prism

Is a triangular transparent glass that refracts light rays into different colours at different angles.

Diagram showing a rainbow

Note

1. Red appears on top because it refracted least.
2. Violet appears on bottom because it is refracted most
3. A person can only see a rainbow when rain is in front of him/her and sun is shining from behind.
4. Every rain drop split up white light from the sun into colours of the spectrum.

COLOURS

There are three types of colours i.e

1. Primary colours (Basic colours)
2. Secondary colours
3. Complimentary colours

1. Primary colours

Are colours which are not obtained by mixing any other colour.

Examples **Formulae used**

- Red
- Blue

} ⟹ **Roy Be Give**

- Green

2. Secondary colours

Are colours obtained by mixing two primary colours.

Examples **Formulae used**

- Yellow
- Magenta ⟹ **Young men Come**
- Cyan (Peacock blue)

How secondary colours are got

Red + Green = Yellow

Red + Blue = Magenta

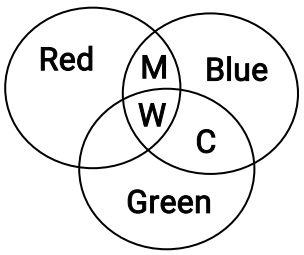
Green + Blue = Cyan (Peacock blue)

3. Complementary colour

Is a colour obtained after mixing primary colour and secondary colour.

e.g White colour

A diagram showing colour wheel



Note: Colour wheel

It was discovered by Isaac Newton with all seven colours of rainbow on a circular wheel rounded them in a high speed and he could only see white colour and it was later called **Newton colour disc**

Activity

1. What is a spectrum?
2. What causes a spectrum?
3. State the effect of dispersion of light.
4. Identify the natural spectrum.
5. Mention one danger of light refraction.
6. Why does a pen put in water appear bent?
7. Define each of the following

i) Refraction of light ii) Reflection of light

8. What will happen to the ray of light passing from glass to air?
9. Give one cause of light refraction.

LENSES

A lens is a transparent material used to focus or change the direction of light passing through it.

TYPES OF LENSES

1. Convex lens (converging lens)
2. Concave lens (Diverging lens)

CONVEX LENS (converging lens)

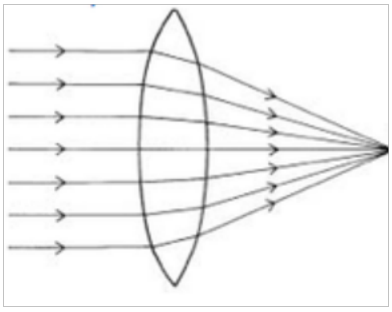
Is a lens which is think in the middle and thin at the edges.

A convex lens makes the beams of light converge at a point.

Convex lens

Effects of convex lens on light

It converges light at one point.



Focus point

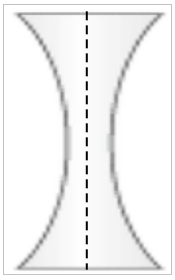
Convex lenses are used as magnifying glasses

Characteristics of images formed by a convex lens

- They are magnified
- They are erect
- They are virtual

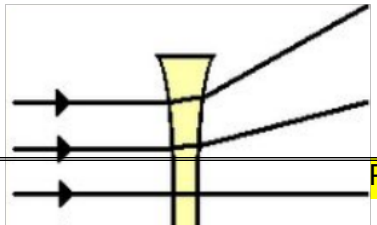
CONCAVE LENS

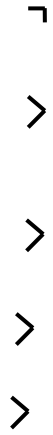
- Is the lens which is thin in the middle and thick at the edges.



Effects of concave lens

- It diverges/spreads out light after passing through it.





Concave lenses are used in eye glasses and telescopes.

Characteristics of images formed by concave lenses

- They are diminished
- They are erect
- They are virtual

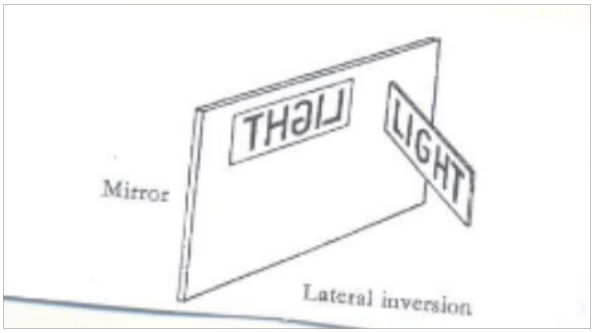
Simple optical instruments.

Optical instruments are instruments which use light for their functioning.
Examples of simple optical instruments are **plane mirrors** and **lenses.**

Plane mirrors.

Characteristics of images formed in a plane mirror.

- They are erect/upright.
- They have the same size as the object.
- The image is laterally inverted. (the right appears to be left in the mirror).
- Image distance is equal to the object distance from the mirror
- The image is virtual. (not formed on the screen)



Uses of plane mirrors

- They are used in periscopes
- They are used as dressing mirrors.
- They are used by dentists.
- They are also used in saloons

Lesson two

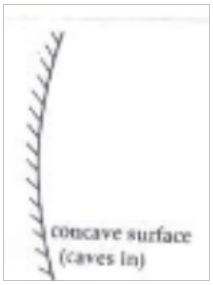
Curved Mirrors

These have their reflecting surfaces form a hollow sphere.

Types of curved mirrors

Concave mirrors: It is coated on the outside of the spherical surface.

- ✓ They are used as reflectors in head light of cars and torches.
- ✓ Used by dentists.
- ✓ They are used in solar cookers to focus light on one spot.
- ✓ Used as shaving mirror



CHARACTERISTICS OF IMAGES IN CONCAVE MIRRORS.

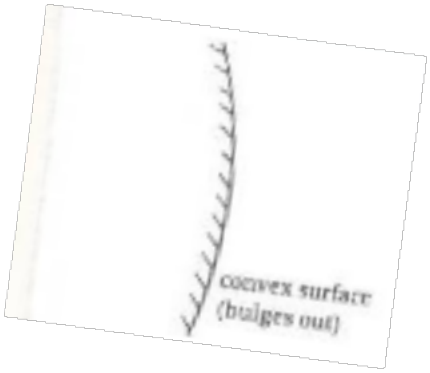
- They are real.
- They are upright.

Convex mirror: It is coated on the inside of the spherical surface.

- ✓ They are used as driving mirrors because they a clear view of the traffic behind.

Characretistics of images formed in convex mirrors.

- ✓ The images are upright
- ✓ The images are virtual.
- ✓ The images are smaller than the objects.



Real and virtual images

Virtual images are not formed on screen.
Virtual images are cast by plane mirrors, concave lens, and convex lens.

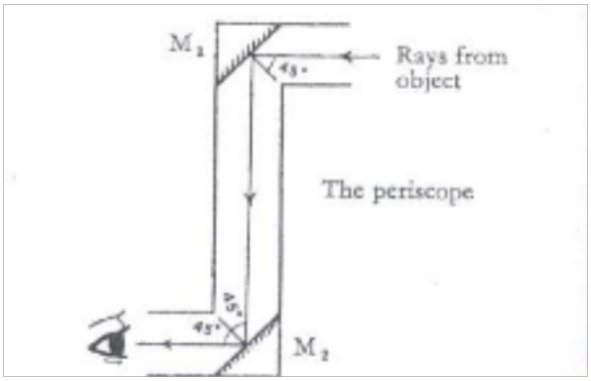
1. **How is reflection important to us?**
2. **How are periscopes useful to sub mariners?**
3. **State the way one can correct the following eye defects:**

   a) Myopia **b) Hypermetropia.**

Lesson three

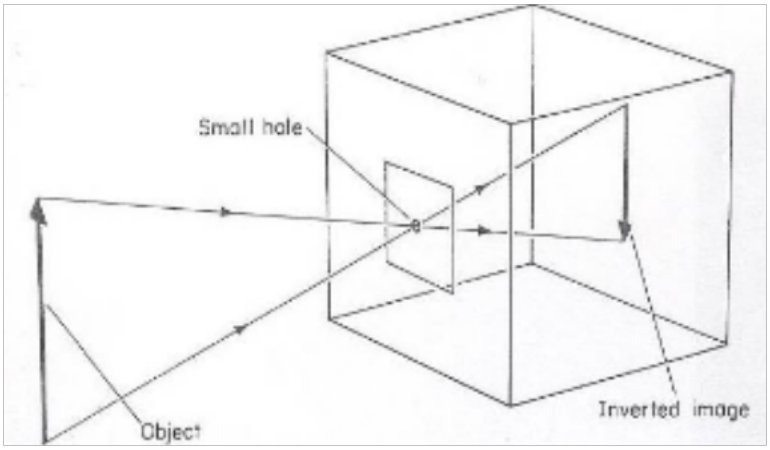
Periscope

They are instruments used to see objects overhead.
It is used by soldiers, sub mariners etc.
A ray of light from the object strikes mirror one at 45 degrees and then turned through 90 degrees to strike mirror two until the object is seen by the observer.
Illustration of a periscope.



