DIGESTIVE SYSTEM

DIGESTION.

1. Digestion is the process by which food is broken down into soluble substances that can be absorbed in the blood stream.
2. Digestion starts from the **mouth** and ends in the **ileum.**

TYPE OF DIGESTION

There are two types of digestion;

a) Mechanical digestion.
b) Chemical digestion

Mechanical digestion

1. This is the process of breaking down food into small particles by the help of teeth.
2. It takes place in the mouth in human beings.

Chemical digestion.

1. This is the process of breaking down food by the help of chemical compounds called **enzymes.**
2. Chemical digestion starts in the mouth and ends in the ileum.
3. Enzymes are chemical substances that speed up the rate of digestion.

Characteristics of enzymes.

a) They are protein in nature.
b) An enzyme always forms the same end product.
c) They are specific i.e. each enzyme acts upon one class of food.
d) They are destroyed by heating.
e) They act in particular conditions i.e. some prefer **acidic**, others **alkaline** conditions.

Conditions under which enzymes work.

a) They work best in temperatures below 40^{o}c.
b) They can easily be destroyed by heat above 40^{o} c
c) Pepsin and rennin work best in acidic conditions.
d) Trypsin, amylase, lipase and intestinal enzymes work best in alkaline conditions.

THE ALIMENTARY CANAL AND THE DIGESTIVE SYSTEM

The alimentary canal.

1. The alimentary canal is a muscular tube that runs from the **mouth** to the **anus**.
2. The alimentary canal is about ten metres in an average adult person.

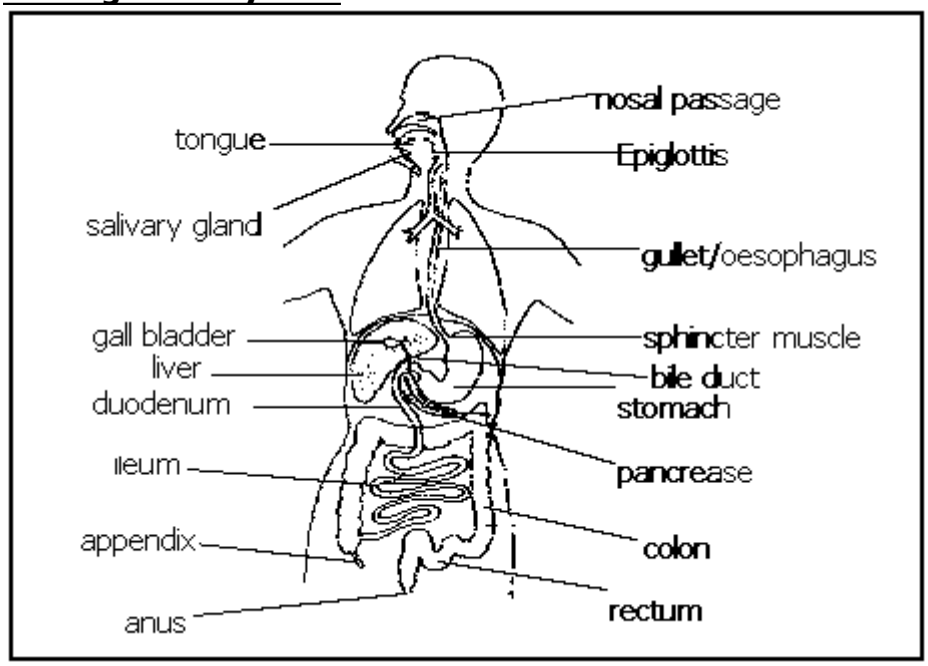
Parts of the alimentary canal.

a) Mouth
b) Gullet (oesophagus)
c) Stomach.
d) Small intestine.
e) Large intestine
f) Rectum
g) Anus
h) Appendix.

The digestive system.

1. The digestive system is made up of the alimentary canal and some other parts that are important during digestion.
2. The parts that together with the alimentary canal form the digestive system are:
   a) Pancreas.
   b) Liver.
   c) Gall bladder.

The digestive system.



Functions of different parts.

Different parts of the digestive system include; mouth, oesophagus (gullet) stomach, duodenum, ileum, colon, rectum and anus.

The teeth:

Break food in smaller particles hence increasing the surface area for the action of enzymes.

The tongue:

a) Tastes food.
b) Rolls the food into a bolus.
c) Pushes food into the gullet.

The epiglottis:

It prevents foreign particles from entering the trachea.

The soft palate:

Prevents food from entering the nasal cavity.

The stomach:

a) Temporary store for food.
b) Produces gastric juice.
c) Produces hydrochloric acid.

d) Absorbs alcohol.

The liver:
Produces bile.

The pyloric sphincter:
It is a strong muscle which holds food in the stomach and lets it into the duodenum at intervals.

The gull bladder:
Stores bile.

The pancreas:
Produces pancreatic juice.

The ileum:
a) Produces intestinal juice.
b) Final digestion of food takes place here.
c) Absorption of digested food takes place here.

The Colon:
Absorbs water from the undigested food.

The rectum:
This is a temporary store for undigested food until it released through the anus.

Anus:
Passes out the undigested food as faeces.

DIGESTION IN THE MOUTH.

1. In the mouth both chemical and mechanical digestion take place.
2. Food is **chewed** by the teeth and mixed with **saliva**.
3. Chewing increases the surface area for the action of enzymes.
4. Chewed food is rolled into **bolus** by the tongue.
5. Saliva is produced by the **salivary glands** in the mouth.
6. The saliva contains an enzyme called **salivary amylase/ptyaline**.
7. Salivary amylase digests **cooked starch**.

Functions of saliva.
a) Softens food.
b) Lubricate food for easy swallowing.
c) Contains an enzyme called salivary **amylase (ptyalin)** that acts upon **cooked starch**

Factors that stimulate the production of saliva.
a) Smell of the food.
b) Sight of food.
c) Taste of food.
d) Expectation for the food.

THE GULLET/OESOPHAGUS
a) It is a muscular tube that runs from the mouth leading to the stomach.
b) Food rolls down through it by wave – like contractions called **peristalsis.**

Illustration of peristalsis.

Digestion in the stomach:

1. The movement of muscles of the stomach churn the food into a semi-solid substance called **chyme.**
2. The stomach walls secret (produce) **gastric juice.**
3. Gastric juice contains **hydrochloric acid** and two enzymes namely;
   a) **pepsin**.
   b) **rennin**.
4. Pepsin digests **proteins** changing it to **peptides.**
5. Rennin clots the **milk** in babies in order to separate **fats** and **protein**.

Functions of hydrochloric acid.

a) Stops the action of the salivary amylase.
b) Provides suitable acidic conditions in which pepsin works best.
c) Kills the bacteria which may have been taken in with the food.

Digestion in the duodenum.

The region of the duodenum contains the **liver**, **gall bladder** and **pancrease**.

The Liver

a) The liver produces bile and stores it in the gall bladder.
b) Bile is green in colour.
c) Bile has no enzyme but only **bile salts**.
d) The bile salts **emulsify (break) down fats**.
e) Bile juice is poured in to the duodenum by the gall bladder through the **bile duct**.

Pancrease

a) The pancrease produces a juice called **pancreatic juice**.
b) Pancreatic juice is also poured in the duodenum through the **pancreatic duct**.
c) Pancreatic juice contains enzymes like;
   i) Pancreatic amylase
   ii) Lipase
   iii) Trypsin.

Pancreatic amylase.

1. Pancreatic amylase digests any starch that skipped from the mouth undigested.
2. It converts starch to **maltose**.

Lipase:
Breaks down fats to **fatty acids** and **glycerol**.

Trypsin:
Breaks down **proteins** to **peptides** and **peptides** to **amino acids**.

Digestion in the ileum.

1. Digestion of food is completed here.
2. The ileum secretes an intestinal juice called **succus intericus.**
3. The above juice has four enzymes.
   a) Maltase.
   b) Lactase.
   c) Sucrase.
   d) Erepsin/peptidase.

Maltase:
Breaks down maltose to glucose.

Lactase:
Acts upon lactose to glucose and galactose.

Sucrase:
Breaks down sucrose to glucose and fructose.

Peptidase:
Breaks down peptides to amino acids.

Absorption in the ileum.

1. Absorption of digested food takes place in the ileum.
2. This takes place with the help of the finger-like structures called **villi**.

Adaptation of the ileum to absorption of digested food.

a) The ileum is long enough to provide a larger surface area for absorption.
b) It has villi, which also help to increase the surface area for absorption of digested food.
c) Each villus has a thin membrane for digested food to pass through them easily.
d) Each villus has dense network of capillaries that facilitate absorption.

Adaptation of the villi to absorption of digested food.

a) Each villus is one cell thick and this makes it possible for digested food to pass through them easily.
b) Each villus has dense network of capillaries that enable easy absorption of the digested
c) food.

Processes that take place in the ileum.

a) Digestion of food.
b) Absorption of digested food.

The colon and the rectum

1. Digestion does not take place in the colon and the rectum because they **do not secrete** enzymes.
2. The major process that takes place in the colon is **absorption of water.**
3. It passes undigested material down to the rectum where it is temporarily stored till it is ready to be passed out through the anus.
4. The passing out of the undigested food from the alimentary canal is called **egestion**.

Summery of the food class and its end product.

Organ	Gland	Digestive juice	Enzyme	Food changes
Mouth	Salivary gland	Saliva	Salivary amylase	Salivary amylase
Stomach	Stomach walls	Gastric juice	Pepsin	Protein to peptides
			Renin	Clots milk.
Duodenum	Liver	Bile	No enzyme	Emulsify fats.
	Pancreas	Pancreatic juice.	Pancreatic amylase.	Starch to maltose
			Lipase	fats to fatty acids and glycerol
Ileum	Intestine walls	Succus intericus	Maltase	Maltose to glucose
			Lactase	Lactose to glucose
			Sucrase	Sucrose to glucose
			Erepsin/peptidase	peptides to amino acids

How digested food is used in the body.

1. **Glucose:**
   a) used to generate energy through respiration.
   b) used to generate body heat through respiration.

2. **Amino acids:**
   a) are re-assembled to form proteins used to make new body cells for one to grow.
   b) are re-assembled to form proteins used to repair worn out tissues.

3. **Fats:**
   a) used to generate energy and heat.
   b) acts as a body insulator.

Note: Twice as much energy is obtained from fats than glucose.

4. **Vitamins and mineral salts:**
Keep us healthy so, they act as protective foods.

Some important mineral salts needed by our bodies.

1. **Iron:**
   a) Found in meat, liver, iron tablets, beans, peas egg yolk and green vegetables.
   b) It's necessary for the manufacture of red blood cells.
   c) Shortage of iron in the diet leads to anaemia.

Other factors that lead to anaemia.
   a) Severe bleeding.
   b) Severe hookworm infection.
   c) Destruction of the red blood cells by plasmodia parasite that cause malaria.
   d) Failure of the red bone marrow to manufacture red blood cells.

How the problem of anaemia is solved in patients.
   a) Eating foods rich in iron.
   b) Through blood transfusion.

2. **Iodine:**
   a) Found in iodised salt and seafood like crabs, sea fish etc.
   b) It's necessary for proper functioning of the **thyroid gland.**
   c) Its deficiency leads to **goitre**.

3 **Calcium and phosphorus.**
   a) Present in the milk and hard water.
   b) They are necessary for the formation of strong bones.
   c) Their deficiency leads to the formation of weak bones.

Some imortant vitamins for our bodies.

1. **Vitamin A:**
   a) Found in milk, green vegetables, liver, pepper, carrots, pawpaw, tomatoes palm oil etc.
   b) It's necessary for good **eyesight.**
   c) Its deficiency leads to **poor night vision.**

2. **Vitamin B_1:**
   a) Contained in yeast, ground nuts and unpolished rice.
   b) Necessary for the prevention of **beriberi.**
   c) Its deficiency leads to **beriberi.**

3. **Other vitamin B_2:**
   a) Found in yeast, groundnuts, yams, milk, meat and egg yolk.
   b) Their deficiency leads to **pellagra.**

4. **Vitamin C:**
   a) Found in oranges, lemon, row mangoes, guava paw paws and green vegetables.
   b) Necessary for the prevention of **scurvy.**
   c) Its deficiency leads to **scurvy.**

5. **Vitamin D:**
   a) Contained in milk, egg yolk, fish liver oil etc.
   b) Necessary for the prevention of **rickets.**
   c) Its deficiency leads to **rickets**.

6. **Vitamin E:**
   a) Present in green vegetables, butter, eggs, grains and nuts.
   b) Necessary for reproduction.
   c) Its deficiency leads to the poor formation of reproductive cells.

7. **Vitamin K:**
   a) Present in green vegetable especially cabbage and spinach.
   b) Essential for blood clotting.
   c) Its deficiency leads to poor blood clotting.

DISEASES OF THE DIGESTIVE SYSTEM:

Ulcers in the stomach and duodenum
a) These are wounds in the stomach or duodenum.
b) They are caused by excess hydrochloric acid which affects the walls.
c) Production of excess acid may be stimulated by emotional upsets tobacco smocking and not eating food at regular intervals.

Appendicitis
a) This the condition where the appendix gets swollen due to infection or when it is filled with stones.
b) The best remedy is to be removed surgically.

Cholera
a) This is caused by a bacteria. It makes the victim vomit very frequently and also have severe diarrhoea
b) It usually causes dehydration that may result into death.

Dysentery
a) This can be caused by a bacteria or amoeba.
b) It spreads through contaminated food or water.
c) It usually causes diarrhoea with blood which may cause dehydration that may result into death

Diarrhoea
This is the passing out of waterly stool. It may be a sign of a disease or a disease.

Worm infection

Disorders of the digestive system:
These are conditions in the digestive system that makes it to fail to function normally.

Constipation:
This is a condition where one passes out faeces with difficulty or fails to pass out these faeces.
a) It is prevented by including roughage in the diet.

b) Taking enough water after meals.

Sources of roughage.

a) Pineapple
b) Mangoes
c) Green vegetables
d) Cereals.

Intestinal obstruction:

Solved through surgical operation.

Vomiting:

Indigestion

It is a condition where food fails to get digested properly.

Causes of indigestion.

a) Swallowing food without chewing.
b) Over eating where the stomach is full and fails to turn the food.
c) Food poisoning and food infection can also cause indigestion.
d) Bad teeth which do not chew food well.
a. Emotional upsets can also cause indigestion.

When indigestion occurs, a person;

a) Feels discomfort in the stomach.
b) Feels heart burn.
c) Belches smelly gas through the mouth.
d) Passes out gas through the anus frequently.

Causes of dis orders are;

a) Not eating meals at regular times.
b) Failure to chew food thoroughly
c) Not doing exercises
d) Not taking enough water after meals
e) Not emptying bowels at regular intervals .
f) Not eating food with roughage

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**.
3. An atom is the smallest indivisible particles of matter.
4. When electrons flow, they produce **electric current**.
5. An electric current is a **flow of electrons**.
6. Electric current is measured in units called **Amperes** using an instrument called ammeter.

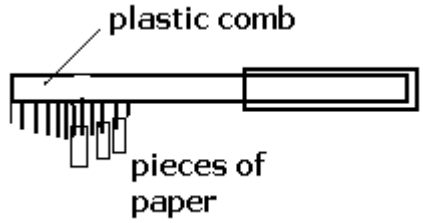
Forms of electricity

There are two forms of electricity:

a) Static Electricity
b) Current Electricity

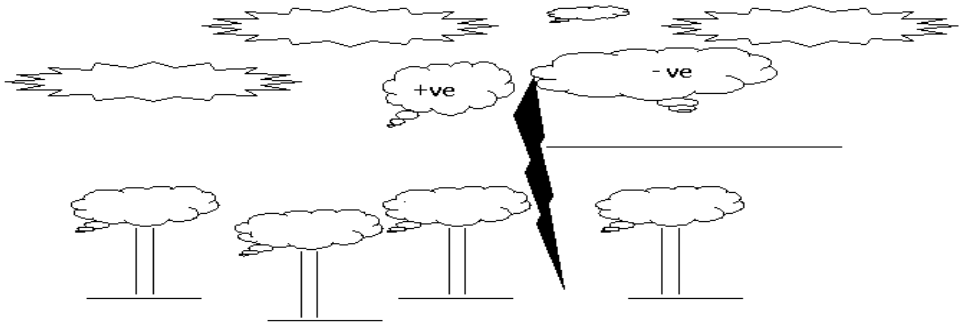
STATIC ELECTRICITY:

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.



