P.7 SCIENCE NOTES

MUSCULO – SKELETAL SYSTEM

The skeleton

1. A skeleton is a framework of bones.
2. **Types of skeletons.**
   a) Exo-skeleton
   b) Endo-skeleton
   c) Hydrostatic skeleton.

Exo-skeleton.

1. In the exo-skeleton, the hard tissues that make up the skeleton are found outside the flesh.
2. It is mostly found in insects.
3. **Examples of animals with exo-skeleton**
   a) Cockroaches
   b) Grasshoppers.
   c) Crickets
   d) House flies

Hydrostatic skeleton

1. Is the type of skeleton where the body is filled with liquid under pressure.

Animals with this skeleton have a thin membrane in which the liquid flows.

Examples of animals with hydrostatic skeleton.

a) Worms
b) Slugs
c) Snails
d) Maggots
e) Caterpillar

Endo- skeleton.

1. In the endo-skeleton, the hard tissues that make up the skeleton are found inside the flesh.

2. **Examples of animals with endo- skeleton**.

a) Man

b) Frog

Lion

Donkey

Tiger

Leopard

Sheep, etc.

Functions of the skeleton

1. The skeleton gives shape to the body of animals.
2. The skeleton supports the soft parts of our body.
3. It provides surface for the attachment of muscles.
4. The skeleton makes blood cells.
5. The skeleton allows movement at joints.
6. The skeleton protects delicate organs

Part	Protected by
Brain	Skull
Spinal cord	Vertebral column
Heart and Lungs	Rib cage

Note: The part of the skull that protects the brain is the **cranium**.

Parts of a skeleton

1. A human skeleton consists of four main parts:

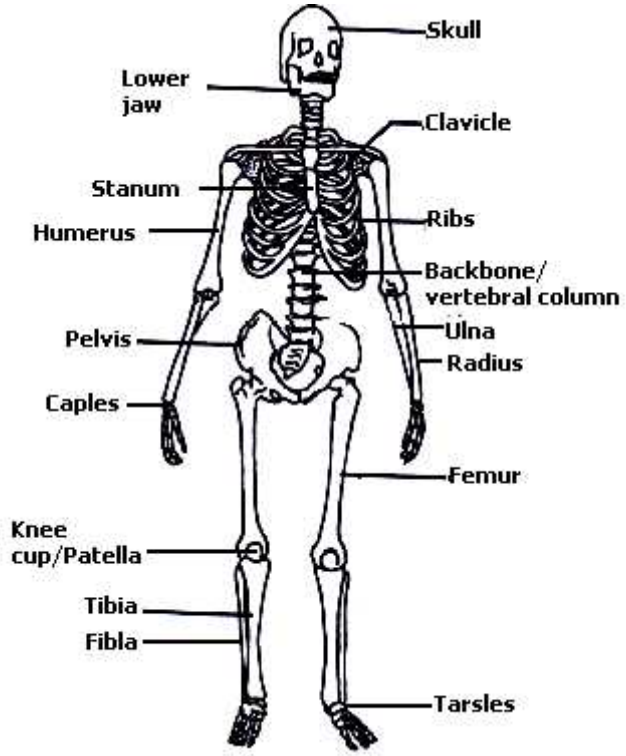
a) vertebral column (backbone)

b) The skull

The limbs (arms and legs)

The limb girdles (pelvis and shoulder)

2. **Structure of the human skeleton**



3. **Types of bones**

a) Long bones

b) Short bones

c) Flat bones

d) Irregular bones

Long bones

1. These are found in the arms and legs (limbs).
2. **Examples of long bones**

a) femur

b) radius

c) ulna

e) fibula

f) tibia.

3. The femur is the longest bone in the body.

Short bones

Are bones of the ***ankles*** and the ***wrist***

Flat bones

These are the ***scapula*** and bones of the ***skull***.

Irregular bones

These are found in the ***vertebral column***.

Joints

1. A joint is a place where two or more bones meet.

2. **Types moveable joints (synovial joints)**
   a) Hinge joint
   b) Ball and Socket joints
   c) Pivot joint
   d) Gliding joint.

Hinge joint

1. This is a joint that allows movement in one plane (direction).
2. Examples of where hinge joints are found
   a) elbow
   b) knee
3. **Diagrams showing hinge joints**.

4. **Funtions of parts of a joint**

   a) **Synovial fluid-**.reduces friction between bones at a joint.

Note: Synovial fluid is compared to oil or grease in machines because both are used to reduce friction.

b) **Synovial membrane**- holds the synovial fluid.

c) **Cartilage**- acts as a shock absorber.

- also help in reducing friction due to its slippery nature.

d) **Ligament-** holds bones together at a joint.

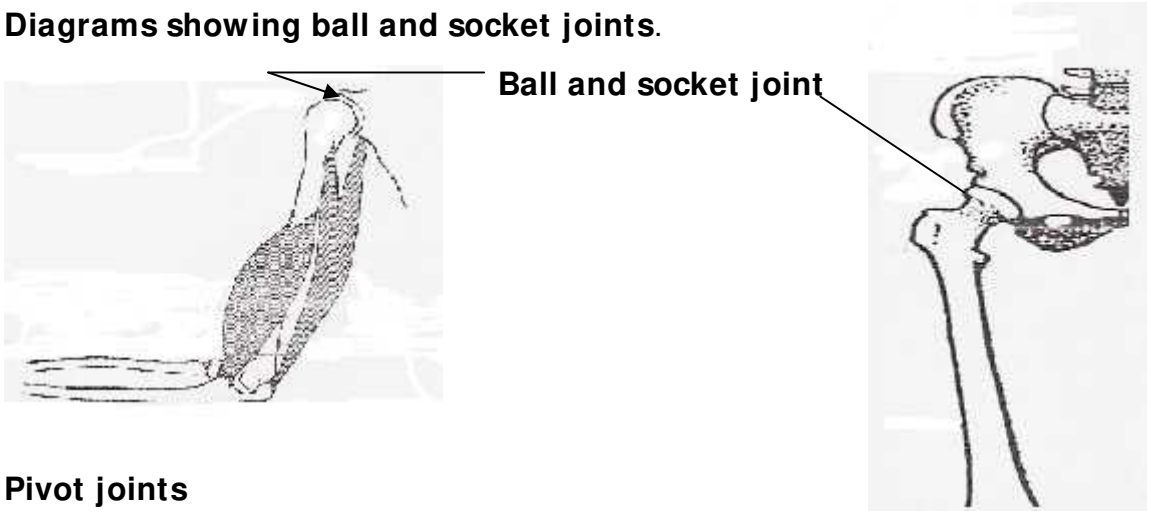
e) **Tendon**- joins muscles to bones.

Ball and socket joint

1. This is the joint that allows movement in all directions i.e. forward, backward, side ways and in circular movement.
2. Examples of where ball and socket Joints are found.
   a) shoulder
   hip

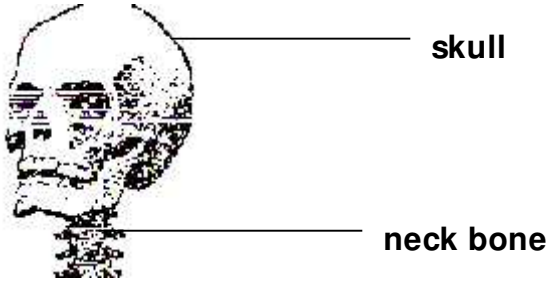
Note: They are called so because the ball shaped end of one bone fits into the socket of the other bone.

Diagrams showing ball and socket joints.



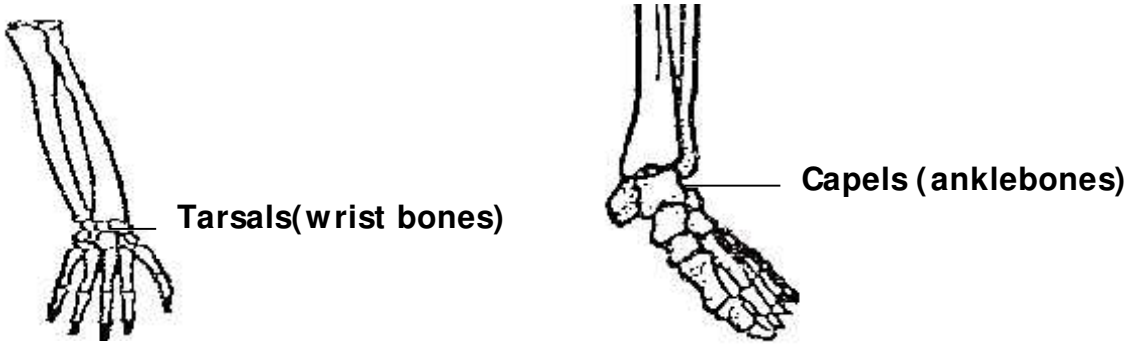
Pivot joints

1. They allow our heads to nod or shake.
2. In the human body pivot joints are found in the neck.



Gliding joints

1. In gliding joints, there are flat bones, which slide over each other.
2. Examples are the tarsals and carpels.



Immovable joints

1. These are joints that do not allow movement.
2. Immovable joints are found in the bones of the skull and these joints are called Sutures.

Note: Joints of the skull are saw- like to keep them rigid.

Immovable joints in the skull (suture joints)

Muscles

1. Muscles are elastic fibre found in the body of animals.
2. Muscles are connected to the bones by tough tissues called Tendons.
3. **Types of muscles**
   a) Voluntary muscles
   b) Involuntary muscles
   c) Cardiac muscles.

Voluntary muscles.

1. These are muscles whose movement can be controlled by will i.e. you can decide to use the voluntary muscles or not to use them.
2. **Examples of voluntary muscles**
   a) Biceps
   b) Triceps
3. The biceps will always contract and the triceps relax when the hand is bent at the elbow.
4. They are sometimes referred to as antagonistic muscles because when one contracts the other relaxes.

Biceps and triceps muscles of the arm.

Involuntary muscles

1. These are muscles whose movement is automatic i.e. not controlled by will.
2. **Examples of involuntary muscles**
   a) Muscles of the reproductive system.
   b) Muscles of the walls of the alimentary canal.
   c) Muscles of the blood vessels.
   d) Muscles of the eyelid .The muscles of the eyelid help in the blinking of the eye.
   e) Muscles of the lungs.

Cardiac muscles.

1. These are muscles whose movements originate from the muscle itself.
2. The brain has no control over these muscles.
3. Examples of cardiac muscles are the muscles of the heart.

Note: These have the Capacity to contract and relax rhythmically throughout ones' life without getting tired.

Functions of muscles

1. Move skeletal bones.
2. Help us in lifting loads
3. Give extra support to joints

Diseases of the musculo- skeletal system.

a) Rickets

b) Polio

c) Leprosy.

Rickets

1. Brought about by lack of vitamin D in the diet.
2. A person with rickets will have bowlegs.

This boy is suffering from rickets.

Polio (Poliomyelitis)

1. Polio is caused by a virus.
2. Polio is spread through drinking contaminated water with the polio germs.
3. Polio weakens or paralyses the muscles resulting into lameness.

Prevention of polio.

a) Through immunization with polio vaccine.

b) Through boiling drinking water.

c) Putting all faeces in a latrine.

This child is suffering from polio.

Leprosy

1. Leprosy is caused by bacteria.
2. It is spread through direct contact with an infected person.
3. If not treated, it causes shortening of fingers and toes. It mainly affects the skin.
4. It also affects the skin causing loss of feeling.

Leprosy can be treated.

Disorders of the muscles and skeleton

a) Knock-knees

b) Club feet

c) Bow legs

How to keep muscles and bones healthy.

1. By eating a balanced diet.
2. Ensuring correct sitting, standing, and walking posture to prevent our bones from growing abnormal shapes.

3. Having regular physical exercises to keep fit.

Posture

1. Posture is the way a person positions his body when sitting, standing or walking.
2. Muscles and bones grow well when we use them in the right way.
3. If we do not sit, stand or walk properly:
   a) Our bones in the body grow bent.
   b) We can have back pain and chest pain.

Importance of correct posture

1. Good posture is important because it helps the skeleton to develop properly.
2. Good posture allows body organs to function properly.

THEME : MATTER AND ENERGY

TOPIC : ELECTRICITY AND MAGNETISM

ELECTRICITY

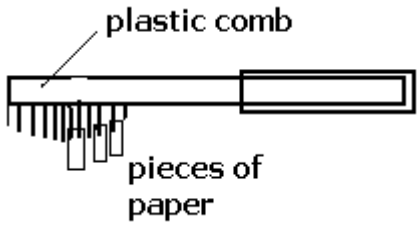
1. Electricity is a form of energy produced by a flow of **electrons**.
2. Electrons are negatively charged particles orbiting around an **atom**.
1. An atom is the smallest indivisible particles of matter.
2. When electrons flow, they produce **electric current**.
3. An electric current is a **flow of electrons**.
4. Electric current is measured in units called **Amperes** using an instrument called ammeter.

Forms of electricity

There are two forms of electricity:
a) Static Electricity
b) Current Electricity

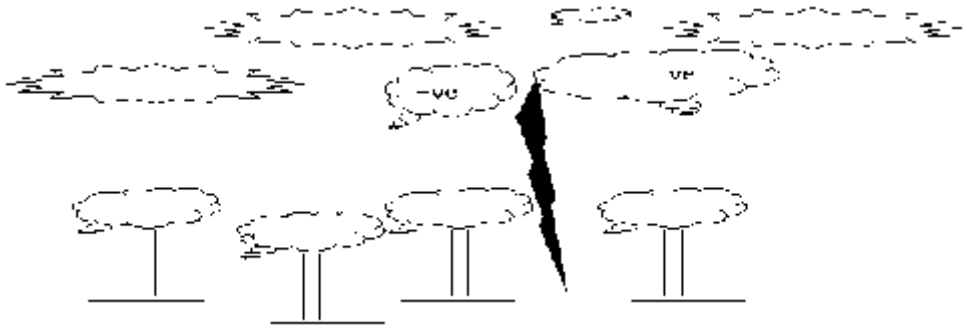
STATIC ELECTRICITY:

1. In some materials called insulators, electrons don't move. They only move when there is friction.
2. Electrons in insulators move from one atom and get attached to another.
3. Static electricity is the form of electricity in which electrons don't flow.
4. It is usually produced when insulators are rubbed together.
5. Static electricity has two charges. These are **negative** and **positive** charges.
6. The positive charges are the protons and the negative charges are the electrons.
7. In static electricity there is **no continuous flow of electrons.**
8. Static electricity takes place **as a result of friction** in insulators.



LI HGTNI NG AND THUNDER

1. In nature static electricity takes place in the clouds as they move rubbing against a layer of air.
2. When a negatively charged cloud meets a positively charged cloud they form a huge spark called **Lightning.**



3. The huge spark causes the air around to expand and contract immediately resulting into a loud sound called **thunder.**
4. Thunder and lighting are formed at the same time but we see lightning first because **light travels faster than sound.**
5. Other examples of static electricity happens after ironing a nylon cloth. When brought near the body hair it stands or sticks out.

DANGERS OF LI GHTNI NG:

1. Therefore lightning can destroy plants and animals life.
2. Lightning can cause huge fires on houses; especially the high raised buildings. This causes destruction of property.

PROTECTI ON AGAI NST LI GHTNI NG:

1. Place Lightning conductors on tall buildings.
   These are copper and aluminum pieces of metals which are placed on the building and are made to connect to a metal plate placed underground.
   spikes or pointed ends of the metal are placed above the building to **attract the charges.**
   Copper or aluminium are used because they are good conductors of electricity. So they conduct the charges to the ground easily where they are neutralised.

2. Avoid standing in an open space when IT IS drizzling, as you may be the tallest material to attract the charges. This may result into being struck by lightning.

3. Avoid seeking shelter from rain under a tree because you may be struck by the charges as they are passing through the tree.

CURRENT ELECTRI CI TY:

1. This is the type of electricity whose electrons flow through conductors.
2. Conductors are materials that allow electricity to pass through them.

3. The flow or movement of electrons through a conductor is what is known as an **electric current.**

Types of Current electricity:

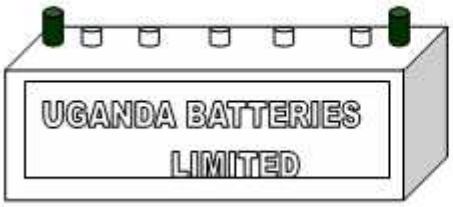
(i) Direct Current (D.C)
(ii) Alternating Current (A.C)

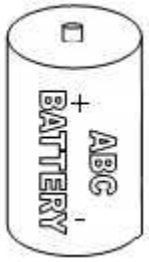
Direct Current:

1. This is the type of current electricity where electrons flow in one direction. They flow from the **negative** terminal of the source through the conductor, appliance and then to the **Positive** terminal.
2. **Current** on the other hand flows from the **Positive terminal** to the **negative terminal**.
3. It cannot be stepped up or down.
4. It cannot be stored.

Sources of direct current electricity.

Dry cells
b) Wet cell.
Batteries





ALTERNATING CURRENT ELECTRICITY:

1. This is the type of electricity where current flows in both directions. (from the source to the appliance and then back to the source).
2. Current electricity is produced by Devices like: - **Generators and dynamos**
3. It can be stored.
4. It can be stepped down up or down.

SOURCES OF ALTERNATING CURRECNT ELECTRICITY:

1. The source of this type of electricity depends on the source of power which helps to turn the generators.
2. Electricity from each source is given a name as below

	Source of energy	Type of electricity
i	Running water	Hydro Electricity
ii	Fuels	Thermal Electricity
iii	Geothermal heat	Geo thermal Electricity
iv	Wind	Mechanical Electricity
v	Nuclear power	Atomic Electricity
vi	Machines (Dynamos)	Mechanical Electricity
vii	Chemicals	Chemo Electricity

ELECTRICITY FROM RUNNING WATER:

1. This is electricity produced by using fast running water to turn **Turbines**.
2. The turbines are connected to generators which produce electricity.
3. The source of electricity in a power station is a **generator**.
3. Electricity produced by energy from running water is called **Hydro Electricity**.
4. Hydro electricity can be obtained by damming running water on rivers or tides on oceans.

Note: The energy change that occurs in a power station is **Kinetic energy** from fast running water plus **mechanical energy** from turbines and generators change to **electric energy**.

DIAGRAM OF A DAM

THERMAL ELECTRICITY:

1. this is electricity produced by burning Fuels like **petrol**, **Diesel** are used to run or turn generators. These produce electricity.
2. **Chemical energy** in fuel plus **mechanical energy** from generators change to **electric energy**.
3. Thermal electricity is more expensive to produce.

SOLAR ELECTRICITY:

1. This is electricity produces by using energy from the **sun**.
2. The **Solar cells** (panels) are used to trap the energy from the sun to produce electricity.
3. This electricity is stored in batteries.
4. Solar electricity is usually in form of Direct Current (D.C).

ELECTRICITY FROM GEOTHERMAL HEAT:

1. It is produced by using heat energy from underground.
2. This type of electricity is mainly produced in areas where there are volcanic actions (Rift valleys).
3. In this type of electricity pipes are sunk down where there is heat from under ground. Water is pumped there.
4. It is heated by the underground heat and pushed back as steam under high pressure.
5. The steam helps to turn turbines. The turbines turn generators that produce electricity.

6. This type of electricity is called **Geothermal Electricity.**

ELECTRICITY FROM WIND:

1. In plains or flat areas there is constant blowing of wind with less disturbance. Wind mills can be constructed in such areas.
2. The wind turns the flaps of the windmills which in turn rotate the generator to produce electricity.
3. Electricity from using wind is termed as **Mechanical Electricity.**

ELECTRICITY FROM NUCLEAR POWER:

1. Some minerals like uranium have the ability to break up and produce energy.
2. This energy can be used to produce electricity.
3. The splitting atoms produce a lot of heat used to boil water to produce steam that turns turbines.
4. Electricity got from energy got from breaking up nuclear of some metals is called **Nuclear Electricity.**

MECHANICAL ELECTRICITY:

1. This is obtained by using machines to turn dynamos to produce electricity.
2. Bicycles and motorcars have dynamos that produce electricity that they use. Some of this electricity is stored in Batteries.

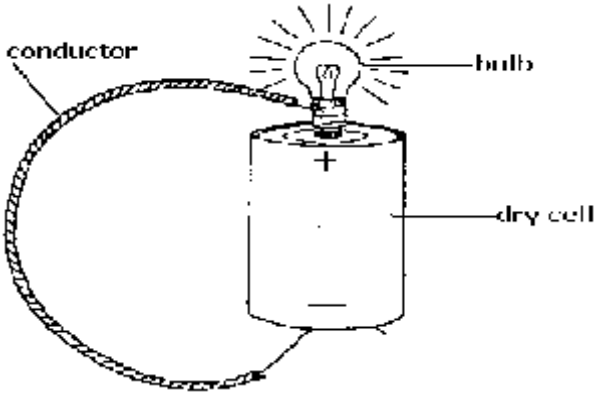
CHEMO ELECTRICITY

This is electricity obtained from chemicals. These chemicals can be found in dry cells and batteries.

SOURCES OF ELECTRICITY

a) Dry cells.
b) Wet cells
c) Solar batteries.
d) Generators
e) Batteries.

SIMPLE ELECTRIC CIRCUIT

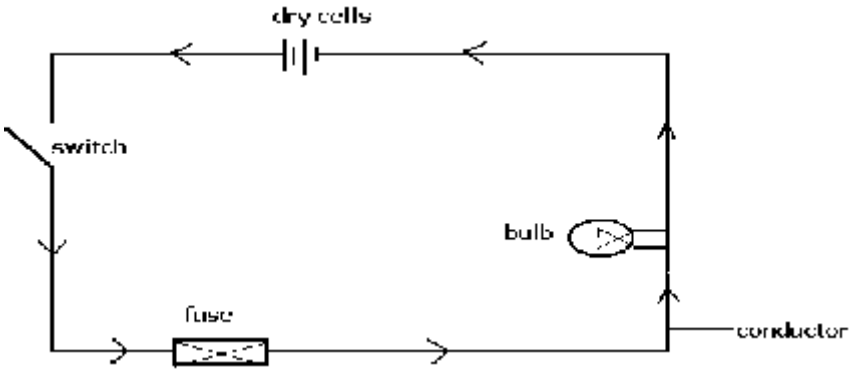


AN ELECTRIC CIRCUIT:

An electric circuit is complete path taken by the flow of current. A simple electric circuit is made up of:-

(i) The source of electricity (Dry cells); to produce electricity.
(ii) The conductor; to transmit current.
(iii) An appliance (bulb); to show whether the circuit is complete.

(iv) A switch; to break or complete the circuit.

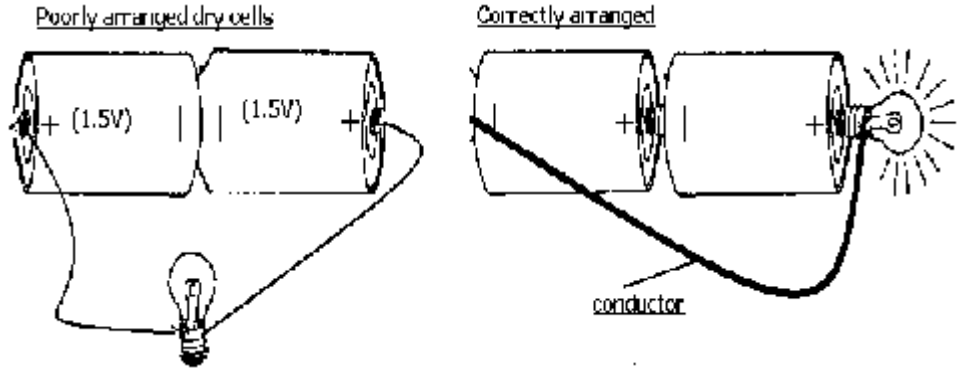


Symbols of parts of an electric circuit

SYMBOL	PART
	Switch
	Bulb
or	Fuse
	Dry cells

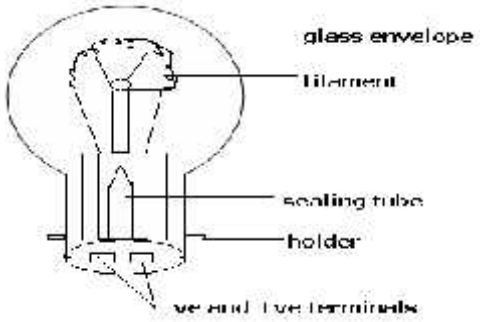
THE DRY CELLS

a) The dry cells supply electricity in a simple circuit.
b) Chemical energy stored in the cells is changed to electric energy.
c) A dry cell is manufactured with **1.5 volts** of electricity.
d) If the dry cells are arranged wrongly, the cancel each other and the bulb will not give light.



THE ELECTRI C APPLI ANCE (BULB)

1. In a simple circuit, the bulb is the electric appliance.
2. The work of an electric appliance is to change electric energy to required form of energy.
3. In this case, the bulb changes electric energy to **heat** and **light** energy.



Functions of some parts of a bulb.

Glass envelope

It holds nitrogen and inert gases.

Examples of inert gases used in the bulb

a) Neon
b) Helium
c) krypton and
d) Argon gases.

Note: These inert gases are used to prevent the filament from burning.

The filament

a) The filament is a thin coiled wire enclosed in a glass envelope.
b) It is coiled to increase resistance against electricity.
c) **Tungsten or wolfram** is the most commonly used conductor when making fillaments of electric bulbs.
d) **Tungsten or wolfram** is used because ;
   i) it has a high melting point(does not melt easily).
   ii) It has a very high resistance on electricity.
e) The energy change that occurs in the filament is; electric energy is changed to heat and light energy.

Examples of electric appliances

a) Radios.
b) Bulbs
c) Televisions.
d) Fridges.
e) Flat irons
f) Funs.
g) Cookers.