Pinhole camera

It works on the principle that light travels in a straight line.



Characteristics of images formed with a pin hole camera

- The image is smaller than the object/diminished.
- The image is upside down./inverted
- The image formed is real.

NB:- If the distance between the object and camera is increased, the image becomes smaller and blurred.

- If the distance between the object and the camera is decreased, the image becomes larger and blighter.
- When the hole is too big, the image is blurred.

Lesson 4 and 5

Refraction of light

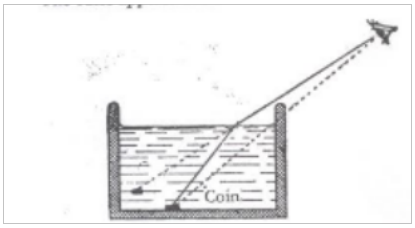
Refraction means the bending of a light ray as it moves from one transparent medium to another.

Principle/law of refraction.

i.The incident ray, the refracted ray and the normal all lie on the same plane.
ii.A ray of light travelling along the normal will not get refracted and will pass unchanged.

Effects of refraction

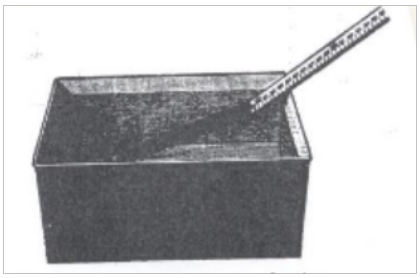
i. Fish in water appears shallower than they are.



ii. A pool appears shallower than it really is.

iii. Refraction produces colors e.g. spectrum

IV. An object put in water appears bent.



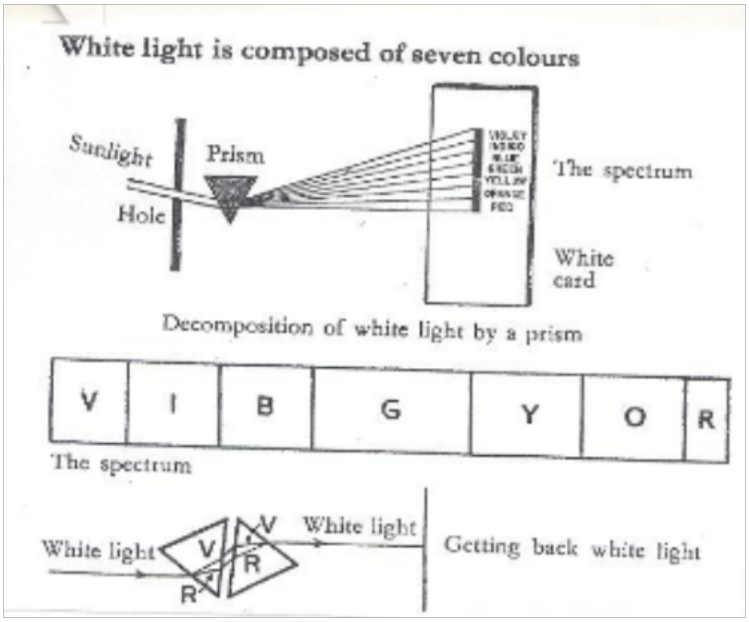
Prisms and Light spectrum.

Spectrum

Is a band of seven colours.

Dispersion of light.

- Is the splitting of light into different colours.
- Dispersion is caused by refraction of light rays at different angles in glass prism. **Dispersion/ Refraction of white light by glass prism**. (ROYGIBIV)
- Light rays in a glass prism bend at different angles because they move at a different speed.
- The fastest ray bends most (violet) and it has a short wave length.

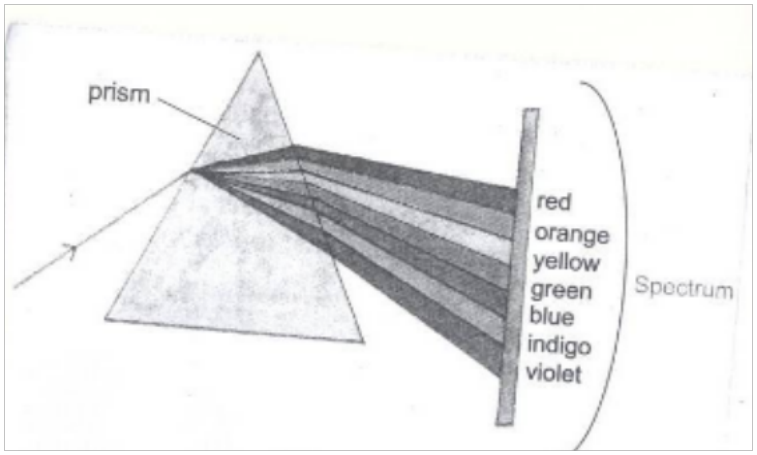


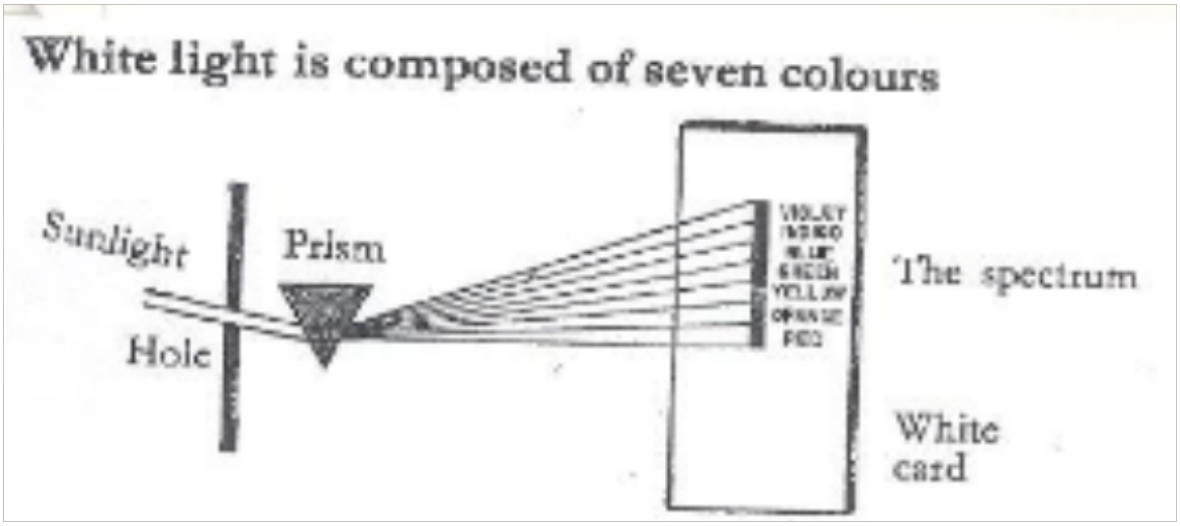
- The slowest ray bends least.(red) and it has a long wave length.
- The order of the colours of the spectrum from top to bottom is Red, Orange, yellow, Green, Blue, Indigo, Violet.
- It can be memorized in the sentence Richard Okello Your Girl Benita Is Vomiting.

