KABOJJA JUNIOR SCHOOL

INTEGRATED SCIENCE P.7

LESSON NOTES

2021-2022

NAME.....

CONTENT

Term one

1. Muscular and skeletal system
2 Electricity and magnetism
3. Energy resources in the environment

Term two

1. Simple machines and friction
2. Excretory system
3. Light energy

Term three

1. Interdependence of things in the environment
2. Population and health

MUSCULAR AND SKELETAL SYSTEM

1. A skeleton is the structure that supports the body of an organism.
2. There are three types of skeletons namely:

(a) Hydrostatic skeleton
(b) Exoskeleton
(c) Endoskeleton

Hydrostatic skeleton

1. This is a type of skeleton that is made up of a body cavity filled with a fluid under pressure.
2. Examples of organism with hydrostatic skeleton include:

(a) Worms (Earth worm, tapeworm, hookworm etc.)
(b) Molluscs (snail, slug, octopus, oyster, cuttle fish)
(e) Coelenterates (Jelly fish, hydra, sea corals, sea anemone)

Exoskeleton

1. This is a type of skeleton found outside the body/that covers the body.
2. It is common in arthropods such as:

(a) Houseflies
(b) Grass hoppers
(c) Mosquitoes
(d) Spiders
(e) Crabs
(f) Millipedes
(g) Centipedes
(h) Crab
(j) Spider
(k) Scorpion

4. Organisms with exoskeleton moult to increase in size.

Endoskeleton

1. This is a type of skeleton found inside the body.
2. An endoskeleton is made up of bones.
3. All vertebrates have endoskeleton.
4. Examples animals with endoskeleton include:

(a) Man
(b) Cows
(c) Tilapia
(d) Snake
(e) Frog
(f) Chicken

Functions of the skeleton to an organism

1. It supports the body.
2. It gives the body shape.
3. It allows movement of the body parts.
4. It protects the delicate body organs.
5. It provides surface for attachment of muscles.
6. It manufactures blood cells.

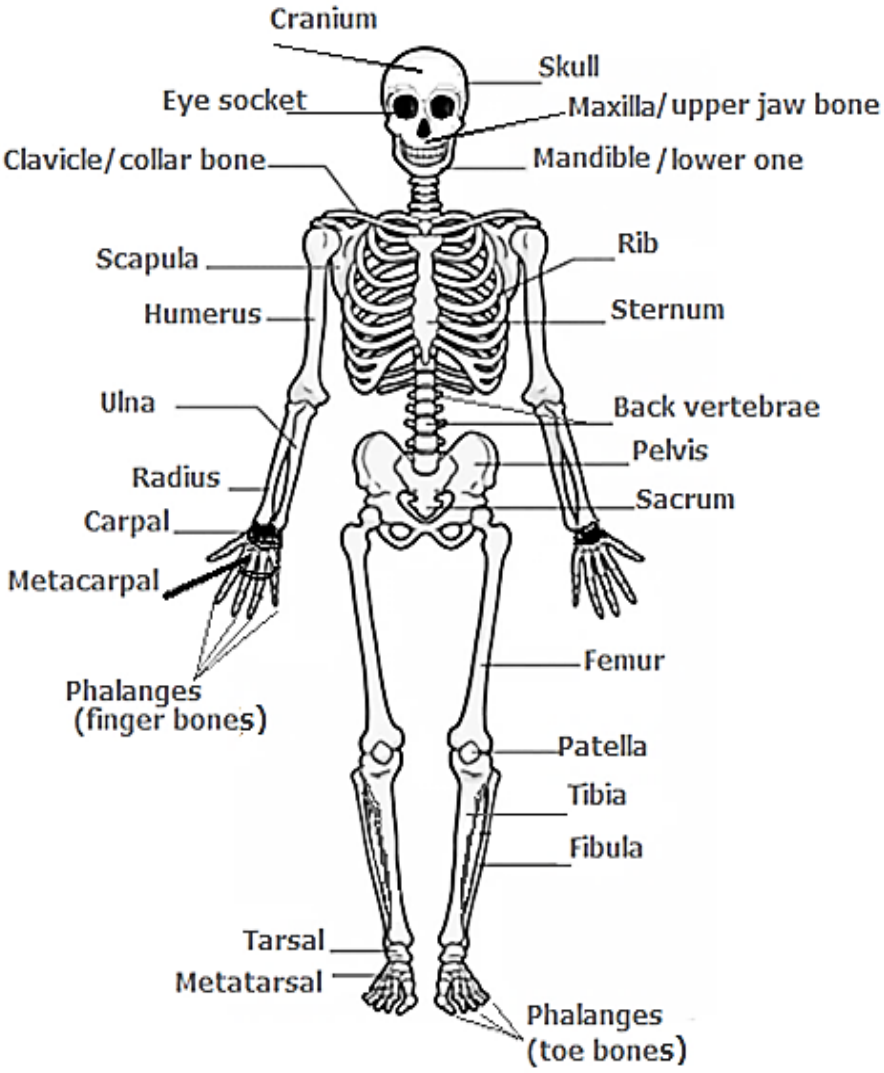
Delicate body organs protected by the skeleton