Energy changes in some electric appliances.

a) A bulb changes electric energy to heat and light energy.
b) A cooker changes electric to heat energy.
c) A radio changes electric energy to sound energy.
d) A television changes electric energy to light and sound energy.

Why a bulb may not give light in a circuit.

a) The dry cell/battery may be used up.
b) The dry cells may be poorly arranged.
c) The bulb may have blown.
d) The conductor may be broken.
e) The circuit may be incomplete.

CONDUCTORS OF ELECTRICITY.

a) Things that allow electricity to pass through them are called **conductors**.
b) Conductors commonly used in transmitting electric current are wires made from copper and aluminium.
c) All metals are conductors of electricity.
   i) Copper
   ii) Iron
   iii) Aluminium
   iv) Silver
   vi) Tin
   vii) Gold.
d) Of the metals silver is the best conductor of electricity. It is not commonly used to make wires because it is very expensive.
e) **Carbon** is the only solid non-metal that conducts electricity.
f) Some liquids conduct electricity. Liquids that conduct electricity are known as **electrolytes**.

Examples of electrolytes.

a) Urine.
b) Un distilled water.
c) Salt water solution.
d) Acid.

INSULATORS OF ELECTRICITY.

a) These are substances/materials that do not allow electricity to pass through them.
b) Insulators are also called **non conductors.**

Examples of in Insulators.

a) Wood
b) Plastic
c) Dry cloth
d) Air
e) Pure water
f) Paper
g) Rubber and
h) glass

Uses of Insulators:

a) Insulators are used to cover conductors so that electricity is transmitted safely.(insulation of conductors)
b) The most common insulators used are **Rubber and Plastic.**
c) Used to make protective gears like gloves that are used by people who handle electric materials.

THE SWITCH

a) A switch is a gap in a circuit which can be opened or closed.
b) A switch is used to **complete** or **break** a circuit.

THE FUSE

A fuse is a safety devise in the circuit that melts to break the circuit to protect it from damage.

How a fuse works:

1. A fuse is made up of a thin wire that can melt easily. (has low melting point) (Tin-lead alloy is usually used).
2. When too much current flows through a fuse it melts and breaks. By so doing it disconnects the circuit preventing electricity from flowing to the appliance to damage it.
3. Therefore the fuse works by **melting and breaking the circuit** in case of over loading.
4. The work of the fuse is to protect appliances from damage by over loading or too much current.

Advantages of a fuse.

a) It reduces the risk of electric fires.
b) It protects delicate appliances from damage from electricity.

Why the fuse may blow/ melt.

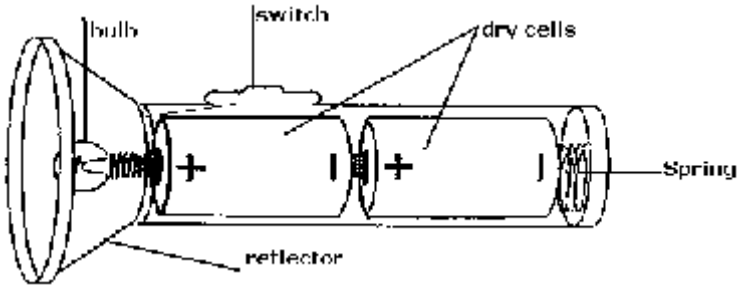
A fuse may blow due to;

a) A short circuit.
b) High voltage.
c) Over loading.

A TOUCH AS A SIMPLE CIRCUIT

An electric torch is an example of a simple circuit.

Diagram of a torch



Functions of each part of a torch.

Switch

It is used to break and complete the circuit.

The bulb.

It produces light when the circuit is complete.

The Dry cells

They supply electricity to the bulb.

The reflector.

The reflector sends the light forward and also helps to diverge (spread) the light.

The spring

The spring is to press the cells together so that they complete the circuit.

ELECTI CAL RESI STANCE.

1. Electrical resistance is opposition towards the flow of current in the conductor.
2. Electrical resistance produces heat.
3. Long and thin wires/conductors produce more resistance than thick wires.
4. Electrical appliances that produce heat are:
   a) Cookers.
   b) Coils
   c) Elements of flat irons.
   d) Elements of fridges.
   e) Filaments of bulbs.
   f) Water heaters.
5. These elements are coiled to increase electrical resistance so that they produce more heat..

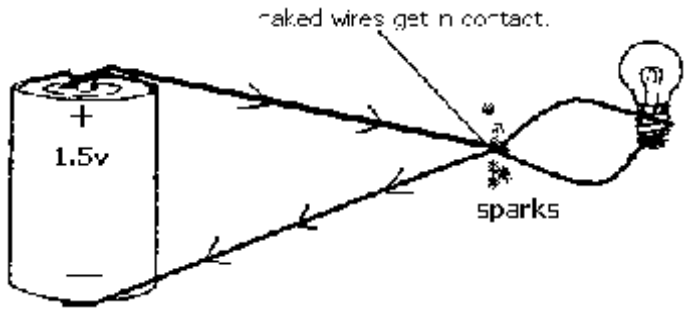
	Filaments of bulbs are coiled in order to increase resist electrical resistance.
	The hot plate is coiled in order to increase resist electrical resistance.
	The water heater is coiled in order to increase resist electrical resistance.
	The elements of flat irons are coiled in order to increase resist electrical resistance.

Electrical pressure.

1. This is the force which push current through conductors.
2. Another name for electrical pressure is voltage (volts)
2. In a simple circuit, the dry cells provide the electrical pressure.
3. Electrical pressure is recoded in Volts.
4. A dry cell is manufactured with 1.5 volts.

SHORT CI RCUI TS:

1. This is a short route taken by electricity besides the normal one.
2. Short circuits occur when current by passes the appliance that is supposed to use the electric energy.



The arrows indicate a short cut taken by current.

Causes of short circuits:

(i) Aging or very old wires. The insulators get worn out and the wires connect causing short circuit.
(ii) Wearing out of insulators due to rubbing and friction of moving parts of the appliance.
(iii) Over loading of current. This causes heat in wires which melts the insulators.
(iv) Insulators being eaten by rats or insects.
(v) Faulty connections by inexperienced people. This can happen during repair of equipment or when wiring a house.
(vi) Short circuits can some times happen when objects fall across power transmission lines.
(vii) Fixing too many appliances in one socket at ago can cause over voltage leading to short circuits.
(viii) Pushing materials in sockets.

Dangers/ Effects of Short circuits:

The short circuit leads to a lot of current flowing through the wires. This can cause over heating of the wires leading to: -

(i) Fires which can burn and destroy houses
(ii) Blowing or damaging of the appliances.

Ways of Avoiding Short Circuit or their effects:

a) We should use insulated wires when connecting electric equipment or wiring houses. Avoid naked ones.
b) Use qualified people to make connections in the house or to repair electric equipment.
c) Avoid installing too many appliances in one socket at ago.
d) Replace the old wires or damaged ones immediately.
e) Place fuses in electric appliances to protect the appliance from dangers of over loading.

Importance of Electricity in Daily life:

Uses of Electricity:

1. Electricity is used to produce heat. The heat from electricity can be used to :
   (i) Cook food
   (ii) Iron clothes
   (iii) Boil water
   (iv) Warm houses
2. Electricity is used for lighting. Examples are car headlamps, touches, and electric bulbs in houses.
3. It is used to run (operate) machines in our homes and factories. These include, motors fridges radios, TVs, clocks etc.

ADVANTAGES OF USI NG ELECTRI CI TY:

It is a renewable source of energy

(i) Electricity is clean and does not pollute the environment.
(ii) It is quick to use or does the work faster or quickly.
(iii) If used instead of other natural fuel resources like wood, it helps to protect the environment by preventing destruction of trees.

(iv) It can operate many machines at ago. This saves energy and resources where one person can operate many machines at ago.
(v) Compared to other energy resources it is cheaper to use.

DANGERS OF ELECTRICITY:

(i) If not properly handled, it can cause shocks that may lead to permanent damage or death.
(ii) Electricity can cause fires that destroy property.
(iii) Overloading may cause damage to appliances leading to over expenditure when repairing or replacing.
(iv) Some times if not regulated it may be very expensive to pay for.

SAFETY WHEN DEALING WITH ELELCTRICITY:

(i) Never do experiments using electricity from the mains.
(ii) Never push objects in sockets like nails, metals etc
(iii) Avoid touching switches, and electric equipment with wet hands.
(iv) Wear rubber gloves when handling or repairing electric equipment
(v) Disconnect or remove appliances from sockets when not in use.
(vi) Avoid stepping on wires from power lines that have broken or fallen down.

MAGNETISM AND MAGNETS

A magnet

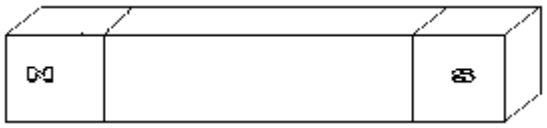
A magnet is a piece of metal that can attract some other metals.

MAGNETISM:

1. Magnetism is a form of energy that enables a magnet to push or pull other objects without touching them.
2. The space or area around a magnet where it extends its force of magnetism is called a **Magnetic field**.
3. In the magnetic field, effects of attraction and repulsion can be detected.
4. The lines around a magnet along which the magnetic force moves are called **lines of force** or **lines of flux**.
5. The lines of force of a magnet run **from the North Pole to South Pole**.

POLES:

The ends of a magnet are called poles. A magnet has North Pole and South Pole.



Magnetic Materials:

1. These are materials that can be attracted by a magnet.
2. Such materials may contain IRON, NICKEL AND COBALT.
3. We can therefore say **Iron**, **nickel** and **cobalt** are the magnetic metals.
4. All materials that contain any of the above three metals can be attracted therefore they are magnetic.

Non-magnetic materials

1. These are substances that can not be attracted by a magnet.
2. Such materials include, wood, plastic, cloth, papers copper aluminium, silver etc.

Metals that are non magnetic materials.

a) gold
b) Copper.
c) Alluminium
d) Silver.

TYPES OF MAGNETS:

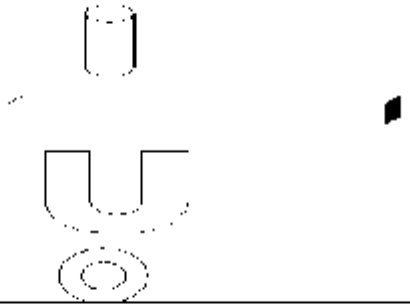
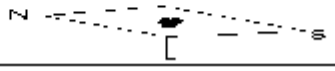
There are two types of magnets.
(i) Temporary Magnets
(ii) Permanent Magnets

Permanent Magnets:

1. Permanent magnets can be natural or artificial magnets.
2. These are magnets that do not lose magnetism even after the source has been removed.
3. A natural magnet was first discovered in a place called **Magnesia**. Magnets derive their name from that place.
4. The natural rock, which could attract other metals, was named **Lodestone** or **magnetite**
5. Therefore an example of a natural magnet is **Lode stone** or **Magnetite**.

6. The earth is also a natural magnet. This is because when a bar magnet is freely suspended it is attracted by the earth and it rests pointing in the North South direction.
7. magnets are of different shapes.

Shapes of Artificial and permanent Magnets:

TYPE OF MAGNET	SHAPE OF MAGNET
CYLINDRICAL MAGNET BAR MAGNET U-SHAPED MAGNET RING MAGNET	
COMPASS NEEDLE MAGNET	

TEMPORARY MAGNETS:

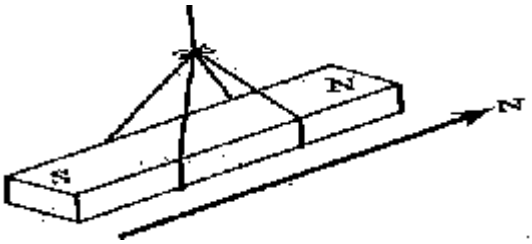
These are magnets that posses that force of magnetism once the source is still present. They lose their magnetism once the source is removed. they are therefore magnets that last as long as their source of magnetism is still present.

Electro Magnets and Induced magnets are the examples of temporary magnets.

Some induced magnets can turn permanent depending on the strength of the source of magnetism and the length of time they stay attracted to the magnetism source.

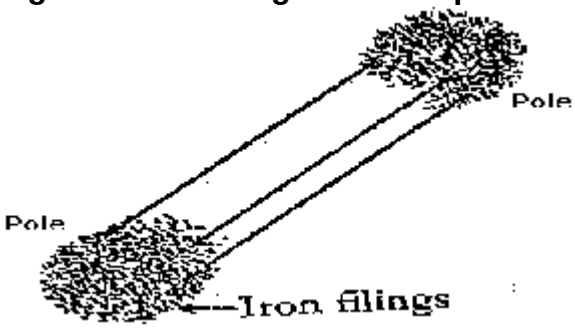
PROPERTIES OF MAGNETS:

1. **A freely suspended bar magnet will rest pointing in the North-South direction**.



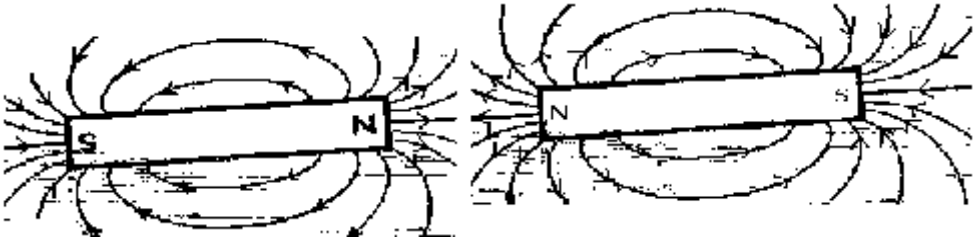
a) This property is used to make compasses that show direction.
b) Sailors, Navigators, Tourists and pilots use this property to help them find direction.

2. **Magnets are strongest at the poles.**

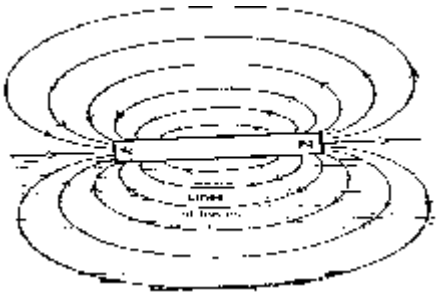


Most fillings collect around poles. This indicates that magnets are strongest at the poles.

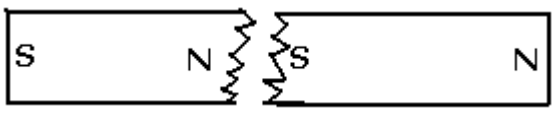
3. **Like poles of a magnet repel each other while unlike poles attract each other.**



4. **Lines of force or flux of a magnet run from the North Pole to the South Pole.**



When a magnet is broken, each peace becomes a complete magnet.



Magnetism can pass through non magnetic materials.

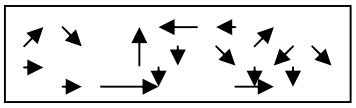
Magnets become weaker with age.

MAKING MAGNETS

1. Magnets are made by Magnetisation. Magnetic materials are turned into magnets.
2. Magnets can only be made from magnetic materials.
3. Alloys when magnetised become strong magnets that do not easily lose magnetism.
4. Steel is one example of an alloy that can be magnetised.

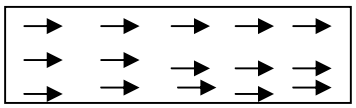
How magnetic materials become magnets

1. Magnetic materials have particles known as **domains.**
2. Before magnetic materials become magnets the domains are disorganised in arrangement.



Domains before magnetising.

3. Once materials get magnetised the domains get arranged in order facing one direction



Domains after magnetising

Making permanent magnets

Permanent magnets can be made using **either** induction method **or** stroking method.

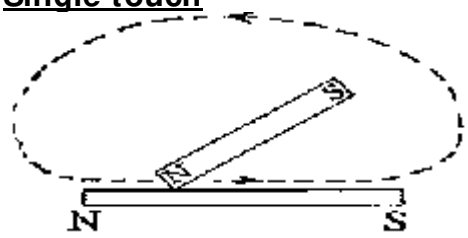
Stroking Method:

1. This is when a new magnet is produced by rubbing a magnet over a magnetic material.
2. There are two ways of stroking;
   (i) Single touch Method
   (ii) double stroke Method or Divided touch.

Single Touch Method:

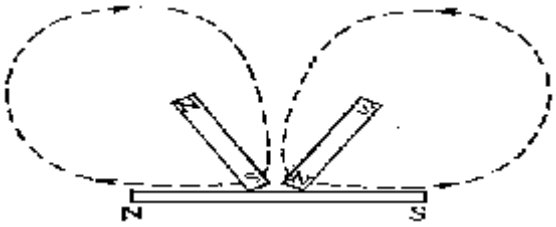
a) This is when one magnet is used to stroke on a magnetic rod to produce a new magnet.
b) It is done several times in the same direction with one pole of a magnet. When the end is reached the magnet is lifted high above and the stroking begins again.
c) The end of the magnetic rod the magnet strokes last becomes the opposite pole of the stroking pole.

Single touch



Double Touch Method or Divided Touch Method:

1. This is a method of stroking a magnetic material using two magnets.
2. Different poles of the magnet are used on either sides of the magnetic material.
3. The stroking starts from the middle moving to opposite poles.
4. Each pole used for stroking produce the opposite pole.



Making temporary magnets:

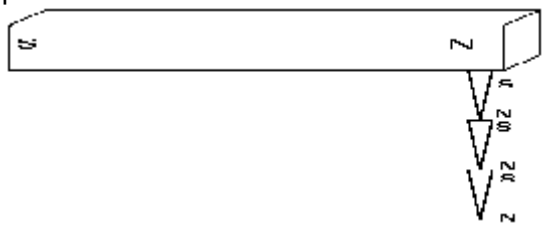
There are two methods of making temporary magnets. These are:

(i) Induction method

(ii) Electrical method (electro-Magnetisation)

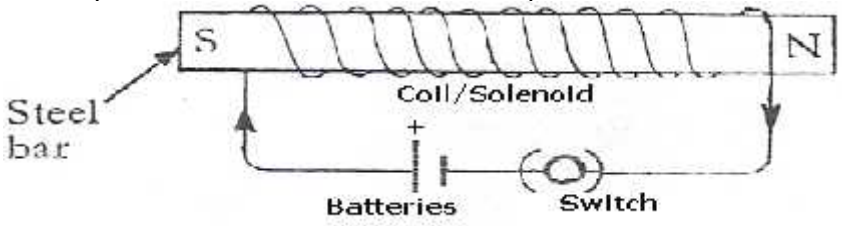
Induction Method:

1. This is a method of making magnets by making a piece of magnetic material to be in contact with a permanent magnet.
2. When other materials are brought near the magnetic material they become attracted.
3. The magnetic material now becomes an **induced magnet.**
4. The induced magnet can lose its magnetism when removed from the permanent magnet**.**
5. During the induction method the part of the magnetic material attached to the Magnet gets the opposite pole. The part at the end gets a similar pole to that at the pole of attachment.



ELECTRICAL METHOD:

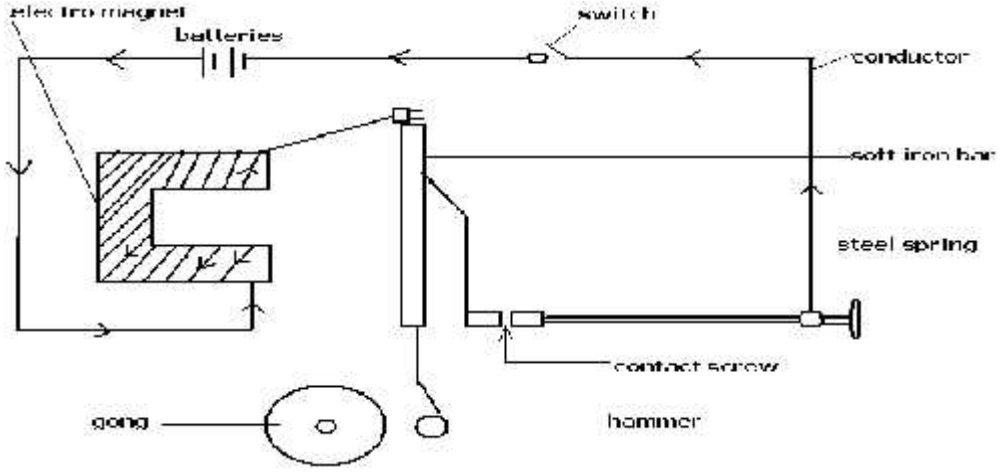
1. This is the method of making magnets using electricity.
2. This type of magnet formed is known as an **Electro Magnet**.
3. An electromagnet is a **temporary magnet.**
4. Electrical method involves making a coil of insulated wires by winding them around a magnetic material. This coil is called a **Solenoid.**
5. This coil of wires is connected to a strong source of electricity.
6. The part of the iron bar that receives the positive electrons of current becomes the South pole and the next is the North pole.



7. A piece of magnetic material will get magnetised when the circuit is completed.
8. This magnet will lose its magnetism once the circuit is broken. Therefore an Electro magnet is a temporary magnet.

9. Electro magnets are used when making **electric bells**, **cranes** that lift heavy magnetic materials, **electric clocks** and **watches**.

AN ELECTRIC BELL



Functions of parts of an electric bell

i) **Switch**
It breaks and completes the circuit.

ii) **Batteries/ Dry cells**
It is a source of electric energy.

iii) **Conductor**
It carries electric current

iv. **Soft iron bar**.
It gets attracted to the electro magnet to move the hammer.

v) **The hammer**
Hits the gong

vi) **The gong**.
It produces sound when hit by the gong.

vii) **The steel spring**.
It helps to break the circle in order to demagnetize the Electro magnet.

How the electric bell works.

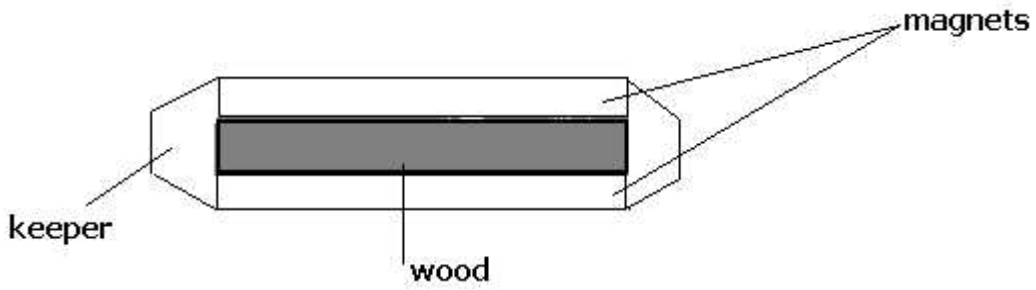
1. When the switch is closed, current flows and the U shaped soft iron bar gets magnetised.
2. The electro magnet pulls the soft iron bar.
3. The hammer attached to the soft iron bar hits the gong which produces sound.
4. When the soft iron bar is pulled away by the electro magnet, it pulls away the steel spring away from the contact screws and the circuit is broken.
5. The electro magnet loses magnetism when the circuit breaks and the soft iron bar moves back again.
6. the steel spring touches the contact and the process continues.

DEMAGNETISATION

1. This is a method of making the magnet lose its magnetism.
2. Methods that can cause demagnetisation include: -
   (i) Repeated hammering or dropping of the magnet.
   (ii) Heating the magnet to red hot.
   (iii) Leaving the magnet to rust.
   (iv) Keeping two like poles together for a long time.
   (v) Putting the magnet in boiling water.
   (vi) Facing the magnet East – West direction for a long time.

KEEPING MAGNETS

i) Magnets should be kept when unlike poles are near each other.
ii) They should be separated by a piece of wood (insulator)
iii) The two like poles should be connected by a piece of iron called keeper.



USES OF MAGNETS.

(i) Magnets are used in the making of loud speakers and microphones.
(ii) Magnets are used in dynamos to produce electricity.
(iii) Magnets are used in Electric bells.
(iv) Opticians and oculists use magnets to remove small magnetic pieces that have gone into people's eyes.
(v) Magnets are used in generators to produce electricity.
(vi) Magnets are used in Electric motors to produce mechanical energy.
(vii) Powerful electro magnets are used to lift heavy magnetic metals in factories using cranes.
(viii) They are used to separate magnetic materials from non-magnetic materials or to pick magnetic materials.
(ix) Magnets are used in screwdrivers.
(x) Magnets are used in compasses to show direction.
(xi) Magnets are used in telephone receivers.
(xii) Magnets are used on fridge doors to keep them tightly closed.
(xiii) Magnets are used in kitchens to hold steel and iron cutlery on walls.

THEME: **THE ENVIRONMENT.**

TOPIC: **ENERGY RESOURCES IN THE ENVIRONMENT.**

RESOURCES:

1. Resources are things we use / need to produce the materials we use in our everyday life.
2. Energy is the ability to do work.
3. Things that we use / need to produce energy used to do work are called **energy resources.**
4. Some of these resources are **renewable** or **non-renewable** energy resources.

Renewable energy resources.

5. These are resources that can be replaces by natural process of reproduction and growth.
6. Plants and plants are renewable sources.

Examples of Renewable energy resources.

a. The sun
b. Water
c. Plants
d. Animals
e. Wind.

Non renewable energy resources.

These are resources that cannot be replaced by any means once they are used.

Examples of non renewable

a. Fossil fuels
b. Minerals

Water as an energy resource.

Water can be used as an energy resource in three ways: -

a. Running water
b. Steam
c. Tidal form

Running water.

1. Water running along rivers can be used to produce (H.E.P) electricity.
2. Running water helps to move boats and other floating materials along the river.
3. It is useful in games and entertainment when flying kites.
4. Plants use the running water as an agent of seed dispersal.

Steam as an energy resource.

1. Steam is a hot gas as a result of water being changed to gas on heating. Steam has kinetic energy that can drive machines.
2. Steam can drive turbines during the production of electricity. Geothermal electricity uses steam after water is heated by underground heat.
3. Steam was used long ago to drive engines of trains called **locomotives**
4. It was also used to drive engines of steam ships called **steamers**.
5. At home steam is used to cook food.