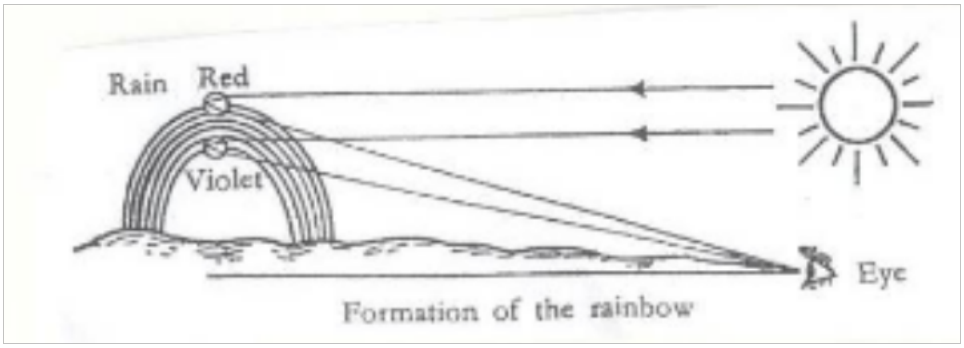
Lesson 6 and 7

THE RAINBOW

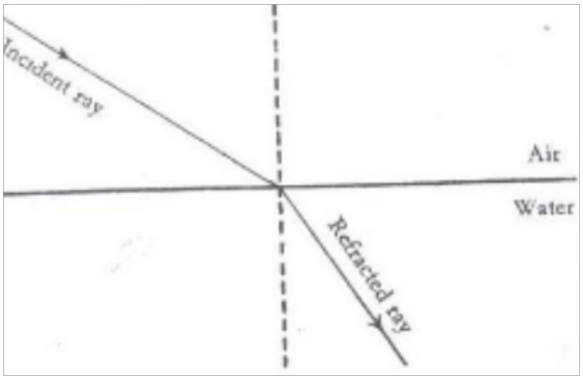
- It is a natural spectrum in the sky.
- It is formed when light rays from the sun pass through rain drops.
- The inner colour of the rainbow is violet.
- The outer colour of the rainbow is red.







Refraction through a rectangular glass prism.



- **I** - Angle of incidence
- **R** - Angle of refraction
- Angle **i** is greater than angle **r.**

Qn. What happens to the ray of light when it moves from one medium with fewer molecules to another one with more molecules?

-Its speed slows down.

-It bends towards the normal

Qn. What happens to the ray of light when it moves from one medium with molecules to another with fewer molecules?
-Its speed increases.
-The light ray bends away from the normal.

COLOURS OF LIGHT
TYPES OF COLOURS.

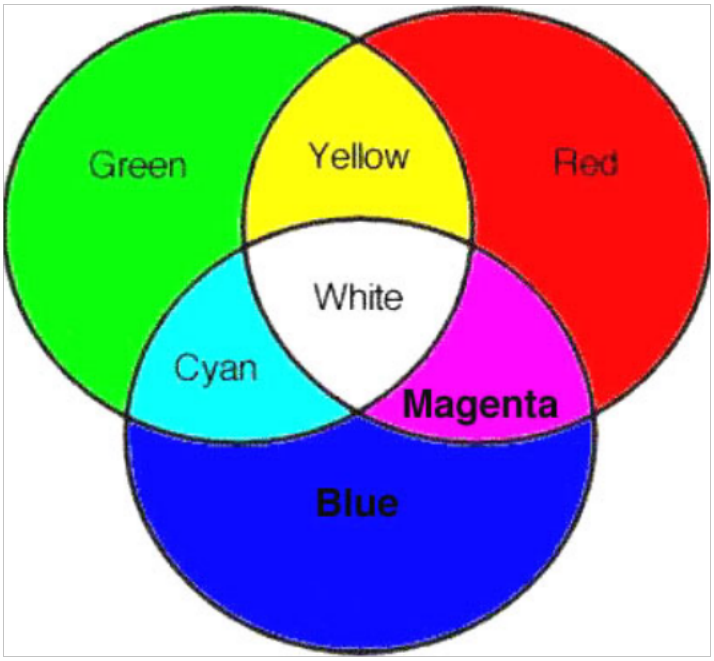
- Primary colours
- Secondary colours.
- Complementary colours.

Primary colors of light are the colours got without mixing any other colour.

Examples of primary colours.Red, Blue and Green

Secondary colours are the colours formed by mixing two primary colours.
Examples of secondary colours are Yellow, Magenta and cyan.
i.e. Red + Green = White
- Red + Blue = Magenta
- Blue + Green =Cyan

Complementary colours. Are the two colours of light which when mixed give white light
Examples of complementary colours are
Blue + Yellow = White
Red + Cyan = White
Green + Magenta = White
Red + Green + Black = White light.



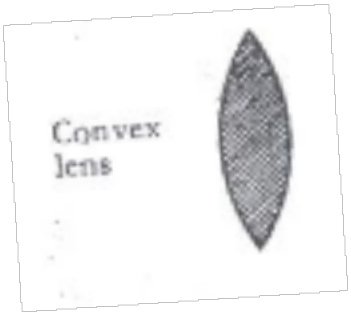
Lesson 8 and 9

LENSES

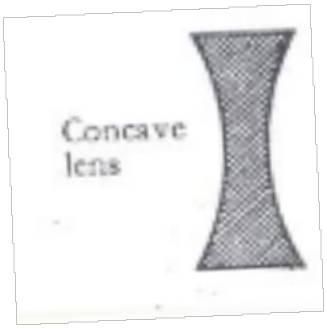
- Lenses are optical instruments used to focus or defocus.
- The surface of the lens may be convex, concave, plane or a combination of these.
- Lenses are used in materials like; cameras, microscopes, binoculars.

Types of lenses

Convex (converging) lens



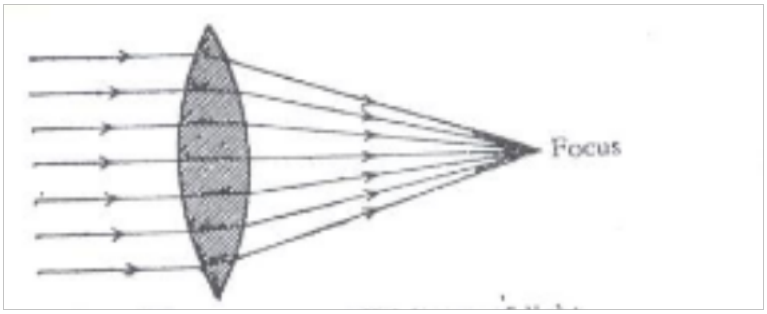
Concave (diverging) lens.



- **The effect of lenses on beams of light.**

Convex (converging) lens.

It refracts light to meet at one point (focal point)



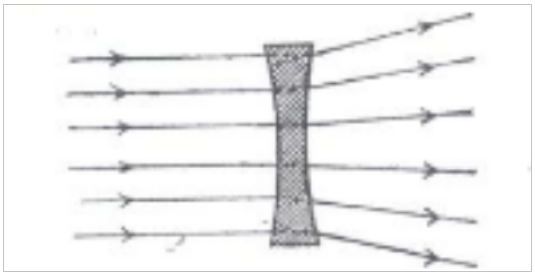
Characteristics of images by convex lenses

- It is inverted.
- It is magnified.

- It is real
- It is formed in infinity.

Concave (diverging) Lens

It refracts light and spread it out in different directions.

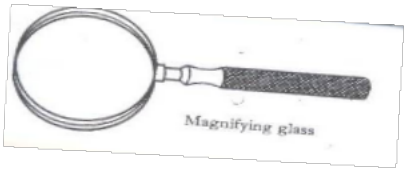


- **Characteristics of images formed by concave lens.**
- Are erect/upright
- Are virtual.
- Image is diminished/reduced in size.

Uses of lenses

- Lenses are used in optical instruments like telescopes, camera, and microscopes etc
- Lenses are used in spectacles.
- Lenses are used in magnifying glasses.

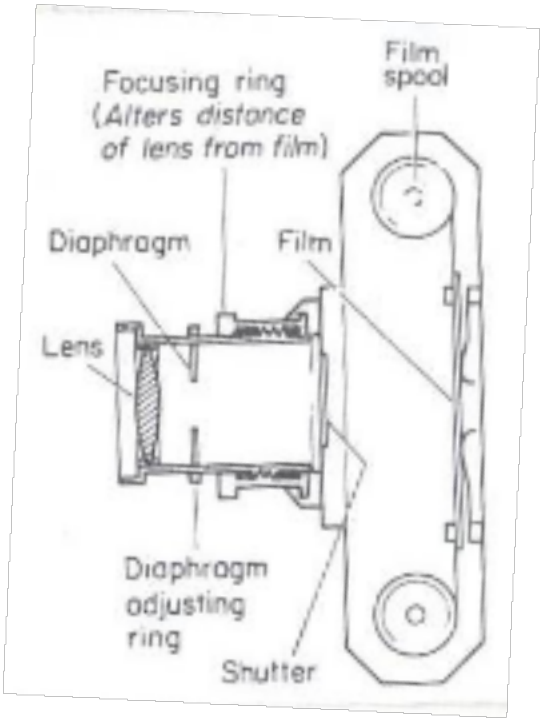
The magnifying glass



WEEK 4

Lesson one and two

The lens camera



Parts of the camera and their functions.