Delicate part	Part for protection
Brain/inner ear	Skull
Lungs and heart	Ribcage
Eyes	Eye socket/orbit
Spinal cord	Back bone/vertebral column
Female reproductive parts	Pelvis

The structure of the human skeleton

1. A human skeleton is a frame work of bones.

Illustration



BONES

1. A bone is the hardest tissue in the body.

Types/classes/groups of bones

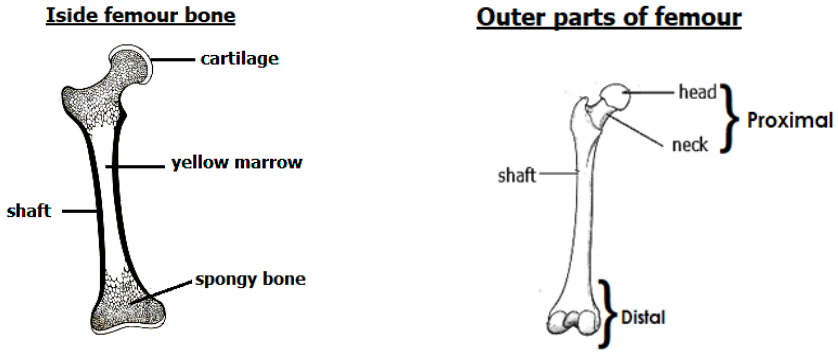
1. Bones are classified according to their shape
(a) Long bones
(b) Short bones
(c) Irregular shaped bones
(d) Flat bones

Long bones

(i) Radius
(ii) Ulna
(iii) Femur
(iv) Fibula
(v) Tibia
(vi) Humerus

Notes: The longest and strongest bone in the human body is the femur.

The structure of femur



SHORT BONES

1. These are found in the wrist and ankles.
2. Examples include:
(a) Carpals
(b) Tarsals
(c) Metatarsals
(d) Metacarpals
(e) Phalanges

NOTE: The stapes (stirrup) is the shortest bone in the body.

Flat bones

1. These are bones that are flat in shape.
2. They include the following:
(a) Scapula (shoulder blade)
(b) Bones of the skull (cranial bones)
(c) Sternum (breastbone)
(d) Ribs
(e) Hip bone
(f) Jaw bones

Irregular shaped bones

1. These are bones with irregular shapes.
2. They include:

(i) Vertebrae

JOINTS

1. A joint is place where two or more bones meet in the body.
2. Joints allow body movement.

Categories/classes/types of joints

(a) Movable joint
(b) Immovable joints

Movable joints/synovial joints

1. These are joints which allow movement.
2. Types of movable joints include:

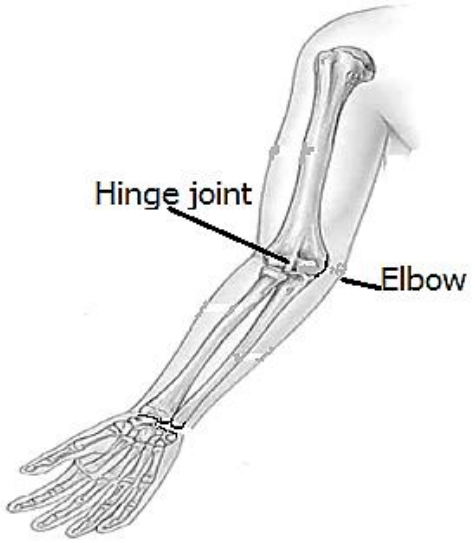
(a) Hinge joints
(b) Ball and socket joints
(c) Pivot joints
(d) Gliding