Tidal Power as an energy resource.

1. A tide is a regular rise and fall of the level of the sea.
2. Tides posses kinetic energy in the moving waves at sea or ocean.
3. Tides are caused by the attraction between the moon, sun and earth.
4. The kinetic energy can be tapped using tidal barriers.
5. At sea, tidal barriers are placed and water is directed through holes which turns turbines and electricity is produced.
6. Tidal barriers are strong walls built across a tide.

The sun.

1. The sun is the main source of energy on earth.
2. This is because all energy resources directly or indirectly originate from the sun.

The sun as an energy resource.

The heat from the sun is used for:-

a. Drying clothes.
b. Preserving food during direct sun drying of food, using solar driers.
c. It can be tapped using a solar cooker and its used for cooking.
d. It is used for evaporating water from water bodies such as lakes and from plants which forms clouds and rainfall is got.
e. It is used for animals and people warming themselves.
f. Energy from the sun is changed into solar electricity by the solar panels. This is used for lighting at night, operating radios, TV, etc
g. Plants use solar energy to manufacture their own food during the process of photosynthesis.

Minerals as energy resources.

1. Uranium is the commonest mineral used as an energy resource.
2. It is a grey metal used as a source of nuclear energy.
3. Heat from uranium is used to boil water to produce steam that produces electricity.
4. Uranium is also used in the production of bombs. (nuclear bombs)

Fossils as energy resources.

Fossils are remains of plants and animal of long ago buried between rocks underground.

Examples of fossils

a. Petroleum or crude oil
b. Natural gas and
c. Coal

Petroleum or crude oil.

1. Petroleum is a thick dark brown or black sticky liquid. It is mined by boring holes through the ground to the oil well underground.
2. It is them taken for refining at the **oil refinery**.

Products of petroleum

a. Diesel
b. Petrol,
c. Paraffin,
d. Aviation fuel, fuel,
e. Plastic and nylon.

3. Diesel, petrol, paraffin and aviation fuel are resources used to produce heat and light when burnt.
4. Fuels from petroleum are used in running machines, heating and, cooking food.
5. They are also burnt to provide light.

Natural gas.

1. During the formation of petroleum or coal, a gas is formed above them.
2. This gas can be tapped after drilling.
3. It is then put under a lot of pressure and is liquefied.
4. It is stored in cylinders.
5. It is used for **lighting, cooking, heating** and **refrigeration**.

Coal

Coal is another fossil which used as an energy resource.

1 Coal is a hard black material found underground.
2 It burns with a lot of heat.
3 When burnt, coal can be used in warming houses in cold regions.
4 It is used in industries to provide heat that smelts metals
5 Coal is also used to heat water to steam during the generation of **thermal electricity**.

Conserving fossil fuels.

Fossils are non-renewable resources. They can get exhausted if not sustainably used and cannot be replaced.

They can sustainably be used by;

- using less fuel consuming
- using alternative sources of energy like H.E.P instead.

Plants as energy resources.

Plants are sources of energy when used as;

a. Plant fuel such as firewood, charcoal, briquettes, and husks.
b. Food.
c. Bio-gas.

Plant fuel as source of energy.

A fuel is anything that can burn to produce heat and light.
Wood can be used as a fuel in the following ways:

1. When fire wood is burnt, it produces heat and light. This heat is used for cooking and lighting.
2. Charcoal which is a product of **wood burnt in limited oxygen**, can also be burnt to produce heat.
3. Briquettes are products that are made by pressing saw dust or other plant residues like coffee husks or rice husks. These can also be used as fuel.
4. Saw dust can also be burnt to produce heat and light.
5. Other plants remains such as coffee husks, rice husks can also be burnt to produce energy.

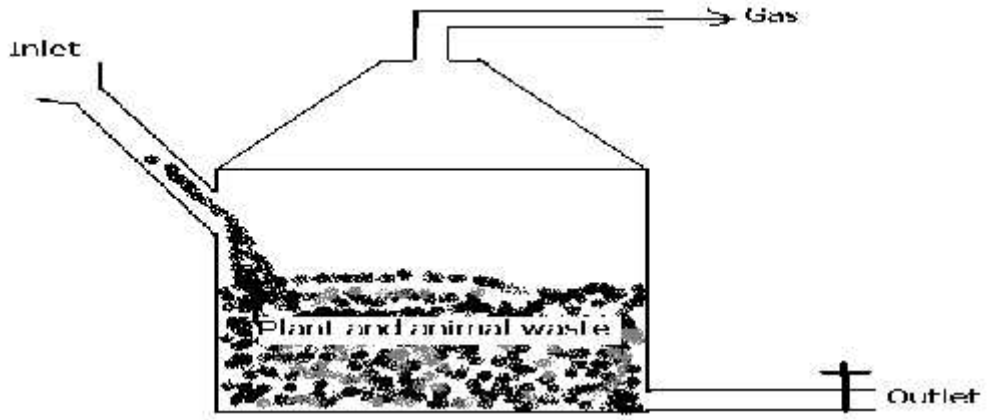
Food as a source of energy

1. Green plants make their own food from water and carbon dioxide by the help of sunlight.
2. This food is stored by the plants in form of chemical energy..
3. People harvest these plants and use them as food.
4. During the process of respiration, food from plants is used to provide energy to people and animals to do different types of work.

Bio-gas as an energy resource.

1. Biogas is a gaseous fuel that can be got from fermenting animal and plant wastes.
2. If the wastes are allowed to ferment, they form a gas that can be collected and then later burnt to produce heat and light.
3. This gas mainly contain methane gas.

Diagram of a bio-gas digester.



4. Fermented molasses from sugar cane can also be distilled into ethanol alcohol.
5. This can be burnt to produce heat and light. It can also be mixed with little petrol to run car engines.

Conserving energy from plants.

Wood from plants can be sustainably be used by:-

i. Using sustainable harvesting methods i.e. copping, lopping and selective felling.
ii. Planting other trees after cutting which take less time to mature.
iii. Use of fuel saving cooking materials.
These includes: -
a). fuel saving stoves or fire places
b). pressure cookers
c). heat conserving cooking materials like pots
iv. Using fuel conserving methods of cooking i.e.
a). covering food when cooking
b). cooking more than one items at ago.
c). soaking dry foods first before cooking ie beans
v. Using alternative sources of fuel instead of wood fuel ie bio-gas, electricity, natural gas etc.

Animals as an energy resources.

Animals obtain their energy from eating plants. Even carnovorous animals in one way depend on plants since they feed on animals that eat plants.

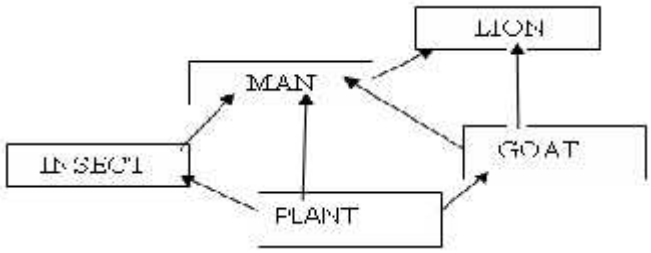
This results into a food chain or food web.

FOOD CHAIN

PLANTS → GRASSHOPPER → BIRDS → MAN → LION →
BACTERIA

In a food chain, plants are producers, animals are consumers and bacteria are decomposers.

A FOOD WEB



Energy from animals can be used in the following forms:-

i. when the animals are eaten as food.
ii. When the animals perform tasks to people .Tasks performed by animals are ploughing, pulling carts, transporting people.
iii. When their wastes are used to produce bio-gas.

Conserving animals.

1. Use scientific methods to bread fast maturing and producing animals to ensure constant and adequate supply of animals for food.
2. Gazette places asNational Parks and Game Reserves to protect the animals.

Energy resource from wind and air.

Wind is moving air. Air in form of oxygen is used in respiration to produce energy. Wind can be used to provide energy for the following purposes.

i. drying clothes
ii. wind is used in winnowing seeds.
iii. Wind helps to move boats on water.
iv. It is used in games to fly kites, gliding etc
v. Wind helps to run wind milk which can be used to generate electricity, pump water, grind grains etc.

P.7 WORK FIRST TERM

INTERDEPENDENCE OF THINGS TO THE ENVIRONMENT

1. Interdependence refers to how different organisms rely on one another in the environment.
2. Environment means things around us.
3. The environment is divided into two types namely;
    a) Biological environment
    b) Physical environment

Biological environment

This is the type of environment that consists of living things e.g. plants and animals.

Physical environment

Physical environment is the type of environment that consists of non-living things e.g.

a) Soil
b) Air
c) Water
d) Sun

Components of the environment

1. There are two major components that make up the environment namely:
    a) Living things
    b) Non-living things
2. The living things include plants and animals.
3. The non-living things include:
    a) Soil
    b) Air
    c) Water
    d) The sun

How living things depend on non-living things

Water

1. Plants and animals depend on water.
2. Plants need water for making their food.
3. Animals need water for quenching thirst
4. Seeds need water to germinate
5. Fish live in water

6. Man needs water for washing, bathing, cooking

Air

1. Man and other animals use oxygen for respiration.
2. Fish and other animals which use oxygen dissolved in water.
3. Plants need carbondioxide for photosynthesis.
4. Carbondioxide helps in putting out fires.
5. Wind dries people's clothes.
6. Moving air moves adhows.

Soil

1. People use soil for crop growing.
2. People use clay soil to make pots.
3. Clay soil is used to build muds

How living things depend on each other

1. Living things in the environment depend on each other to get their needs.
2. Therefore, interdependence is how things rely on each other for their needs e.g.
    a) People depend on plants
    b) Animals depend on plants
    c) People depend on one another
    d) Animals depend on each other
    e) Plants depend on animals
    f) Plants depend on each other

How people depend on plants

a) Trees protect people's homes against strong winds
b) We get food from plants
c) People get money from selling plants
d) Plants provide shade to people
e) People get firewood from plants
f) We get local medicine from plants

How animals depend on plants

a) Animals take in oxygen for respiration which plants give out during photosynthesis.

b) Animals depend on plants for food.
c) Plants provide a home to some animals like the monkey

People depend on each other

a) People get protection from security guards.
b) Doctors and nurses treat patients
c) Teachers teach children

Animals depend on each other

a) Some animals live in the bodies of other animals e.g. worms such as hookworms.
b) Other animals depend on others for food
c) Man depends on other animals for security (a dog).
d) Ox peckers depend on other animals for food (ticks)
e) Some domestic animals (cats, cattle, dogs) depend on man for medication.

Plants depend on people and other animals

a) Animals pollinate plant's flowers
b) Plants get carbondioxide from animals
c) Animals such as man, monkey, bats help in seed dispersal
d) Animals provide manure to plants

Plants depend on each other

a) Weak plants climb other plants for support
b) Short and smaller plants get support from bigger or taller trees.
c) Parasitic plants depend on other plants for food and water.
d) Plants such as legumes add nitrates to the other plants.

Food Chain

1. A food chain is the energy transfer in the environment.
2. In a food chain, plants act as producers because they are the makers of food.
3. All other living things which depend on food produced by plants are called consumers.

Categories/ Groups of consumers

a) Primary consumers
b) Secondary consumers

c) Tertiary consumers

Primary consumers

1. These are animals that feed directly on the producers (plants)

Example of primary consumers

a) Grasshoppers
b) Caterpillars
c) Antelopes
d) Goats
e) Cows
f) Sheep

Secondary consumers

1. These are animals that feed on primary consumers.
2. They are mostly carnivorous animals

Examples of secondary consumers

a) Cats
b) Leopards
c) Lion
d) Tiger

Tertiary consumers

1. These are animals that feed on secondary consumers.

Examples of tertiary consumers

a) Bird of prey
b) Pig
c) Man

Decomposer

These are organisms that help to break organic matter.

Examples of decomposers

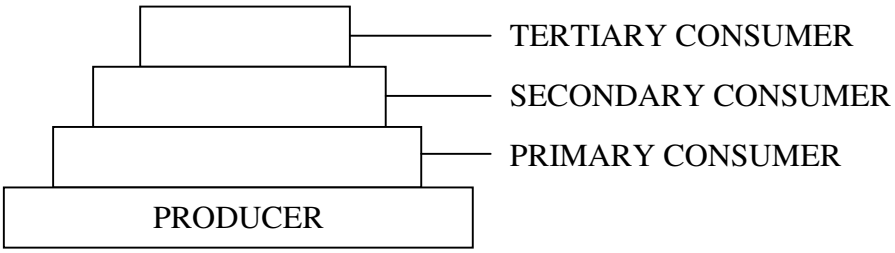
a) Bacteria
b) Fungi

Note: In the food chain the sun provides sun light energy for the plants to make food its therefore the main source of energy.

Summary of the food chain

Producer – Primary consumer – Secondary consumer – Tertiary consumers

Note: A food chain can also be illustrated inform of a pyramid of numbers.



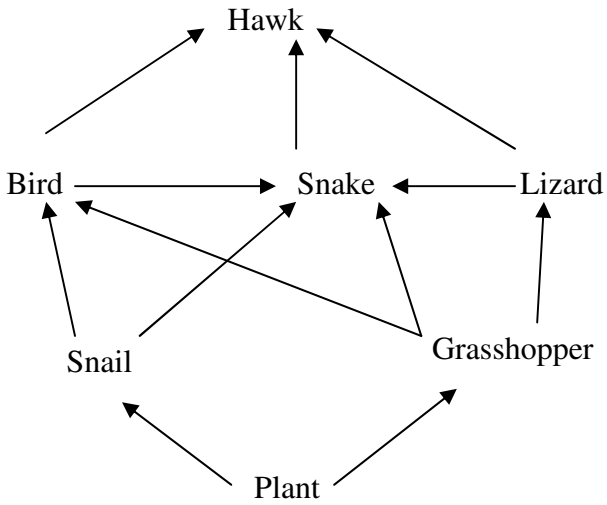
The number of organisms to be eaten should be greater so as to sustain the number of consumers.

An example of a typical food chain

Grass – Grasshopper – Lizard – Hawk

Food Web

1. This is a more complicated way on how living things depend on each other for food.
2. An ecosystem is a community of living things in a habitat



Growing of crops and trees together

1. Afforestation is the growing of trees where they have never existed.
2. Reafforestation is the growing of trees where they have ever existed.
3. Deforestation is the massive cutting down of trees without replacement.
4. Devegetation is the destruction of vegetation in an area.
5. Agro-forestry is the growing of crops and trees on the same piece of land.

Importance of trees

1. Trees are a source of wood for:
    a) Timber
    b) Firewood
    c) Charcoal
    d) Poles for construction
2. Trees recycle carbondioxide into oxygen (provide animals with oxygen)
3. Trees are a source of fruits
4. Trees control soil erosion by acting as wind brakes
5. Legume trees improve on the soil fertility
6. Trees help in the formation of rainfall through transportation
7. Trees are a source of local medicine
8. Trees are homes to some animals

Common types of trees grown

a) Wood trees
b) Fruit trees
c) Legume trees
d) Shade trees

Wood trees

These are the trees

Fruit trees

a) Mango tree
b) Jack fruit tree
c) Orange tree
d) Avocado tree
e) Guava tree

Legume trees

1. These are trees with root nodules on their roots.
2. They are commonly used when fallowing land.

Note: Fallowing is the rest period given to land

Shade trees

These are trees planted purposely for their shade.

Examples

a) Fider tree b) Jakaranda tree

Wood trees

These are trees whose stems are used as a source of wood, poles, timber, charcoal, firewood, etc.

Examples of wood trees

a) Muvule tree
b) Mahogany
c) Cyprus trees
d) Musizi tree
e) Pine

Common indigenous trees

a) Muvule
b) Musizi
c) Mahogany

Common foreign trees

a) Cypress
b) Pine
c) Eucalyptus
d) Cedar

Common tree planting materials

a) Seeds
b) Stem cuttings

Methods used in tree planting

a) Raw planting
b) Broadcasting

Agro-forestry systems

The most common systems used in agro-forestry include;

a) Trees along the border system; this involves planting trees along boundaries of agricultural crop gardens or around pasture farms.
b) Alternate raw system; this is a system where crops are planted between rows of trees.
c) Random mixture system; this is where trees are planted randomly in vacant places between crops.
d) Contour planting system; contours are imaginary lines joining places of the same attitude. Trees are therefore planted along contour lines.

Importance of Agro-forestry

a) A farmer gets income from both crops and trees.
b) Trees in agro-forestry help in controlling soil erosion by acting as wind breakers.
c) Trees in agro-forestry provide shelter to crops that protect them from strong winds.
d) Fruit trees in agro-forestry provide us with fruits.
e) Legume trees help to improve on soil fertility.
f) Wood trees provide firewood, timber and charcoal.
g) Trees are a habitat to birds and other animals that help in pollination.
h) Trees help to recycle carbon dioxide into oxygen hence reducing global temperatures.
i) Some trees in agro-forestry are a source of local medicine.
j) Leaves of trees once decomposed improve on the soil fertility.
k) Trees planted at the borders can act as live fence.

Nursery bed

1. A nursery bed is a small plot from where seedlings are raised.
2. A nursery bed should be narrow for easy watering.
3. A seed bed is a well prepared garden

Illustration of a nursery bed

Common activities in taking care of seedlings

1. Watering – water seedlings regularly to prevent them from withering.
2. Weeding – remove all weeds may be competing with the seedling for sunlight, water and nutrients.
3. Hardening off – this is the gradual removal of the shelter to make seedlings get used to harsh weather conditions.

Tool for watering seedlings

Transplanting

1. Transplanting is the transfer of the seedlings from nursery bed to a prepared gardens.

2. **A tool for transplanting seedlings (trowel)**

3. If a seedling is in a polythene bag, cut open the polythene

4. Some leaves are removed from the seedling to reduce the rate of transpiration.
5. Transplanting should be done late in the evening because the rate of transpiration is lower at night. This gives the seedling time to establish its roots in the soil so as to balance water loss and uptake.

Care for trees

Weeding

1. This is the removal of unwanted plants from the garden.
2. A weed is the unwanted plant in the garden

Importance of weeds

a) Weeds are a source of food for people and other animals.
b) Legume weeds improve on the soil fertility.
c) They provide good soil cover that reduces soil erosion.
d) When rotten, they can improve on the soil fertility.

Dangers of weeds

a) They compete with crops for water, plant nutrients and sunlight.
b) Lead to low crop yields
c) Lead to poor quality yields
d) Habour pests and diseases
e) Some weeds are poisonous to humans

Different ways of controlling weeds

a) Mulching
b) Spraying with herbicides
c) Uprootind
d) Digging with hand hoe
e) Slashing
f) Practicing crop rotation

Mulching

Is the covering of the soil surface with the dry plant material.

Advantages

a) To keep soil moist
b) Control weeds
c) Control soil erosion
d) Improves on the soil fertility when rotten.

Disadvantages

a) Fire hazard
b) Breeding place for pests
c) Can turn into weeds

Pruning

1. This is the removal of unwanted parts of a plant.
2. The unwanted parts could be the diseased or the unproductive.

Commonly pruned parts

a) Leaves
b) Branches
c) Roots

Appropriate tool for pruning (pruning saw)

One can also use a panga

Root pruning is the removal of some roots from a plant

Root pruning can be bad because it leaves the plant weak and can be easily be blown down by a strong wind.

Advantages of pruning

a) It reduces the rate of transpiration.
b) Pruning of branches encourages the plant to grow taller and straight hence yielding better quality timber.
c) Pruning of branches also reduces the weight on the plant.
d) Root pruning reduces competition for nutrients and water among trees.

Spraying

Spray trees to control pests and diseases

Common pests to trees

a) Caterpillars which eat up the tree leaves.
b) Termites that eat up the roots and stems.
c) Wood wasps that bore into woody plants.

Thinning

Thinning is the removal of some plants from areas where they are crowded.

Importance of thinning

a) Reduces competition for water, sunlight nutrients among trees.
b) Trees yield more
c) Improves the quality of the produce

Pollarding

This is the cutting off of the tip of a tree.

Importance of pollarding

Encourages branches to grow thicker and yield more.

Harvesting of trees

Methods of harvesting trees

a) Lopping
b) Coppicing
c) Selective felliings

Lopping

1. This is the method of harvesting trees where side branches are cut leaving the tree to continue growing.
2. This encourages the immature branches to continue growing to maturity.

Coppicing

1. This the cutting of a tree at an angle to stump level.
2. Cutting a tree at angle encourages water to flow which prevents rotting of the stamp.
3. The stump later grows new shoots.

Selective felling

1. This is the method where only mature trees are cut leaving the immature ones to grow to maturity.
2. In selective felling, seedlings are planted in the spaces created by the cut trees.

Preparation of wood

Wood after harvesting is usually prepared according to the purpose.

Wood for firewood

a) Is split and sundried
b) The suitable tool for splitting

Wood for timber

a) Wood is sawed into timber planks of specific sizes.
b) The planks are laid on a flat surface to ensure that they dry in a straight form.
c) Air should be allowed to circulated into the planks to prevent the growth of moulds.

d) Tools used
    - Hand saw
    - Chain saw

Wood for poles

a) Trees are cut and the bark removed.
b) They are then treated with chemicals such as old engine oil, wood preservative or merely painted.
c) The treatment prevents from rotting and protects it from being attacked by pests such as termites and wood wasps.

Wood preservation

Wood for timber and poles needs to be protected from pests.

How to protect wood from pests and diseases

a) Painting

b) Varnishing

c) Soaking in old engine oil or wood preservatives.

THEME: THE COMMUNITY POPULATION AND FAMILY LIFE.

TOPIC: POPULATION AND HEALTH CONCERNS.

Family

1. A family is a small group of people living together under the leadership of a father.
2. The relationship between members of the family can be by blood or marriage.

Major types of families

a) Nuclear family
b) An extended family

Nuclear family

This is a family of a father, mother and their own children.

Advantages of a nuclear family

a) Children get close attention from their parents.
b) This type of family is affordable in terms of providing basic needs.
c) As a necessity in the present situation, parents of this family can afford better education for their children.

Disadvantages of a nuclear family

a) This types of family may lack support from the relatives.
b) Children of this family may lack moral upbringing.
c) Children of this family usually find it difficult to associate with other relatives.
d) Children of this family may find it difficult to share items with other relatives.

An extended family

1. This is a family of a father, mother, their own children and relatives.
2. This type of family is a typical setting of African culture.

Advantages of an extended family

a) Work is easily done because each member of the family is assigned a responsibility.
b) Children of such a family are socially brought up.
c) It is good for children because they learn to share and cooperate with one another.

Disadvantages of an extended family

a) Children of an extended family may not get close attention from their parents.
b) Such a family is expensive in terms of providing basic needs.
c) There is heavy responsibility on the head of the family.
d) The presence of poorly brought up relatives is a clear route (way) for children in this family to get spoilt.

Marriage

Marriage is a legal union of a man and a woman as husband and wife.

Purpose of marriage

a) To have children
b) To provide companionship

c) For sex enjoyment
d) To relieve parents from the burden of looking after their son/ daughter
e) To show adulthood

Choice of a marriage partner

a) A partner should be from a good family background.
b) He/she should be God fearing.
c) He/she should of a character accepted in a community.
d) A partner shouldn't be too young or too old for you.
e) Should be some one presentable.
f) Both parents should approve the consent of their children.
g) Know your HIV status.

Types of marriages

a) Religious marriage
b) Civil marriage
c) Customary marriage

Religious marriage

1. Here, the union of a man and a woman as husband and wife is done by a religious leaders.
2. The couple and other witnesses sign a marriage certificate to confirm their acceptance.

Civil marriage

This is a type of marriage where a town clerk, CAO or county chief performs the role of uniting a man and a woman as husband and wife.

Customary marriage

1. This is a type of marriage where both parents accept the relationship of their children, the boy's family pays bride price and a hand over ceremony is made.
2. Here, a marriage certificate is not signed.

Young parent

A young parent is a person who produces when he/she is under 18 years.

Problems of young parents

a) May drop out of school
b) At their age they may be lacking the knowledge to care for the baby.
c) They may not have a source of money to cater for the baby.
d) May be forced into marriage.
e) May suffer rejection from the family.

Problems of young mother

a) May meet difficulty in delivering.
b) The girl is likely to drop out of school.
c) The girl may suffer rejection from parents.
d) She may risk abortion and die.

Divorce

Divorce is a legal dissolution of a marriage.

Factors that may lead to divorce

a) When a man loses the ability to have sexual intercourse.
b) Love outside marriage (adultery)
c) Criminal acts from either spouse.
d) Extreme cruelty.
e) Inability to have children by a woman (barrenness).

Effects of divorce

a) It disorganises family setting.
b) The upbringing of the children is endangered.
c) May lead to parental disharmony.

POPULATION AND HEALTH

Population and health concerns

a) Poor sanitation
b) Antisocial behaviours.
c) Poor water supply
d) Inadequate food supply.

Poor sanitation

1. Sanitation is the general cleanliness to promote public health.
2. Health is a state of physical, mental and social welfare.
3. Poor sanitation is mostly brought about by poor disposal of waste.
4. Poor sanitation usually results into a number of diseases in a community.