- **Lens**: It focuses light to the film.
- **Film:** The image is formed there.
- **Diaphragm**: Controls the amount of light entering the camera.
- **Shutter**: It uncovers the diaphragm to allow light into the camera.
  It blocks light entering the camera.
- **Bellows(screw mounting):** Adjusts the distance of the lens from te film to obtain the sharp image.

When the film is developed in a chemical a **negative** is got.
On the negative the **bright** part appears **dark** and vice versa.
That is the reason why it is called **negative**.

- **Aperture:** It allows light into the camera.

Characteristics of images formed by the lens camera

- They are real (they are formed on the film.)
- They are smaller than the object.
- They are inverted

Telescope:
It is used to look at distant objects.

Microscope:
It is used to look at very small objects e.g. bacteria, amoeba, cells etc.
Spectacles
Projectors.
It casts images from films and slides to the screen.
It consists of a source of light, a concave reflector and a condenser.

The condenser focuses the rays through the film or side.

Epivisors.

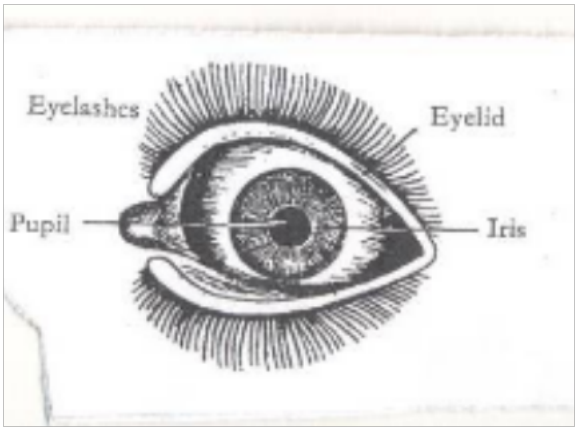
Lesson three and four

The human eye

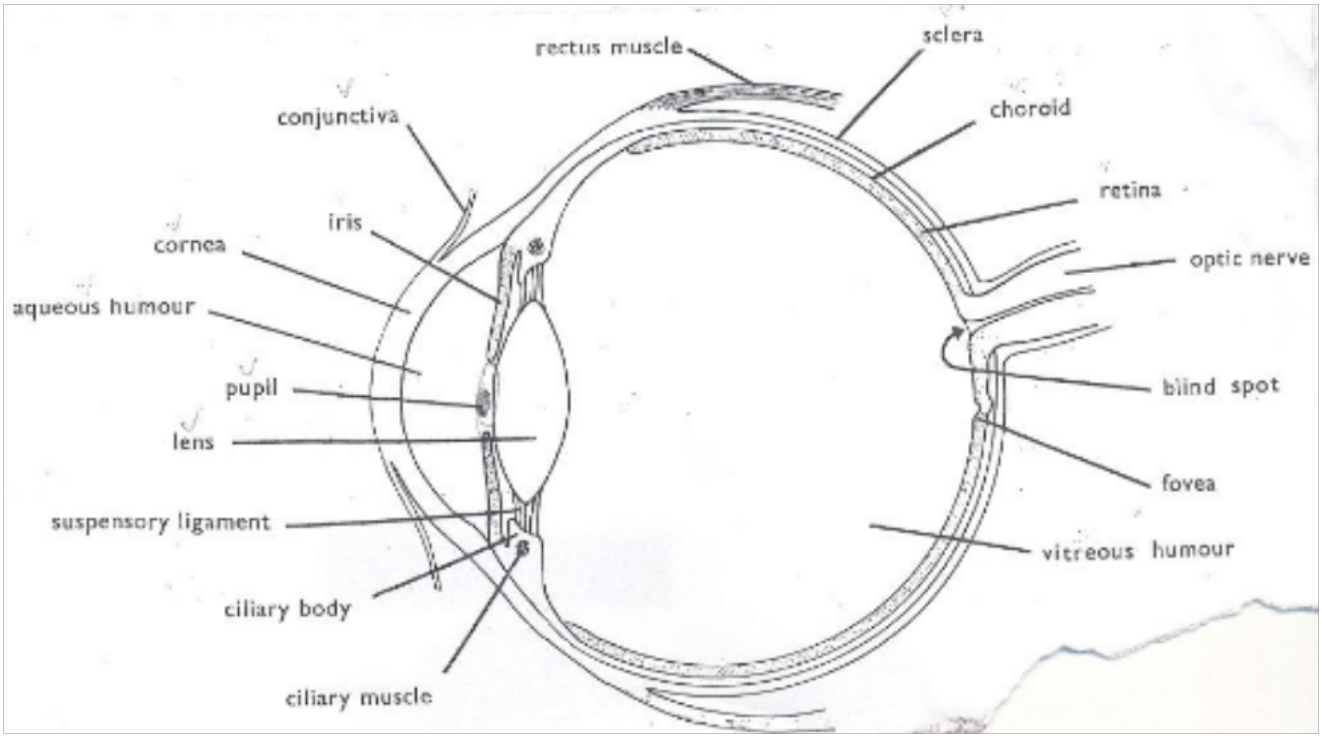
The eye is the sense organ for sight.
The complete eye is called the **eyeball**.
The eye ball is protected by the socket of the skull.

A structure of a mammalian eye

Front view



Cross section view



<u>Uses of the parts of the eye</u>

i. **Cornea**: It aids refraction of light rays to begin converging as it passes through it.

ii. **Conjunctiva**: It covers the front part of the eye.

iii. **Aqueous humour**: It maintains the shape of the eye.

It helps to refract light and form an image on the retina.

iv. **Iris:** It controls/regulates the amount of light entering the eye.

It expands and contracts to reduce the size of the pupil.

v. **Pupil:** It lets enough light into the eye.

vi. **Convex Lens:** It focuses light on to the retina (accommodation)

vii. **Ciliary muscles:** These change the shape of the lens for accommodation.

viii. **Vitreous humour:** It maintains the shape of the eye.

It helps to refract light and form an image on the retina.

ix. **Retina:** It is where the image is formed.

It has the rods (light sensitive cells that are responsible for dim light) and the

cones (light sensitive cells that are responsible for bright light)

x. **Optic nerve:** It transmits light messages to the brain.

xi. **The eye lids:** Prevent foreign bodies from entering the eye

xii. **Eye rashes:** Prevents water and other particles from entering the eye.

xiii. **Fovea**: It gives the most accurate interpretation of an image.

xiv. **Blind spot:** Has no light sensitive cells. If part of an image falls on it no impression is recorded in brain.

xv. **Ciliary body**: It contains blood vessels which supply blood to the eye.

xviii. **Choroid:** a black pigment under the sclera that prevents **internal reflection** in the eye.

xv. **Tear glands:** produces a solution that keeps the eye moist and washes dust fro m them.

xvi. **Sclera:** It is a tough, non elastic and fibrous coat round the eyeball

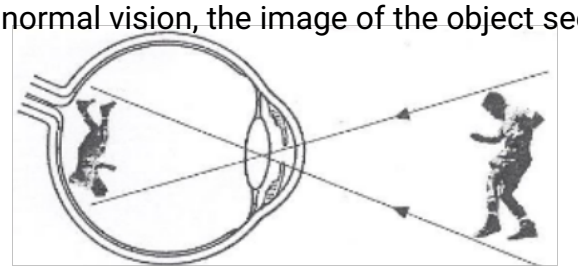
How is regular blinking important to the eye?

It distributes the fluid over the surface of the eye and prevents it from drying up.

Characteristics of images formed by the eye.

i. It is upside down/inverted.
ii.Smaller than the object/dimished.
iii.The image is real.

Normal vision.
In normal vision, the image of the object seen is formed on the retina.



The Lens in the person's eye is **convex.**

Compare a mammalian eye and a lens camera.