LIHGTNING 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 LIGHTNING:

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.

PROTECTION AGAINST LIGHTNING:

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 ELECTRICITY:

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:

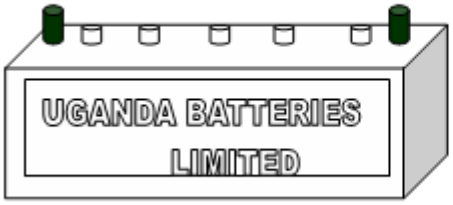
(i) Direct Current (D.C)
(ii) Alternating Current (A.C)

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.

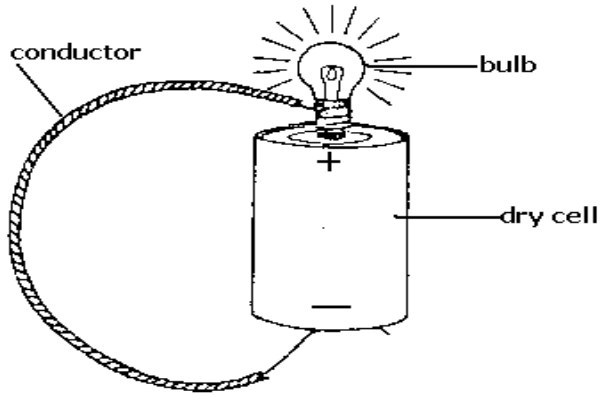
CHEMO ELECTRICITY

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.

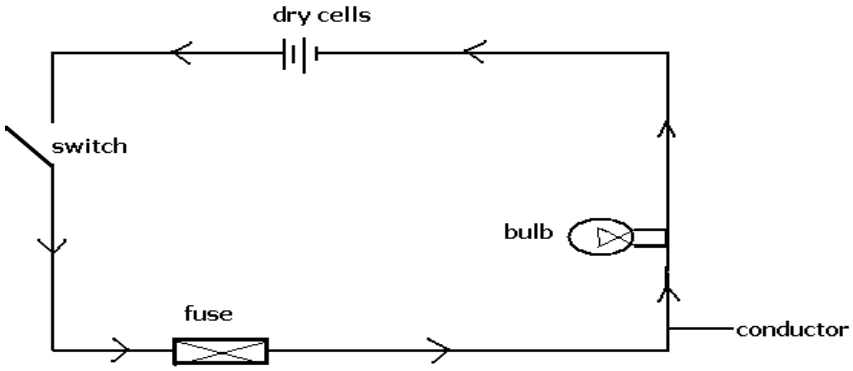
SIMPLE ELECTRIC CIRCUIT



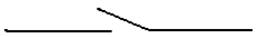
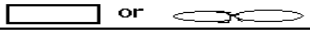
AN ELECTRIC CIRCUIT:

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.



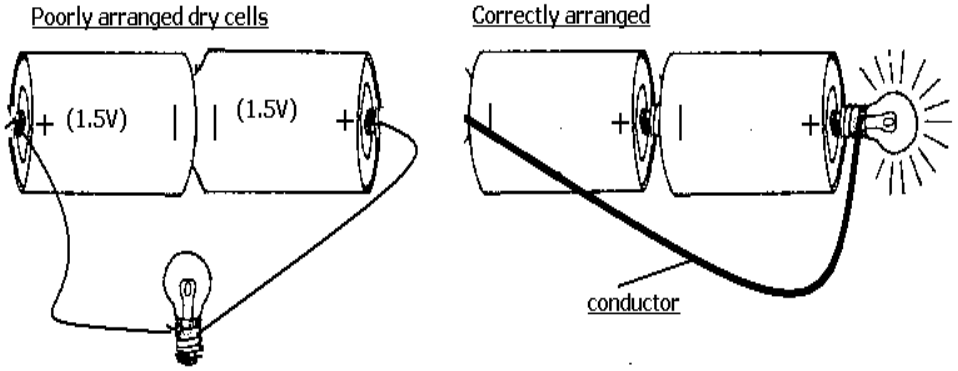
Symbols of parts of an electric circuit

SYMBOL	PART
	Switch
	Bulb
	Fuse
	Dry cells

THE DRY CELLS

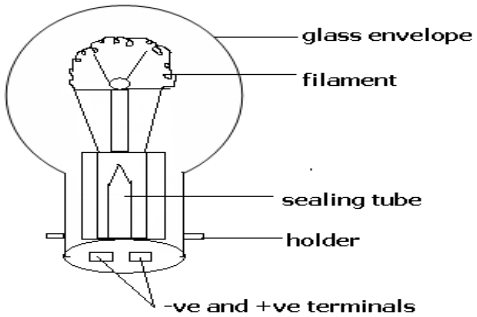
a) The dry cells supply electricity in a simple circuit.
b) Chemical energy stored in the cells is changed to electric energy.
c) A dry cell is manufactured with **1.5 volts** of electricity.

d) If the dry cells are arranged wrongly, the cancel each other and the bulb will not give light.



THE ELECTRIC APPLIANCE (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.

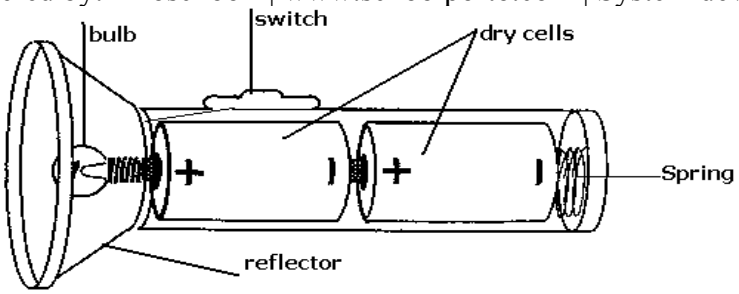
A fuse may blow due to;

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.

ELECTICAL RESISTANCE.

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

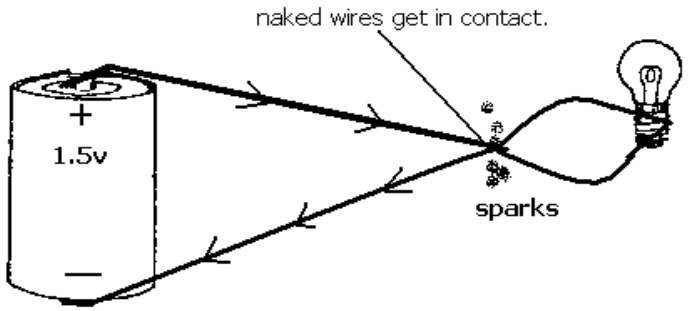
	order to increase resist electrical resistance.

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 CIRCUITS:

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 USING ELECTRICITY:

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:

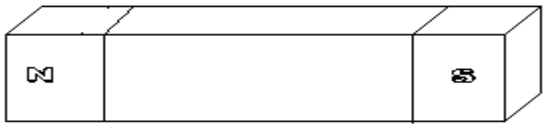
(i) Never do experiments using electricity from the mains.
(ii) Never push objects in sockets like nails, metals etc
(iii) Avoid touching switches, and electric equipment with wet hands.
(iv) Wear rubber gloves when handling or repairing electric equipment
(v) Disconnect or remove appliances from sockets 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.

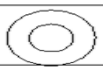
TYPES OF MAGNETS:
There are two types of magnets.
(i) Temporary Magnets
(ii) Permanent Magnets

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:

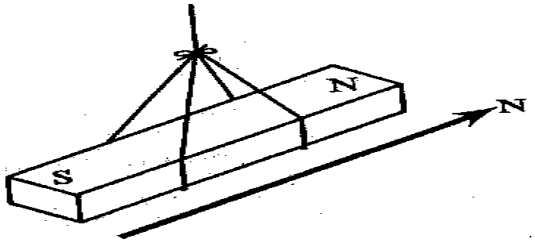
These are magnets that posses that force of magnetism once the source is still present. They lose their magnetism once the source is removed. they are therefore magnets that last as long as their source of magnetism is still present.

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.

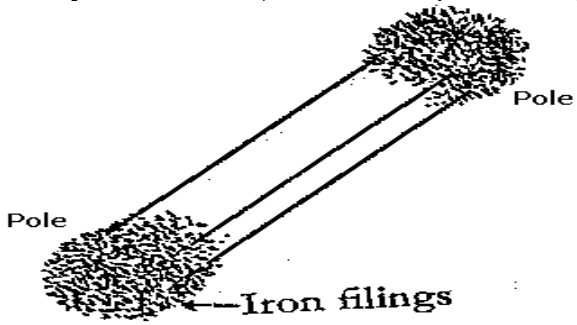
PROPERTIES OF MAGNETS:

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



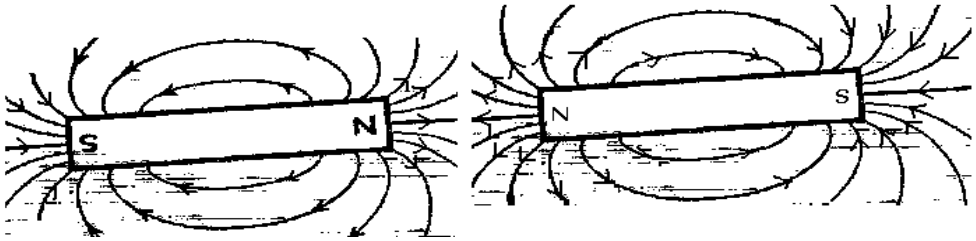
   a) This property is used to make compasses that show direction.
   b) Sailors, Navigators, Tourists and pilots use this property to help them find direction.

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

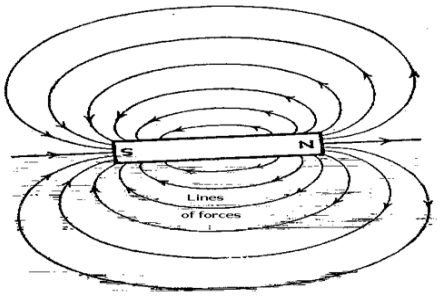


Most fillings collect around poles. This indicates that magnets are strongest at the poles.

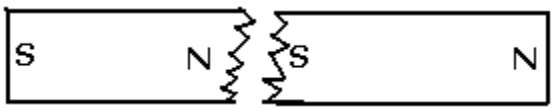
3. Like poles of a magnet repel each other while unlike poles attract each other.



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.

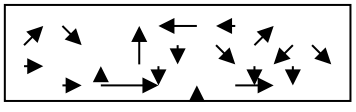
Magnets become weaker with age.

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.

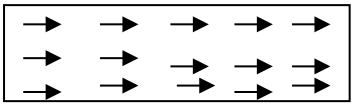
How magnetic materials become magnets

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.

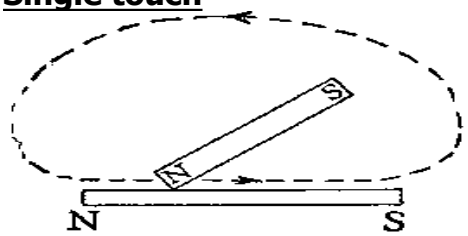
Stroking Method:

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:

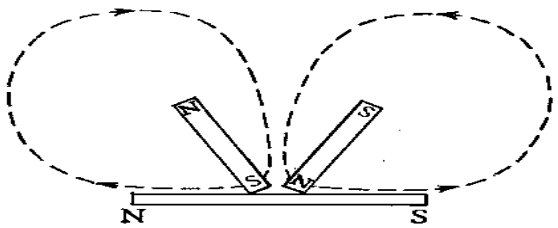
a) This is when one magnet is used to stroke on a magnetic rod to produce a new magnet.
b) It is done several times in the same direction with one pole of a magnet. When the end is reached the magnet is lifted high above and the stroking begins again.
c) The end of the magnetic rod the magnet strokes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

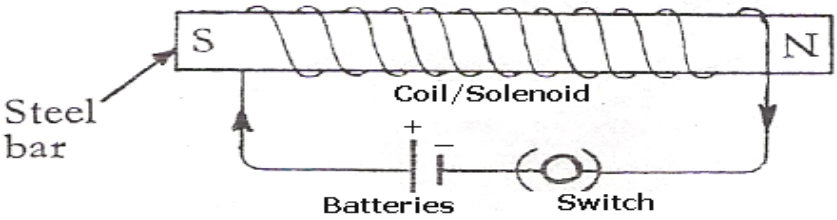
(ii) Electrical method (electro-Magnetisation)

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.

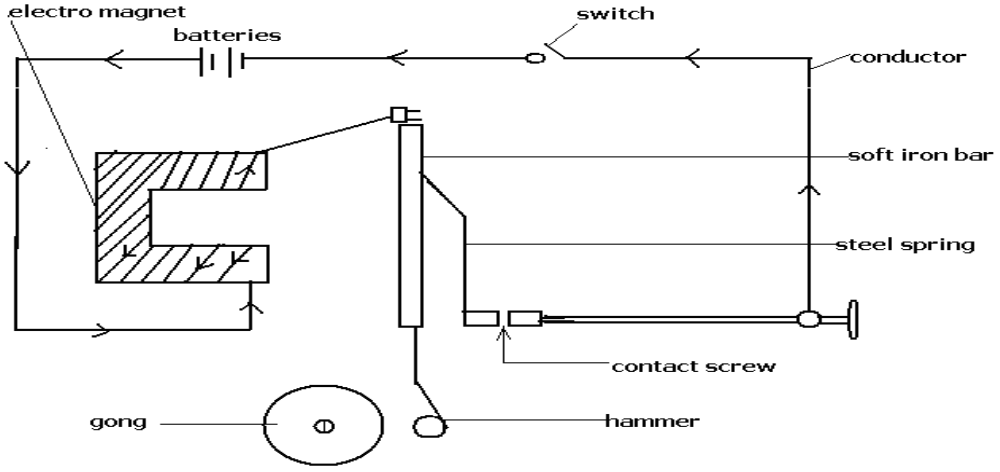
ELECTRICAL METHOD:

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.

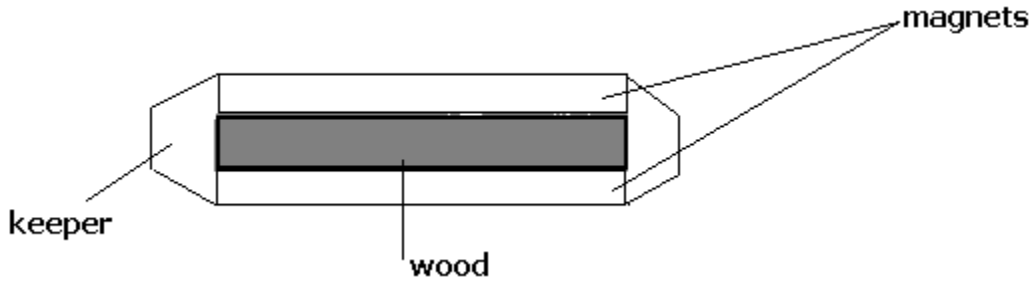
1. When the switch is closed, current flows and the U shaped soft iron bar gets magnetised.
2. The electro magnet pulls the soft iron bar.
3. The hammer attached to the soft iron bar hits the gong which produces sound.
4. When the soft iron bar is pulled away by the electro magnet, it pulls away the 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.

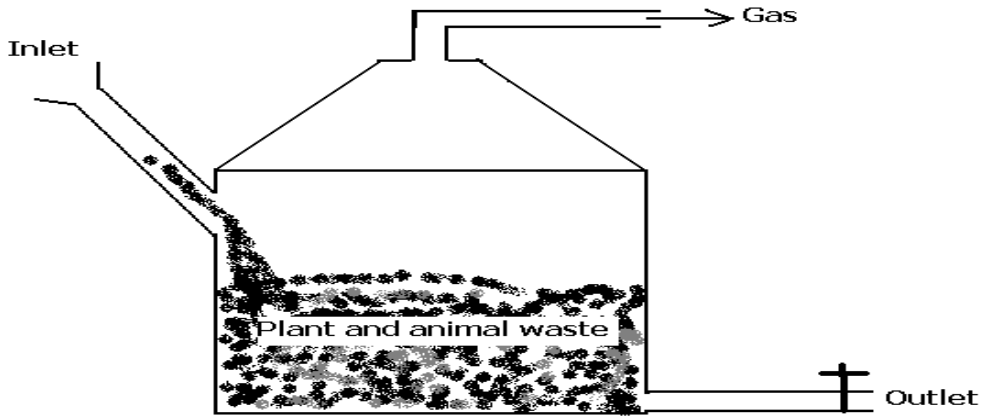
Food as a source of energy

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:-

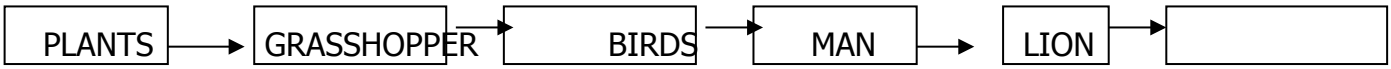
i. Using sustainable harvesting methods i.e. copping, lopping and selective felling.
ii. Planting other trees after cutting which take less time to mature.
iii. Use of fuel saving cooking materials.
   These includes: -
   a). fuel saving stoves or fire places
   b). pressure cookers
   c). heat conserving 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.