Diseases associated with poor sanitation

a) Cholera
b) Typhoid
c) Diarrhoea
d) Polio
e) Dysentery

Activities to address the problem of poor sanitation

a) Construct pit latrines in homes.
b) Scrubbing toilets
c) Collecting and buying rubbish
d) Clearing bushes around compound
e) Dig rubbish pits in homes

Poor water supply

1. Water is a compound of hydrogen and oxygen in the ratio 2:1 (H_2O).
2. Poor water supply can be looked at in three ways;
    a) Its exposure to contamination.
    b) Its limitedness in supply
    c) Its poor drainage

Some source of water that are exposed to contamination

a) Rivers
b) Streams
c) Lakes
d) Swamps
e) Open wells

Water borne diseases (diseases got from drinking contaminated water)

a) Polio
b) Cholera
c) Typhoid
d) Hepatitis
e) Dysentery
f) Diarrhoea

Water habitat vector diseases (diseases whose vectors breed in water)

Disease	Cause	Vector
Malaria	Plasmodia	Female anopheles mosquito
Elephantiasis	Filarial worm	Culex mosquito
Yellow fever	Virus	Aedes/tiger mosquito
River blindness	Filarial worm	Black fly/ Jinja fly/ Simulium fly
Bilharzias	Bilharzias fluke	Fresh water snail

Water cleaned diseases (diseases got when we use little water to clean our bodies)

a) Trachoma
b) Scabies
c) Impetigo
d) Conjunctivitis

Activities to address the problem of poor water supply

a) Boil all water for drinking
b) Cover open wells to protect them from contamination.
c) Drain stagnant water around compounds.
d) Use water tanks to harvest rainwater to solve the problem of inadequate water supply.
e) Drill more boreholes to solve the problem of inadequate water supply.
f) Use chemicals to kill vectors.

Inadequate food supply

Factors that can lead to inadequate food supply

a) Poor climatic changes
b) Poor soils that lead to poor harvests
c) Natural disasters like landslides, flood, etc
d) Pests and diseases that attack crops
e) Civil wars
f) Extravagance

Problems related to inadequate food supply

a) Starvation
b) Malnutrition
c) Increased food theft

Activities to address the problem of inadequate food supply

a) Use both natural and artificial fertilizer to improve on the soil fertility.
b) Spray crops with pesticides to control pests and diseases.
c) Educate the public on the importance of budgeting to curb the problem of extravagance.
d) Practice irrigation to ensure continuous food production.

Anti-social behaviours

Anti-social behaviour is an act that is not accepted in a society where one lives.

Some examples of anti-social behaviours

a) Lying
b) Violence
c) Stealing
d) Arson
e) Abortion
f) Premarital and extramarital sex
g) Truancy (school refusal)

h) Alcoholism and drug abuse
i) Wandering (running away from home)

Factors that may make one leave school

a) Bulling by other children
b) Boredom
c) Learning difficulties
d) Poor school administration

Juvenile delinquency

1. Juvenile is a person below 18 years.
2. Delinquency is an anti-social act committed by a person below 18 years.
3. Delinquent is a person below 18 years who commits a wrong act.
4. Juvenile delinquency is where a person below 18 years commits a wrong act.
5. Crime a wrong act committed by an adult person.
6. Criminal is a nadult person proven by court to have committed a wrong act.

Causes of anti-social behaviours

a) Poverty
b) Frustration
c) Unemployment
d) Poor home background
e) Influence from bad peers
f) Inadequate or inappropriate guidance
g) Negligence from the parents
h) Poor sense of value on the part of the parents and the community.

Effects of anti-social behaviours

a) Many delinquent children end up becoming criminals in their adult life.
b) Stealing leads to imprisonment
c) Drug dependence lead to drug addiction
d) Sexual offenses lead to STDs and unwanted pregnancies
e) Abortion may result into death
f) Arson usually results into the destruction of property and life.
g) Delinquents may end up being disowned by their families or community.
h) Anti-social behaviours like premarital and extra marital sex weaken the religious and cultural norms.
i) Victims of aggression suffer pain, injuries or even death.
j) The delinquent himself may suffer pain, injuries or even death.
k) The delinquent may end up in remand homes.

Ways of preventing anti-social behaviours

a) Attempts should be made to provide appropriate sex education to children.
b) Avoid bad company
c) Consistency in rewards and punishments should be aimed at by teachers and parents
d) Get involved in meaningful activities to keep yourself busy.
e) Delinquents should be put in reformatory schools.
f) Appropriate guidance should be offered to the delinquents.
g) Governments should set up small scale industries to curb the problem of unemployment.

Sex deviations

a) Bestiality
b) Incest
c) Homosexuality
d) Lesbianism
e) Oral sex
f) Masturbation

Budgeting

A budget is an advance plan on how to spend the family income.

Systems in budgeting

a) Hand out system
b) Allowance system
c) Joint control system
d) Family budgeting

Handout system

Is where one member of the family controls the money and gives it out on demand.

Advantage of a handout system

The money may not be misused because members do not know what the family has.

Disadvantages of a handout system

a) The controller of the money may not use the money appropriately.
b) The requests of young members of the family or relatives may be turned down.
c) Some basic needs of the family may be ignored.

Allowance system

Here, an income earner hands over a given sum of money to the house keeper to be used in a given period of time.

Advantage of allowance system

It enables the housekeeper to plan for the money according to the needs of the family.

Disadvantages of allowance system

a) The wage earner may not give a realistic amount of money.
b) The housekeeper may misuse the money by skipping the essential items

Some control system

This is where both the husband and the wife are salary earners and they divide the household expenses e.g. one pays school fees and the other house rent.

Advantage of joint control system

Works best when the earning members understand each other.

Disadvantage of a joint control system

Can lead to argument as who contributes more.

Family budgeting

This is where the entire family examines the family needs, plans are made so that the total income earned by all the wage earners is used accordingly.

Advantages of a family budgeting system

a) Its democratic in a way that both parents and the grown up children are given a chance to give their views.
b) This system teaches young ones to be responsible over their money.
c) Priorities can be made according to the resources.
d) Each member of the family is made aware of the family's income stand.
e) It creates less suspicion and leads to honesty.
f) It ensures that the family lives with its income.

g) All the needs of the family can be taken care of.

Components of budgeting

1. Planning-thick about all the family needs and how much they cost.
2. Prioritising-arrange all the family needs according to priority.
3. Evaluation-once a problem is solved, it is important to look back if a right action was taken (value for money).
4. Accounting – take record of all that you have bought.
5. A system of physical handling of money – people prefer envelopes.

Population and Health concerns.

1. The number of people in the given area is what we refer to as population.
2. These people have various concerns that affect their way of living. These concerns may also affect their health.

They include:-

a. Poor sanitation
b. Anti social behaviours
c. Poor water supply and
d. inadequate food.

POOR SANITATION:

1. Sanitation is the general cleanliness to promote public health.
2. Poor sanitation is mostly brought about by poor disposal of wastes.
3. To control poor sanitation, human wastes (urine & faeces) should be disposed off in latrines. These if not properly disposed off are a source of many diseases.
4. Other wastes should also be properly disposed off in rubbish pits, garbage bins etc. This doesn't only reduce disease spread but also controls accidents like cuts.
5. Keeping proper hygiene both and home hygiene helps to maintain proper sanitation.
6. Ensure proper housing to control over crowding, overcrowded places are difficult to clean and spread a lot of respiratory diseases.

Anti social behaviours:

1. Acts or habits that are not acceptable in society are called anti social behaviours.

Examples of Anti social behaviours -

a. Smoking
b. Alcoholism
c. Drug abuse
d. Stealing

3. Some of these anti social behaviours can lead to serious health problems.

Effects of anti social problems.

a. Drug abuse and smoking may lead to respiratory diseases and brain damage.
b. Alcoholism causes liver problems, circulatory disease and brain damage.
c. Stealing leads to the victim to lose life or be jailed .

Causes of Anti social behaviours:

a. poor parental guidance
b. bad peer groups influence
c. Misleading advertisements on radio and T.V.
d. Lack of parents (orphans)
e. Poor social environment.
f. Bad social environment.

Poor Water Supply:

Since water is very important in the community we need a clean source of water. However, some places do not get the clean water supply or enough water.
This leads to spread of diseases. These diseases spread by contaminated water are referred to as **water borne diseases.** Lack of enough water may lead to diseases caused by not using enough water to clean ourselves. These diseases are known as **water cleared diseases.** Line: scabies, trachoma.
Water contact diseases can also be a result of poor water supply.

Adequate Food:

When the population has enough food for today and for the future, we say they have food security.
People need enough food to stay healthy and to get energy to do work.

i) Inadequate food supply may be caused by pests that destroy crops, bad weather like drought, storms etc wars where people are not able to grow enough food, over population etc.
ii) Lack of enough food supply leads to malnutrition diseases like kwashiorkor, measles etc.

Activities that address health concerns.

The population should ensure that it performs activities that will address health concerns. Such activities include:-

i) Care for homes
ii) Taking health surveys
iii) Carry out primary health care activities

Care for homes.

This involves setting up a system and structures which will ensure that the home will be kept clean.

Structures that can be set up are:-

i) Latrines that should be 10m from having house 30m from water source.
ii) Rubbish pits; these should be burnt regularly.
iii) Proper housing structures where living houses are separate from animals.

Health Surveys

These are activities done to collect data (information) about the state of health in an area.

Community leaders should organize a system and programme where they can get reports about the health status of the members. This helps to organize and plan for the health needs of the people.

Health surveys activities include;

i) Observing and recording the health of members.
ii) Interviewing or asking questions to members concerning health

iii) Recording all health problems observed in the community during visits

All these help to plan for the people in the community.

Carrying out PHC activities.

These are activities which involve all the community members to ensure good health.

The include: -

i) Immunizing people to prevent infections
ii) Enforcing proper sanitation in an area
iii) Ensuring that there is enough and proper water supply
iv) Vector control

All these will go a long way in ensuring health by reducing infections.

Health Education.

This is a means of sharing information about health to increase awareness.

Health education enables a member to be aware of:-

i) Causes of diseases.
ii) Mode of spread of a disease.
iii) Days of preventing the spread of a disease.
iv) How to use the available health facilities

How health education can be passed on to the public.

This can be done using posters, songs, films, drama and plays, and through meetings.

It could also be through child-to-child programmes where the elder children teach the young ones about the values of good health. Health education aims at preventing infection and other problems. This can only be achieved when people practice what has been learnt.

Collecting information and data on human population.

The collection of information on human population can be done by government of Uganda through the ministry of finance planning and economic development.

They can d o this through the population census or by using the community leaders to collect the information. Information includes; demography, housing information, immunisation and available health h services.

The information collected is used for:-

i) Identifying the common problems in communities
ii) The population increase and compare it with the available facilities to see whether they are enough
iii) Planning to see how they can improve upon the health of the people and their standard of living.

Demography

This is the study of changes in the number of births, deaths, marriages and disease infections in a particular area.

Importance of demography.

i) The deaths and births rate in a certain area helps to plan for the facilities to be provided i.e. the drugs needed for immunisation treatment and their qualities.

ii) Helps to find out the common diseases that affect the community.
iii) It helps to plan the health education to give the medicine to plan to buy and stock in the health centres.
iv) The number of births, marriages and deaths help to indicate the population growth.
v) This helps to plan for other infrastructure and services.

Housing information.

The data collected involves;
i) The number of houses, their sizes compared to the population
ii) The type of houses built; permanent or temporary
iii) Ventilation of the houses
iv) Animal housing i.e. do animals stay in the same house with people?
v) Housing information helps to know the living conditions of the people
v) It helps to plan also for the health education strategy to take.

Immunisation information:

The information collected may include;
i) The number of children and their ages
ii) The number of immunised children in an area
iii) The diseases they have been immunised against
iv) Problems that affect the immunisation process
v) It helps to recognize whether there is need for more immunisation in an area
vi) To plan for the facilities

Available Health Centres.

This involves information on:-
i) Number of health centres in an area and distances from each other.
ii) Number of private and public health centres.
iii) The services given by each health centre.
iv) Number of health workers available and their qualifications.
v) Number of ambulances.

These help to plan for adequate health services to the people.

THEME : MATTER AND ENERGY

TOPIC : LIGHT ENERGY

SOURCES OF LIGHT:

1. Light is a form of energy that enables us to see.
2. This form of energy can be obtained from very many sources. The things that give off light are known as **sources of light**.
3. These sources can be **natural sources** of light or **artificial sources** of light.

Natural Sources of Light:

These are sources that exist without peoples influence or control.

Examples of natural source of light.

a) Sun
b) Stars
c) Fire flies
d) Glow worm
e) Volcanic eruptions
f) Lightning

1. The **Sun** is the main source of light on earth.
2. The moon is sometimes not regarded as a source of light because it does not produce light of its own but reflects it from the sun.
3. Sources that give off their own light are called **Luminous sources.**
4. Sources which reflect light but do not give their own light are known as **non luminous sources**.

Artificial Sources of Light:

1. These are source of light that were made by people.
   Examples of Artificial sources of light
   a) Electric bulbs
   b) paraffin lamps
   c) Candles etc.
2. Some of these sources produce light after producing heat.
3. These are called **Incandescent sources**.
4. Those which give light without producing heat first are **----------.**

USES OF LIGHT:

1. Light can be used in the following ways:-
   a) Sunlight is used by plants to make their own food
   b) Light is used by animals to see.

How we are able to see

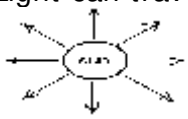
i) We are able to see objects when these objects reflect light into our eyes.
ii) light from the source moves to the object, the object reflects some of the light into our eyes and we see the object.
iii) We cant see objects in darkness because there isn't light for the objects to reflect into our eyes.
c) Sunlight is converted into Solar electricity by the solar panels.
d) Our bodies use light from the sun to make vitamin D.

2. Light from artificial sources like electric bulbs, candles is used to see at night.
3. It is used for protection to scare away enemies or wild animals.
4. Light in general is used in **photography** and in any other optical instrument.

PROPERTI ES OF LI GHT:

1 Light comes from different colours.

2 Light can travels in all directions from the source e.g. the sun.



3 Light travels along a straight line.

4. A path along which light travels is called a **Ray.**

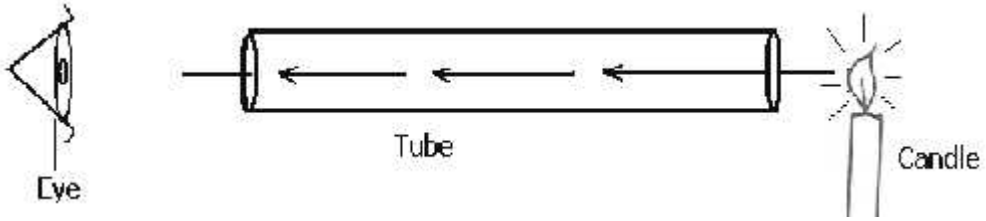
5. A ray of light is represented as a straight line with an arrow head to indicate the direction of movement of light.

A ray of Light.



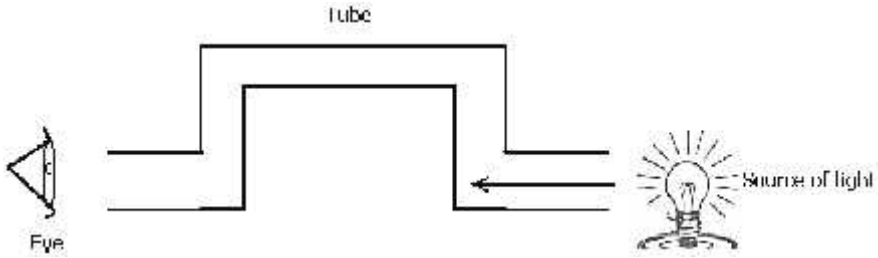
Experiments to show that light travels in a straight line

a)



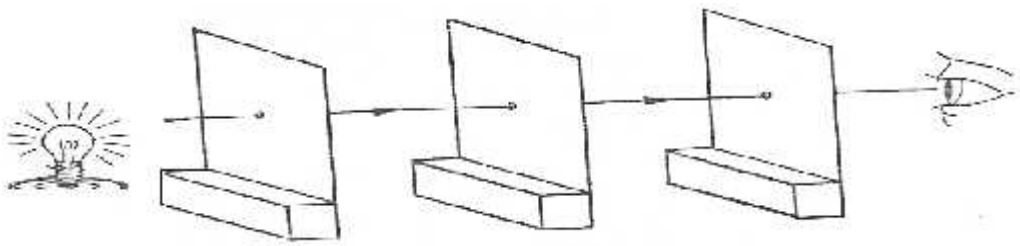
The light can be seen because there is a straight line from the candle to the eye.

b)

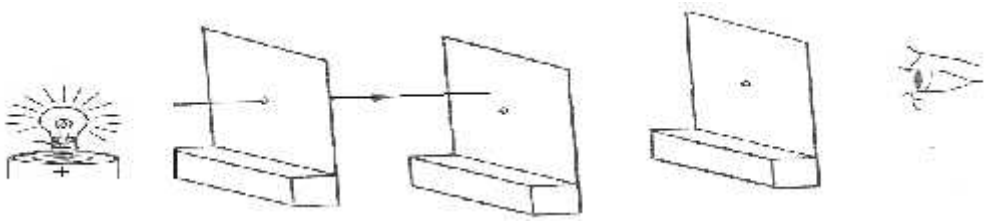


The light from the electric bulb will not be seen because light does not bend around corners.

c)



d)



Light in c can be seen because the holes in the cardboards is straight while the light cannot be seen because the holes in the cardboards are not in a straight line and so light does not travel around corners.

RAYS AND BEAMS OF LIGHT:

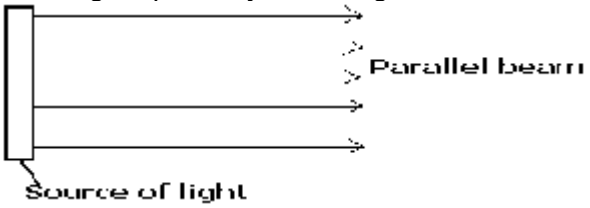
1. A ray is a straight path taken by light.
2. A collection of rays of light or group of rays moving in the same direction is called a **beam**.

TYPES OF BEAMS.

i) Parallel beams,
ii) Diverging beam
iii) Converging beam

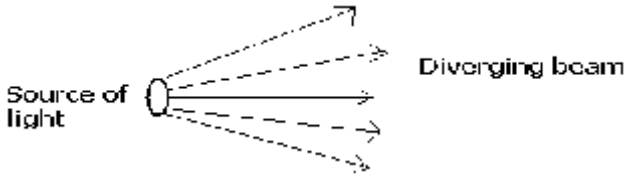
Parallel beams:

It is a group of rays moving in one direction at an equal distance from each other.



Diverging beams:

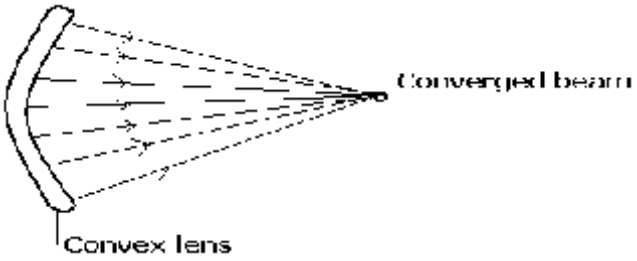
It is a group of rays moving in different directions from one source.



Torches and car head lamps give off diverging beams.

Converging Beam:

It is a group of rays moving towards one point from different directions.



Convex Lenses and Solar cookers give off converging beams

LIGHT AND SOUND.

1. Light travels faster than sound.
2. The speed of light is 300,000km/sec.

Examples to show that sound travels faster than sound

a) We see lightening first before we hear sound during thunder.
b) In fire works, we see light spread first before hearing the sound.
c) If a gun fired in the air at night, we see the light from it first before we hear the sound.
d) The moving aeroplane in the air is actually seen in front of where sound is heard.

3. The speed of light in glass and water is much slower.

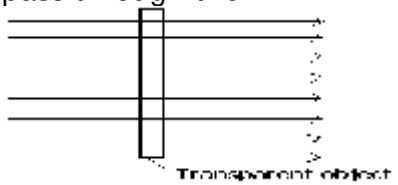
Effects of Different materials on light:

When light rays fall on an object, it may be;

a) Allowed through the object.
b) Reflected by the object.
c) diffused/altered in different directions.
d) Obstructed.

TRANSPARENT OBJECTS:

1. These are objects that allow all the light to pass through them.
2. We are able to see through transparent materials because they allow all light rays to pass through them.

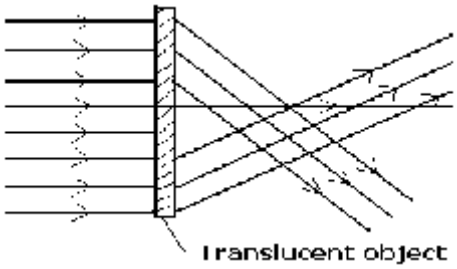


Examples of transparent materials.

f) air
g) clear polythene papers
h) Clear glass
i) Clear water.

TRANSLUCENT OBJECTS:

1. These are objects that allow only little light to go through them.
2. When light meets a translucent material it is **scattered/ diffused.**
3. We cannot see clearly through translucent objects because they diffuse/scatter light rays.

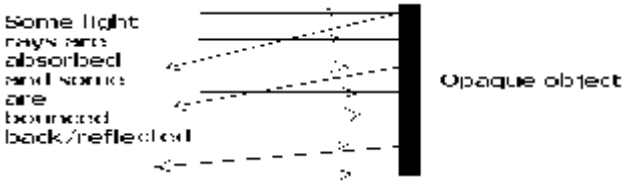


Examples of translucent materials

a) Frosted glass (glass with rough surface).
b) Waxed or oiled paper,
c) Thin cloth, and
d) Coloured water.
e) Misty air/ Air with fog

OPAQUE OBJECTS:

1. These are materials that do not allow any light to go through them.
2. We cannot see through opaque objects because they do not allow any light ray to pass through them.



3. When light meets an opaque object, it is blocked or stopped.

4. Some of the light is **absorbed** and some is **bounced back**.
5. The bouncing back of light rays is called **reflection of light**.

Examples of opaque objects

a) Stones
b) Bodies of animals,
c) Concrete
d) Wood
e) Metal etc.

Effects of light when it meets opaque objects:

1. When light meets an opaque object it is obstructed.
2. Once light is obstructed a **Shadow** is formed to the opposite of the source of light.
3. A shadow is a region of darkness formed when light rays are obstructed by an opaque object.

Types of Shadows

There are two types of shadows and these are:

a) Umbra
b) Penumbra

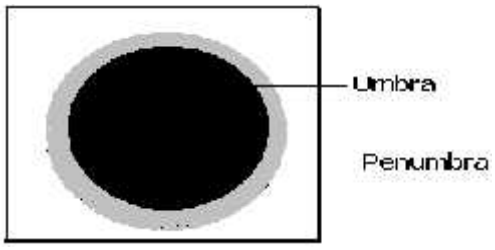
UMBRA

1. This is the darker region of a shadow.
2. This is caused when the source of light is far smaller than the object.

PENUMBRA

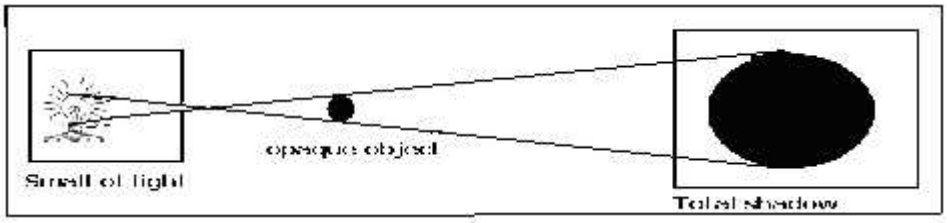
1. Penumbra is a partially dark/ lighter region of a shadow.
2. In most cases it surrounds the Umbra-shadow.

Diagrams showing umbra and penubmra shadows

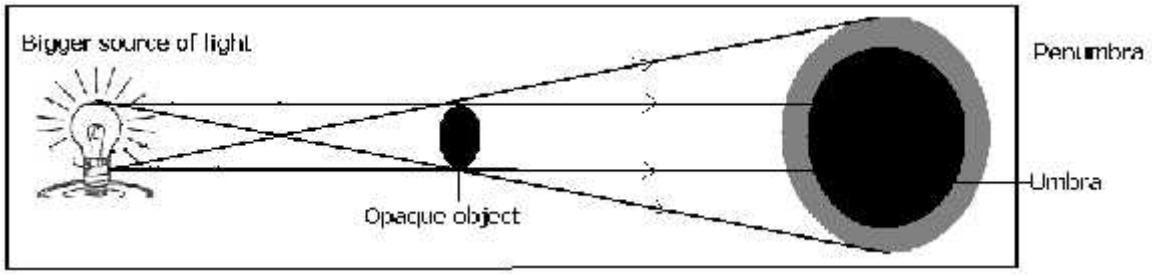


How a shadow is formed

a) When the source of light is small, the shadow formed is dark allover.



b) When the source of light is larger, the shadow formed has two regions, Umbra and Penumbra.



Size of Shadow in Relation to position of source of light.

c) The size of the shadow depends on the angle of the source of light in relation to the object and screen.
d) Shadows caused by sunlight are longest in the morning at sun rise and at evenning at sun set because of the angle of the sun and the objects.
e) They are shortest at noon.
f) The size of the shadows also depends on the distance of the object from the source and distance from the screen.

Importance of shadows.

a) Shadows are used to tell direction.
b) Shadows provide shelter to animals and some plants.
c) We also use the shadow to estimate time.

ECLIPSES:

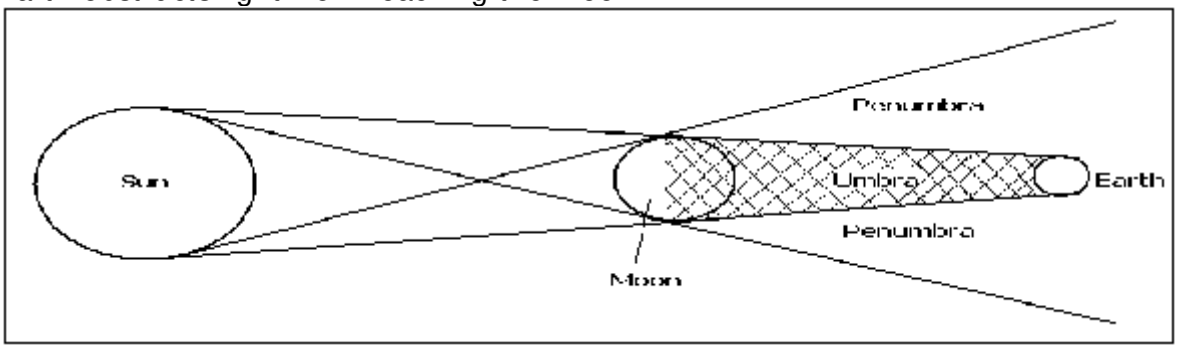
1. Eclipses are also shadows. The word Eclipse means **cut off.**
2. Eclipses are formed when the moon or earth obstructs light from the sun.