DIFFERENCES

Eye	Camera
Lens focuses light on the retina	Lens focuses light on the film
Iris controls light intensity.	Diaphragm controls light intensity
Eyelids block light from entering the eye	The shutter blocks light into the camera
The images are formed on the retina	The images are formed on the film
The pupil allows light into the eye	The aperture allows light into the eye.
The choroid prevents internal reflection	The black inside parts prevents internal reflection

Lesson five and six

SIMILARITIES BETWEEN IMAGES FORMED IN A CAMERA AND EYE.

The images are real, diminished and upside down

Compare a mammalian eye and a pinhole camera.

Eye	Pin hole camera
Focusing is done by changing the shape of the lens.	Focusing is done by moving the camera forwards or backwards

Image is formed on the retina.	Image is formed on the screen
Iris controls light entering the eye	No control of light.
The eye can be covered by eyelids.	The pinhole is always exposed to light.

Similariries.

The image formed is upside down The image is diminished The images formed are real

The parts of the eye and Camera with similar functions.

Eye	Camera
1. convex Lens	convex Lens
2. Iris	Diaphragm
3. Eye lid	Shutter
4. Retina	Film
5. Pupil	Aperture
6. Choroid	The black inside part of the camera.

Diseases and disorders of the human eye.

Eye diseases

1. Conjuctivitis (Red eyes/pink eyes)

Cause

It is caused by **bacteria or viruses**.

Spread

It is spread by finger and face towels.

Signs and symptoms

- Red eye/pink eye.
- Mild burning in the eyes.
- Eyelids stick together during sleep.
- Watery fluid discharge.

Control

- Isolation of the sick.
- Avoid sharing towels, handkerchiefs and bathing containers.
- Always wash hands with clean water.
- Treat pregnant mothers with gonorrhea.

2. Trachoma

Cause; It is caused by a bacterium called **Chlamydia.**

Spread; It is spread by houseflies, hands and face towels.

Signs and symptoms

- The eye turns red.
- The eyes produce watery fluids.
- Irritation in the eyes.
- Small lamps under the upper eyelids.
- The white part swells.

Control

- Wash hands and eyes regularly.
- Do not shake hands during the outbreak.
- Do not share hankies and face towels.
- Treat the infected ones.

3. **River Blindness**

It is caused by **onchocerca**

It is spread by black flies/simulids /Jinja fly.

Signs and symptoms.

- The eyes turn red
- Tears flow.
- Inflammation of the iris.
- The skin gets rough.
- Enlargement of lymph nodes.
- Itching on the trunk.
- Lumps from under the skin.

Control

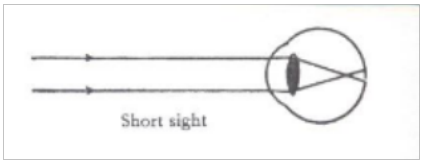
- Clear vegetation on banks of rivers.
- Spray the larva of Jinja fly.

Other eye diseases.

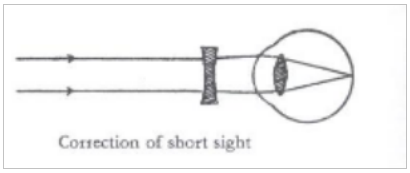
- Blepharitis.
- Cataracts-clouded lenses
- Glaucoma- damage to the optic nerve from too much pressure in the eye Sty.

Eye defects/disorders, cause and correction.

- **i.Short sight (myopia)**
  It is where a person is able to see nearby objects clearly but not far off objects.

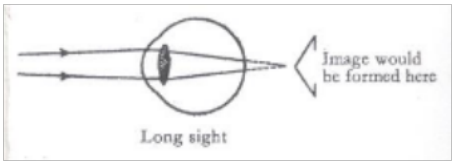


Causes of short sight.
-Large/elongated eyeballs.
-Eye diseases
Correction.
Wear spectacles with concave lens

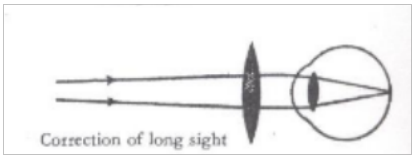


ii.Long sightedness. (Hypermetropia

Is where a person can see distant objects clearly but not nearby objects.



Correction.
Wear spectacles with convex lens.



iii.Astigmatism. (distorted vision at all distances)
It is a condition in which one is unable to see both vertical and horizontal objects clearly at the same time.
Astigimation is common during old age.
Causes of astigmation.
Having irregular cornea.
Correction
Wearing glasses with cylindrical lenses.

Care of the human eye

6. Wash eyes with soap every day.
7. Don't look directly at very bright light e.g. sun.
8. Don't share face towels.
9. See the optician in case of a problem.
10. Avoid reading on dim light.
11. While reading, let the light come from over the shoulders.
12. Avoid rubbing your eyes.
13. While reading don't be too close to the source of light.

questions

1. **State any one reason why it important to keep our eyes clean always.**
2. **How are translucent objects important in our daily life**

Topic 7: INTERDEPENDENCE OF THINGS IN THE ENVIRONMENT.

VOCABULARY

- **Dependence**
- **Agro forestry**
- **Pollarding**
- **Lopping**
- **Coppicing**
- **Welfare**

Interdependence:
It the way things benefit from each in the environment.
Environment:
It refers to things surrounding people.
Components of the environment
They are divided into two groups:

i. Living things eg plants, animals
ii. Non living things eg water bodies, air, soils

How plants depend on animals.

i. Plants get carbon dioxide.

ii. They get manure.

iii. They are pollinated

iv. They get care.

v. Plants are dispersed.

How animals depend on plants.

i. They get Oxygen.

ii. They get food.

iii. They get habitat.

iv. People get fire wood from them.

v. They get building materials.

vi. They get herbal medicine.

Animals depend on other animals in the following ways;

i. Some feed on others(predators)

ii. Some animals live in/on others.eg internal parasites and external parasites.

iii. Some provide transport to others.eg Donkey, Ass, Camels

iv. Some provide security e.g. Dog

Plants depend on other plants in the following ways.

i. The weak get support from other plants.eg Morning glory

ii. Some parasitic plants obtain food from the host plants.

iii. Some tall plants provide shade to small trees.

iv. Some plants protect small trees against strong wind.

Interdependence of living things and non living things

A. Animals depend on non living things (air, water, soil)

i. Termites / earthworms live in the soil.

ii. People use soil to build houses, pottery etc

iii. People get rocks for construction of roads, houses etc

iv. Animals drink water.

v. Animals breathe in air.

vi. Animals get heat and light from the sun.

B. Plants depend on non living things (air, water, soil)

i. Plants breathe in air.

ii. Plants get heat and light from the sun.

iii. Plants grow on soil.

iv. Plants use water to make food.

Non living things benefit from living things.

i. Plants purify air by absorbing carbon dioxide from it.

ii. Plants control silting of water bodies.

iii. People add manure to the soil.

AGRO FORESTRY

Agro forestry.

- The growing of trees along side crops.

Importance of growing crops and trees together.

- Trees provide shelter to other crops.
- Trees control soil erosion.
- Crops get protection from wind and strong sunshine.
- Some trees have nitrogen fixing bacteria that make the soil fertile.
- Double income e.g. food and timber.
- Reduce global warming as trees use carbon dioxide.
- Trees contribute to rainfall formation.

Growing trees and keeping animals on the same farm

- Trees provide shade to animals.
- Trees provide oxygen to animals.
- Trees purify the environment by using the carbon monoxide gas.
- Some leguminous trees are used as animal feeds.
- The farmer can get double income.

Rearing animals and growing crops on the same farm.

- Animals get food.

- Crops get manure.
- The farmer can get double income.
- Animals give carbon dioxide to crops.
- Crops provide oxygen to animals

Rearing and caring for animals, growing crops and trees on the same farm.

- Some trees are used to make live fences(hedge)
- Some leguminous trees may be used as sources of animal feeds.
- Trees provide oxygen to animals.
- Animals give carbon dioxide to plants.

Tree growing

- Trees grow from seeds.
- The seeds selected should be healthy.

Indigenous trees

These are trees that have been growing in Uganda for many years.
Examples include.

- Musizi
- Acacia
- Mvule
- Mahogany

Characteriastics of indigenous trees;

- Produce hard wood.
- Take long to mature.
- Can withstand rough soil and weather.
- Grow in the wild.

Exotic trees:

These are the recently introduced species of trees.

They include;

- Cypress, Pine, Cedar, Mango, Black wattle, Eucalyptus, Jack fruit tree and Ficus tree.

Characteristics of exotic trees

- They produce soft wood.
- They mature faster than the indigenous trees.
- Need proper care.
- Some cannot withstand harsh weather.