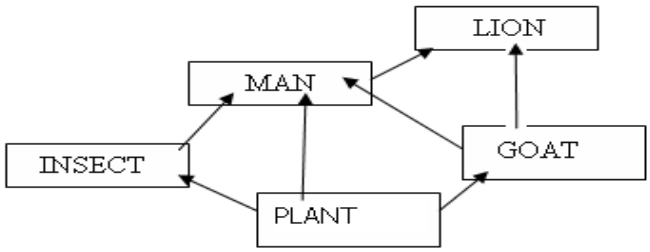
FOOD CHAIN



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.

THEME: **Managing changes in the Environment.**

TOPIC: **Controlling and Managing changes in the environment.**

THEME: **THE COMMUNITY POPULATION AND FAMILY LIFE.**

TOPIC: **POPULATION AND HEALTH CONCERNS.**

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.

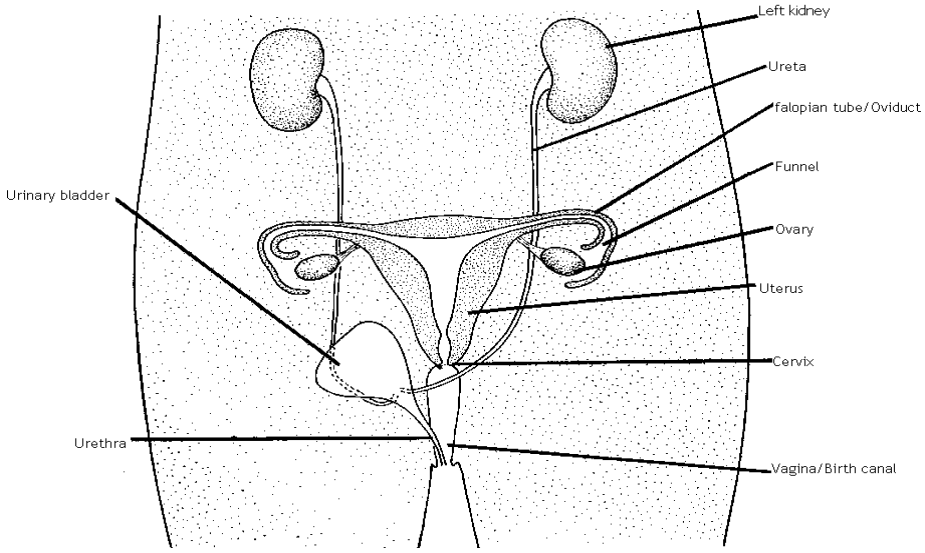
REPRODUCTIVE SYSTEM

Reproduction in humans.

1. Reproduction is a process where living things increase in number. Humans undergo sexual reproduction.
2. This involve the union of the male and female reproductive cells.
3. These cells are reproduced by the male and female reproductive organs.

The female reproductive organ.

front view



Functions of different parts.

1. **Vulva:**

   Receives and directs the penis in the vagina.

2. **Vagina:**

   a) It receives semen.

   b) It also acts as a birth canal

3. **Cervix:**

   This is a ring of muscle that closes the womb during pregnancy or when it is not ready to receive sperms.

4. **Uterus:**

   a) This is where conception or pregnancy takes place.

   b) It is where the foetus develops from.

5. **Oviduct/ Fallopian tube:**

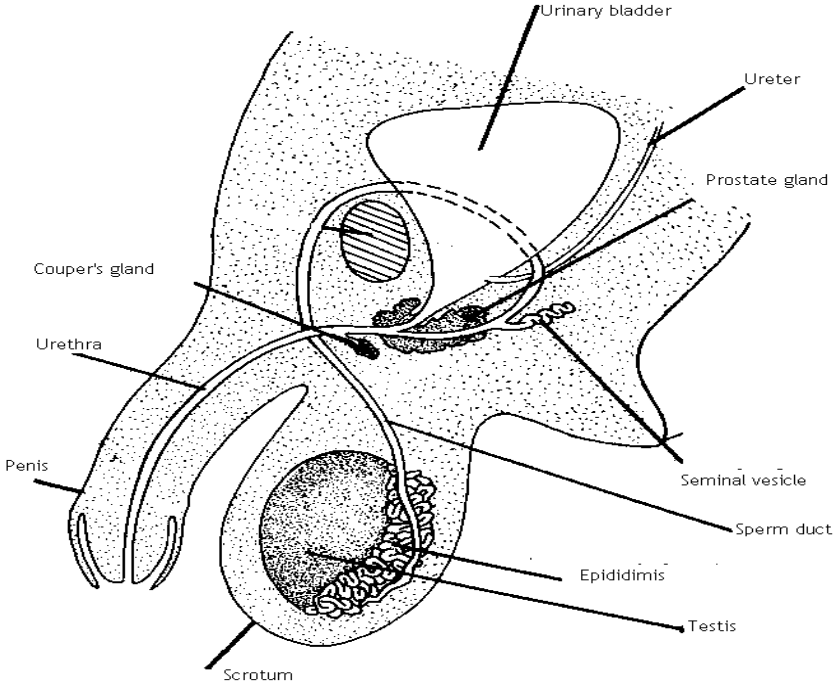
   This where fertilization takes place.

6. **Ovary:**

   a) Produces ova (female reproductive cells).
   b) Produces hormones like Oestrogen which controls the secondary characteristics

The male reproductive organ.

Diagram of the side view and front view of the male reproductive parts.



Functions of different parts.

1. **Scrotum:**
   a) Protects the testes.
   It hangs outside to prevent the sperms from being destroyed by too much heat.

2. **Testes:**
   a) Produce sperms (the male reproductive cells).
   b) Produce a hormone called testosterone which is responsible for secondary characteristics in boys.
3. **Epididymis:**
   A coiled tubes of about 6m long which stores already manufactured sperms.
4. **Sperm duct:**
   Conducts sperms from the epididymis to the urethra.
5. **Seminal vesicle, cowpers and prostate glands:**
   Produce seminal fluid in which sperms swim.
   A mixture of sperms and seminal fluid is called semen.
6. **Urethra:**
   Conducts semen into the vagina during copulation.
7. **Erectile tissue:**
   When stimulated, the numerous blood vesels will be filled with blood making
   the penis large and stiff.
8. **Penis:** Used for penetration and to deposit semen into the vagina.
7. **Sheath/Fore skin:**
   a) Covers the most sensitive part of the penis called the glans.

Fertilisation in humans:

1. Fertilisation is the union (fusion) of the male and the female gamete nuclei to form a zygote.

Humans undergo internal fertilization.

Internal fertilisaion:

1. This is a type of fertilisation where the nuclei of the female cells unite with that of the male one inside the female's body.
2. This takes place when there introduction of semen in the female organs during the time of ovulation.
   Ovulation is a process where the ovary releases a mature ovum into the oviduct.
3. Ovulation takes place every 12-14 days from the day of menstruation.
4. 2-3 hundred million sperms are introduced in the vagina in one ejaculation but only one is required to fertilise an ovum.
5. The act of inserting the penis into the vagina which results in the accumulated semen being ejaculated into the vagina is called copulation (mating).
6. A released human ovum is estimated to live for 12- 24 hrs. while a sperm can live in a female reproductive organ for 2-3 days.
7. When the nucleus of the sperm and ovum unite, a zygote is formed.
8. A zygote is a developing embryo between fertilisation to 8 weeks.
9. A foetus is a developing embryo between 8 weeks to birth.
10. In animals like rats, rabbits, dogs, pigs etc. many ova are relesed and are fertilised by a corresponding number of sperms.

Menstruation.

1. This is the monthly shedding of blood by the uterine walls whenever an ovum is not fertilised.
2. Usually, during ovulation, the walls of the uterus are thickened with layers of cells onto which the fertilised ovum attaches.
3. But if the ovum is not fertilised, the uterus walls break and shed off the blood, mucus and unwanted cells.
4. Menstruation occurs once in every 28 days.
5. It lasts about 3-5 days.

Implantation.

1. Implantation is a process where a fertilised ovum attaches itself onto the uterine lining.
2. After implantation, we say conception has taken place and that confirms pregnancy.

Pregnancy/ gestation.

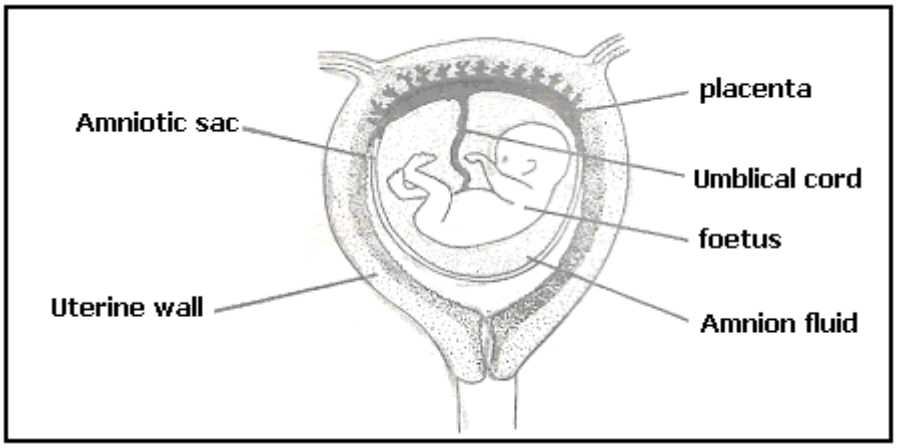
1. This is a period from fertilisation to birth.
2. In man, it lasts 9 months.

3. **Common indicators of pregnancy.**
   a) monthly menstrual periods stop.
   b) breasts enlarge.
   c) morning sickness especially in the 2^{nd} and 3^{rd} month of pregnancy.
   d) enlargement of the belly.
   e) cervix closes.
   f) movement of the baby can be felt.

Events in pregnancy.

a) The fertilised ovum develops finger-like structures (villi) into the uterus.
b) The part with the villi develops into a specialised organ called a placenta.
c) The uterine lining under the influence of Oestrogen and progesterone develop rich supply of blood vessels to facilitate exchange of materials between the mother's and the foetus' blood.
d) Dissolve oxygen, glucose, amino aids and salts from the mothers uterine blood pass to the embryo while the carbondioxide and other nitrogenous wastes pass in the opposite direction through the umbilical cord.
e) A water sack called an amnion, which cushions it from damage, surrounds the embryo.

Human foetus in the uterus.



Functions of different parts.

1. **Umbilical cord:** contains an artery and a vein through which materials are conducted to
   and from the foetus.
2. **An amnion:** holds the amniotic fluid.
3. **Amniotic fluid:** cushions the foetus from damage.
4. **The placenta:**
   a) acts as a food store and wastes.
   b) prevents the mother's hormones from reaching the foetus.

Requirements by females during pregnancy.

1. **Ante-Natal care:** This is the regular visits to the medical personel by a pregenant woman. During these visits the following take place;
   a) Treatment if sick.
   b) Immunisation against tetanus.
   c) Advice on the nature of the food to eat and the dressing during pregnancy.
   d) Advice o doing exercise
   e) Checking on the position of the foetus and the way it is developing.
2. **Good nutrition:**
3. Should eat a variety of foods mostly with proteins to ensure proper upkeep, better growth and development of the foetus.
4. **Physical exercise:**

Should have regular physical exercise such as walking, simple housework etc. but should not be given heavy work like lifting heavy loads.
Exercise keeps her fit in preparation for birth.

5. **Personal hygiene:**
   Should ensure cleanliness in herself and the cloths she wears.
6. **Rest and sleep:**
   Apart from the sleep at night, a pregnant mother requires adequate rest and sleep during the day.
7. **Appropriate dressing**:
   Should be dressed in a martinet dress (free dress) and a brassier.
8. **Avoid self-medication**:
   Shouldn't take any drug unless prescribed by a health worker.
   Some drugs are harmful to the growing foetus.
8. **Keep off from the patients:**
   This is simply to prevent infectious and other contagious diseases.

Common problems related to pregnancy.

1. Morning sickness and vomiting.
2. Burning feeling or pain in the chest or stomach.
3. Lower back pain.
4. Swollen veins.
5. Piles and haemorrhoids.
6. Constipation.
7. Anaemia.
8. Swollen feet.

Birth.

1. A few weeks before birth, the foetus has to lie with the head down.
2. The labour pains usually indicate the on set of birth.
3. These pains experienced by a pregnant mother resulting from the contraction and relaxation of the uterine walls.
4. While in labour pains, the amnion breaks and the fluid (amniotic fluid) escapes through the vagina.
5. This is followed by the dilation of the cervix and the vaginal walls.
6. Finally, the foetus is expelled through the dilated cervix and the vagina.
7. The umbilical cord that still connects the baby to the placenta should be tied and cut with sterilised equipment to prevent infection.
8. The placenta is the n expelled as an after birth.
9. A few days later, the remains of the umbilical cord fall off leaving behind a scar called a navel.

Note: The sudden fall in temperature experienced by the newborn stimulates it to take its first breath and induces crying.

Persons that help in child delivery.

a) Mid wives
b) Surgeons
c) Local birth attendants

Note: Local birth attendants are trained to cater for;

i) Areas where health centres are not easily accessible.
ii) Emergency deliveries.

Twins.

1. These are two babies produced by a mother in the same birth.

2. **Types of twins**.
   a) identical twins
   b) fraternal twins
   c) Siamese twins

Identical twins.

1. Occurs when a fertilised ovum divides into two in the early stages of cell division and each part develops independently into an embryo.
2. Such twins are of the same sex and look alike in nearly every physical respect.

Fraternal twins.

1. These result from two ova being released by the ovaries at the same time and are fertilised by the corresponding number of sperms.
2. Such twins may be of different sexes and may not necessarily look alike.

Siamese twins.

1. Occurs when a fertilised ovum divides but fails to separate fully.
2. The twins therefore end up being joined to one another and may share organs like the heart, liver, stomach and the brain.
3. These twins may successfully be separated through surgical operation.

Multiple births.

1. Multiple birth is where triplets or more babies are born in the same birth.
2. It results from many ova being released from the ovaries and being fertilised by a corresponding number of sperms.

Sex of a child.

1. In the early stages of development, zygotes in most animals look alike but because of the instructions given by the sperm and the ovum, changes occur.
2. Sperms and ova contain chromosomes in which genes are carried.
3. Female gametes contain X- chromosomes and the male gametes contain X or Y- chromosomes.
4. If a sperm with X- chromosome joins an ovum, the baby will be a girl and if a sperm with Y- chromosome joins an ovum, the baby will be a boy.

	Sperm	
	x	y
x	xx	x y
x	xx	x y

Note: A gene is a unit of inheritance.

Barrenness.

1. Barrenness is one's inability to produce young ones.

2. Causes of barrenness.

   a) Inability to produce enough sperms by males.
   b) Inability to produce ova by females.
   c) Blocked oviduct or sperm duct due to STD^s or STI^s etc.

d) Impotence.(failure for the penis to stiffen)

Common causes of impotence.

a) Psychological- if one's mind is not sexually aroused, he may fail to erect.
b) Prolonged Drug or alcohol abuse.

Breast-feeding.

1. This is natural way of feeding in which a baby sucks milk from the mother's breasts.

2. **Importance of breast feeding to a baby**.
   a) Breast-feeding builds a strong relationship between the baby and the mother.
   b) Breast milk contains antibodies that boost the baby's immune system.
   c) Breast milk is clean and ready for use at any time.
   d) Breast milk contains almost all the food values needed by the baby.