Types of Eclipses

i). Lunar Eclipse (Eclipse of the moon)
ii) Solar Eclipse (Eclipse of the sun)

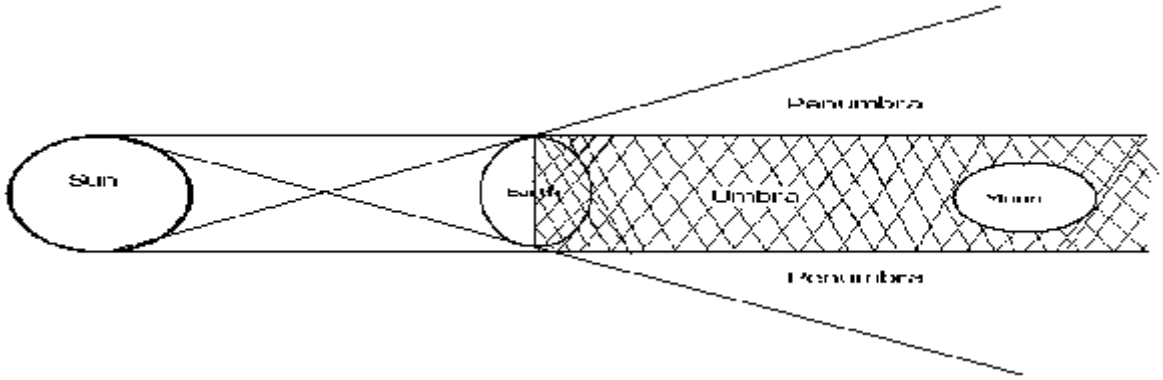
Lunar Eclipse (Eclipse of the moon

Lunar Eclipse takes place when the Earth comes between the moon and the sun. The Earth obstructs light from reaching the moon.



Solar Eclipse (Eclipse of the sun)

1. Solar Eclipse takes place when the moon comes between the sun and the Earth.
2. The moon obstructs light from reaching some parts of the earth.
3. The parts which receive Umbra shadow get **total darkness** and those which get penumbra shadow receive **partial darkness**.

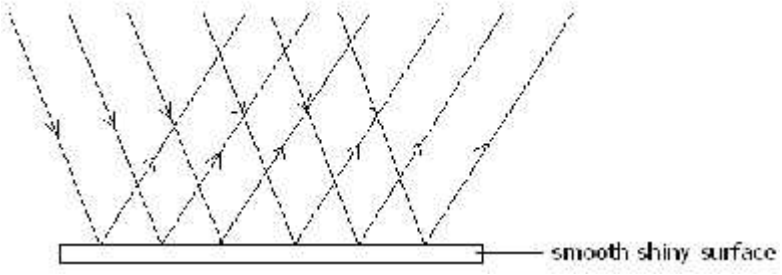


REFLECTION OF LIGHT:
Reflection is **the bouncing back of light**.

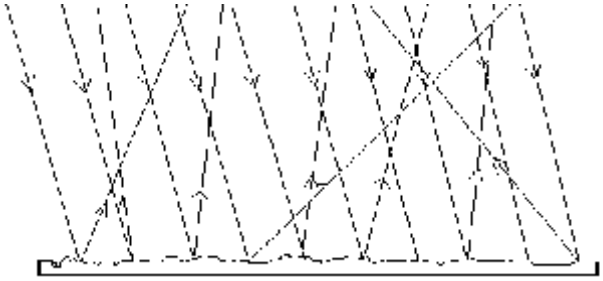
Types of reflections
a) Regular reflection
b) Irregular reflection

REGULAR REFLECTION:
1. This is when light rays are bounced back in a regular direction.
2. It takes place when a parallel beam meets a smooth and shiny surface and is reflected as a parallel beam.
3. The surfaces include
   a) Plane mirrors
   b) Polished surfaces etc.

Rays of light on a smooth shiny surface.



IRREGULAR RELFECTION:
1. This takes place when light meets rough opaque objects.
2. When a parallel beam meets a rough surface, the rays are reflected when they are **scattered**.
3. The scattered reflection is known as **diffused reflection**.
4. This type of reflection is common in rough surfaces like frosted glasses.
5. We are unable to see clear images on rough surfaces because they give irregular reflection.



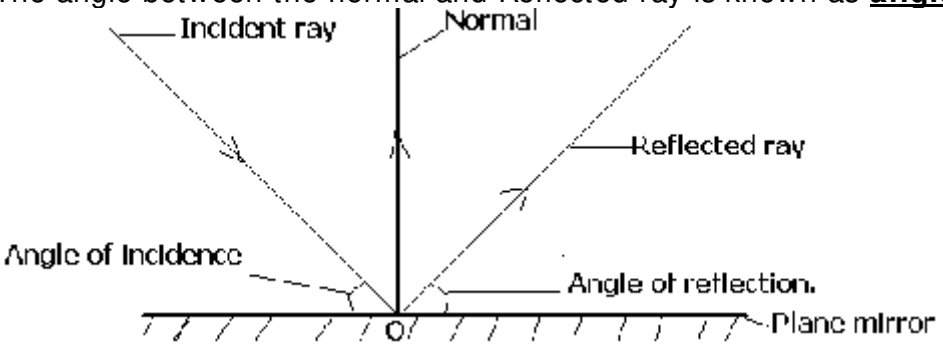
REFLECTION ON A SMOOTH SURFACE.

1 The ray of light from the source of light to the smooth surface is known as an **incident Ray**.

2 The ray of light bounced off from from the reflecting surface is known as **reflected ray**

3 The angle between the normal and the incident ray is called **angle of incidence**

3 The angle between the normal and Reflected ray is known as **angle of Reflection.**



LAWS OF REFLECTION:

The laws of reflection state that:

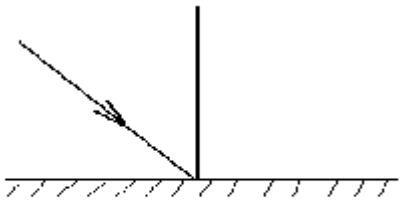
(i) The ray of incidence, Normal and ray of reflection lie in the same plane at the **point of incidence.**

(ii) Angle of incidence equals to the angle of reflection.

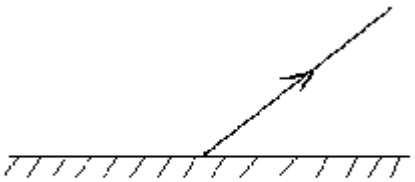
APPLICATION OF THE LAWS OF REFLECTION

Complete the diagrams below

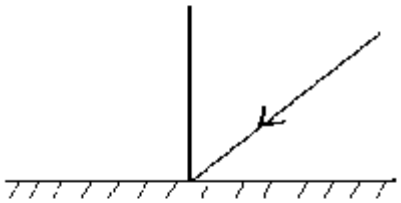
a.



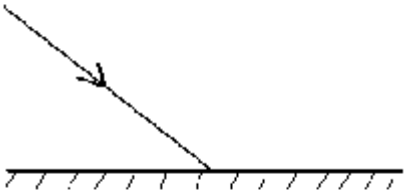
b.



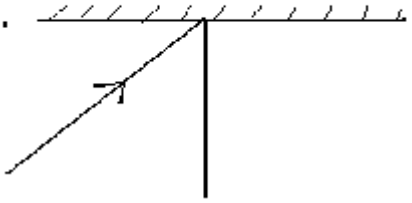
c.



d.



e.

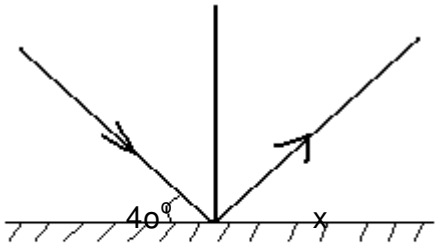


f.

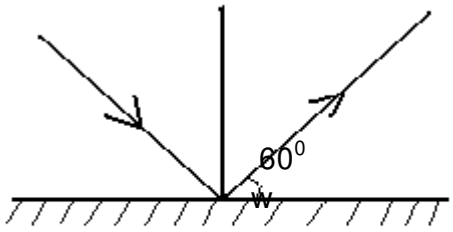


Find the given unknown angles.

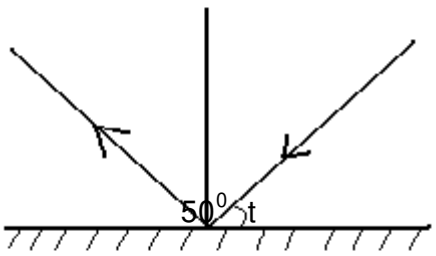
a.



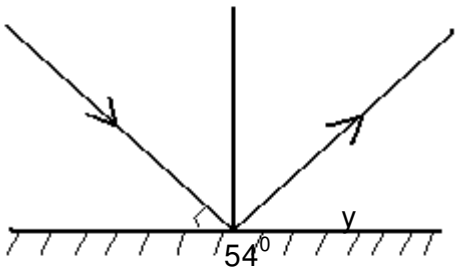
b.



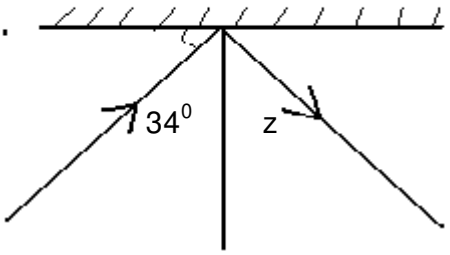
c.



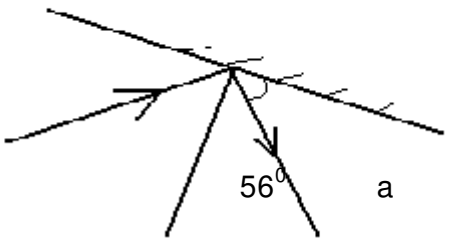
d.



e.



f.



REFLECTION AND ABSORPTION OF LIGHT BY DIFFERENT MATERIALS.

1. Brightly coloured objects reflect more light and heat than dull coloured ones.
2. Smooth and polished objects reflect more light and heat than rough and unpolished ones.
3. Dark materials are good absorbers of light and heat.
4. Black clothes dry faster than white because black absorbs more light and heat than white which reflect more heat and light.
5. Food in a black sauce pan will cook faster than food cooked in a shinny sauce pan.
6. Houses in hot areas should be painted with bright colours like white to reflect heat and keep the interior of the house cool.
7. People living in hot areas prefer wearing brightly coloured clothes to dark coloured clothes because brite colours reflect heat to keep the body cool while dark ones absorb heat which makes one uncomfortable with heat.

IMPORTANCES OF REFLCTION

(i) Reflection helps us to view objects. This is so because in order to view objects, light has to be reflected from the object to our eyes.
(ii) Reflection helps us to use mirrors to view our images and other images either behind or above us.
(iii) Helps in the making of solar cookers.
(iv) Reflection is useful in reflectors of car headlamps and torches to help to form a diverging beam.

IMAGES

1. An image is **a light picture**.
2. When light falls on a plane mirror, it is reflected.
4. When the rays are from an object and fall on a plane mirror, they are reflected and form an **image**.

Types of Images

There are two types of images and these are:

d) Real images
e) Virtual images.

REAL IMAGES

These are the images formed on the screen like:

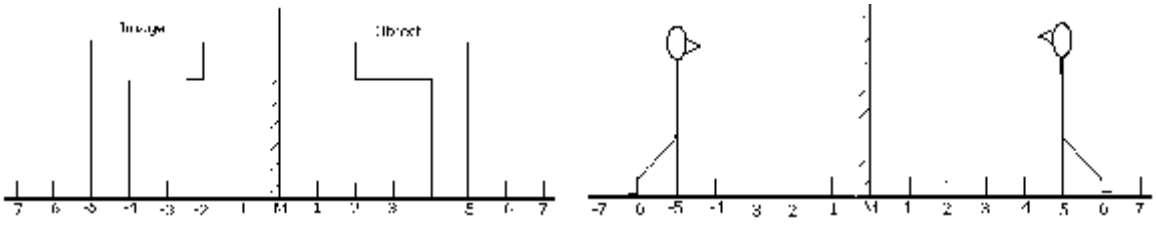
a) Televisions
b) Cinemas
c) Photographs.
d) Computers

VIRTUAL IMAGES.

These are images formed behind the screen e.g. on mirrors.

Application of the characteristics of plane mirror images.

a) b)



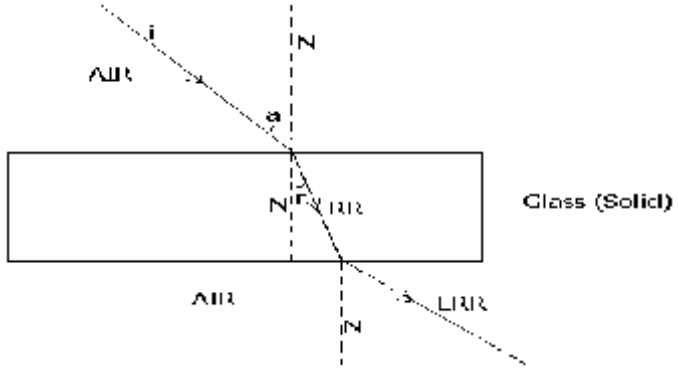
c)



REFRACTION OF LIGHT:

1. This is **the bending of light rays** as they pass from one media to another.
2. Refraction is brought about by **change in speed of light** as it passes through transparent objects of different densities.
3. A sudden change of speed of light leads to change in direction seen as a bend.
4. When light passes from air to water it will bend because air is less dense than water.

Illustration.



i. Incident ray.
RR Refracted ray
ERR Emergent refracted ray.
a. Angle of incidence.
r. Angle of refraction.

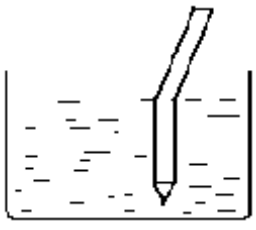
NOTE:

When rays are from less dense medium to a denser medium, it bends towards the normal.

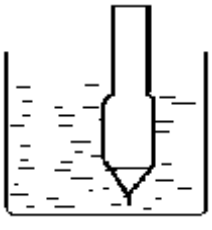
When it moves from a denser to a less denser medium, it bends away from the normal.

EFFECTS OF REFRACTION:

b) It makes pools of water appear shallower than they are.
c) It makes a stick placed in a glass of water appear bent.



A pencil put in a glass at an angle.



A pencil put perpendicularly.

c) It causes mirages on hot sunny days.
d) It makes the white colour to split into the seven colours of the rainbow.
e) A fish in water is seen to be nearer the surface of water than its actual depth due to refraction.

Advantages of Refraction:

a) It enables the camera to focus images on the film.
b) Enables optical instruments like microphones, telescopes to function.
c) Enables eyes to focus images onto the retina.

Disadvantages of Refraction:

a) It brings about short sightedness and long sightedness.
b) It may cause accidents of drowning in pools of water when they are miss judged to be shallow.

SIMPLE OPTICAL INSTRUMENTS:

These are instruments that work with the help of light.

Examples of optical instruments

a) Plane mirrors.
b) Periscope
c) Curved mirrors
d) Lenses
e) Camera
f) Pinhole Camera
g) Telescope
h) Binoculars
i) Magnifying glasses

PLANE MIRRORS:

1. This is a flat, opaque smooth shiny piece of glass.

Characteristics of images formed on plane mirrors.

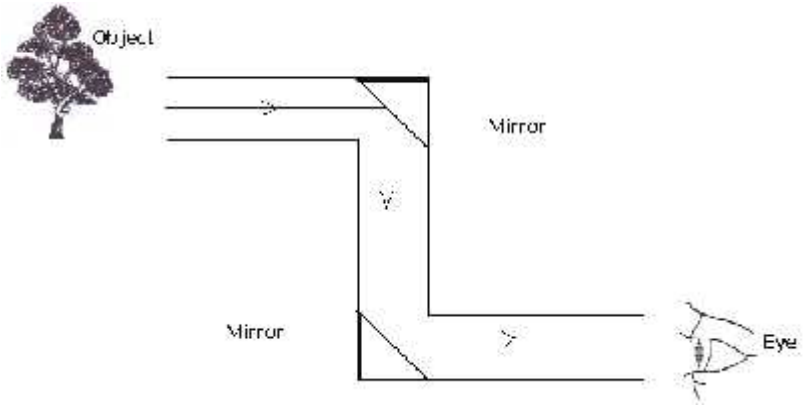
a) They are virtual. Virtual images are images that cannot be formed on the screen. They are formed behind the mirror.
b) They are laterally inverted (changed left to right or has reversed sides)
c) Same distance behind the mirror as the as the object in front of the mirror.
d) It is the right way up.
e) Has the same colour, shape and size as the object.

USES OF PLANE MIRRORS:

1. They are used by people as dressing mirrors to look at themselves.
2. Mirrors are used by drivers to see traffic behind them.
3. The are used in **periscopes** to view objects above the viewers level.

PERISCOPE

1. A periscope is an instrument used to view things over obstacles and around corners.
2. Periscopes are made up of plane mirrors placed at 45^{o} facing each other.
3. The rays from the objects are reflected on to the first mirror. It is then reflected into the second mirror and then viewed by the viewer.



USES OF PERI SCOPES

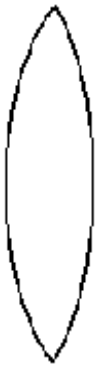
a) Periscopes are used in submarines when under water to view object on the water surface.
b) They are also used by soldiers hidden in trenches to view things above them.
c) They are used by short or hidden spectators in stadiums to watch matches.
d) They are used by minors to view what is on the ground.

CURVED MI RRORS:

They are two types: Convex and Concave mirrors.

Convex mirrors

Convex Mirrors are curved outwards.
They form small images.
A convex mirror



Convex mirrors are used as follows:

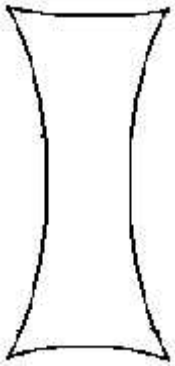
a) As driving mirrors to view traffic behind.
b) In supper markets they are used to monitor the activities in the building (room).
c) Security people use them to view dangerous objects hidden under cars.

Convex Mirrors are used for the above uses because they show a large area compared to plane mirrors.

Concave Mirrors:

These are curved inwards.

They form magnified images of objects.



Uses of concave mirrors

(i) They are used as reflectors of car head lamps, touches, bicycle and motor cycle lights.
(ii) They are also used by dentists to view bad teeth in people's mouth.
(iii) They are used as shaving mirrors to view more details when shaving.
(iv) They are used to make solar cookers.

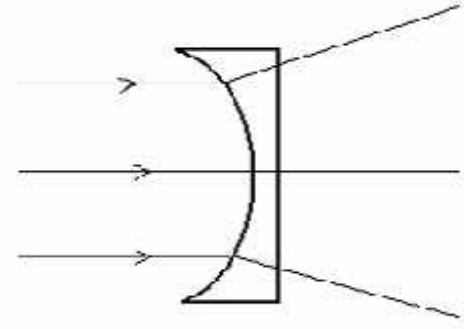
LENSES:

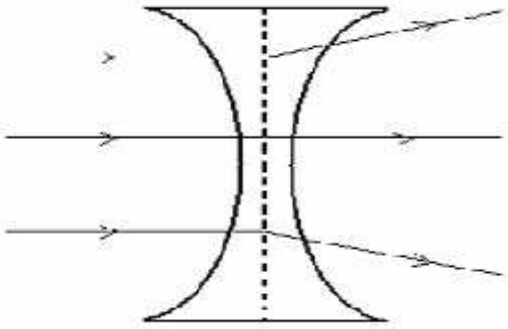
1. Lenses are transparent, curved pieces of materials.
2. Lenses can be made from glass, clear plastic or any other curved transparent materials.
3. There are two types of lenses:-
   (i) Concave lens
   (ii) Convex lens

4. When rays are passing through lenses they bend towards the thicker surfaces.
5. Rays passing through the centre of the lens are not refracted.

CONCAVE LENSES:

1. This is a transparent material curved inwards. It is thinner in the centre and thicker at the outside edges.
2. When curved on only one side it is called a plano concave when curved on both sides it's a biconcave.
3. When light rays fall on the concave lens, they pass through when they are spread outwards.
4. A concave lens forms a diverging beam. It is also called a diverging lens because it makes the rays to diverge as they pass through it.
5. When viewed through concave lenses make things appear smaller.

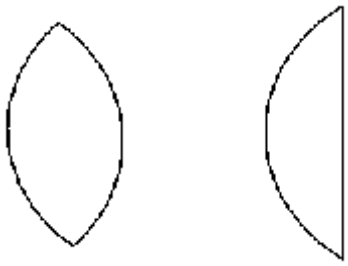




CONVEX LENSES:

1. Convex lenses are transparent materials curved outwards.
2. Convex lenses are thicker in the centre and thinner at the outside edges.

3. When curved one side it is known as a Plano Convex. When curved on both sided it is known as a biconvex.



When light rays fall on a concave lens, they converge as they pass through.

4. They form a converging beam. That why it is also called a coverging lens.
5. The point at which rays meet is known as focal point.

USES OF LENSES:

Lenses are used in the following optical instruments:-

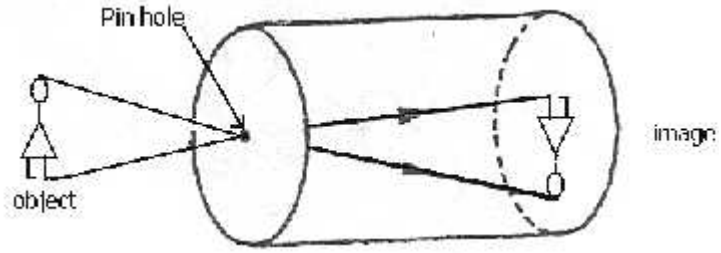
(i) They are used in the eyes. (convex lenses) to focus light onto the retina.
(ii) They are used in cameras to focus light into the film.
(iii) Spectacles use lenses to correct eye defects.
(iv) Microscopes and magnifying glasses use lenses to make objects appear bigger so that details are viewed properly.
(v) Projects use lenses to magnify images from the film.
(vi) Telescopes and binoculars use lenses to view distant objects by making them appear nearer.

IMAGES FORMED BY LENSES:

i) Convex lenses form real images which are upside down and smaller than the objects.
ii) Real images are those that can be formed onto the screen.

A PIN HOLE CAMERA:

This is a dark box which allows light through a tiny hole made on one side of the box. At the other side opposite the hole there is a translucent paper which acts as a screen. An extension of the dark box is made after the screen for better viewing of the image on the screen.



How it works:

1) Light from an object is reflected towards the pinhole cameracamera.
2) Rays pass through the pin hole moving in a straight line.
3) The rays then fall on the screen and form an image.
4) The image formed by a pin hole camera has the following characteristics:-
   (i) It is real
   (ii) It is smaller than the object
   (iii) It is upside down

NOTE:

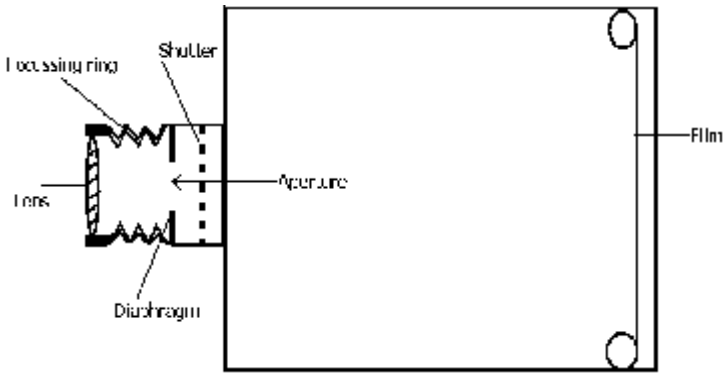
(i) The smaller the hole the better the image formed.
A wide hole gives unclear images.

(ii) The pin hole works on the principle that **light travels in a straight line.**

A LENS CAMERA (PHOTOGRAPHIC CAMERA):

It is a light proof box with the following functioning parts; The Diaphragm, aperture, lens, shutter, film and focusing ring.

Diagram of a lens camera



Functions of each part

1. **The Diaphragm:**
   i. It is made of opaque materials with a hole in the centre called Aperture.
   ii. The diaphragm regulates the amount of light entering the camera.
   iii. This is done by changing the size of the aperture.

2. **The Aperture:**
   The aparture is a small hole in the centre of the diaphragm where rays pass through to enter the camera.

3. **The Lens:**
   This is a convex lens made of glass. Its function is to focus light rays entering the camera.

4. **The Shutter:**
   i. This is an opaque material that covers the diaphragm to prevent light from entering the camera.
   ii. It opens for a fraction of a second to allow light into the camera during the photographing exercise.

5. **The Film:**
   It is a light sensitive plastic or piece of paper on which images are formed.
   The images formed have the following characteristics:
   (i) They are real
   (ii) Diminished
   (iii) Upside down
   (iv) Same shape as the object

6. **Focusing Ring:**
   This is the material that adjusts the distance of the lens from the film.

It does this by moving the lens either forward or backwards nearer the film.