Starting a tree nursery bed.

What is a nursery bed?
A nursery bed is a small piece of land prepared for raising seedlings.
Reasons for growing crops in a nursery bed.

- It protects seedlings from bad weather conditions.
- It makes it easy to care for seedlings e.g. weeding, thinning, spraying etc.
- It enables the seeds to germinate well as the soil is loose and moisture.
  TYPES OF NURSERIES

i. Nursery bed-raised on the ground.

ii. Seed boxes-Wooden boxes filled with soil.

iii. Soil blocks-Soil put in polythene bags and sacks.

Care for seedlings in the nursery bed.

- Watering.
- Thinning.
- Spraying.
- Hardening off seedlings.

A seed bed
It is a large piece of land where seedlings are planted for further growth.

Steps taken when starting a nursery bed.

a) Choose a good site, clear the land and dig deep to make the soil fine.

b) Add manure in the nursery bed and mix it well with soil.

c) Furrow the soil using a stick and plant the seeds you have selected.

d) Cover the prepared area with mulches,provide a shade and water.

NB:Remove the shade when the seedlings are about to be transplanted.

What is hardening off?
It is the making of seedlings gets used to garden conditions.
At this time the following are done.

- Shelter is removed.
- Watering is reduced.

The garden conditions are rain, sunshine and pests.
Transplanting.
It is the process of moving seedlings from the nursery bed to the main field.
(seed bed)
It should be done in the evening when the weather is cool and wet to prevent the plants from losing a lot of water due to transpiration of water.

Ways of caring for trees in agro forestry
1. **Watering**; this is the application of water to plants.
2. **Fencing**; the construction of wooden fence around the gardens or individual plants.
3. **Transplanting**: the removal of seedlings from the nursery bed to a seed bed.
4. **Spraying**: the application chemicals to plants to kill pests
5. **Mulching**: The covering of top soil with dry plant materials.

Pruning: The cutting of excess branches of a plant.

Advantages of pruning.

- Reduce competition for air.
- Controls pests by removing hiding places for pests.
- Eases harvesting.
- Reduces transpiration.
- Reduces weight of a plant.
- Pruned materials can be used for mulching.

Thinning: The removal of excess or poorly growing seedlings from the garden.

Advantages of thinning.

- Gives enough space for other crops to grow.
- Control the spread of diseases.
- Control the spread of pests.

- Eases spraying.
- Improves yields and quality of harvest.

Staking: the providing of support to plants with weak stems.

Why staking?

- Controls ground pests.
- Eases weeding.
- Eases harvesting.
- Eases pruning.
- Eases spraying.
- Improves plant access to sunlight.

Crop spacing: the leaving of open spaces between individual plants.
It is the planting of crops leaving spaces between individual crops.

Importance of crop spacing.

- Reduces competition for water and space.
- It ensures proper circulation of air to the plant.
- Plants get enough sunlight.
- Easy weeding.
- Easy harvesting.

Weeding: the removal of unwanted plants in the garden.
How bad are weeds?

- Hide pests.
- Weeds compete with crops for sunlight and other nutrients.
- Some weeds are poisonous to plants and live stock. E.g. tick berry bush.
- Increase the cost of farm management.

Advantages of weeds

- Leguminous weeds fix nitrogen in the soil and increase soil fertility.
- Weeds can be used as animal feeds.

- Source of herbal medicine.
- Weeds rot to form manure.
- Weeds can be used as mulches.

How to control weeds.

- Uprooting and burning the weeds.
- Cutting with a hoe.
- Spraying with herbicides.
- Mulching.

Tree pests and their control.
What is a pest?
A pest is a living organism that destroys crops.
A vermin is an animal pest.
Examples of vermin include; rats, monkeys, elephants etc.

Examples of crop pests.

PEST	CROPS ATTACKED	DAMAGE.
Mealy bug	Pineapples, coffee	Leaves turn yellow or pink.
Aphids	Oranges, coffee, cabbages etc	Wilting back of terminal bud.
Banana weevils	Bananas	Leaves turn yellow Bananas fall easily.
Codling moth.	Citrus fruits like oranges and mangoes	Fruits fall off.
Thrips	bananas	Premature ripening of bananas Banana fruits burst.
Moles, rats, squirrels, mice, cane rats.	Cereals	Direct consumption of seeds an stems.
Citrus black fly.	Citrus fruits	The flies suck sap from leaves and tender shoots.
Leaf miners	Coffee, cocoa, pineapples, aloevera, sisal	Plant's abilty to make sugar is reduced.
Cut worms	vegetables	Leaves are destroyed.
Locusts	All crops	
Army worms	Cereals and grasses	
Maize stalk borer	Maize	
Boll worm	Cotton	
Antestia bug	Coffee	
Game animals e.g. monkeys	Oranges, mangoes	
Birds.	Maize, sorghum.	

Methods of controlling pests.

- Early planting.
- Spraying with pesticides.
- Use of birds to eat lady birds. (Biological method)
- Crop rotation.
- Weeding.(methods)
- Plant clean materials.

Crop diseases.

DISEASE	CROP	CAUSE	SIGN	CONTROL
Panama disease	Bananas		Plant Banana Wilts	Burn entire stock Plant healthy suckers
Cigar End rot	Banana	Bacteria	Banana tips resembles burning cigar	Burn infected crops.
Banana bacterial wilt	Banana	Bacteria	Banana stem rots and falls down	
Powdery mildew.	Mangoes	Fungi	Powdery patches on leaves	Spray with fungicides
Green mould	Citrus fruits	Fungi	The stem dries with a green powder	Spray with fungicides.
Stem pitting	Citrus fruits	Fungi	Dry patches on the stem.	Spray with fungicides.
Tomato blight	Tomatoes, potatoes	Bacteria	Yellow leaves	
Crown gall	fruits	Bacteria	Leaves shrink	
Fire blight.		Bacteria	wilting	
Rust fungus	Cereals	Fungi	Black spot on leaves	
Root rot	Tea plants	Fungi		
Coffee berry diseases(CCB)	Coffee	fungi	Brown spots appear on berries.	

Factors that affect crop production

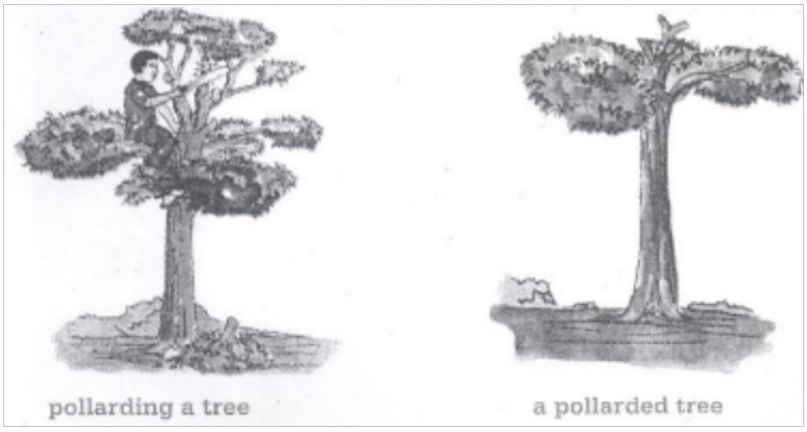
- Crop pests and diseases.
- The use of poor methods of farming.

- The harvesting of immature seeds.

Proper ways of harvesting trees.

1. **Coppicing**-Cutting of the whole tree but leaving room for it to sprout again.

2. **Pollarding-** The cutting of the top part of a tree allowing new branches to develop.



3. **Lopping**- Cutting of the side branches from the truck.

a lopped tree

Advantages of Starting and managing a school/home wood project.

- Production of food for the family.
- Source of income.
- Practicing the science learnt in class.
- Trees provide shelter.
- Trees are source of wood fuel.

Consideration when starting a tree and crop growing project.

- Site-near your home.
- Soil drainage.
- Nearness to the water source.
- Fertility of the soil.
- Security.
- Accessibility.
- Nearness to the home/school.

Factors considered when choosing crops or trees for planting.

- Those which mature faster
- Those that give high yields.
- Those that are not easily attacked by disease

- Those which are multipurpose.

Preparing wood for different purposes and proper storage.
Uses of wood

- For charcoal.
- For fire wood.
- For medicine.
- For timber.
- To make electricity and telephone poles.
- For increase/produces a pleasant smell when burnt.