Importance of breast feeding to the mother.

a) Breast- feeding lays mother's next pregnancy thus providing natural child spacing.
b) Breast-feeding strengthens the relationship between the mother and the baby.
c) Breast milk is cheaper to the family because it's not bought.
d) Breast- feeding is not time wasting because breast milk is always ready.
e) Breast- feeding gives a mother chance to rest from what she has been doing.

Bottle feeding.

1. This is an artificial way of feeding in which a baby sucks milk from the bottle.

2. **Factors that make a baby be bottle-fed**.
   a) When the mother is HIV positive.
   b) When the mother does not produce enough milk.
   c) If the mother is of working class.
   d) If a mother dies immediately after giving birth.

3. **Advantages of bottle-feeding.**
   a) In case of working mothers, bottle- feeding gives them a chance to concentrate on their work.
   b) It prevents mother to child transmission of diseases like AIDS.
   c) It acts as a supplement for babies whose mothers do produce enough milk.
   d) It's the only feeding solution to babies whose mothers die when they are still young.

4. **Problems associated with bottle- feeding.**
   a) May lead to infection due to contaminated bottles.
   b) Bottle-feeding is time wasting.
   c) Bottle- feeding is expensive because the family has to spend money to buy milk.
   d) Some babies may be allergic to the cow's milk.

Growth and development.

1. Growth refers to one's increase in size.
2. Development refers to one's increase in maturity.
3. Puberty is when one becomes sexually mature.
4. Adolescence is stage of development between child hood and adult hood.

Primary sex characteristics in adolescents.

1. These are changes that involve sex organs in preparation for a reproductive function.

2. **In males:**
   a) the penis and the testes enlarge
   b) testes begin to produce sperms
   c) one begins to experience wet dreams

3. **In females:**
   a) development of the uterus and the ovaries
   b) production of ova by the ovaries
   c) menstrual cycles begin

Secondary sex characteristics in adolescents.

1. These are changes that are related to physical features that differentiate a mature man from a mature woman.

2. **In males:**
   a) Growth of hair on the chest, armpit and on the face.
   b) The voice deepens.
   c) Sweat glands become active.
   d) Development of muscles.

   Note: Increased levels of a hormone called testosterone bring about these changes in males.

3. **In females:**
   a) Development of breasts.
   b) Growth of hair in the pubes and the armpit.
   c) Enlargement of hips.
   d) Active sweat glands.
   e) Development of muscles and beautiful look.

Psychological and emotional changes.

1. These are changes that occur in one's mind and may not be realised by an adolescent.
2. They include:
   a) Adolescents become interested in members of the opposite sex.
   b) They want to look and be recognised as mature.
   c) Move in peer groupings of boys and girls.
   d) Become angry and disappointed quickly.
   e) React quickly to different situations e.g. a boy or girl who was once docile and cooperative, becomes resistant and disobedient.

Out of step changes.

1. These are changes that occur differently to different in the same age group.
2. Some of these changes occur earlier or later than they are expected in some individuals.
3. They include:
   a) A boy who was previously short may find himself taller compared to his age mates.

b) A girl who was once considered small may find herself too tall and too fat compared to her age mates.
c) Those who mature later may be influenced by those who mature early.
d) Anxiety may be created on those who mature later and left behind by their age mates.

Problems of adolescence.

a) This stage brings conflicts between adolescents and culture and religion.
b) This stage brings conflicts by adolescents wanting to experiment situations.
c) Makes adolescent to develop anti-social behaviours such as smoking, alcoholism etc.
d) Makes an adolescent gain forms of wished anxiety.
e) Brings conflicts between adolescents and elders.

Family planning.

1. Family planning is a measure taken by parents to have a manageable number of children.
2. This is usually achieved through birth control methods.
3. Birth control methods ensure child spacing.
4. Child spacing is where parents give adequate time between the birth of their family children.

5 U**ses of family planning.**

a) Enables the mother to regain her health in preparation for the next pregnancy.
b) Enables parents to have a manageable number of children in a family.
c) Enables children to have enough basic needs.
d) Checks on the population of a country.
e) Helps in the control of unwanted pregnancies.

6. **Some reasons why some parents produce many children.**

a) Ignorance about family planning methods.
b) High infant mortality rate.
c) Desire for a particular sex of a child.
d) Cultural beliefs and the need to show that one is sexually strong.

Birth control methods.

1. **Natural birth control methods**.
   a) **Abstinence**: This is a method where persons do without sex for an agreed period of time. This method is good for school going children and the unmarried.
   b) **Breast-feeding:** Breast- feeding delays the re- occurrence of ovulation and menstrual periods. It's only effective if the mother breast-feeds frequently and for a longer time.
   c) **Rhythm:** This involves studying one's menstrual cycle and having sex only when ovulation is likely not to take place. It is effective in females with regular menstrual cycles. It calls for mutual understanding between the two partners.
   d) **Withdrawal method**: This is a method where a man pulls out his penis from the vagina before ejaculation. It's not effective because semen leak ahead of time for ejaculation.
2. **Artificial birth control method**.

a) **Use of contraceptive pills:** Pills contain hormones that suppress (prevent) ovulation. This method is effective if the pills are correctly used as directed by the health worker.
b) **Birth control injections:** This works in the same way as the pills. The also contain hormones that prevent ovulation and menstruation. Here, a dose of an injection is given for along time (3-6 years).
c) **Use of condoms:** A condom is a thin rubber made in different shapes to be used by both men and women.

d) **Use of IUD:**
   - IUCD= Intra Uterine Contraceptive Device.
   - IUD= Intra Uterine Device.

These are specially shaped plastic that are inserte int the uterus. This device prevents implantation of a fertilised ovum thus making conception impossible.

Some of the Intra-Uterine Contraceptive Devices

e) **Use of a diaphragm:** This is a shallow cup made of rubber and worn by women before sexual contact. Unlike condoms, a cup can be used several times. It prevents semen from getting in contact with the female reproductive organ thus preventing fertilisation. The method is effective if it's used together with the contraceptive foam.

f) **Use of contraceptive foam:** This is a chemical applied into the vagina an hour before sexual intercourse. The chemical kills sperms.

Sterilisation method: This is a permanent method in which the couple will not have a child in their lifetime. The operation involves cutting and tying the oviduct and the sperm duct in females and males respectively. In males, the operation is called vasectomy and in females, the operation is called tubl- ligation.

Abortion.
Abortion is the deliberate or an intended termination of pregnancy.

Factors that make one opt foe an abortion.
a) The need to continue with education.
b) Public opinion- Women fear to be seen pregnant especially in the first pregnancy.
c) Fear to lose a job.
d) Un wanted pregnancy e.g. pregnancy resulting from rape.

Dangers of abortion.
a) Can lead to death.
b) May lead to secondary infertility.

Miscarriage.

This is un intended or accidental termination of pregnancy.

Causes of miscarriages

a) Malaria infection.
b) Severe alcoholism and drug abuse by pregnant mothers.
c) Self medication.
d) External pressure like beating.
e) Stress.

Disorders of the reproductive system

a) Blocked oviduct or sperm duct which could have been brought by un treated gonorrhoea.
b) Undescended testes that usually leads to non production of sperms in males.
c) Presence of both the male and female organs in one being.
d) Kinked fallopian tube.

Diseases of the reproductive system.

a) Gonorrhoea.
b) Syphilis
c) Candidiasis.
d) Genital werts.
e) Genital herpes.
f) Chancroids

Sexually transmitted diseases.

1. S.T.D - Sexually transmitted Diseases.
2. S.T.I sexually Transmitted Infection.

Common Sexually Transmitted Diseases.

a) AIDS
b) Gonorrhoea.
c) Syphilis
d) Candidiasis.
e) Genital werts.
f) Genital herpes.
g) Chancroids

Gonorrhoea.

1. Caused by a bacterium called gonococcus.
2. Spread through sexual contact with an infected person.

Signs and symptoms of gonorrhoea

In males

a) Painful urination.
b) Wounds in the urethra.
c) Discharge of pus from the urethras.

In females.

a) Painful urination.

b) Wounds in the vagina.
c) Discharge of pus from the vagina.
d) Pain in the lower abdomen.

Prevention and control of gonorrhoea
a) Abstain from sex.
b) Stick to one healthy and faithful sexual partner.
c) Have protected sex. ie use of condoms.

Treatment of gonorrhoea.
Treat gonorrhoea with antibiotics like penicillin.

Effects of gonorrhoea.
a) Untreated gonorrhoea leads to blocked oviduct or sperm duct hence infertility in adults.
b) Gonorrhoea can lead to blindness in newly born babies.

SYPHILLIS
1. It is caused by a bacterium.
2. It is spread through sexual intercourse with infected person.
3. Babies get congenital syphilis from their mothers during pregnancy.

Signs and symptoms of syphilis
a) Painless sores around the genitals
b) Later, one develops blister-like sores all over the body.

Note: The sores can disappear even before treatment but can reappear.

Prevention and control of syphilis.
a) Stick to one healthy and faithful sexual partner.
b) Have protected sex i.e. use of condoms.
c) Observe hygiene while under treatment.
d) Treat early before syphilis gets worse.

Treatment of syphilis
Treat syphilis with antibiotics like benzathine penicillin.

Effects of syphilis.
a) Un treated syphilis may lead to brain damage.
b) It can lead to infertility.
c) It can destroy sexual organs especially in males.

AIDS
1. AIDS – Acquired Immune Deficiency Syndrom
2. AIDS is caused by a virus called HIV.
3. HIV – Human Immune Deficiency Virus.

Common ways through which HIV spreads.
a) Haviing un protected sex with an infected person.
b) Sharing skin cutting or piercing objects with infected persons.
c) Through transfusion of the infected blood.
d) From mother to child during birth.

e) From mother to child during breast feeding.

Note: HIV is mainly spread through exchange of body fluids.

Body fluids that contain HIV
a) Blood
b) Seminal fluid
c) Vaginal fluid
d) Breast milk.

Some cultural practices that promote the spread of HIV.
a) Circumcision where one knife is used on many people.
b) Tattooing
c) Sharing women.
d) Inheriting widows or widowers.
e) Cementing friendship by sharing coffee beans smeared with blood.

Signs and symptoms of AIDS
a) Persistent cough.
b) Persistent fever.
c) Rash all over the body.
d) Associated with diarrhoea.
e) Loss of weight.

Note: AIDS is a disease while HIV is a germ that causes AIDS.

AIDS should not be confused with the following:
a) Tuberculosis
b) Severe alcoholism.
c) Typhoid
d) Measles
e) Chicken pox

People at a high risk of acquiring HIV
a) The youth because they are sexually active.
b) Prostitutes because they are exposed to many sex partners.
c) Bar maids because they are working in places with high sexual temptations.
d) Long distance drivers because they are exposed to sex partners they do not know.

Why girls are more vulnerable to HIV than boys.
a) They are the victims of rape and defilement.
b) Girls mature earlier and get into sex before the boys.
c) Girls have a low bargaining power for safer sex.

Effects of AIDS on one's body.
a) Weakens ones immune system because it attacks the White blood cells. This makes one be killed by opportunistic diseases like typhoid, Malaria, diarrhoea, tuberculosis etc.
b) AIDS can lead to mental confusion

Note: Opportunistic diseases are diseases that take a chance to kill a person whose immune system has been weakened.

Effects of AIDS to the community.

a) Many orphans in the community.
b) Leads to low agricultural production because it weakens people who are supposed to grow crops.
c) Leads to loss of skilled people.

Preventiopn and control of AIDS.

a) Abstain from sex.
b) Stick to one healthy and faithful partner.
c) Use condoms.
d) Avoid sharing skin cutting or piercing objects.
e) Avoid premarital and extra marital sex.
f) Screen blood before transfusion.
g) Sterilize equipment before reuse.
h) Avoid inheriting the late person's wife or husbands.

Some organisations that are helping in the fight against AIDS.

a) **TASO** - The AIDS Support Organization.
b) **PIASCY** - Presidential Initiative on AIDS Strategy for Communication to the youth.
c) **UAC** - Uganda AIDS Commission.

Services of TASO to AIDS patients.

a) Offers voluntary HIV testing.
b) Provides counselling services.
c) Provides Anti Retro-Viral (ARV) drugs
d) Provides food to AIDS patients.

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.

e) Sun
f) Stars
g) Fire flies
h) Glow worm
i) Volcanic eruptions
j) 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

c) Electric bulbs
d) paraffin lamps
e) 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.

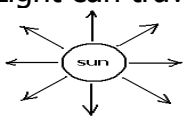
How we are able to see

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.

PROPERTIES OF LIGHT:

1 Light comes from different colours.
2 Light can travels in all directions from the source e.g. the sun.

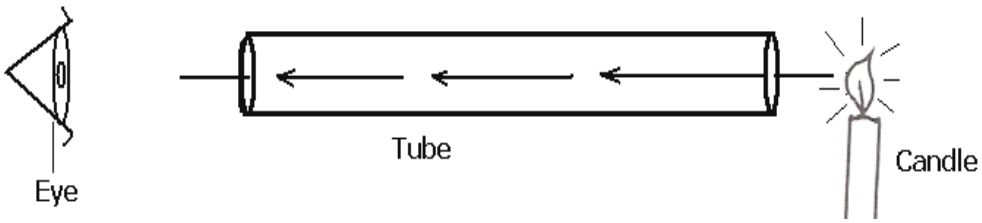


3 Light travels along a straight line.
4. A path along which light travels is called a **Ray.**
5. A ray of light is represented as a straight line with an arrow head to indicate the direction of movement of light.

A ray of Light.

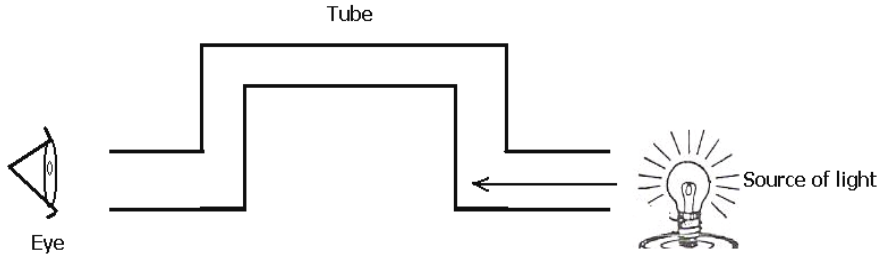
Experiments to show that light travels in a straight line

a)



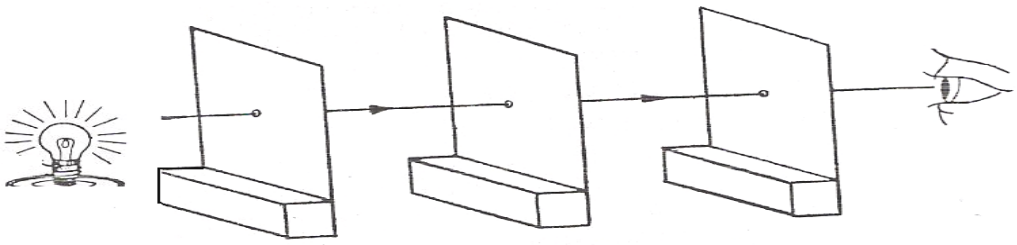
The light can be seen because there is a straight line from the candle to the eye.

b)

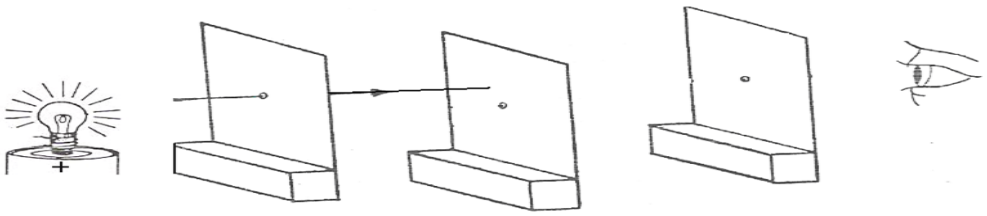


The light from the electric bulb will not be seen because light does not bend around corners.

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:

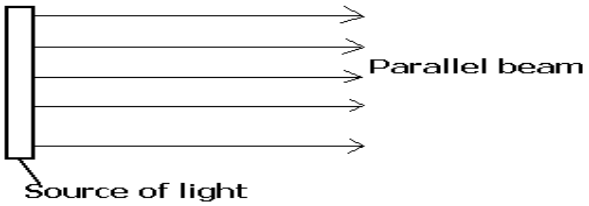
1. A ray is a straight path taken by light.
2. A collection of rays of light or group of rays moving in the same direction is called a **beam**.

TYPES OF BEAMS.