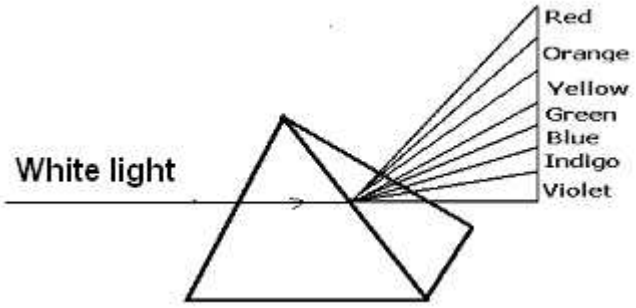
How a lens Camera Works:

i) Rays from the are reflected towards the camera.
ii) The shutter opens for a fraction of a second to allow in the light.
iii) The Diaphragm regulates the amount of light entering the camera.
iv) When the light passes through the lens it is focused onto the film.
v) The film reacts to the lights to form an image.
Photographs are got after the film is developed (chemicals removed). And then the images are printed into photographs.

A GLASS PRISMSAND LIGHT SPECTRUM

1. When light passes through a triangular glass prism, it is refracted and it splits into seven colours.
2. The seven colours into which the while light splits are **Red, Orange, Yellow, Green, Blue, Indigo and Violet**.
3. The group or band of the seven colours in which the white light splits is known as a **light spectrum.**
4. The splitting of the white light into a spectrum is known as the **dispersion of light.**

Diagram showing a light specrum

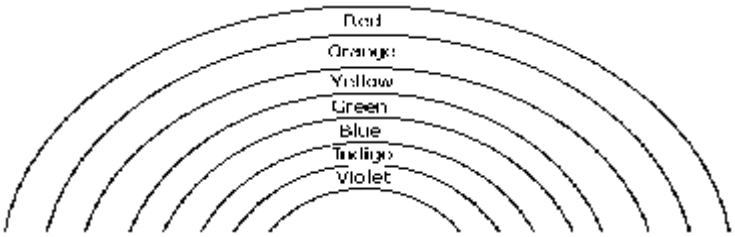


Spectrum can also be formed in the following ways.

(i) Putting a glass with water in the morning at the window sill so that the rays go through it.
(ii) Reflecting sun light with a mirror partly dipped in a basin of water.

A RAIN BOW:

1. A rainbow is a natural spectrum formed when the sunlight is refracted by raindrops during a cloudy day.
2. The rain drops act as a prism and split the sunlight into seven colours i.e Red, Orange, Yellow, Green, Blue, Indigo and Violet.



RIMARY AND SECONDARY COLOURED LIGHTS:

1. Coloured lights which can not be got by mixing other coloured light are called Primary Colours. 2. Red, Green and Blue are the primary coloured lights.
3. All the other colours got after mixing other colours are known as Secondary Colours.
4. Below are examples
   (i) Blue and Green when mixed you get **cyan**
   (ii) When Red and Blue lights are mixed you get **Magenta**
   (iii) Mixing Red and Green lights you get **Yellow**.
   (iv) When all colours are mixed you get **White**.

HOW WE ARE ABLE TO SEE COLOURS:

Objects appear to be of certain colours because they absorb other colours and reflect only that colour. i.e

(i) Objects appear blue because they absorb all the other colours and reflect Blue
(ii) Objects appear red because they absorb other colours and reflect Red.
(iii) Objects appear white because they reflect all the colours and absorb none.
(iv) Black objects absorb all the other colours and reflect none that is why they appear Black.
(v) Dull and Black colours absorb more light and heat than they reflect.

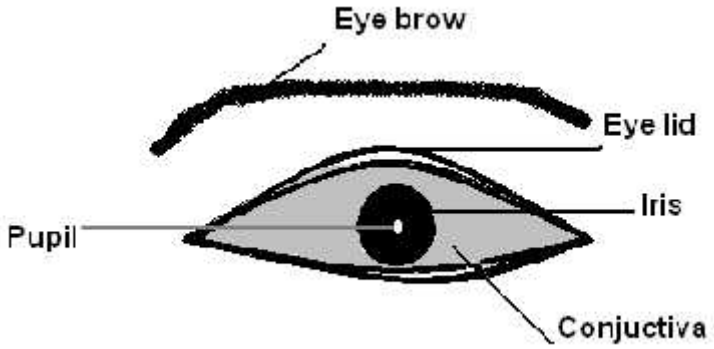
NOTE

i) Bright and White colours reflect more light and heat than they absorb.
ii) For that reason, people in hot regions should put on white or bright colours to reflect off the heat. Cars and buildings are painted bright colours to reflect off the heat and light.

THE HUMAN EYE:

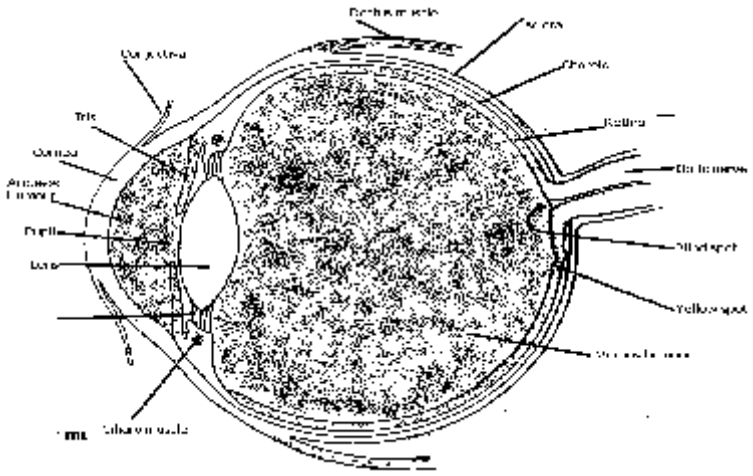
1). An eye is the organ that uses light in order to function.
2). It is shaped like a ball and it is enclosed in a part of the skull called **Socket.**

An ouside view of the eye



Part and Its Function	
Eye Lids	These are tough coats that protect the eye by covering it. The closing can be voluntary or reflex action. (done without the will and consultation of the brain)
Conjuctiva	A thin layer covering the front part of the eye.
Eye Lashes	These trap foreign bodies from entering the eye easily.
Eye Brows	These prevent sweat from flowing into the eye.

THE INNER PARTS OF THE EYE



The function of the parts of the human eye:

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PART	FUNCTION.
The Iris	It controls the amount of light entering the eye by regulating the size of the pupil. It is responsible for the colour of the eyes.
The convex lens	Refracts the light entering the eye so that it is focused on the retina.
Aqueous and vitreous humours	i. They keep the shape of the eye. ii. They also refract light so that it is refracted onto the retina.
The pupil	It allows light into the eye.
The choroid	is made up of capillaries which supply the eye with blood. This blood supply food and oxygen to the eye. It is opaque to prevent light from entering the eye and also to prevent internal reflection
The retina	It is a light sensitive part of the eye. It is where images are formed in the eye
The **yellow spot** (Fovea)	is a small bend in the retina where there is the highest concetration of light sensitive cells. If images are formed here they will clearly be seen.
The blind sport	It is a point where the nerves leave the eye . If images are formed here no image will be seen.

i) The retina is a light sensitive part of the eye.

- It is where images are formed in the eye.
- It is made up of two types of cells, the cones and rods.
- The cones help in colour vision while the rods help in dim light and night vision.
- The images formed at the retina are diminished,(smaller than the object), real and upside down.
- The retina is connected to the brain by the optic nerves.
- In the retina the images are changed to nerve impulses (messages). These messages are taken to the brain by the optic nerves.

NOTE

The tear glands are found under the top layer of the eye lids. They produce tears. Tears have the following functions:

- help to lubricate the eye ball.
- help to wash off foreign bodies from the eyes.
- help to kill some bacteria that go to the eyes.

Comparison of the human eye and pin hole camera:

Human Eye	Pin hole Camera
Pupil changes size to control light entering	Hole remains the same size
Has a convex lens	Has no lens
Focuses the light by changing the shape of the lens	Focuses the light by changing the distance of the camera from the object.
Has eyelids to close the eye Images is upside down	Opening always open Image upside down
Images formed on the retina (Real Images)	Image formed on the screen (Real Images)
Images are smaller than the object	Images are smaller than the object

CARE FOR THE EYE:

Eyes are delicate sensory organs that need a lot of care. We can care for our eyes in the following ways:

i. Clean the eyes with plenty of clean water and soap. When eyes are not properly washed with plenty of water, one gets water cleaned diseases. Like: trachoma
ii. Avoid sharing face towels and handkerchiefs with eye infected people. This spreads eye diseases.
iii. Use proper lighting when reading. Flickering lights and dim lights can destroy eyes when used for reading. Very bright light damages the retina.
iv. - Removal of foreign bodies from eyes should be done using the tip of a clean sterilised cloth or handkerchief.
- They can also be removed by washing the eye with plenty of water.
- Avoid rubbing the eye when a foreign body goes onto it. Avoid using a sharp object to remove the foreign body as it may scratch the eye.

5... Treat eye infections immediately.

Eye Defects

Eye defects are abnormalities in the eyes which prevent some one from seeing properly.

Causes of eye defects

i. Abnormal shape of the eyeballs.
ii. Weak lenses
iii Irregular shape of the cornea.

Examples of eye defects

i. shortsightedness (myopia)
ii. long sightedness (hypermetropia)

iii. astigmatism iv.

SHORT SIGHTEDNESS:

1. This is an eye defect nearby objects are seen clearly but distant ones are nor clearly seen.
2. Short sightedness can also be called myopia or near sightedness.
3. Short sightedness is caused by elongated eye balls.
4. It can also be caused by the lens failing to change to become long and thin (short fat lens).
5. Short sightedness person the images from far will be formed infront of the retina.
6. Short sightedness can also be caused by continual use of eyes to close work i.e T.V or computers, ready writing.

Correction for short sight.

1. The correction for short sight is wearing spectacles with concave lenses.

2. Concave lenses are used because they first diverge the rays before they enter the eyes.

LONG SIGHTEDNESS.

1. A long sighted person cannot see nearby objects clearly but can see distant objects clearly.

2. Long sightedness can also be called far sighetedness or hyper metropia.
3. Long sightedness is caused by eye balls which are shorter than normal.
4. It can also be caused by the lens failing to become short and fat.
5. Images from near are formed behind the retina in a long sighted people.

Correction of Long sightedness.

A convex lens is used to correct long sightedness.

A convex lens is used because it converges the rays before they enter the eyes.

Astigmatism Presbyopia

EXCRETORY SYSTEM

Excretion is the process by which the body removes harmful products from the body before they become poisonous. (Toxic)

Excretory system

1. It is a collection of organs the body that helps in removing harmful products in the body before they become toxic.
2. The excretory organs include:
   a) Kidneys
   b) Lungs
   c) Liver.
   d) Skin.

The KIDNEYS

There are two kidneys located at the back of the abdomen.
They are bean shaped and reddish in colour.

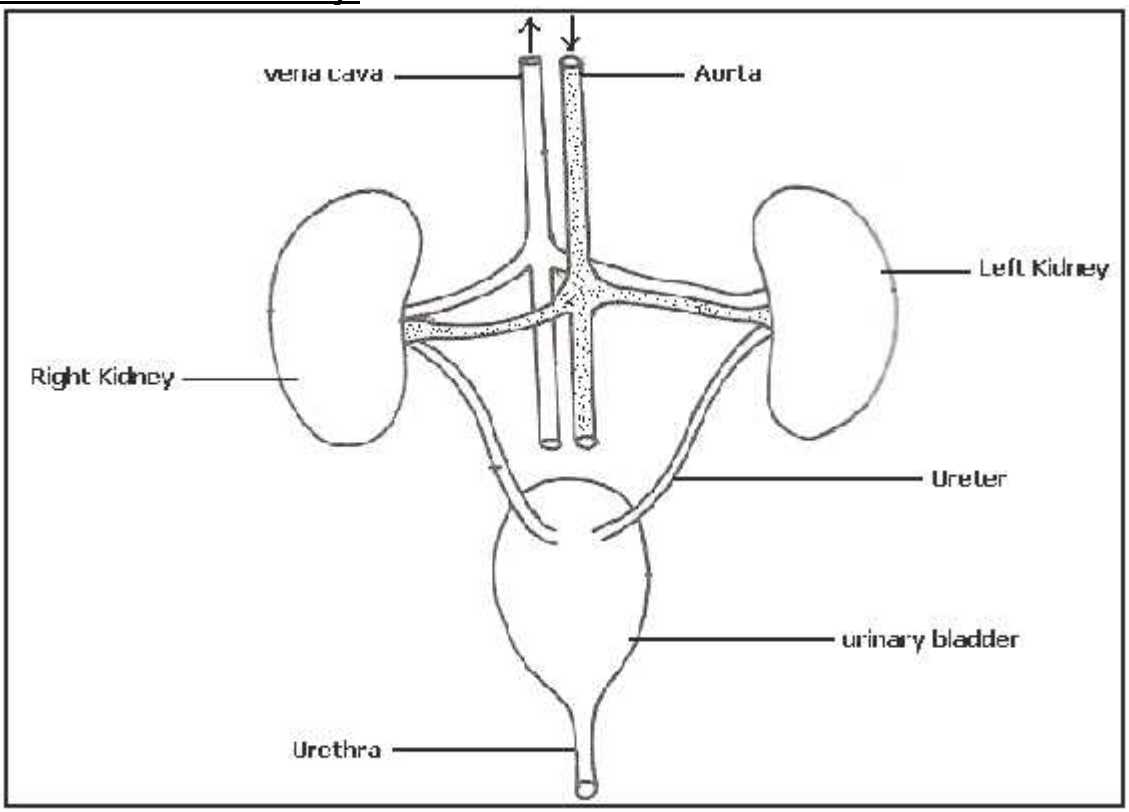
The major functions of the Kidneys.

e) Kidneys filter blood in order to remove harmful products which is passed to the bladder.
f) The kidneys help in controlling the amount of water and salts in the blood.

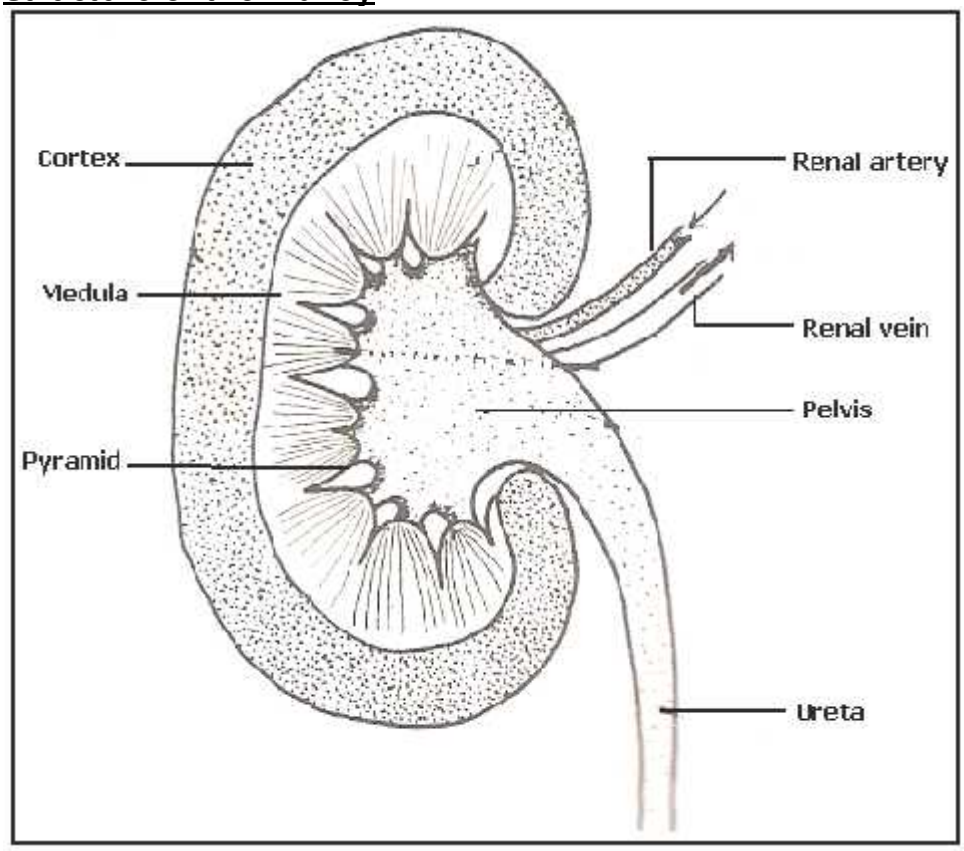
Substances excreted by the Kidney.

a) urea.
b) Uric acid
c) Excess water
d) Excess salt.

Position of the kidney.



Structure of the kidney



Functions of parts of the Kidney.

Renal artery

It carries oxygenated blood to the kidneys.

Renal veins

They carry deoxygenated blood away from the kidneys.

Medula

It receives blood that should be filtered.

The Pyramid

It contains nephrones that filter blood.

The Pelvis

It receives harmful substances filtered by the kidney.

The ureta

It carries urine from the pelvis to the urinary bladder.

The urinary bladder.

It temporarily stores urine before it is passed out.

The urethra

It passes out urine from the bladder out of the body.

Diseases of the Kidney.

a) Gonorrhoea
b) Kidney stones.
c) Nephritis
d) Bilharzia

e) Kidney cancer
f) Kidney failure/Uremia.

How to care for the Kidneys.

a) avoid a lot of salt in food.
b) Avoid drinking a lot of alcohol.
c) Drink water regularly.
d) Urinate as soon as you feel the bladder is full. Don't hold urine for a long time.
e) Eat a balanced diet
f) Have regular body exercises.

THE LUNGS

1. The lungs act as both the respiratory system and excretory system.
2. It is an excretory system because it excretes carbondioxide and water vapour.
2. It is a respiratory system because it helps the body to get oxygen for the process of respiration.
3. Respiration is the process by which the body uses food and oxygen to produce energy, water and carbondioxide.
4. The equation for respiration is
   Food + Oxygen = Energy + Heat + Water + Carbondioxide.

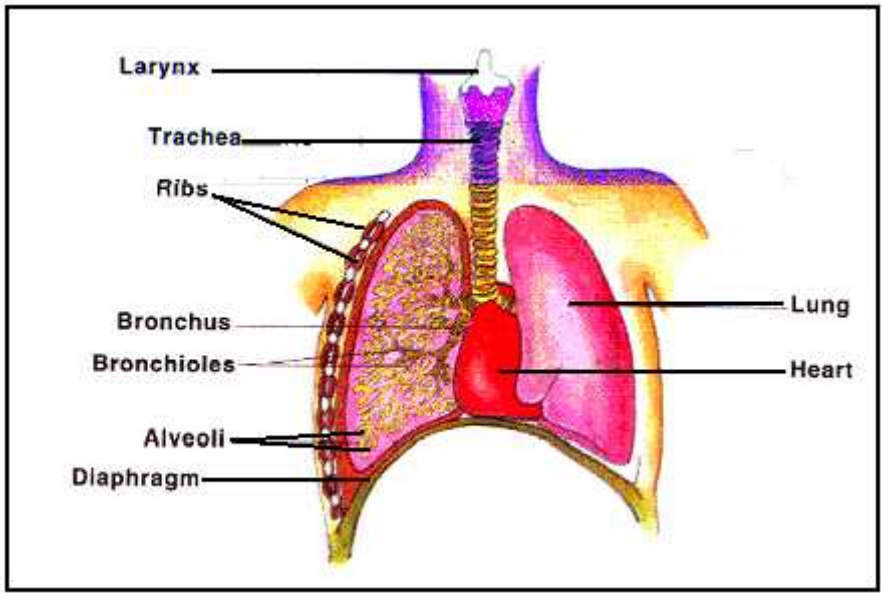
Note: Water and Carbondioxide are by products of respiration and the major products are energy and heat

The products of respiration.

a) Energy
b) Heat
c) Carbondioxide.
d) Water.

Note. Carbondioxide and water are given out when we breathe out. Heat and energy are used by the body.

The respiratory system



Functions of different parts of the respiratory system

The nose
It contains mucus and cilia which help to trap dust and bacteria.
Note: Air is warmed and moistened in the nose.

Epiglottis
It prevents foreign bodies from entering the trachea.
Note: If food enters the trachea, choking and coughing will occur to clear the passage.

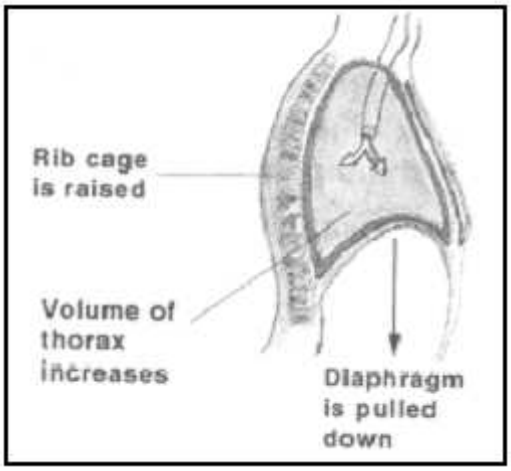
Trachea (wind pipe)
It conducts air into the lungs
Note: A trachea is made up of cartilages to keep it open.

Alveoli (air sacs)
a. It is where gaseous exchange takes place.
b. Air sacs are adapted to this function by being surrounded by many blood capillaries and having thin walls.

The pleural cavity
It produces pleural fluid.
Note: The pleural fluid cushions the lungs and reduces friction between the lungs and the ribs.

BREATHING
1. Breathing is the act of taking in and out of air.
2. There are two types of breathing:
   a. Inspiration (inhalation) – breathing-in.
   b. Expiration (exhalation) – breathing-out.

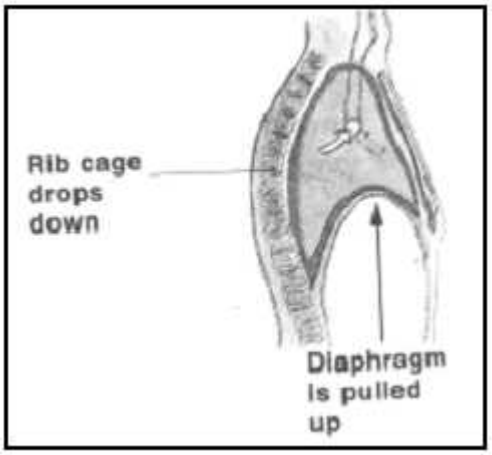
What happens when you breathe-in (during inspiration)



1. The ribs move up and outwards.
2. The diaphragm flattens to create space for the in coming air.
3. The volume of the lungs/chest increases.
4. Air is drawn-in.

Note: Inspiration is also known as inhalation.

What happens when you breathe-out (during expiration)



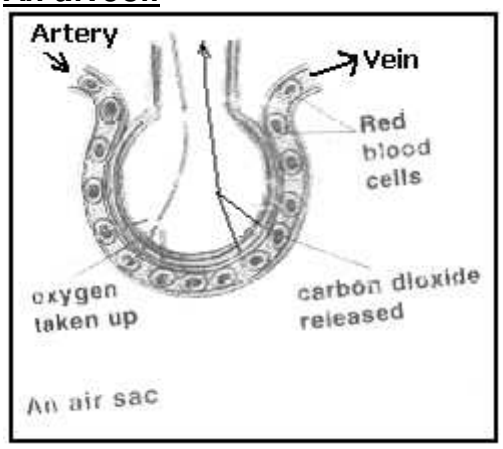
1. The ribs move to their original position.
2. The diaphragm becomes dome shaped.
3. The lungs go back to their original volume.
4. Air is expelled.

Note: Expiration is also known as exhalation.

GASEOUS EXCHANGE

1. Gaseous exchange takes place in the alveoli.
2. The air we breathe-in contains more oxygen than the one we breathe-out.
3. The air we breathe out contains more carbondioxide than the one we breathe-in.
4. When air reaches air sacs, oxygen diffuses through the walls of the air sacs.
5. Carbondioxide in the blood also diffuses into the air sacs and it is eventually expelled through the trachea and the nose.

An alveoli



6. Diffusion is the process by which molecules move from areas of high concentration to areas of low concentration.

Table showing approximate composition of inspired and the expired air

	Inspired air	Expired air
Oxygen	21%	16%
Nitrogen	78%	78%
Carbondioxide	0.03%	4%

Note: The concentration of nitrogen we breathe in and out does not change because it is not used in our bodies.

Rate of breathing

1. Under normal conditions, the rate of breathing is always between 10 to 16 times per minute.
2. The breathing rate increases because there is need for more oxygen for respiration to meet the energy demand of the body.

Factors that can increase the rate of breathing

a. Physical activity.
b. Fear
c. Fright
d. Diseases related to the respiratory system

Diseases, Infections related to Lungs

1. Lung cancer
2. Tuberculosis
3. Whooping cough
4. Asthma
5. Bronchitis
6. Pneumonia
7. Diphtheria
8. Emphysema
9. Influenza

Lung cancer

1. This disease destroys the cells of the lungs.
2. Lung cancer commonly affects smokers and people who work in factories which produce a lot of smoke.

Tuberculosis(TB)

1. It destroys the lungs especially air sacs.
2. A person with TB coughs a lot, becomes very thin, sweats a lot and has continuous chest pain.

Whooping cough(pertussis)

Bacteria cause whooping cough.

Asthma

1. A person with asthma finds it difficult to breathe.
2. The air passage is blocked by over production of mucus.

Bronchitis

1. Caused by a virus but worsened by smoking.
2. This is a disease that affects the air passage.
3. A person with bronchitis coughs continuously and experiences breathing problems.
4. This disease is common to people who smoke.

Pneumonia

It is an air borne disease caused by a bacteria and it affects both human beings and animals.

Influenza

It is an airborne disease caused by a virus.
(Prevention and control of immunizabe diseases; revise P.5)

How to care for the lungs

a) Avoid dusty places/Wear nose protective gear when in dusty places.
b) Do a lot of physical exercises.
c) Eat meals with a balance3d diet.
d) Stop smoking and keep away from smokers.
e) See a health worker in case of respiratory illness.

THE LIVER.