Wood for firewood.

- It is split, dried and then kept in a shed.
- Trees store much water inside their cells.
- When is split water evaporates from it.
  Wood for electricity and telephone poles.
- Poles are treated with chemicals known as wood preservatives.
  A strong salt can act as a **wood preservative.**
- The bark is first removed then soaked.
  Wood for timber
- Trees are cut into different pieces.
- The pieces are put under shade to dry at slow pace.
  Seasoning.
  It is the putting of pieces of timber under shed to dry at slow pace.
  If timber is dried under direct sunshine it gets twisted/out of shape.
  The twisting of the pieces of timber is referred to as **warping.**
  Reasons for seasoning timber.
- To prevent it from splitting.
- To prevent it from warping/bending.

Record keeping

It the gathering and storage of information about farm activities.

Farm records:

These are written information showing different out puts and inputs on a farm.

Types of records kept on a farm.

i. Inventory records e.g. farm tools, farm machinery,

ii. Production records

iii. Health records

iv. Breeding records

v. Feeding records

vi. Income and expenditure records.

Importance of keeping farm records.

i. To know the income and expenditure and avoid losses.

ii. To know whether they are making profits or losses.

iii. Identify areas of development and investment.

iv. To budget for the farm.

Young farmers, club.

It is a club in a school in which members learn practical skills about keeping animals and growing crops.

Promotion of Young farmers club.

- Some schools have gardens where they practice farming.
- They organize trips to agriculture research stations.

QUESTIONS.

1. What is agro forestry?
2. Suggest any one importance of keeping animals and growing crops on the same piece of land at the same time?
3. Suggest one method of properly harvesting trees.
4. Why is it important to treat wood for electric poles before planting them?
5. How are young farmers clubs important in schools?
6. Why is it important to keep records on farms?
7. Give any one reason why it is important to keep trees.
8. Write down any one disease that affects bananas.
9. How important are the following farm practices important on a farm.
   a) Thinning b) staking c) pruning
10. How are vermins different from vectors?

11. Why is it important for farmers to plant their crops in nursery beds?
12. State any three crops that can planted in a nursery bed.
13. State one thing done to seedlings in a nursery bed that are about to be transplanted.
14. Why watering seedlings important when they are in a nursery bed
15. Mention any one characteristic of exotic trees.

Topic 8: POPULATION AND HEALTH

VOCABULARY

- **Health concerns**
- **Community**
- **Health surveys**
- **Demography**
- **Health data**
- **Population.**

Community Health and social problems

Community

It is a group of people living or working together having common needs, interests and problems.

Health

Health is a state of being physically, socially, economically and mentally well but not necessarily without sickness.

Community Health

- It refers to the essential health conditions in which individuals and families within a community live.

Examples of communities

1. A school
2. A town
3. A village

Examples of common health and social problems in communities;

1. Smoking
2. Alcohol and drug abuse
3. Poor sanitation standards
4. Malnutrition
5. Disease outbreak

6. Anti Social behavior

Types of common sickness in a home.

1. Immunisable diseases
2. Deficiency diseases
3. Communicable diseases
4. Self inflicted diseases
5. Sexually Transmitted diseases
6. Hereditary (genetic) diseases

IMMUNISABLE DISEASES

These are diseases which can be prevented through immunization.

Immunisable diseases are in two categories;

1. Childhood immunisable diseases e.g. polio, measles, tuberculosis, tetanus, whooping cough (pertussis), diphtheria, hepatitis B, Haemophilus Influenza b.
2. Non childhood immunisable diseases e.g. typhoid, meningitis, cholera, yellow fever, small pox, german measles (rubella) e.t.c.

DEFICIENCY DISEASES

These are diseases that are caused by lack of some food values in our daily diet.

Examples of deficiency diseases

Deficiency disease	Due to lack of
Night blindness	Vitamin A
Beriberi	Vitamin B_1
Pellagra	Vitamin B_2
Scurvy	Vitamin C
Rickets	Vitamin D
Infertility	Vitamin E
Poor blood clotting (haemorrhage)	Vitamin K
Goitre	Iodine
Marasmus	Carbohydrates
Kwashiorkor	Proteins
Anemia	Iron

COMMUNICABLE DISEASES

These are diseases which can be spread from one infected person to a healthy person.
They are caused by **germs**

Examples of communicable diseases

Bacteria	Virus	Protozoa	Worm infections	Fungal

Gonorrhoea	HIV/AIDS	Malaria	Round worms	Athletes foot
Syphilis	Measles	Sleeping sickness	Tape worms	Ring worm
Trachoma	Polio	Amoebic dysentery	Flat worms	
Diphtheria	Influenza		Thread worms	
Bacillary dysentery	Common cold		Hook worms	

SELF INFLICTED DISEASES

These are diseases which people get due to poor health life styles. E.g. Smoking, alcoholism, over eating, lack of exercises, prostitution etc.

Examples of self inflicted diseases;

1. Lung cancer
2. Sexually Transmitted Infections.
3. Emphysema
4. Obesity

SEXUALLY TRANSMITTED DISEASES (VENEREAL DISEASES)

These are spread through having unprotected sexual intercourse with infected persons.

Examples

1. HIV/AIDS
2. Gonorrhoea
3. Syphilis
4. Genital warts
5. Candida

HEREDITARY (GENETIC) DISEASES

These are diseases that are passed on from parents to off springs through genes.

Examples include;

1. Sickle cell anemia
2. Diabetes
3. High blood pressure

Causes of sicknesses in the home and community

1. Poor disposal of human and industrial wastes.
2. Alcohol and drug abuse.
3. Poor nutrition
4. Some diseases are inherited from parents eg sickle cell.

Controlling common sicknesses in a home and community.

1. Proper sanitation.
2. Family planning
3. Good nutrition.
4. Brushing the teeth after every meal
5. Doing daily physical exercises.

How to avoid health and social problems.

1. Proper sanitation
2. Proper waste disposal
3. Keep our homes and water sources clean.
4. Proper feeding.
5. Avoid drug abuse
6. Abstain from sex if not married

Methods of preventing diseases in the community.

- Immunization
- Through proper nutrition
- Personal hygiene
- Boiling water for drinking.
- Good food hygiene.
- Proper rubbish disposal.

How young people can avoid social and health problem

1. Avoiding bad peer groups.
2. Form clubs such as young farmers club, drama and music.
3. Join church choirs
4. Participating in sports activities such as football, netball, swimming and athletics.

5. Attending youth seminars and conferences on morals, drug abuse, HIV/AIDS
6. Using their leisure time to learn practical skills e.g. weaving, tailoring, computer use.

Life skills of avoiding social and health problems

1. Critical thinking
2. Decision making
3. Problem solving
4. Self awareness
5. Effective communication
6. Creative thinking

ANTISOCIAL BEHAVIOURS.

These are unacceptable behaviours in the society.

Delinquency is a bad act performed by a juvenile and is punishable by law.

Juvenile delinquency is a bad act performed by a juvenile and is punishable by law.

A Juvenile is person below 18 years

A delinquent is a young person who commits an act punishable by law.

EXAMPLES OF ANTISOCIAL BEHAVIOURS.

- Lying, Truancy, Stealing, Arson (fire setting), Sex offences, Wandering, Telling lies.
- Fighting, Teasing in school/bullying, Murder, Drug abuse. E.g. smoking.
- Child prostitution, Raping, Aggression/violence

CAUSES OF ANTISOCIAL BEHAVIOURS.

- Disturbed homes.
- Bad peer influence
- Poor social environment.
- Poor home atmosphere like fighting by parents.
- Over strictness by both parents and teachers.
- Unfulfilled expectations.
- Pampering children.

- Failure to enforce rules in the community.
- Poor family back ground.
- Poor social environment.

Effects of antisocial behaviours.

- Many delinquent children may become adult criminals.
- Individuals suffer from pain, injury and death.
- Sex offences may result into sexually Transmitted Diseases.
- Fire setting leads to destruction people's property.
- Drug abuse may be a bad example to the children.
- Leads to School dropout.
- Causes Shame to parents.
- May lead to Death.
- The family may disown the child.
- Weaken the custom, religion and organization.

How to prevent and control antisocial behaviours.