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

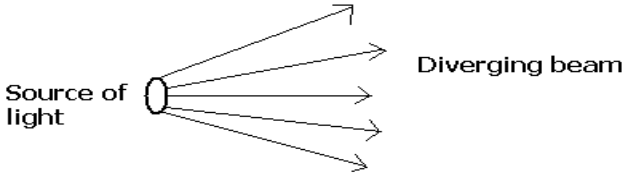
Parallel beams:

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



Diverging beams:

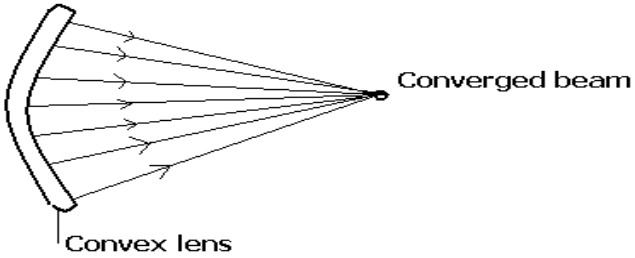
It is a group of rays moving in different directions from one source.



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.

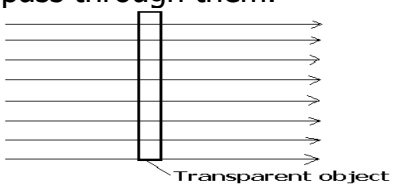
b) Reflected by the object.

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.

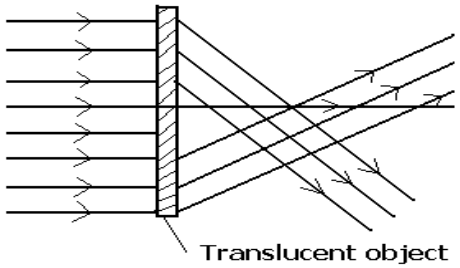


Examples of transparent materials.

c) air
d) clear polythene papers
e) Clear glass
f) 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.

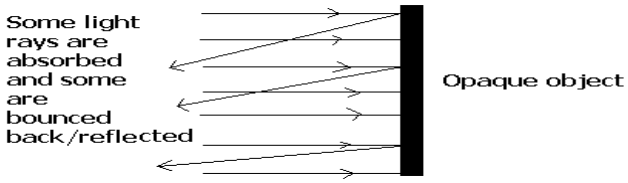


Examples of translucent materials

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:

f) Umbra
g) Penumbra

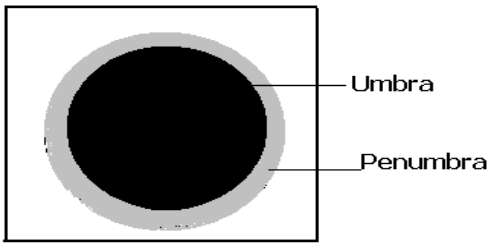
UMBRA

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

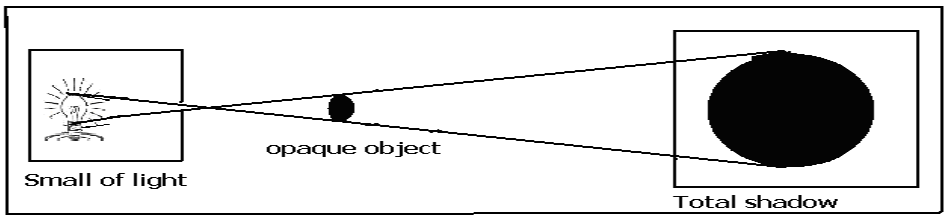
1. Penumbra is a partially dark/ lighter region of a shadow.
2. In most cases it surrounds the Umbra-shadow.

Diagrams showing umbra and penubmra shadows

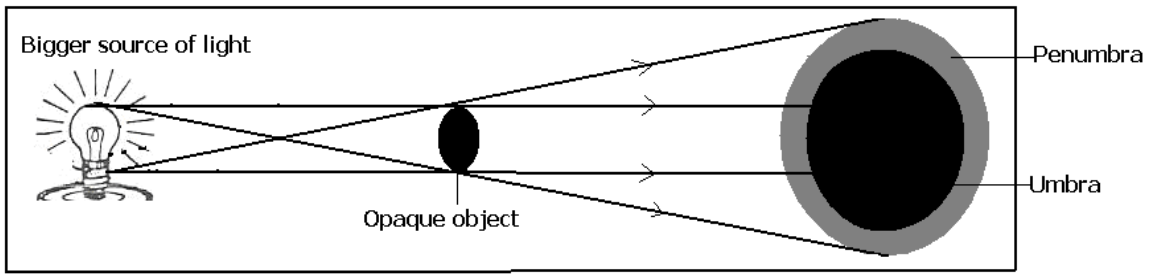


How a shadow is formed

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.

e) The size of the shadow depends on the angle of the source of light in relation to the object and screen.
f) 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.

g) They are shortest at noon.
h) 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:

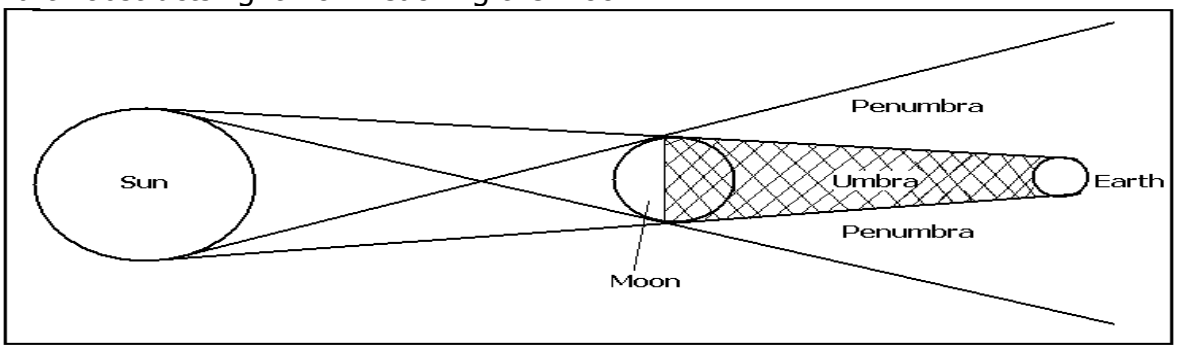
1. Eclipses are also shadows. The word Eclipse means **cut off.**
2. Eclipses are formed when the moon or earth obstructs light from the sun.

Types of Eclipses

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

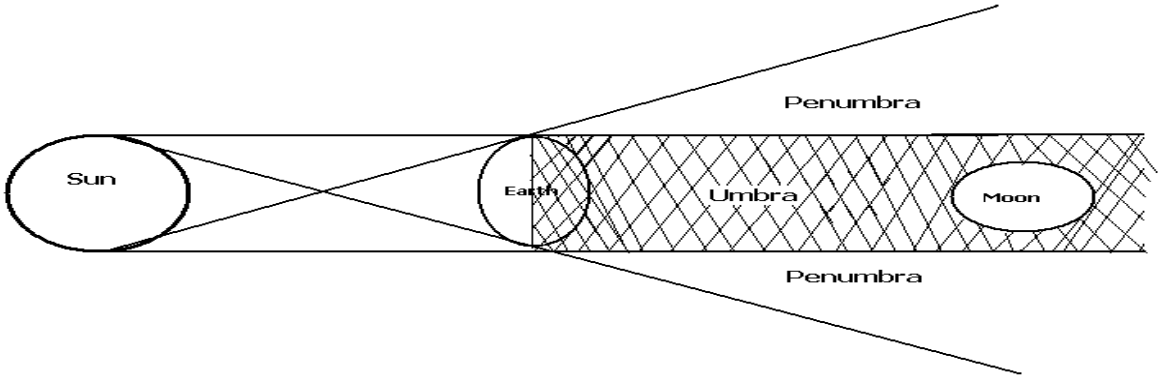
Lunar Eclipse (Eclipse of the moon

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**.

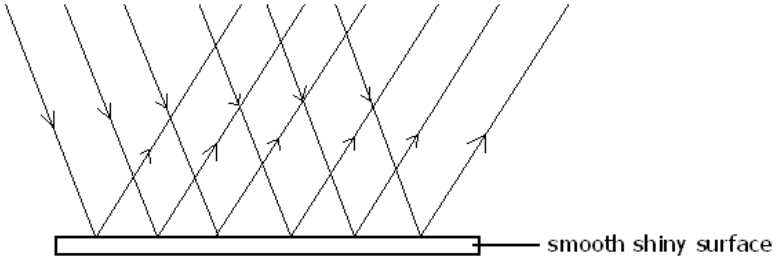
Types of reflections

a) Regular reflection
b) Irregular reflection

REGULAR REFLECTION:

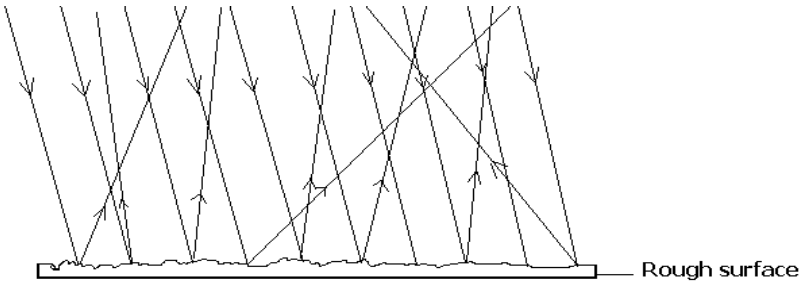
1. This is when light rays are bounced back in a regular direction.
2. It takes place when a parallel beam meets a smooth and shiny surface and is reflected as a parallel beam.
3. The surfaces include
   a) Plane mirrors
   b) Polished surfaces etc.

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.



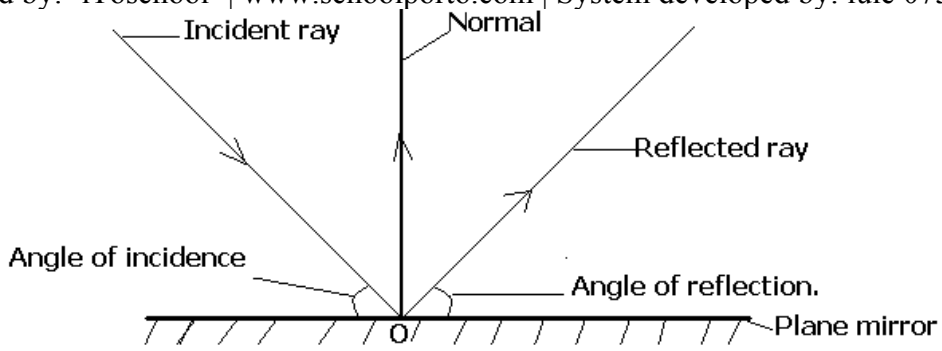
REFLECTION ON A SMOOTH SURFACE.

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**

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



LAWS OF REFLECTION:

The laws of reflection state that:

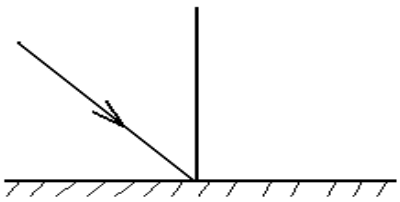
(i) The ray of incidence, Normal and ray of reflection lie in the same plane at the **point of incidence.**

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

APPLICATION OF THE LAWS OF REFLECTION

Complete the diagrams below

a.



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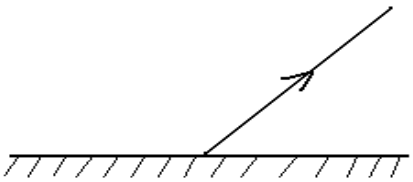
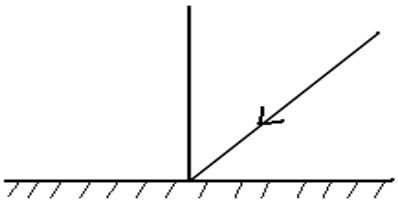


c.



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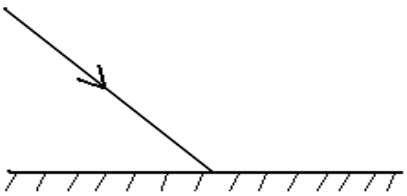
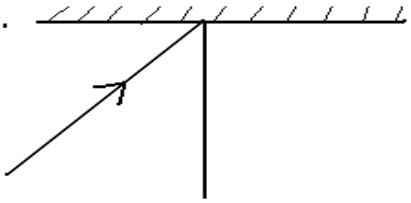


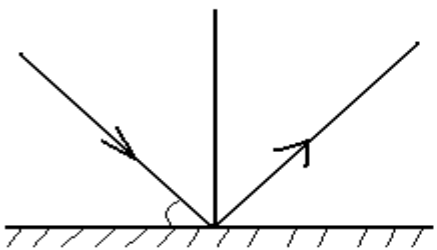
e.



f.

Find the given unknown angles.

a.



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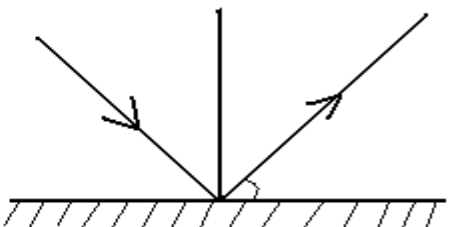


REFLECTION AND ABSORPTION OF LIGHT BY DIFFERENT MATERIALS.

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:

g) Real images
h) Virtual images.

REAL IMAGES

These are the images formed on the screen like:

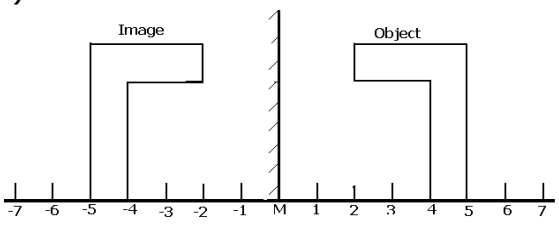
a) Televisions
b) Cinemas
c) Photographs.
d) Computers

VIRTUAL IMAGES.

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

Application of the characteristics of plane mirror images.

a)



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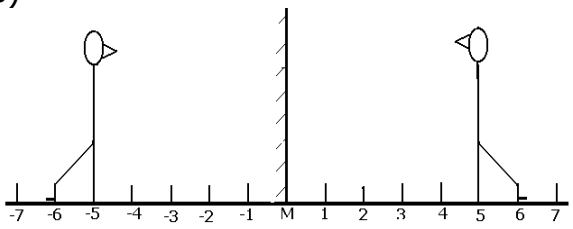

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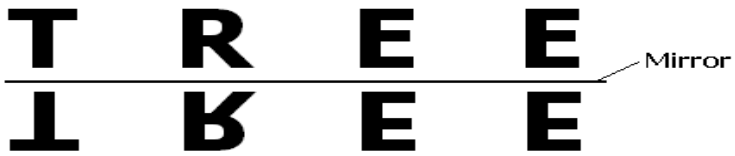
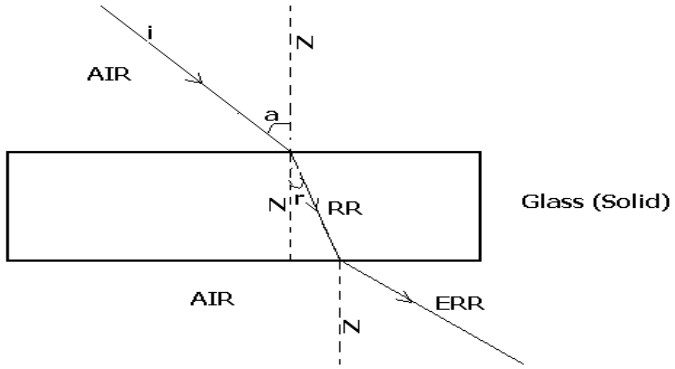


REFRACTION OF LIGHT:

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.

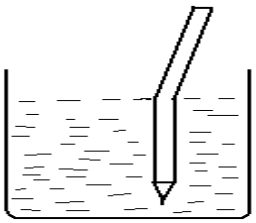
NOTE:

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

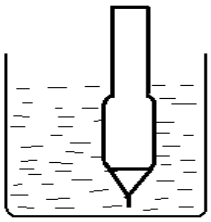
When it moves from a denser to a less denser medium, it bends away from the normal.

EFFECTS OF REFRACTION:

d) It makes pools of water appear shallower than they are.
e) 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.