1. The liver is a reddish brown organ in the body which removes dead blood cells from the blood.
2. It receives oxygenated blood through the hepatic artery.
3. It receives digested food from the alimentary canal through the Hepatic portal vein.

Functions of the liver

1. As an excretory organ, the liver removes dead blood cells from blood for the purposes of making bile.
2. The liver regulates blood sugar.
4. The liver stores vitamins and mineral salts.
5. The liver detoxicates some poisonous substances in the blood before the kidneys filter it.
6. The liver produces heat that is distributed to other parts of the body.
7. The liver changes the stored fatty into glucose for energy.

Diseases of the liver.

1. Cirrhosis of the liver (hardening of the liver due to malnutrition).
2. Hepatitis (a water borne disease caused by a virus)
3. Liver abscess (Boils which form pus in the liver caused by a germ.
4. Liver cancer

Care for the liver.

1. Avoid drinking a lot of alcohol.
5. Boil drinking water to prevent hepatitis.
6. Eat a balanced diet.
7. Immunization against hepatitis.

THE SKIN

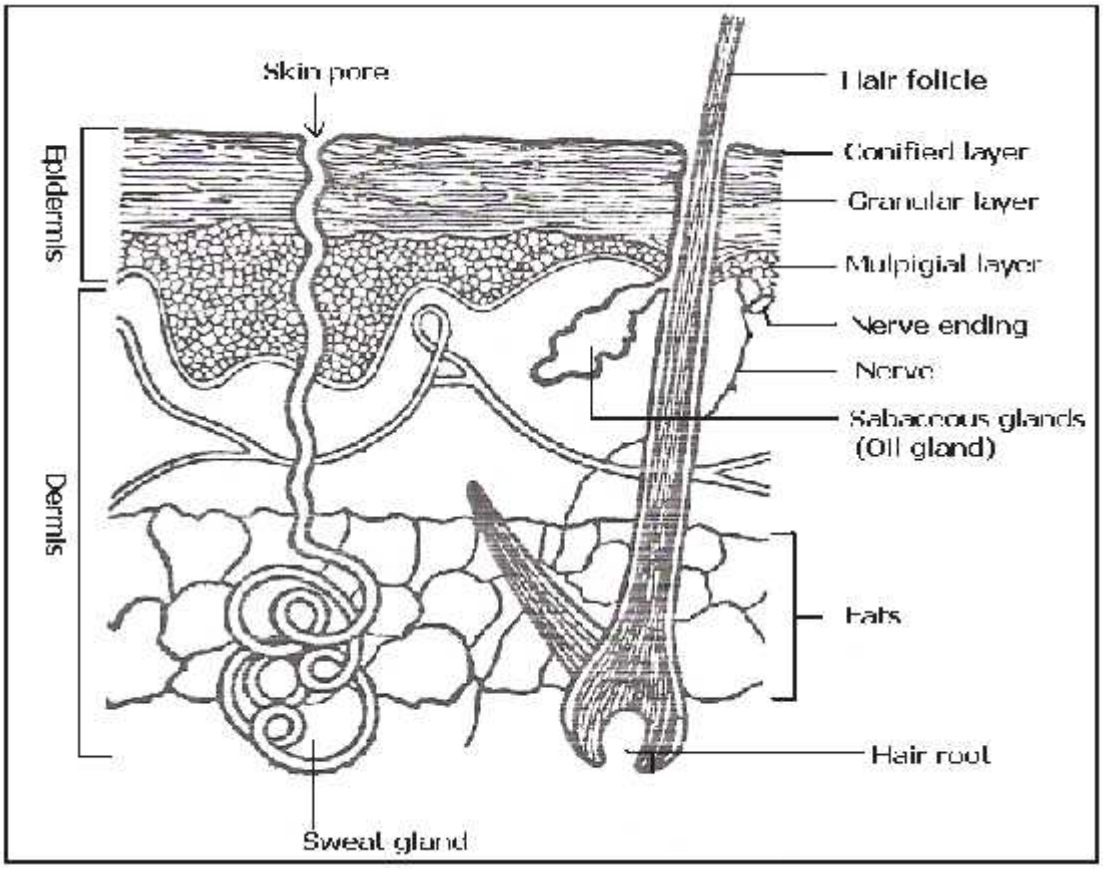
1. The skin is both an excretory and sensory organ.
2. It is an excretory organ because it excretes salt, excess water and sweat.

3. The skin has two main layers:
   a) The epidermis
   b) The dermis.

The functions of the skin

a) It regulates the body temperature.
b) It covers the body to protect it from germs.
c) It protects the body from serious damage.
d) It excretes sweat, salt and water.
e) The skin prevents the body from dehydrating.

The structure of the Skin



Parts of the Skin.

THE EPIDERMIS

1 It is the outer most layer of the skin.
3. it protects the inner layer from harm.
4. It is further divided into three layers in the order of:
   a) Conified layer
   b) Granular layer.
   c) Malpigian layer.

The Conified layer.

1. The Conified layer is made up of dead cells which provide protection against harm, bacterial, fungal and viral infection.
2. It also controls the loss of water from the body since it is waterproof.

The granular layer.

It is made up of living cells which die and continue making up the Conified layer.

The Malpigian layer.

1. It contains a pigment called melanin, which determines skin colour.
2. It also gives protection against ultra Violet rays from the sun.

THE DERMIS

The dermis is the inner most layer of the skin and it contains the following:

a) Sweat gland
b) Sebaceous glands
c) Nerve endings

d) Blood capillaries
e) Fats

Sweat gland
The sweat glands produce sweat which cools the body.

Sebaceous glands
These produce oil which keeps the skin moist, smooth and soft.

Nerve endings
The help in feeling. Eg touch, pain heat etc.

Blood Capillaries.
They carry to and from the skin. The carry food nutrients to the skin, oxygen and other materials the skin will require.

Fats
They prevent heat loss from the body. They act as insulators.

SKIN DISEASES
a) Ring worms.
b) Athelete foot.
c) Leprosy
d) Coerns
e) Skin cancer

Ring worms.
1. Ring worms are caused by fungus.
2. It spreads through:
   a) By body contact.
   b) Sharing clothes with infected person.

Scabies
Scabies is a skin disease caused and spread by itchmites.

Athlete foot
1. It is caused by a fungus and spread through infested socks and shoes.
2. It can be prevented by:
   a) Changing socks.
   b) Drying the feet before putting on socks or shoes.
   c) Disinfect shoes and socks with athelete foot powder and spray.

Leprosy
1. Leprosy is caused by bacilli bacteria and spread through:
   a) Air
   b) Body contact.

Cones
1. They are caused by wearing very tight shoes.
2. Prevention is by wearing well fitting shoes.

Care for the skin.
1. Wash your skin/bathe with clean water and soap.

3. Carry out physical exercises for proper functioning of the skin.
4. Protect your skin from sharp and hot objects.
5. Avoid using skin-lightening creams.
6. Wear lose clothes to allow proper aeration of the body.
7. Eat meals with a balanced diet for a healthy skin.

MACHINES.

1. A machine is a device that simplifies work.

How machines simplify work.

a. Reducing the force needed to do work.
b. Increasing the speed at which work is done.
c. Changing the direction n which force is applied.

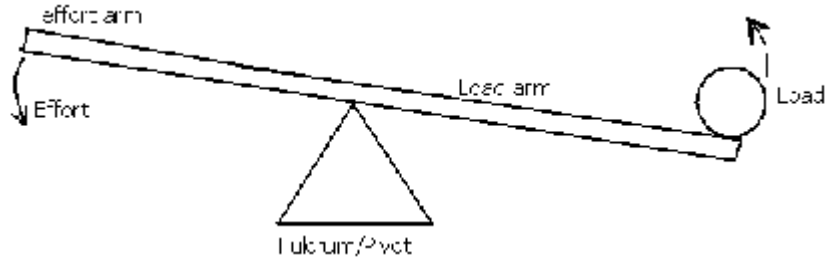
2. Machines are grouped into 7 groups. These are referred to as simple machines.

Examples of simple machines:-

a. Levers
b. Inclined planes
c. Wedges
d. Screws
e. Wheels and axles
f. Gears
g. Pulleys

LEVERS

1. A lever is a **rigid rod** moving freely at a fixed point.
2. A fixed point at which the lever moves is called a **pivot** or **fulcrum**.
3. In order for a lever to function force is applied. The applied force to the lever is called **effort**.
4. The objects to be lifted or resistance to be overcome is known as the **load**.



   i. The side which has the load is known as **load arm**.
   ii. The side with the effort is known as **effort arm**.

5. The distance from the pivot to the effort is known as **effort distance**.
6. The distance from the pivot to the load is known as **load distance**.

CLASSES OF LEVERS.

1. Levers are divided into three classes.
2. The classes depend on the position of the load, pivot and effort.
3. If the **pivot** is in between the load and effort that is a **first class lever**.
4. If the load is in between the pivot effort it is a **second class lever**.
5. If the effort is in between the load and pivot it is a **third class lever**.

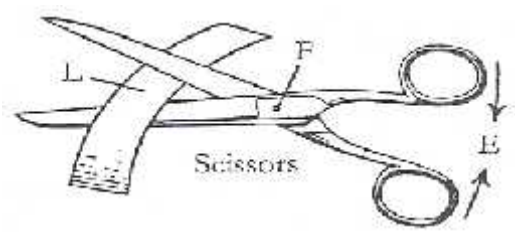
(PLE - HELPS TO KNOW THE ORDER OF LEVERS.)

FIRST CLASS LEVER

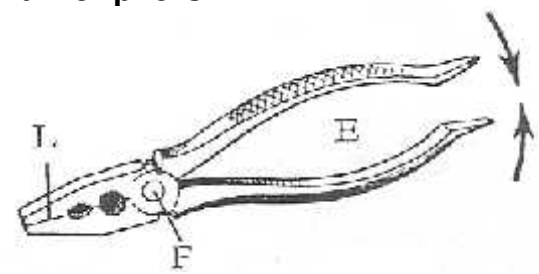
These are leavers whose pivot is between the load and the effort.

Examples of first class lever machines

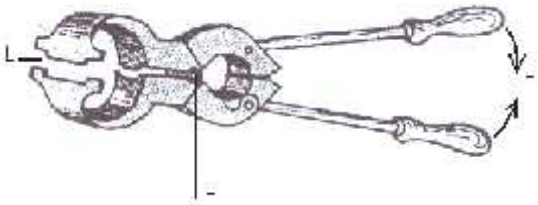
Pair of scissors



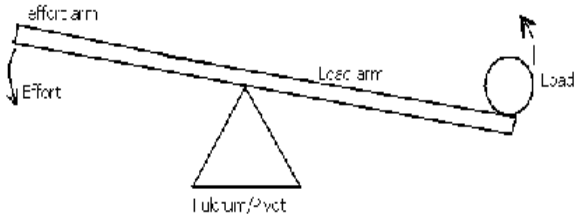
Pair of pliers.



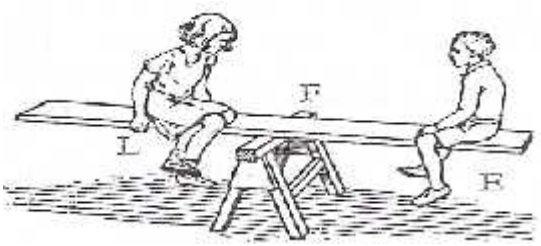
Burdizzo



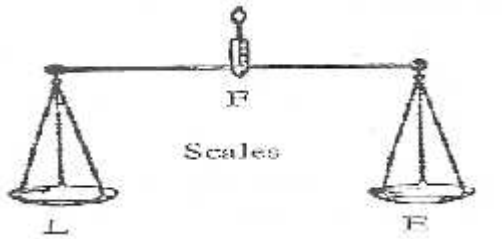
A craw bar



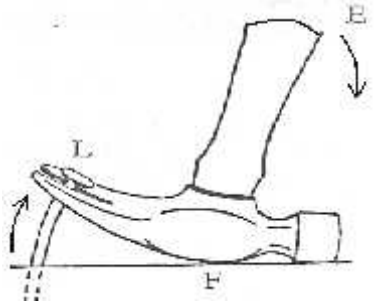
Sea saw



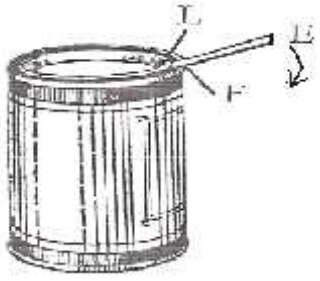
Weighing scale



A claw hammer



Tin lid opener.



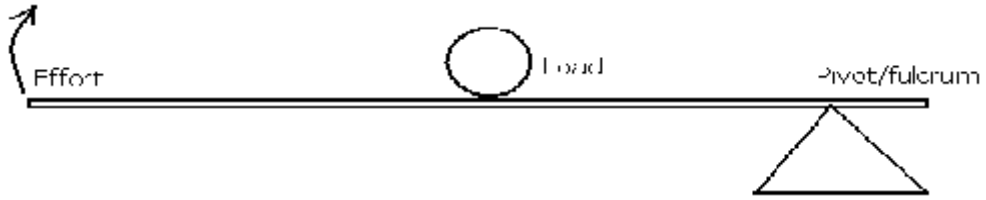
Advantages of using a first class lever.

1. It changes the direction of effort. i.e Effort moves in the opposite direction to that of the load.
2. Small effort moves a large load.
   NB: Work done is the same b'se the effort moves a longer distance than the load.

SECOND CLASS LEVER

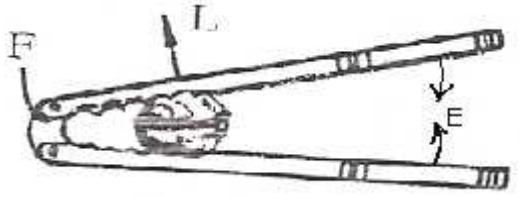
This is the class of levers in which the load is between the effort and the fulcrum.

Illustration

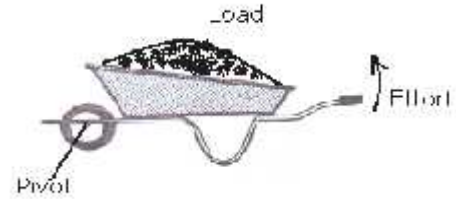


Examples of second class of levers.

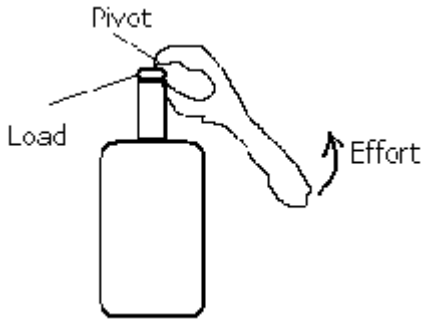
A nut cracker



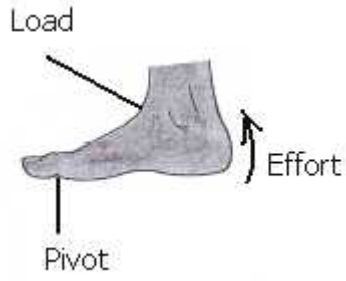
Wheelbarrow



Bottle opener



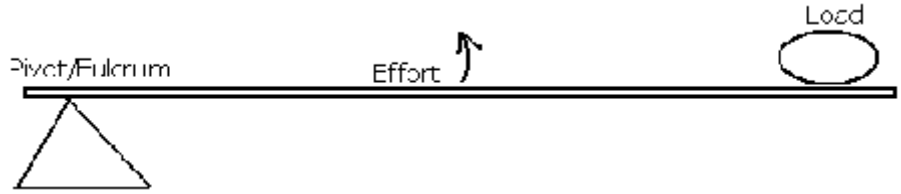
The foot



THIRD CLASS LEVER.

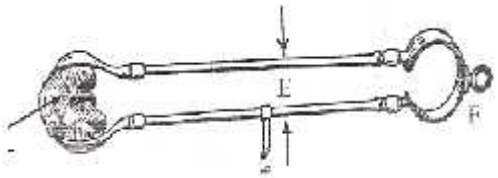
1. This is the class of levers in which the effort is between the load and the fulcrum.
2. Effort and load move in the same direction.

Illustration.

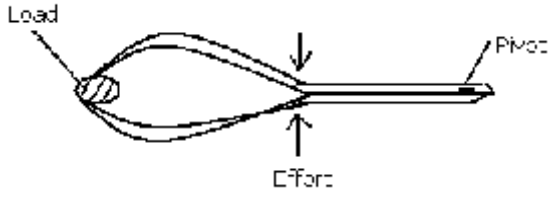


Pair of Tongs

.

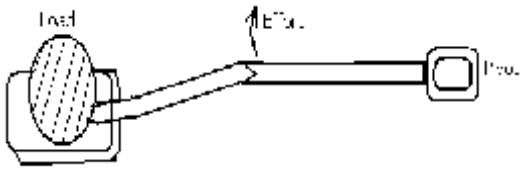


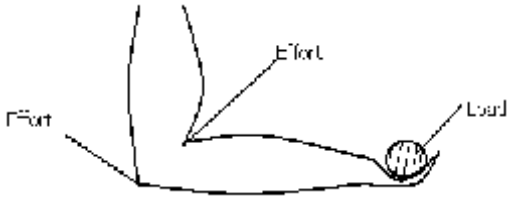
Pair of tweezers



A spade

The arm





A steppler.

A pair of Forceps.

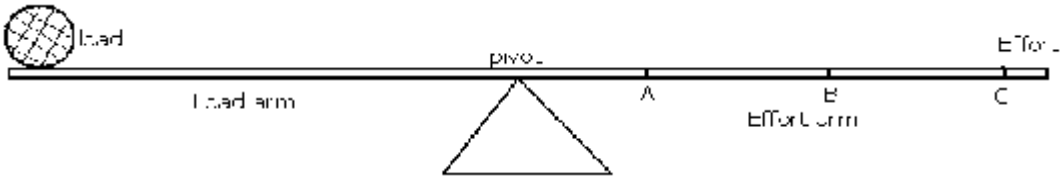
A fishing rode



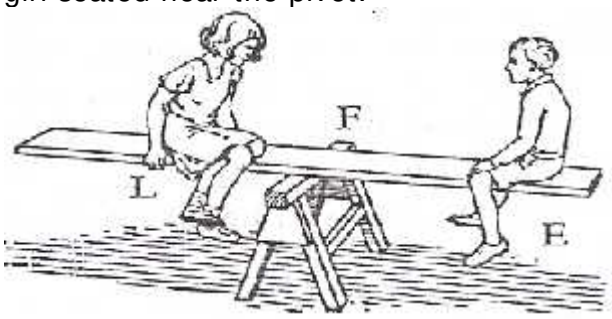
USI NG LEVERS TO MAKE WORK EASY.

1. Levers make work early by using less effort to lift the heavy load.
2. In order to use less effort the **effort arm** should be longer than the **load arm.**

Example I



1. When held at C, the least effort is used to lift the load.
2. A smaller boy seated at the end of the seesaw will be able to balance with the big girl seated near the pivot.



MOMENTS

1. A moment is a turning force of a lever.

Moment = Force X Distance.

The Laws of levers/ Moment.

The law of levers states that

a) "For a lever to balance, effort multiplied by the effort arm distance equals to the load, multiplied by the load arm distance, and vise versa.

Effort x Effort arm distance = Load x Load arm distance.

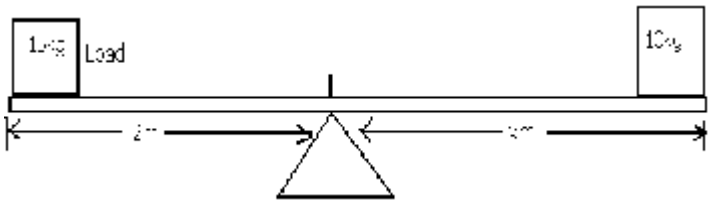
E x EA = L x LA

OR

Load x Load arm distance. = Effort x Effort arm distance

L x LA = E x EA

Example I :
If the lever is to balance, find the length of X.



Solution.

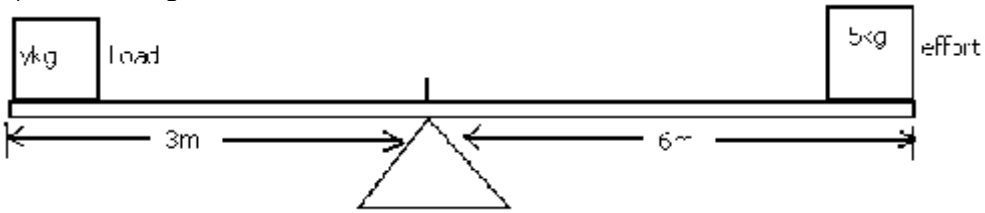
E x ED = L X LD

15kg x 2m = 10kg x X

30 = 10x
10 10

X = 3m

b) The longer the effort arm from the fulcrum, the smaller the effort applied.



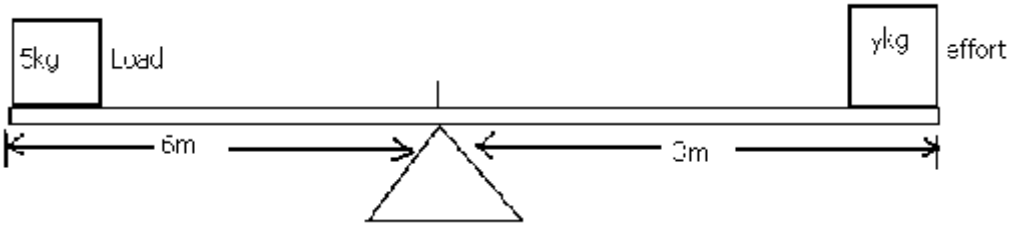
L x LD = E X ED

ykg x 3m = 5kg x 6m

3y = 30
3 3

y = 10

c) The shorter the effort arm from the fulcrum, the more effort is applied.



L x LD = E X ED

5kg x 6m = ykg x 3m

$\frac{30}{3} = \frac{3y}{3}$

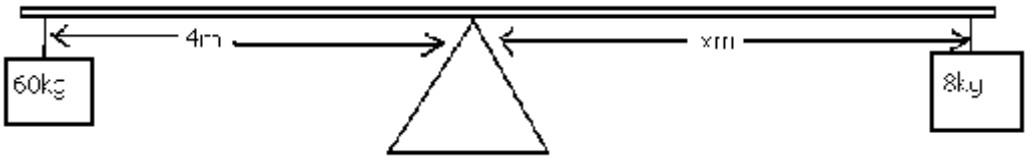
y = 10

NOTE:
Compare the effort applied in b and c. Effort applied in c is more than effort applied in b because the effort arm in c is shorter than the effort arm in b. i.e. the longer the effort arm, the smaller the effort applied and the shorter the effort arm, the more effort is applied.

EXERCISE.

Remember to sketch the diagrams.

1. Sarah sat 3m from the pivot at the seesaw. Her husband Musa who is 60kg sat 2m from the pivot. If the seesaw is balancing, what is Sarah's weight? (Illustrate the diagram to show this information)
2. Swabura who is 50kg sat on the seesaw and balanced with Tendo who is 70kg and is seated 5m from the pivot. If the two are balancing, hos far is Swabura from Tendo. Use a diagram to illustrate this information.
3. Wakida sits 4m away from the pivot of a sea saw and balance with his wife Mudondo on the other side. His wife weighs 90kg and sits 8m away from the pivot.
   a) Draw a sketch to illustrate the information.
   b) How heavy is Wakida?
4. Katisi weighs 45 kg and sits fm away from the pivot and Hindu weighs 30 kg and sits 6m away from the pivot and they balance. Find the value of f.
5. Study the diagram below and find the value of x



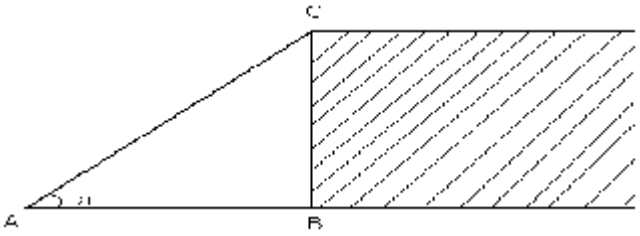
EFFICIENCY OF A MACHINE.

1. Efficiency of a machine is the relationship between work input and work out put.
2. if work input and output were the the same, the machine would be 100% efficient.
3. There is no machine which is 100% efficient due to friction.

Efficiency = workoutput x 100
Work input.

INCLINED PLANES

1. An inclined plane is a sloping surface which connects a lower level to a higher one.
2. It helps in raising the load by making the user apply less effort.
3. The advantage of using an inclined plane is that less force is applied to raise the load.
4. The disadvantage of using an inclied plane is that the effort moves a longer distance than the load.

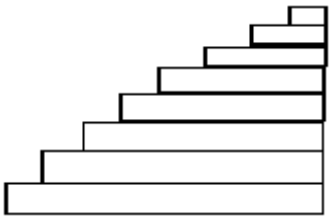


AC - Effort distance
BC - Load distance.
$\angle a$ - Angle of inclination.

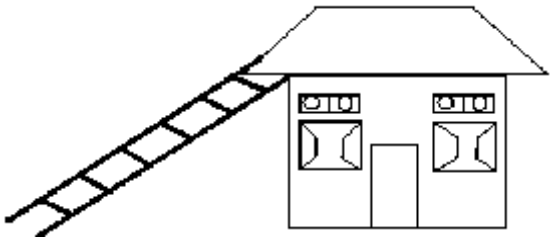
5. If the inclined plane is long, less effort is applied.

Examples of inclined planes

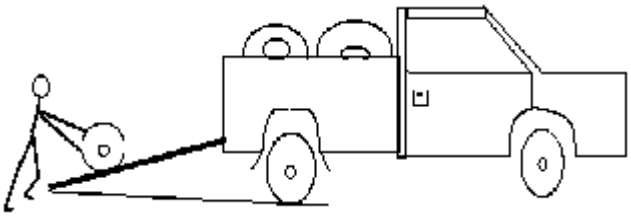
a) Stair cases



Ladders.