- All parents should create stable families.
- Parents should take children through counseling and guidance lessons.
- Children should join youth clubs and societies.
- Children should avoid bad peer groups.
- Children should be exposed to sex education.
- Punish wrong doers and praise good behavior.
- Equal treatment should be given to all children.
- Elders should be exemplary.
- Children should engage in gainful activities during free time
- Avoid setting too high standards of behavior.
- Children should join youth and sports clubs and societies.

VIOLENCE

This is a state in which a person is aggressive and has destruction behaviour.

Types of violence

- ✓ Sadism: an extreme motive to harm others.
- ✓ Masochism: an extreme motive to harm oneself

SEXUAL DEVIATIONS

-It is an abnormal sexual practice.

Give the forms of Sexual deviations:

- ➢ Bestiality
- ➢ Homosexuality,
- ➢ Masturbation,
- ➢ Oral sex
- ➢ Lesbianism,
- ➢ Incest
- ➢ Fellatio

Reasons why people practice sexual deviations.

- For personal satisfaction
- As an effect of drugs.
- As an effect of pornography consumption
- Bad peer influence.
- As a result of broken homes

Ways of avoiding sexual deviations.

- Avoid bad peer groups
- Avoiding drug abuse
- Through guidance and counseling.
- Avoid watching pornography.
- Avoid incentives from strangers.

- Join gainful clubs during leisure.

Population and health concerns.

What is population?
This is the number of people living in an area or country

Health concerns.

These are health problems that affect the us and need immediate solutions.

Population and health concerns.

- Poor sanitation.
- Anti social behavior.
- Poor water supply.
- Inadequate food.

Poor sanitation.
It is the improper disposal of human waste and other waste products into the environment.
Indicators of poor sanitation.

- Poor ventilation of houses.
- Bushes around homes.
- Poor disposal of faeces and urine.
- Sharing houses with animals.

The following should be observed when constructing a dwelling house.

- It must be constructed downhill.
- Ten metres from the latrine and **30**m from the water source.
- Below the water level.
- In a home there should be a **rubbish pit** to hold refuse.
  Activities or solutions to poor sanitation.

1. Construct rubbish pits in a home
2. Construct pit latrines
3. Sweeping the compound
4. Picking rubbish around homes.
5. Cut grass around our homes short

6. Build well ventilated houses
7. Avoid sharing houses with domestic animals.

Poor water supply
It is when the community receives little or dirty water for use.

Water associated diseases;

Categories of water associated diseases.
i. Water borne diseases
These are diseases spread through drinking contaminated water.
Examples include:

- Cholera
- Typhoid
- Bilharzia
- Polio
- Dysentery.
- Hepatitis.
- Diarrhoea.
  ii. Water contact diseases
  These are diseases which spread when our bodies get into contact with contaminated water.
  Examples of water contact diseases
- Bilharzia
- Swimmer's itch
- Ear, eye and nose infections
  Water cleaned diseases
  These are diseases we get when we don't have enough water to use.
  Examples of water cleaned diseases include;
- Scabies.
- Impetigo.
- Trachoma
- Conjuctivitis
- Eczema.
  Water habitat vector diseases

These are diseases which spread by vectors which spend part of their life cycle in water.

Examples of water habitat vector diseases include;

- Malaria.
- Bilharzia.
- River blindness.
- Dengue fever.
- Yellow fever.
  Ways of making dirty water safe for drinking
  -Boiling.
  -Use chemicals like chlorine, calcium chloride, potassium permanganate.
  Processes at national water sewerage co-operation. (NWSC)
- Sedimentation, Filtration, Coagulation, Chlorination.

Activities to address poor water supply.

1. Construct wells.
2. Cut bushes around wells
3. Fencing the water sources
4. Treating water

Inadequate food
This is the situation in which a family or community members lack enough food

Causes of inadequate food

- High population increase.
- Laziness and inability to grow crops.
- Poverty.
- Ignorance of good farming methods.
- Drought.
- Wars.
- Floods.
- Poor attitude towards farming
- Pests and diseases.

Food security

It is having enough food for future use.

Effects of malnutrition in people

- Chronic fatigue.
- Low concentration at work.
- Poor spirit of doing things.
- Loss of interest at work

Activities to address inadequate food supply.

- Seek advice on good methods of farming from agricultural officers.
- Construct valley dam to trap water for irrigation during drought.
- Avoid draining wetlands to avoid floods.
- Introducing agriculture schools.
- Digging should not be given as punishment in schools.
- Grow crops which are resistant to diseases.

Activities to address health concerns.

- **Care for a home**

A home is a place where people stay and live.

How to care for a home

- Slash tall grass around homes
- Drain stagnant water around our homes.
- Construct a pit latrine
- Have a rubbish pit

Healthy life styles;

These are

Examples of healthy life styles include;

- Doing physical exercises.
- Resting after meals
- Bathing daily.
- Eating a balanced diet.
- Going for medical checkups.

Importance of resting after meals

- Digestion of food is carried out smoothly.
- The brain rest and gets refreshed.
- The body is able to repair worn out cells.

Reasons for doing daily physical exercises

- For body flexibility.
- Strengthen body muscles.
- For proper functioning of the body organs and systems
- Reduce excess fats in the body.

Health education.

It is the making of the community get aware of the matters concerning diseases and how to prevent them.

Ways of educating people

- Through Songs, plays, storytelling.
- Through Radios, newspapers, talks
- School pupils pass information to their parents, brothers, sisters and relatives.

Having a family budget.

A family budget.

It is an advance plan of how the expected family income is to be spent.

Advantages of family budgeting

i. It helps to cater for all family needs.
ii. It helps to avoid over spending.
iii. It avoids debts.

Collecting information/data on human population.

Demography

This is the study of the changing numbers of births, deaths and diseases in a community. Information can be collected from hospitals and by going to homes.

Importance of demography

- To plan for the community services e.g. health centres, markets and water.
- The government is able to know the general health of people.

Housing information

This is the finding out of the number of people who sleep in permanent or temporary houses to estimate the poverty line of the people.

Available health services

The government needs information on these services to be able to deliver medical services quickly and monitor the health of its population

Information available on health services include

- Immunization.
- Family planning.
- Treatment of infections.
- Provision of water.
- Control of epidemic diseases.

Immunization

The introduction of vaccines into the body to produce anti bodies against certain diseases.

Collecting information on immunization

Information includes.

- Number of immunization centers.
- People involved in carrying out immunization.
- Days and time on which immunization is done.

Importance of immunization

- To protect children against the childhood immunisable diseases.
- To boost the immunity.
- Reduce the rate at which children die / reduces infant mortality rate.

A child health card.

It is a document given by the government to every child with information about his/her immunisation.

Importance of a child health card.

- To know the date of the next dose.
- To monitor the growth (looking at the growth curve)
- It shows the child's name, sex, date of birth, birth order, mother's name, mother's occupation, father's name and where the family lives.

Collecting information on available health services.

Advantage of collecting information on available health services.

-It helps in quick delivery of medical services.
-Control of epidemic diseases.
-It helps the government to monitor the health of people.

Health surveys

A health survey is a strategy of finding out health problems and solve them.
The information obtained from a healthy survey is called health data
The health survey is carried out by village health committee and government officials.

Nature of questions asked.

i. What are the common sicknesses in the community?
ii. What kind of treatment is given for each sickness?
iii. What are the Causes of the sickness

A health club

It is an association of members in a school or community who voluntarily wish to promote community health.

Activities of health clubs include;

- Promotion of personal hygiene in a community/school.
- Educating members of the community about sanitation.
- Encourage the community to participate in community basic health programmes.
- Caring for those in poor health.
- Getting health information from technical personnel and distributing to the community.

TOPICAL QUESTIONS

1. State any one type of common sickness in a community.
2. What is a health parade?
3. State one cause of common illiness in our communities.
4. Why is it important to collect information about immunization in our community?
5. State any one activity done during a health survey.
6. How are health clubs useful in our community?
7. Cite any one importance of health surveys in our community.
8. Why is it importance of health education to children ion schools?
9. Write down any two examples of water borne diseases.
10. What are anti social behaviours?
11. Give any two examples of antisocial behviours.
12. How can antisocial behaviours be controlled in our community.

13. Write any two indicators of poor sanitation in a home.
14. Briefly explain the term health.
15. State any two ways we can contribute towards the reduction of proper functioning of our health.

END OF P.7 WORK

WISHING YOU SUCCESS IN YOUR FORTH COMING PLE EXAMINATION

By Mr. Oturen John