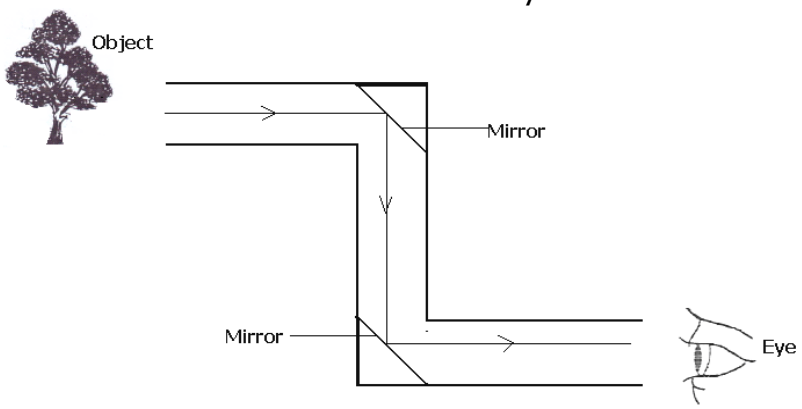
a) They are virtual. Virtual images are images that cannot be formed on the screen. They are formed behind the mirror.
b) They are laterally inverted (changed left to right or has reversed sides)
c) Same distance behind the mirror as the as the object in front of the mirror.
d) It is the right way up.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

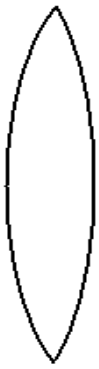


USES OF PERISCOPES

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 MIRRORS:
They are two types: Convex and Concave mirrors.

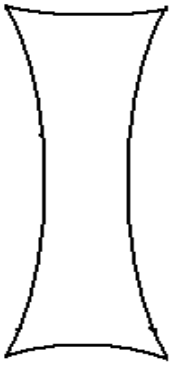
Convex mirrors
Convex Mirrors are curved outwards.
They form small images.
A convex mirror



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.

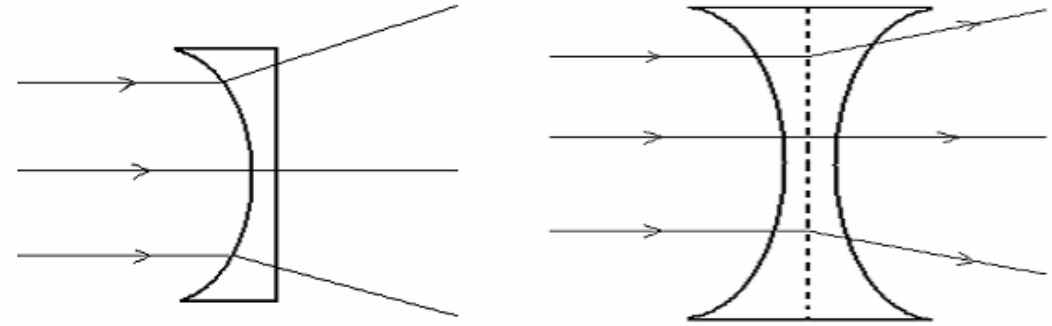
LENSES:

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.

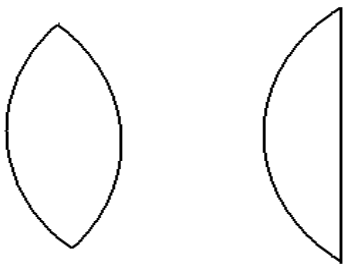
CONCAVE LENSES:

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:-

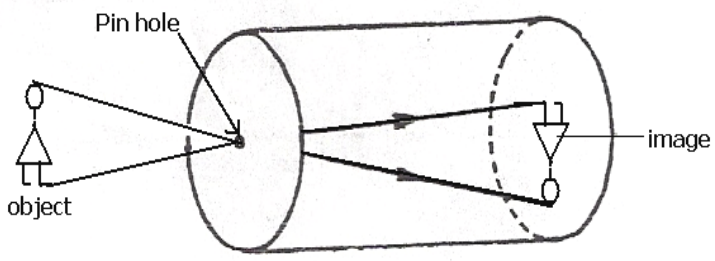
(i) They are used in the eyes. (convex lenses) to focus light onto the retina.
(ii) They are used in cameras to focus light into the film.
(iii) Spectacles use lenses to correct eye defects.
(iv) Microscopes and magnifying glasses use lenses to make objects appear bigger so that details are viewed properly.
(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

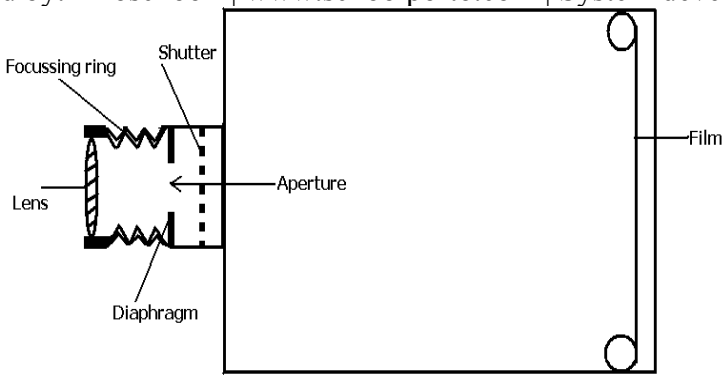
NOTE:

(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.

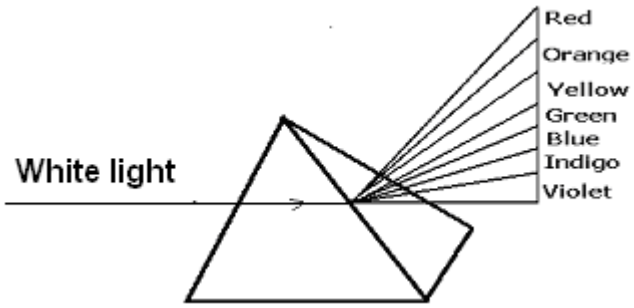
How a lens Camera Works:

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



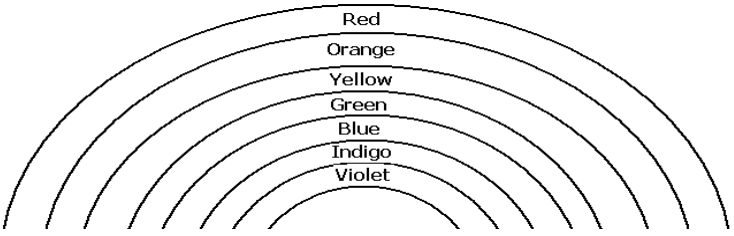
Spectrum can also be formed in the following ways.

(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.

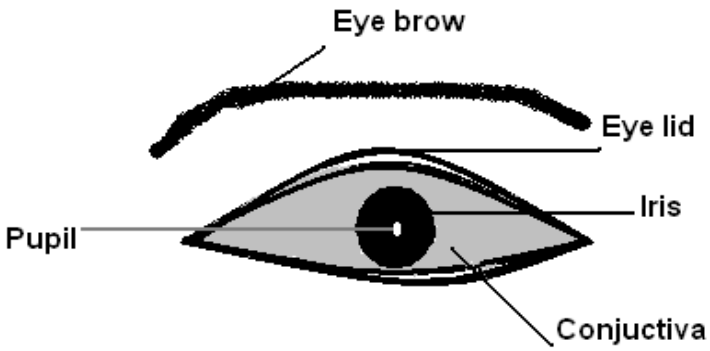
NOTE

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.**

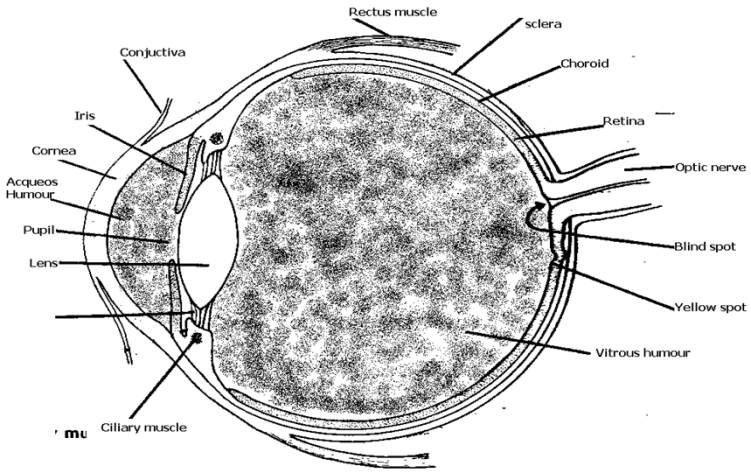
An ouside view of the eye



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.

<u>Eye Defects</u>

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.

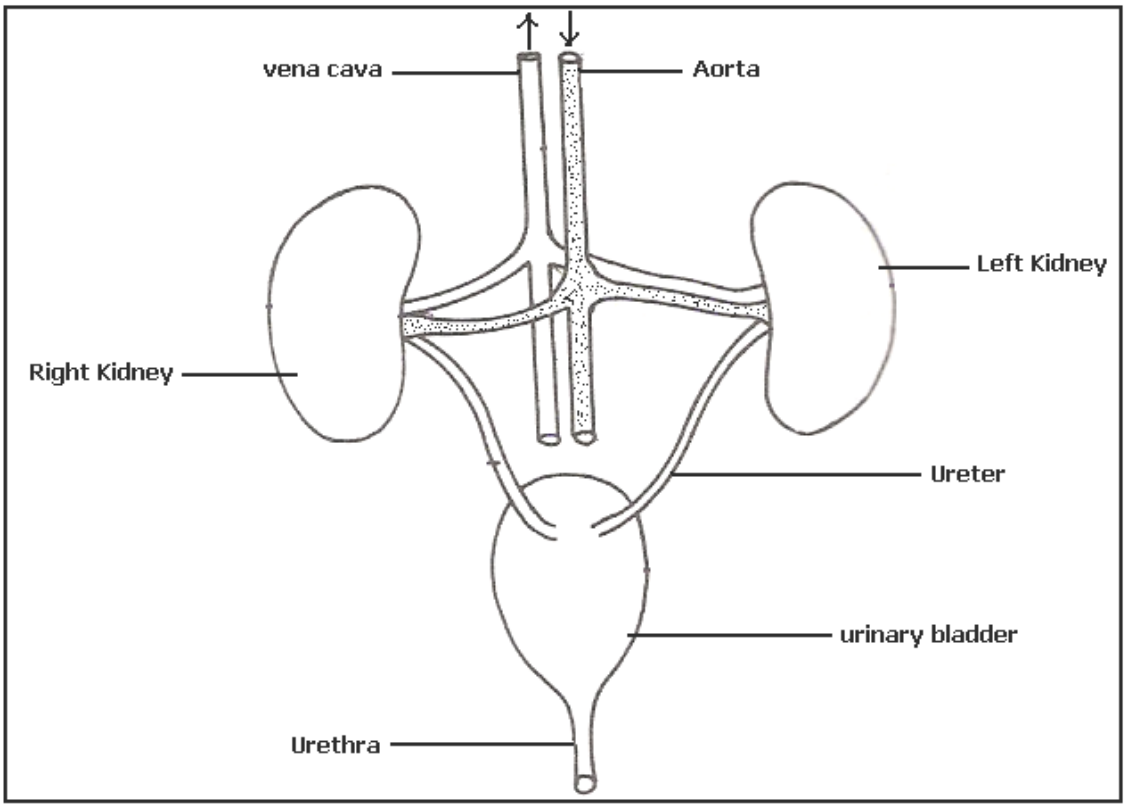
The major functions of the Kidneys.

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

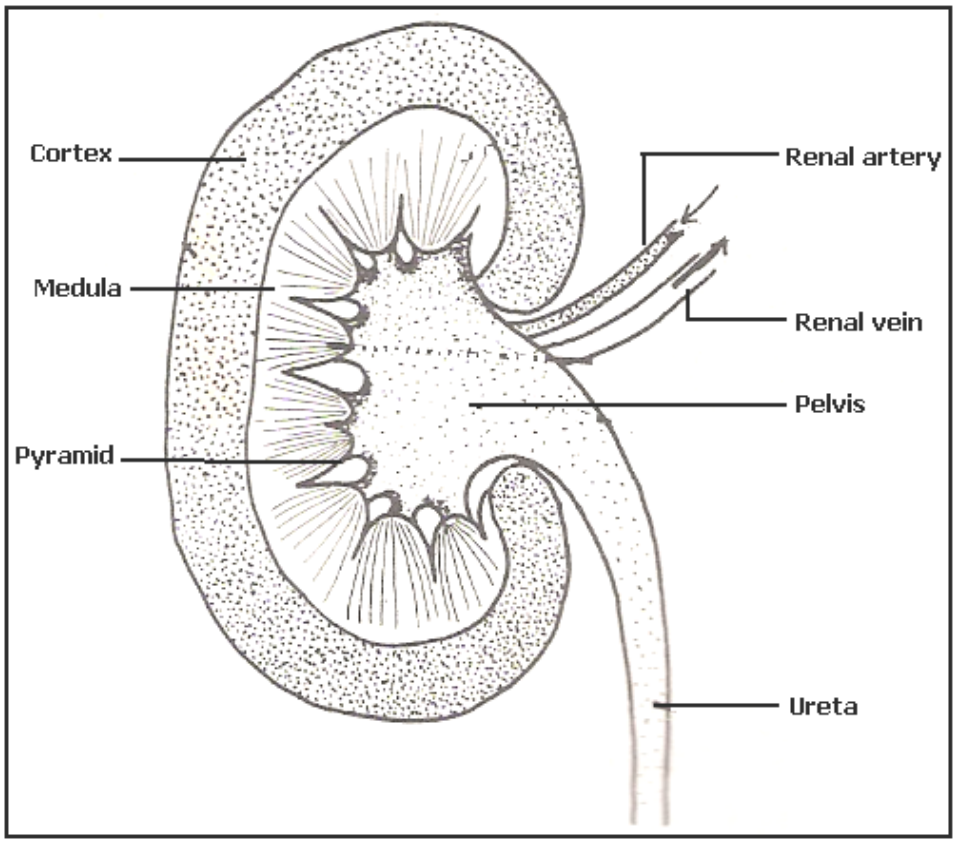
Substances excreted by the Kidney.

c) urea.
d) Uric acid
e) Excess water
f) 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.
e) Gonorrhoea
f) Kidney stones.
g) Nephritis
h) Bilharzia
i) Kidney cancer
j) Kidney failure/Uremia.

How to care for the Kidneys.
d) avoid a lot of salt in food.
e) Avoid drinking a lot of alcohol.
f) Drink water regularly.
g) Urinate as soon as you feel the bladder is full. Don't hold urine for a long time.
h) Eat a balanced diet
i) 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.

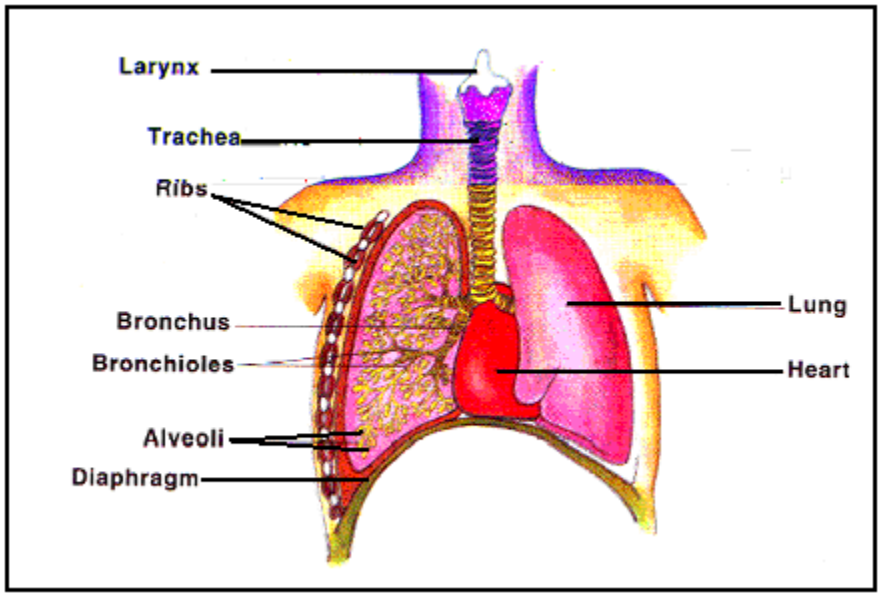
Note: Water and Carbondioxide are by products of respiration and the major products are energy and heat

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.