Hinge joints

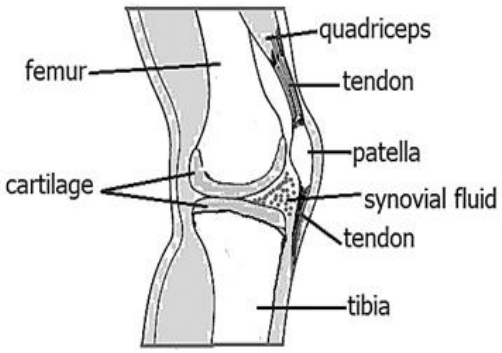
1. These are joints that allow movement **in one direction** (plane).
2. Their movement is like that of door hinges.
3. They are found in knees, elbow and jaws.
3. Examples of hinge joints include:

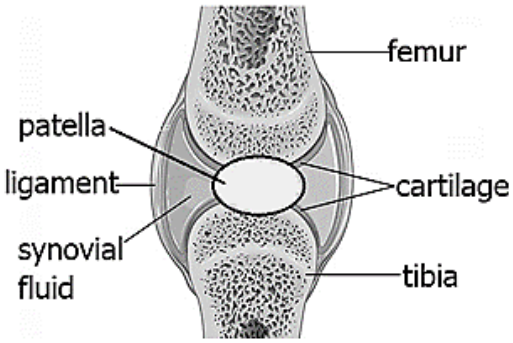
(a) The elbow joint.
(b) The knee joint.
(c) Joints of the jaw bones.

The structure of hinge joint of the elbow



Hinge joint in the knee





Parts of movable joints and their functions

Synovial fluid

It reduces friction. Synovial fluid reduces friction by lubricating the joints.

Note Synovial fluid is similar to oil or grease because both reduce friction.

Cartilage

This is a soft and flexible part of the bone.

(ii) It reduces friction at a joint. This is because it is smooth and slippery.

(ii) It absorbs shock at a joint. This is because it soft.

Ligament

It joins a bone to a bone.

Tendon

Joins a muscle to a bone.

Ball and socket joints

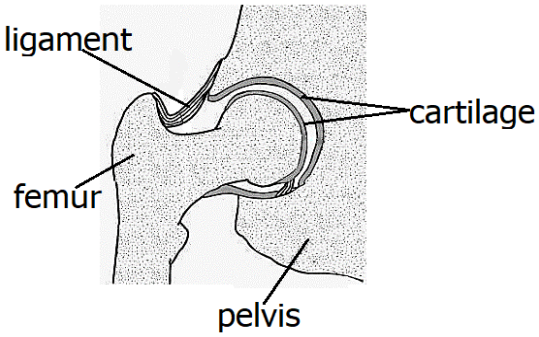
1. These are joints which allow movement in all directions (three planes)
2. They are called ball and socket joints because ball shaped end of a bone fits into a socket shaped end of another bone.
3. Examples of ball and socket joints include:

(a) The shoulder joint.

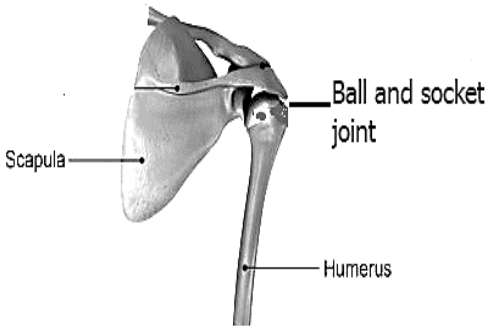
(b) The hip (pelvic) joint

The structure of ball and socket joints

Hip joint



Shoulder joint



Pivot joint

1. This is joint with bones that turn/rotate over others.
2. An example is the neck joint (between the atlas and axis bones).
3. They help us to nod and turn our heads our heads from one side to the other.