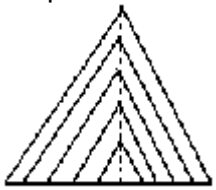
c) Plank of wood.



WEDGES

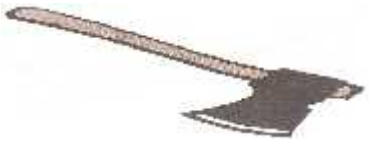
1. A wedge is a tool used for cutting or piercing.
2. It is also called a double inclined plane.

Shape of a wedge.



Examples of wedges.

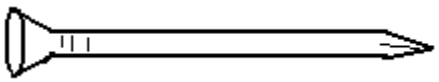
a) An axe



b) A panga



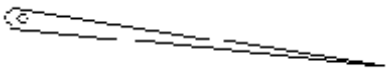
c) A nail



d) A spear



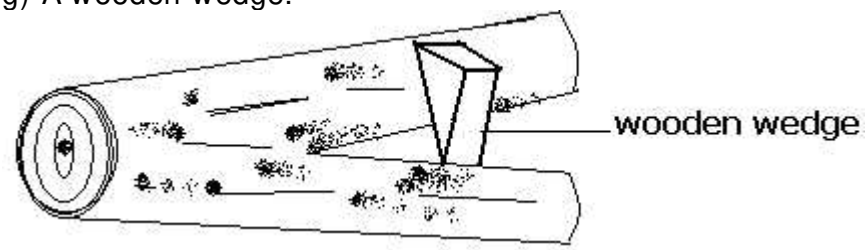
e) A needle



f) A knife



g) A wooden wedge.



Uses of wedges

a) For cutting
b) For piercing
c) For splitting wood

SCREWS

A screw is an inclined plane wound around the rod.



Examples of screws.

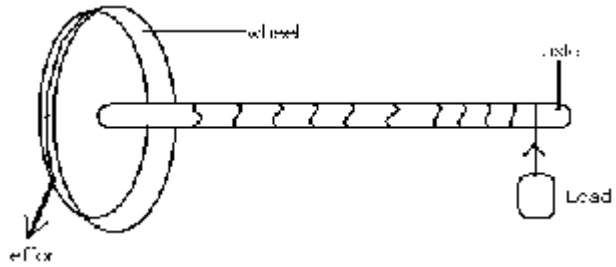
a) A car jack
b) Bolts and nuts
c) Some bottle lids
d) Some jerican lids
e) Drilling machines.

Uses of screws

a) Screws hold parts of machines together.
b) Screws are use4d for drilling holes.
c) Screws help to tighten lids of tins, bottles, and jericans.

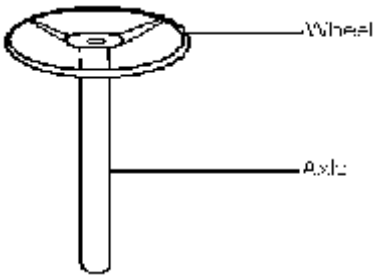
WHEEL AND AXLE

1. A wheel and axle is composed of two wheels rotating together.
2. The bigger wheel is the wheel and the smaller one is the axle.

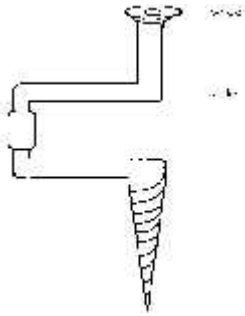


Examples of Wheel and axle.

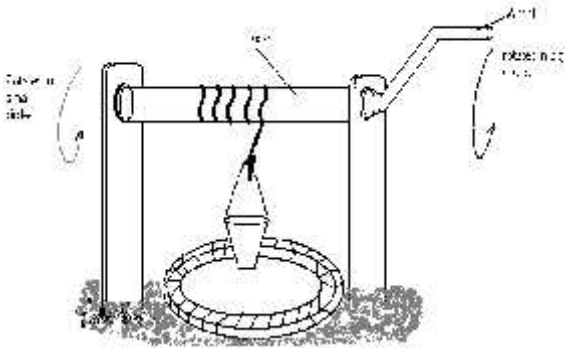
a) Steering of a car.



b) Driller



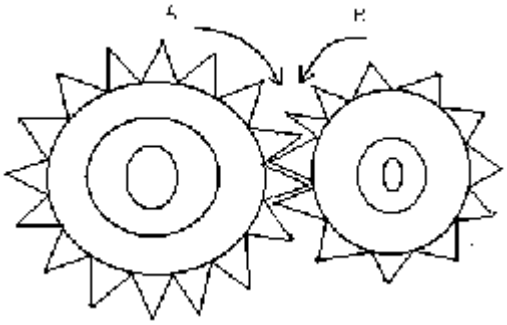
c) Windless for drilling water.



d) Bicycle handles

GEAR WHEELS.

1. A gear wheel is a special wheel with teeth on its rim.
2. gear wheels transmit motion/movement from one wheel to another.



3. Gear wheels move in the opposite direction.

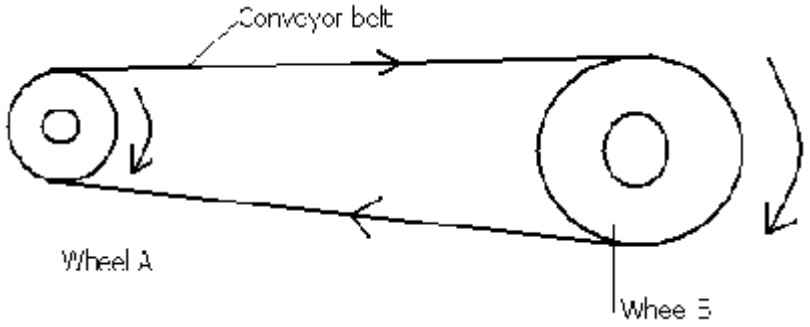
4. If gear wheel A has 40 teeth and B has 20 teeth, in one revolution of A, b turns twice.

Uses of gear wheels.

a) They are used in vehicles to multiply on the speed.
b) They are used in machines to multiply effort.
c) They are used to change direction of movement i.e reversing in vehicles, rewinding tapes in radios.

CONVEYOR BELTS/ BELT DRIVES.

1. A conveyor belt is used to transmit motion from one wheel to another.
2. Wheels driven by conveyor belt turn in the same direction.



Examples of conveyor belts

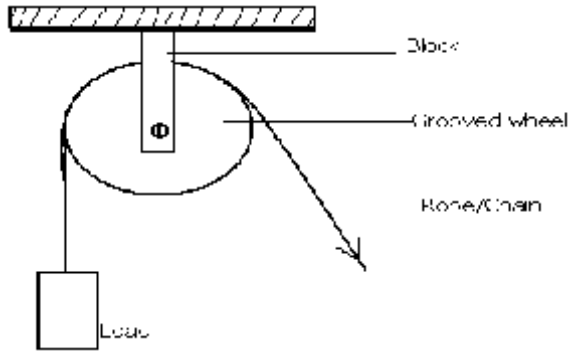
a) Bicycle/motorcycle chains.
b) Sewing machine belts.
c) Luggage conveyors
d) Fan belts in car engines.
e) Motor belts in radios, Decks, Grinding mills etc.

PULLEYS

1. A pulley is a free rotating wheel with a grooved rim.
2. A rope or chain is passed through the groove and force is applied at one end to over come

Load at the other end.

3. The frame which holds the pulley is called a **Block**.

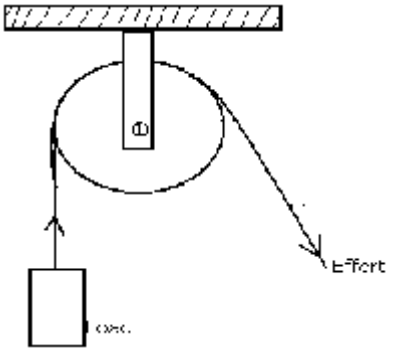


Types of pulleys

a) Single fixed pulley.
b) Single movable pulley.
c) Block and Tackle/Fixed movable pulley

Single fixed pulley

1. A single fixed pulley rotates but does not move.
2. It is fixed to one side.



Advantage of a single fixed pulley.
It changes the direction of force by pulling down.

Mechanical advantage of a single fixed pulley.
The mechanical advantage of a pulley is one because the effort applied is equal to the load force.

Calculating the M.A. of a single fixed pulley.

Example.
Find the mechanical advantage of a single fixed pulley lifting the load of 45Kgf
Load = effort.

Load = 45Kgf, Effort = 45Kgf.

$$\text{Mechanical advantage} = \frac{\text{Load}}{\text{Effort}}$$

$$= \frac{45\text{Kgf}}{45\text{Kgf}}$$

$$= 1$$

Mechanical advantage = 1

Example II
Find the effort force applied on a single fixed pulley to lift a load of 60Kg.

$$\text{Mechanical advantage} = \frac{\text{Load}}{\text{Effort}}$$

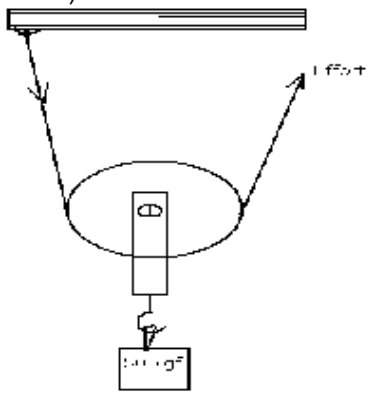
$$\text{Effort} \times 1 = \frac{60\text{kgf}}{\text{Effort}} \times \frac{\text{Effort}}{}$$

Effort = 60Kgf

EXERCISE
1. Calculate the effort used to raise aq load of 90Kgf using a single fixed pulley.
2. Find the load lifted by a single fixed pulley when an effort is of 63N is applied on the effort side.
3. Calculate the mechanical advantage of a single fixed pulley on which an effort of 45Kgf is applied.

Single movable pulley.

1. In a single movable pulley, the wheel moves along the rope or chain.
2. Less force is used in a single movable pulley.
3. It doesn't change the direction of the force.
4. The mechanical advantage of a single movable pulley is **two.**
5. The effort applied in the single movable pulley is always half of the load.($^1/_2$ of Load).



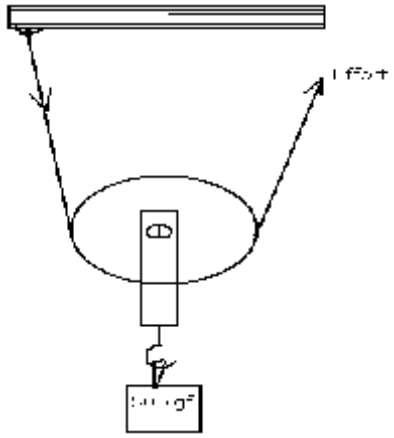
Advantages of single movable pulley.

a) two sections of the rope/chain give support to the load, so we use less force than the load by half.

Calculating the Mechanical advantage of a single movable pulley.

Example

What force will be needed to raise a load of 50kgf using the pulley shown below.



Mechanical advantage = Load / Effort

Effort x 2 = 50Kgf x E

2 E / 2 = 50kgf / 2

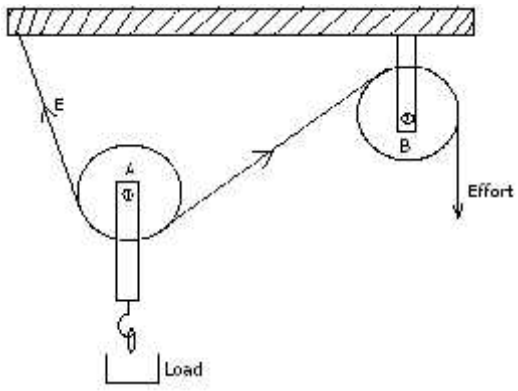
Effort = 25

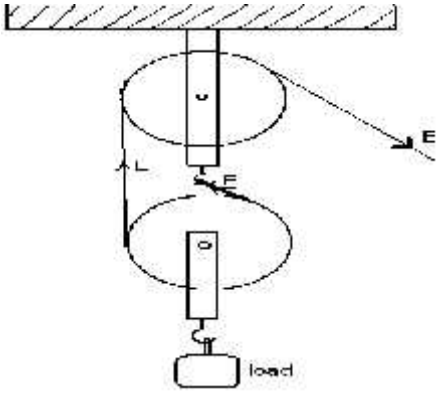
Difference between single fixed and single movable pulley

Single fixed pulley	Single movable pulley.
Has mechanical advantage of one.	Has mechanical advantage of two.
Pulley is fixed in one place.	Pulley moves along the rope/chain.
Effort applied is equal to the load.	Effort applied is half of the load.
Has one section of the rope supporting the pulley.	Has two section of the rope supporting the pulley.
Distance moved by effort is equal to distance moved by load.	Effort moves a longer distance than the load.

Block and Tackle (Fixed movable pulley)

1. This has more than one pulley.
2. It is made up of the fixed and the movable pulleys.
3. The mechanical advantage of a block and tackle is three.





Calculating the Mechanical advantage of a single movable pulley.

Example:

1. What force will be required to lift a load of 45kgf using a block and tackle with two wheels?

$$\text{Mechanical advantage} = \frac{\text{Load.}}{\text{Effort}}$$

$$\text{Effort} \times 3 = 45\text{Kgf} \times E$$

$$\frac{3}{3} E = \frac{45}{3}\text{kgf}$$

Effort = 15Kgf

EXERCISE

1. Calculate the mechanical advantage of a fixed movable pulley with two wheels when an effort of 90kgf is applied to lift a load of 270kgf.
2. What load force will be lifted by a block and tackle pulley if an effort force of 96kgf is applied?

USES OF PULEYS

1. Pulleys are used in breakdown vehicles to pull stranded vehicles.
2. They are used in lifts in tall buildings.
4. They are used in hoisting the flood.
5. They are used in by builders to lift blocks and other building material on top of high buildings.

EFFICIENCY OF MACHINES.

1. Efficiency of a machine is the relationship between work input and work output.
2. If two were the same, then the machine would be 100% efficient.
3. There is no machine on earth which is 100% efficient because of **friction**.

$$\text{Efficiency} = \frac{\textit{Work output x 100}}{\textit{Work input}}$$

FRICTION

Friction is the force that opposes motion.

Properties of friction

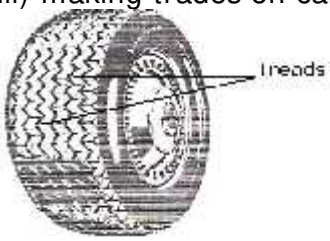
1. Rough surfaces produce more friction than smooth surface.
2. Heavy bodies produce more friction than the light one.
3. Sliding friction is smaller than rolling friction.

Friction as a useful force.

g) It enables us to write using pens, pencils chalk, etc.
h) It enables brakes of vehicles to stop movement.
i) It helps in lighting a match stick.
j) It enables forward movement of vehicle tyres.
k) It was used by early man to produce fire.
l) It is used in sharpening tools.
m) It enables plant roots to hold the plant firmly in the soil.
n) It enables us to walk without sliding.
o) It enables us to hold objects tightly.

How to increase friction.

a) Making surfaces rough through;
   i) Applying sand or stones between surfaces.
   ii) Increasing the weight of the object.
   iii) making trades on car tyres.



   iv) Making patterns on shoe soles



   v) Putting spikes on shoes to increase on friction.



Friction as nuisance

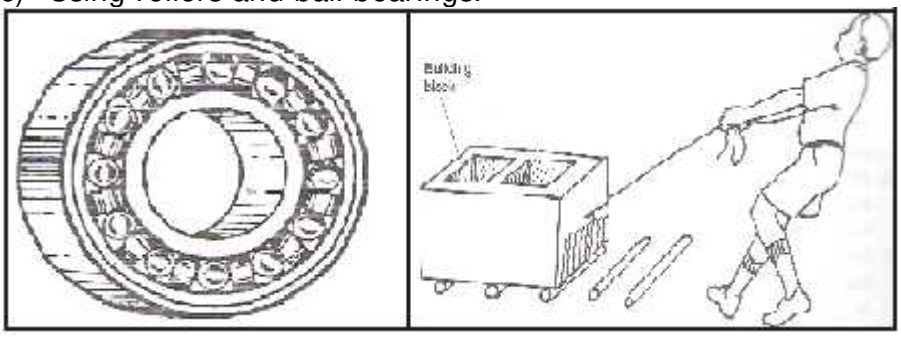
d) It causes things to wear off.
e) It causes unnecessary noise in machines.

f) It produces unnecessary heat in machines.
g) It delays work.
h) It makes us do little work after applying a lot of energy.

How to reduce friction.

Friction can be reduced by:

a) Oiling the moving parts of the machine.
b) Greasing the moving parts of the machine.
c) Using rollers and ball bearings.



d) Reducing the weight of objects.
e) Making rough surface smooth.
f) Synovial fluids in joints reduce friction.
g) Streamlining bodies to reduce friction in water and air.

VISCOSITY

1. Viscosity is friction in air or water.
2. Viscosity is reduced by streamlining the machine that move in water and air.
3. Some animals that dwell in water and air are streamlined bodies to reduce viscosity.

Animals streamlined to reduce viscosity.

a) Fish
b) Birds
c) Crocodiles
d) Snakes
e) Earthworms
f) Cheetah or Leopard
g) Whale

Streamlined machines to reduce viscosity.

a) Boats
b) Canoes
c) Marines
d) Spears
e) Arrows
f) Rockets and jets.
g) Aero planes

ESSENTIAL/ MEDICAL DRUGS AND DRUGS OF DEPENDENCE

DRUG

Drugs are chemicals that affect the way the body or the mind works.

Medical drugs:

Medical drugs are chemical substances that are used to treat or prevent diseases

Examples of essential drugs.

a) Aspirin
b) Panadol
c) Piriton
d) Chloroquin
e) Septrin
f) Tetracyline Tablets
g) Pen V
h) Valium

Types of essential drugs:

1. Essential drugs are grouped into factory made drugs and local drugs.
2. Factory-made drugs are those produced in industries. i.e. panadol, aspirin, chroloquine, etc...

Uses of essential drugs:

1. Drugs can be used to treat diseases.
2. Vaccines are used to immunize the body against diseases.
3. Drugs are used relieve pain.
4. Drugs can used to prevent germ infection.

Characteristics of essential drugs:

1. Essential drugs are easy to use without the involvement trained health workers.
2. Essential drugs are cheap and affordable.
3. Essential drugs have a proven curative value.
4. Essential drugs should be easily available in the community.

Advantages of using factory made drugs:

1. Factory-made drugs are pure and clean.
2. Factory-made drugs are properly packed.
3. Factory-made drugs are produced under hygienic conditions.
4. Factory-made drugs take a long time to expire.
5. Factory-made drugs are easy to prescribe because the chemical composition can easily be established.
6. Factory-made drugs have production and expiry dates.

Disadvantages of factory made drugs:

1. Factory-made drugs are expensive.
2. Factory-made drugs can easily lead to body poisoning through over dosage.

Drug prescription:

1. This is the information given by ba health worker for proper and safe use of drugs.
2. This information is always give in a prescription sheet.

Factors to be considered when prescribing drugs

a) Age of the patient.
b) Strenghth of the drug.
c) Level of the sickness.
d) Weight of the patient.

Importance of drug prescription.

a) Prevents under dose.
b) Prevents over dose.
c) Prevents poisoning.

Storage of drugs.

a) Store drugs out of reach of children.
b) Do niot keep poisonous chemicals in poisonous in soda bottles.
c) Keep drugs in a cool dry place.

Local drugs:

1. Local drugs are those drugs available in the environment.
2. Local drugs include leaves from plants, roots, barks of trees, seeds, etc…

Advantages of local drugs:

1. Local drugs are cheap.
2. Local drugs contain both medical and nutritional benefits.

Disadvantages:

a) Local drugs are sometimes prepared under in hygienic conditions.
b) Local drugs take a short time to expire.
c) Local drugs are not easy to prescribe because their chemical composition cannot be easily determined.
d) The dosage is not known.
e) They have a lot of impurities.
f) They are not easy to prescribe.

Drug misuse:

1. Drug misuse the use of drugs without following the prescription.
2. Prescriptions are instructions under which a particular drug should be used.
3. Drug prescriptions help to prevent overdose, underdose, poisoning.

Ways in which drugs are misused:

a) Sharing drugs prescribed for one person can cause drug misuse.
b) Wrong route application of the drug.
c) Self-medication can cause drug misuse.
d) Failure to complete the prescribed dose.
e) Using many types of drugs to treat the same sickness.

Effects of drug misuse:

a) Over dosage.
b) Under dosage.
c) Germ resistance to treatment.
d) Miscarriages in pregnant women.
e) Injection abscess.
f) Fits and convulsion.

Drug abuse:

1. Drug abuse is the use of drugs in a way that is harmful to the body.
2. Drug abuse involves both legal and illegal drugs.
3. Legal drugs commonly abused include tobacco, alcohol, pain killing drugs
4. Illegal drugs commonly abused include opium, heroin, cocaine, Mira, gum, jet fuel, etc…
5. A narcotic drug is a drug that relieves and brings about sleep.
6. A stimulant is a drug that can increase physical ability beyond the normal operational levels.

Reasons why people abuse drugs:

a) People abuse drugs to reduce chronic pain.
b) People abuse drugs to enhance body performance.
c) People abuse drugs to fit in a group of drug addicts.
d) People abuse drugs because they are dependent or addicted to the drugs.
e) People use drugs to enhance pleasure.

Effects of drug abuse:

a) Abuse of narcotic drugs can cause mental disorders. i.e. insomnia. Insomnia is the inability to sleep.
b) Drug abuse can cause mouth and stomach ulcers.
c) Drug abuse causes heart coronary diseases.
d) Drug abuse causes poverty.
e) Drug abuse can cause body poisoning.
f) Drug abuse causes self and family neglect.
g) Use of narcotic drugs causes criminal behaviour.
h) Drugs can cause job neglect and unemployment.

Control of drug abuse:

a) Community members should be educated on the dangers of drug abuse and drug misuse.
b) Community members addicted and who are dependent on drug should be rehabilitated and counselled.
c) Avoid the company of people who are already on drugs.
d) Enforcement of laws prohibiting the use and trafficking of narcotic drugs.
e) Engage in drama or sports activities to avoid idleness.

Drug Dependence

1. It is where a person relies on drugs to perform certain activities.
2. Drug dependence usually results into drug addiction.
3. Drug addiction is a state of being unable to stop using drugs.

Note:
Nacotic drug is a drug that relieves pain and brings about sleep.
A stimulant is a drug that increases physical activity and takes the user to the world of fantacy.

Drugs of dependency

a) Cannabis/Marijuana/bhang/Njaga
b) Miraa/khat/Mirungi
c) Opium
d) Cocain

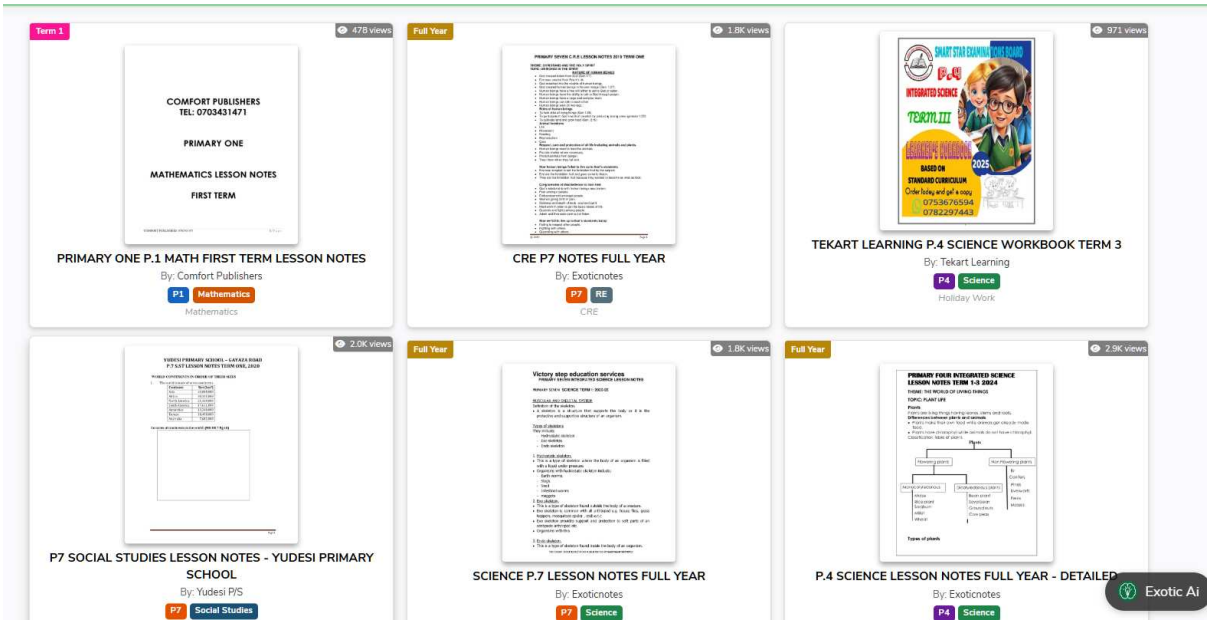
Effects of drug dependency to the body.

a) Insomia – inability to fall asleep.
b) Shaking or tremour.
c) Nervousness, irritability and inability to concentrate.
d) Constipation.
e) Mouth and stomach ulcers.
f) Heart attack
g) Loss of appetite.

Developing life skills against drug dependency

a) One should acquire as much relevant information as possible about the harmful effects of various types of drugs.
b) Avoid company of drug addicts.
c) Look out for suitable activities to occupy you such as ; Sports, Games, Music and dance, religious or community services.
d) One should seek for help when he or she has personal or family problems.

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