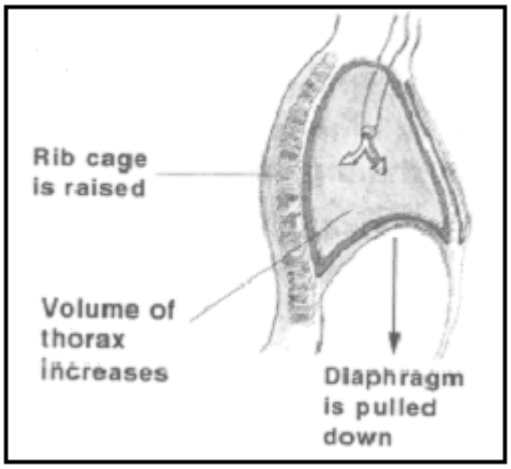
Alveoli (air sacs)
a. It is where gaseous exchange takes place.
b. Air sacs are adapted to this function by being surrounded by many blood capillaries and having thin walls.

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.

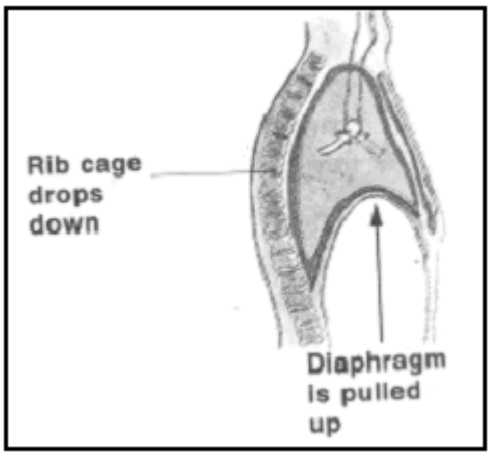
What happens when you breathe-in (during inspiration)



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)



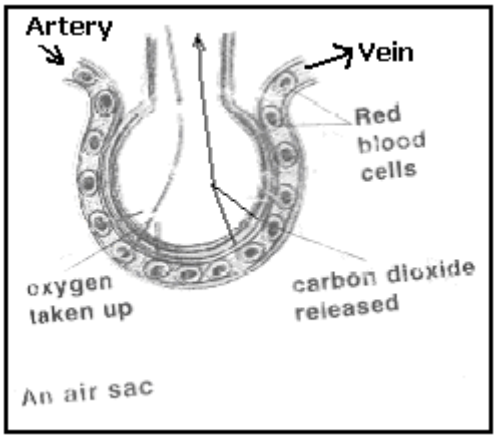
1. The ribs move to their original position.
2. The diaphragm becomes dome shaped.
3. The lungs go back to their original volume.
4. Air is expelled.

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

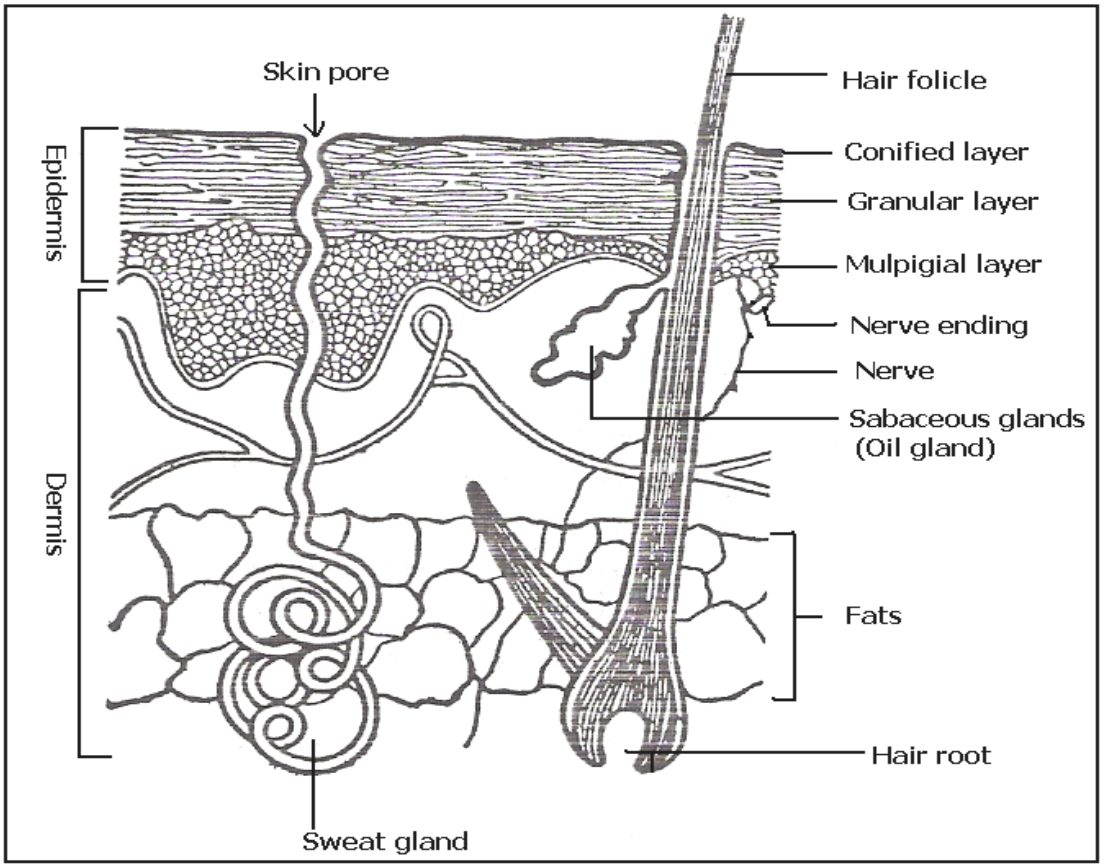
1. The skin is both an excretory and sensory organ.
2. It is an excretory organ because it excretes salt, excess water and sweat.

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.

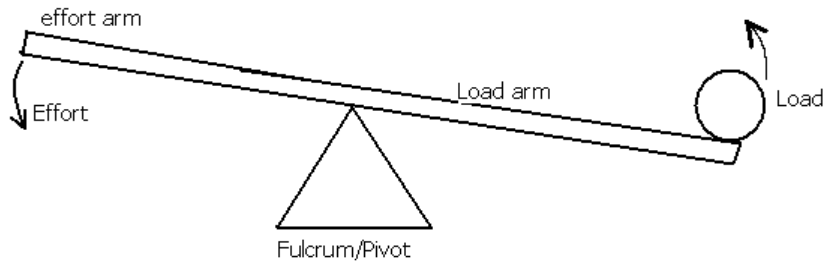
2. Machines are grouped into 7 groups. These are referred to as simple machines.

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**.

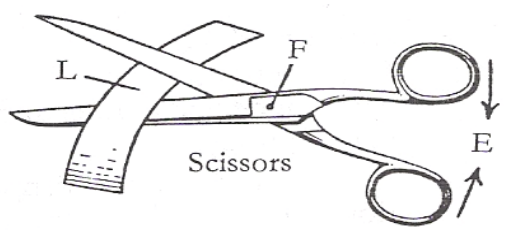
5. If the effort is in between the load and pivot it is a **third class lever**.
(PLE - HELPS TO KNOW THE ORDER OF LEVERS.)

FIRST CLASS LEVER

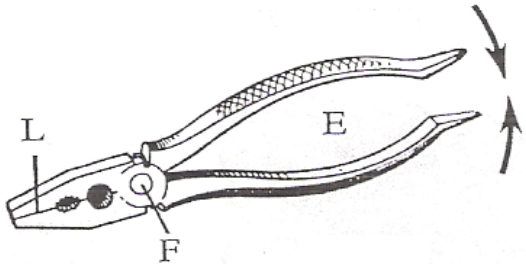
These are leavers whose pivot is between the load and the effort.

Examples of first class lever machines

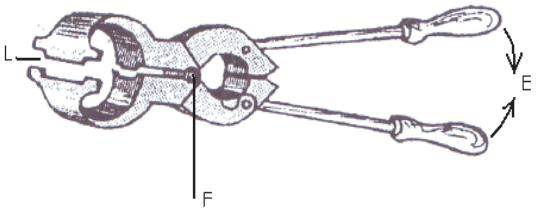
Pair of scissors



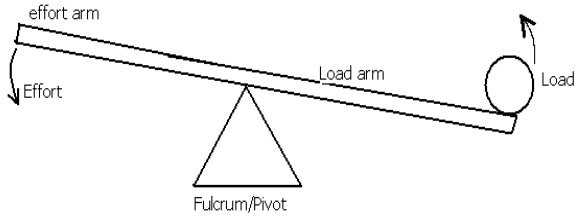
Pair of pliers.



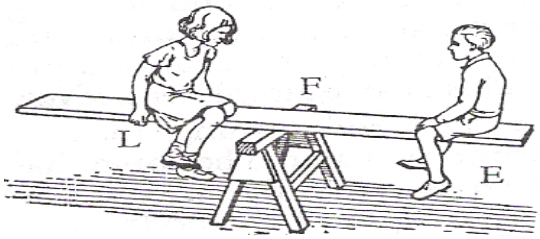
Burdizzo



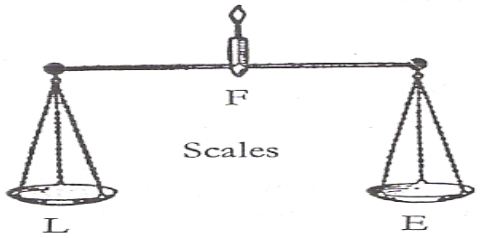
A craw bar



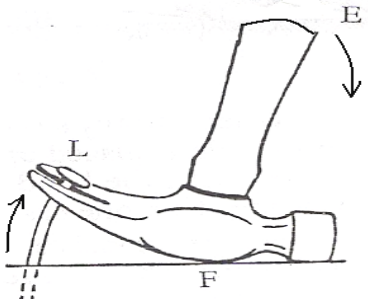
Sea saw



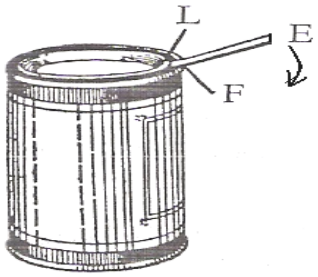
Weighing scale



A claw hammer



Tin lid opener.



Advantages of using a first class lever.

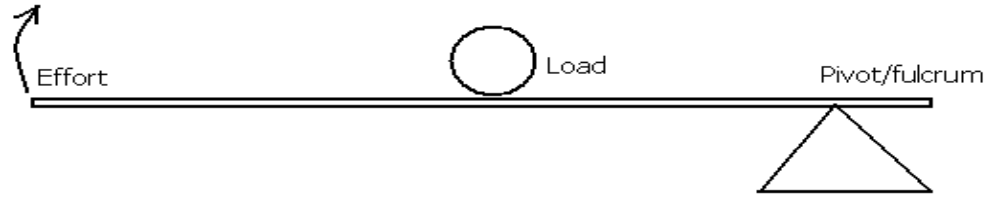
1. It changes the direction of effort. i.e Effort moves in the opposite direction to that of the load.
2. Small effort moves a large load.

NB: Work done is the same b'se the effort moves a longer distance than the load.

SECOND CLASS LEVER

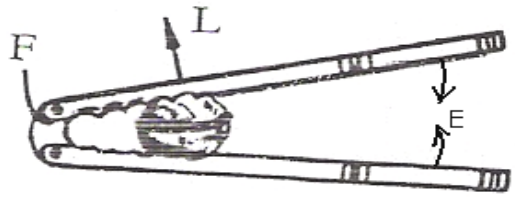
This is the class of levers in which the load is between the effort and the fulcrum.

Illustration

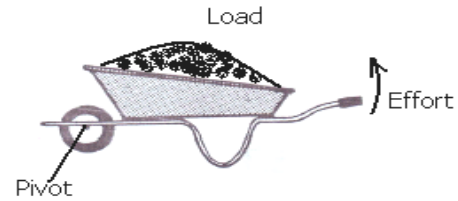


Examples of second class of levers.

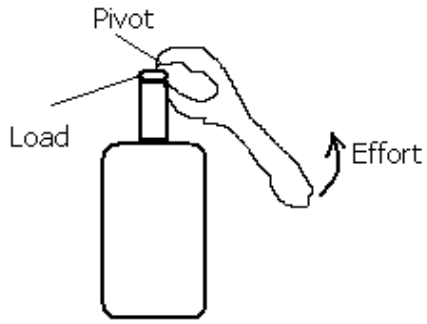
A nut cracker



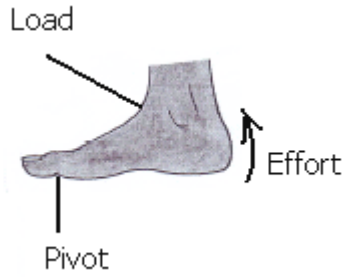
Wheelbarrow



Bottle opener



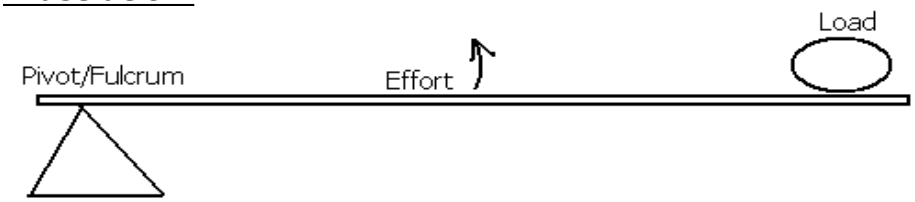
The foot



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.

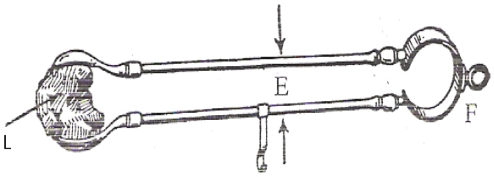
Illustration.

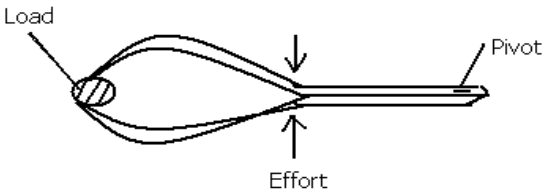


Pair of Tongs

.

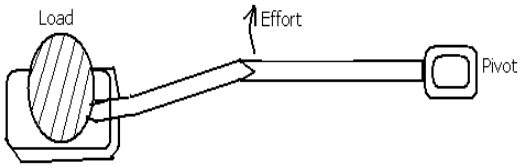
Pair of tweezers

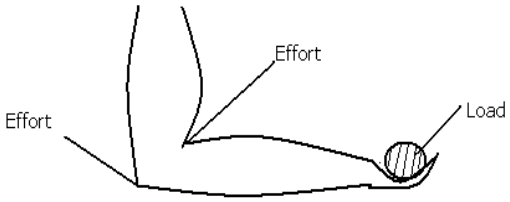




A spade

The arm

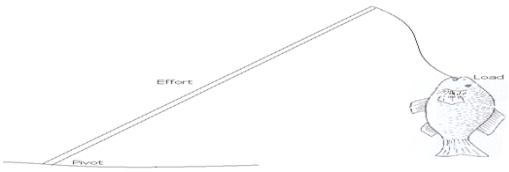




A steppler.

A pair of Forceps.

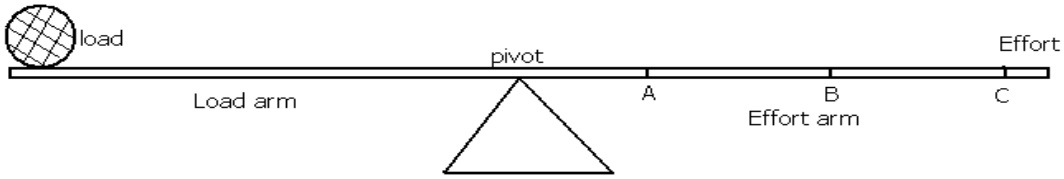
A fishing rode



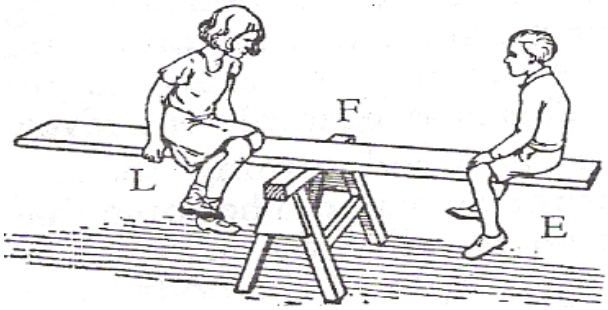
USING LEVERS TO MAKE WORK EASY.

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

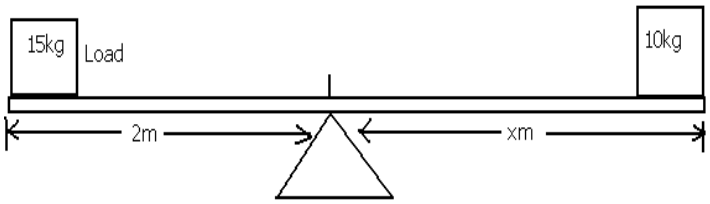
OR

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.

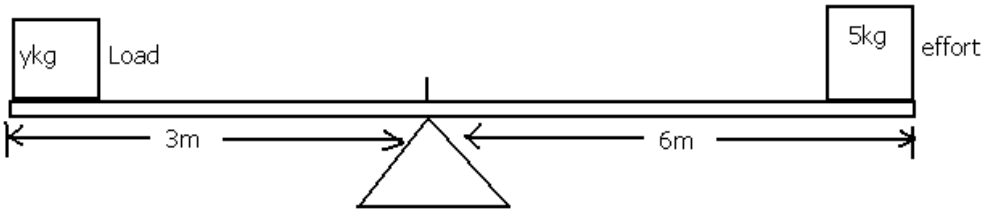
E x ED = L X LD

15kg x 2m = 10kg x X

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

X = 3m

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



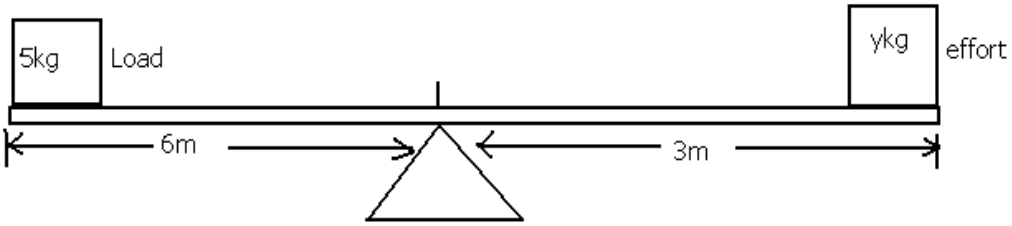
L x LD = E X ED

ykg x 3m = 5kg x 6m

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

$y = 10$

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

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

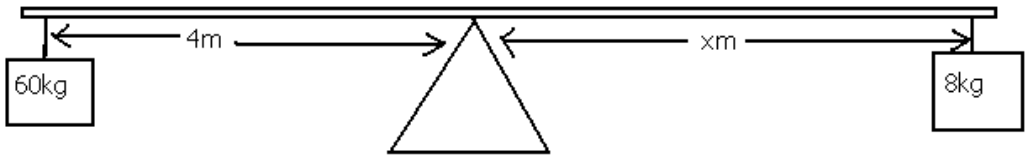
$y = 10$

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



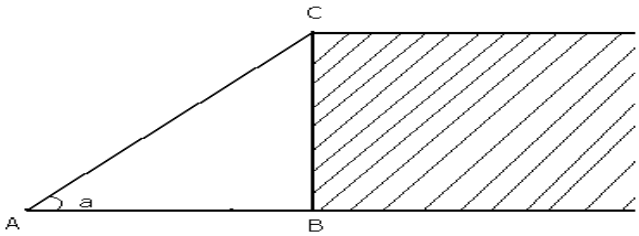
EFFICIENCY OF A MACHINE.

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

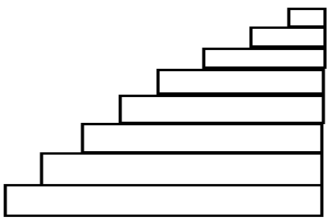
1. An inclined plane is a sloping surface which connects a lower level to a higher one.
2. It helps in raising the load by making the user apply less effort.
3. The advantage of using an inclined plane is that less force is applied to raise the load.
4. The disadvantage of using an inclied plane is that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



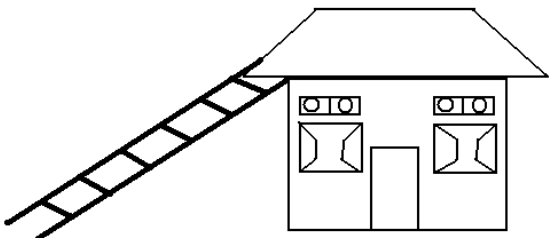
AC - Effort distance
BC - Load distance.
$\angle a$ - Angle of inclination.

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

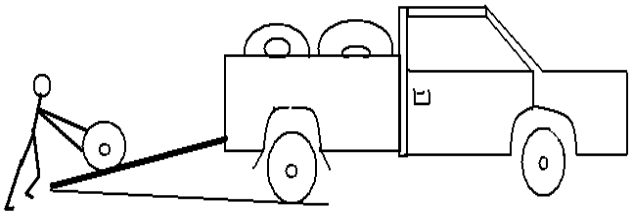
Examples of inclined planes
a) Stair cases



Ladders.



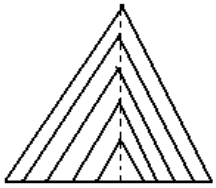
c) Plank of wood.



WEDGES

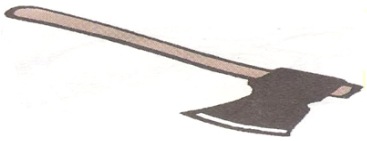
1. A wedge is a tool used for cutting or piercing.
2. It is also called a double inclined plane.

Shape of a wedge.



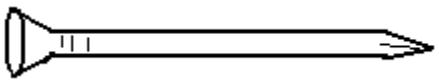
Examples of wedges.

a) An axe



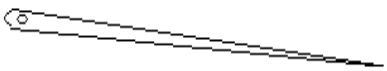
b) A panga

c) A nail



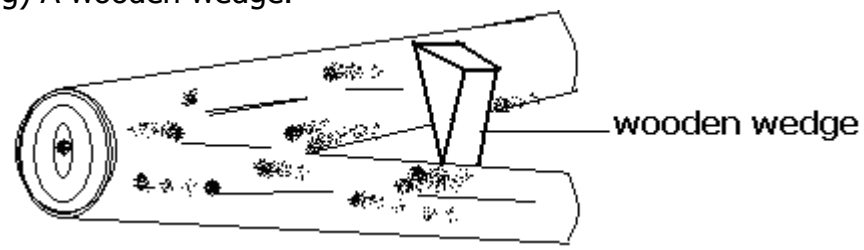
d) A spear

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.

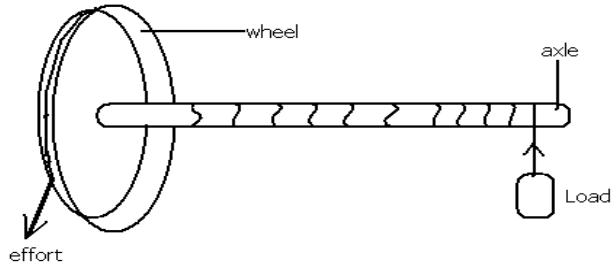
a) A car jack
b) Bolts and nuts
c) Some bottle lids
d) Some jerican lids
e) Drilling machines.

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.

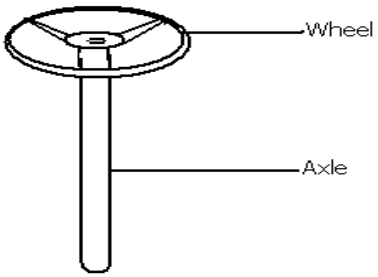
WHEEL AND AXLE

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.

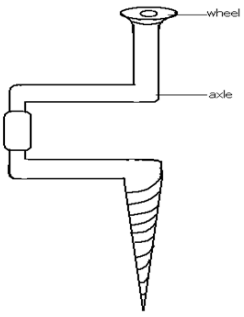


Examples of Wheel and axle.

a) Steering of a car.

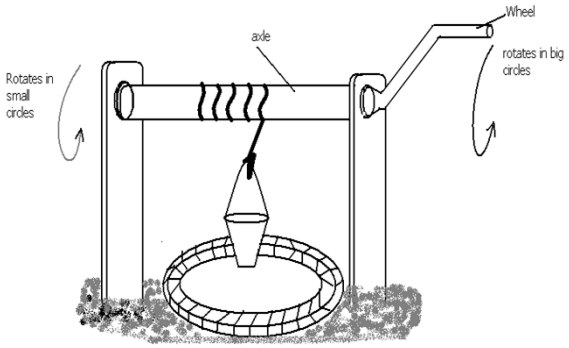


b) Driller



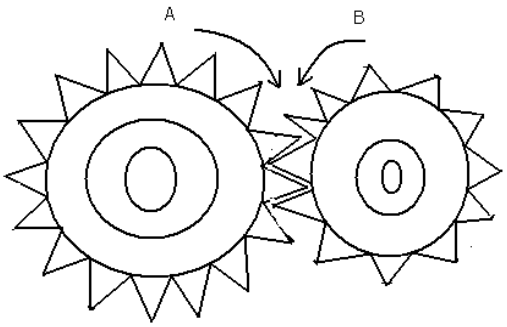
c) Windless for drilling water.

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.



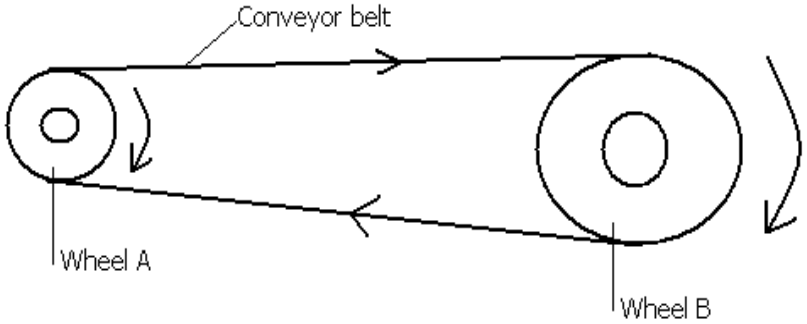
3. Gear wheels move in the opposite direction.
4. If gear wheel A has 40 teeth and B has 20 teeth, in one revolution of A, b turns twice.

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.

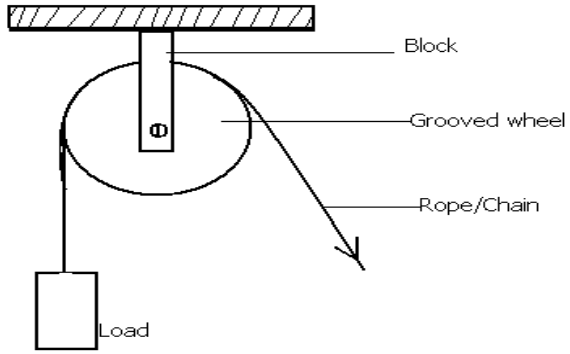


Examples of conveyor belts

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**.

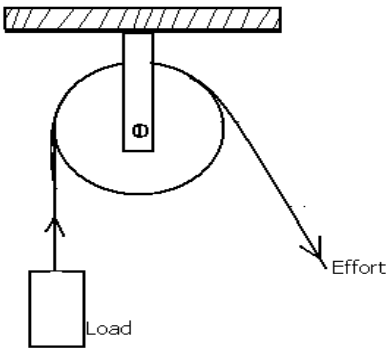


Types of pulleys

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.

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

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

$$= 1$$

Mechanical advantage = 1

Example II

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

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

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

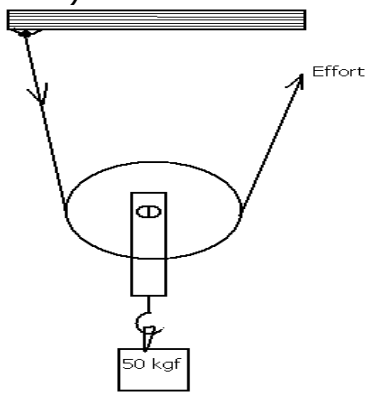
Effort = 60Kgf

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).



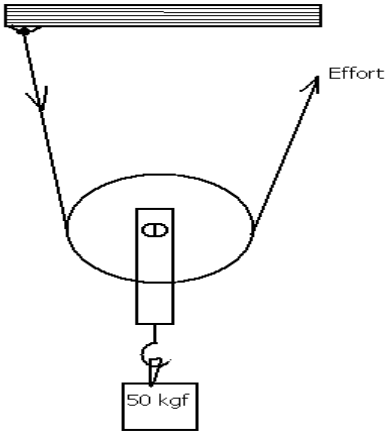
Advantages of single movable pulley.

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 = 50kgf
2 2

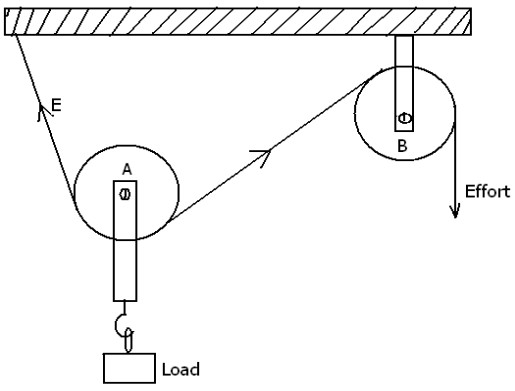
Effort = 25

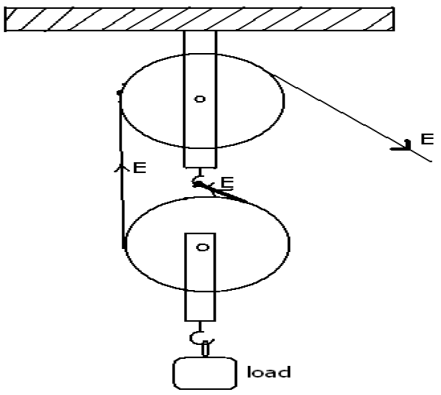
Difference between single fixed and single movable pulley

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?

Mechanical advantage = Load.
Effort

Effort x 3 = 45Kgf x E

$\frac{3}{3}$ E = $\frac{45}{3}$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**.

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.

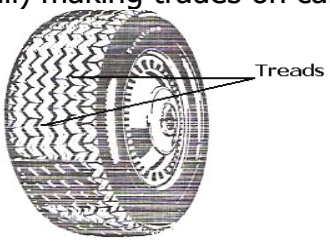
Friction as a useful force.

k) It enables us to write using pens, pencils chalk, etc.
l) It enables brakes of vehicles to stop movement.
m) It helps in lighting a match stick.
n) It enables forward movement of vehicle tyres.
o) It was used by early man to produce fire.
p) It is used in sharpening tools.

q) It enables plant roots to hold the plant firmly in the soil.
r) It enables us to walk without sliding.
s) 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.

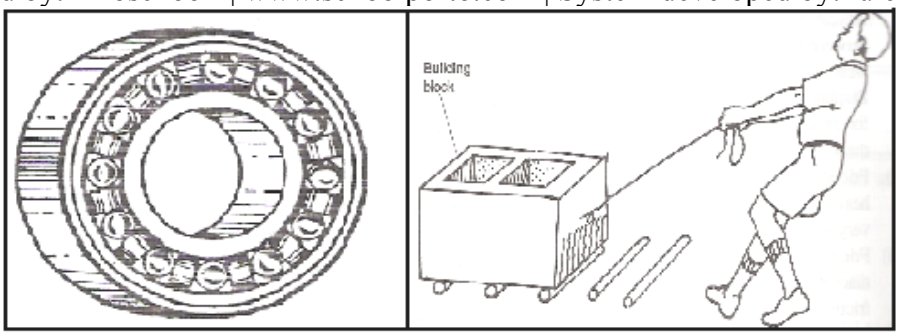
Friction as nuisance

f) It causes things to wear off.
g) It causes unnecessary noise in machines.
h) It produces unnecessary heat in machines.
i) It delays work.
j) 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

S**treamlined machines to reduce viscosity.**

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

ESEENTIAL/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.