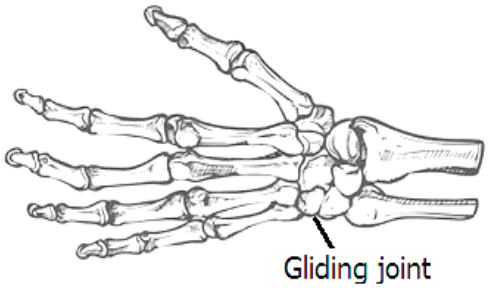
Gliding joints

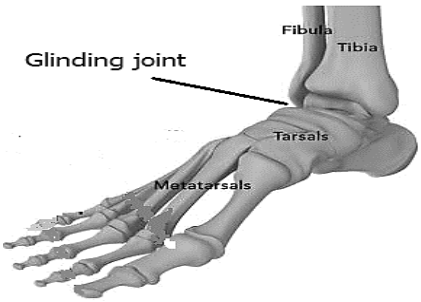
1. These are joints with bones that slide over one another.
2. They are found in the wrists and ankles.
2. Examples include:

(a) Wrist joints

(b) Ankle joints

The structure of gliding joints

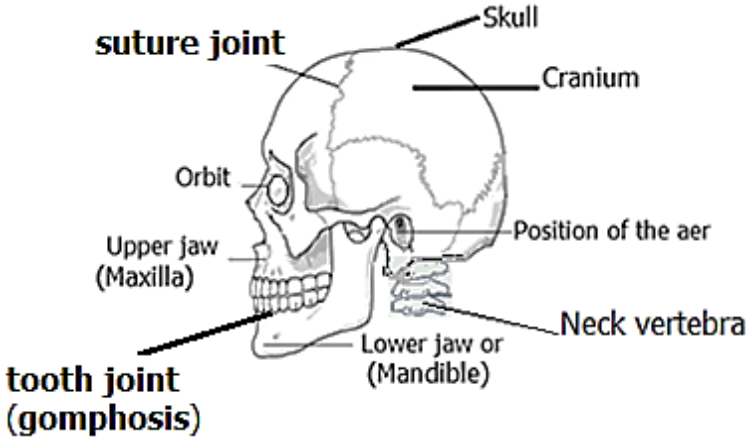




IMMOVABLE JOINTS/FIXED JOINTS

1. These are joints which do not allow any movement. This is because bones are tightly fixed together.
2. Examples of immovable joints are suture joints.
3. Suture joints are found in the skull.
4. The skull protects the brain.
5. The part of the skull that protects the brain is called cranium.

The structure of the immovable joint



Joint injuries

1. Dislocation
2. Sprain

MUSCULAR SYSTEM

1. This is the body system made up of muscles
2. A muscle is a soft tissue in the body.
3. Muscles cause movement by contracting and relaxing.

Types of muscles

(i) Voluntary or skeletal muscles
(ii) Involuntary or smooth muscles

Voluntary or skeletal muscles

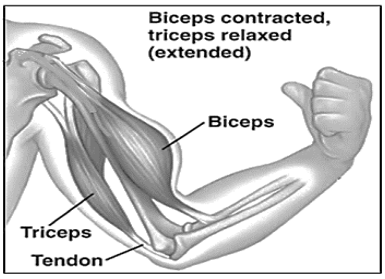
1. These are muscles which are controlled by the brain.
2. They are attached to the skeleton.
3. Examples of voluntary muscles

(i) Biceps
(ii) Triceps
(iii) Calf muscles
(iv) Quadriceps
(v) Ham muscles

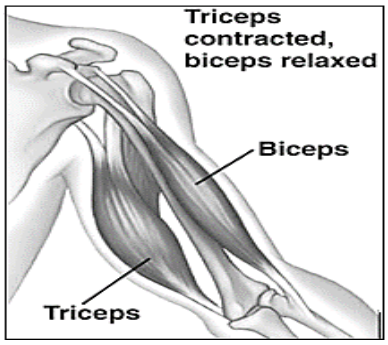
4. Triceps and biceps are called antagonistic muscle. This is because when one contracts the other one relaxes/When one relaxes the other contracts/they work in an opposite way to each other.

Illustrations of the biceps and triceps muscles and how they work

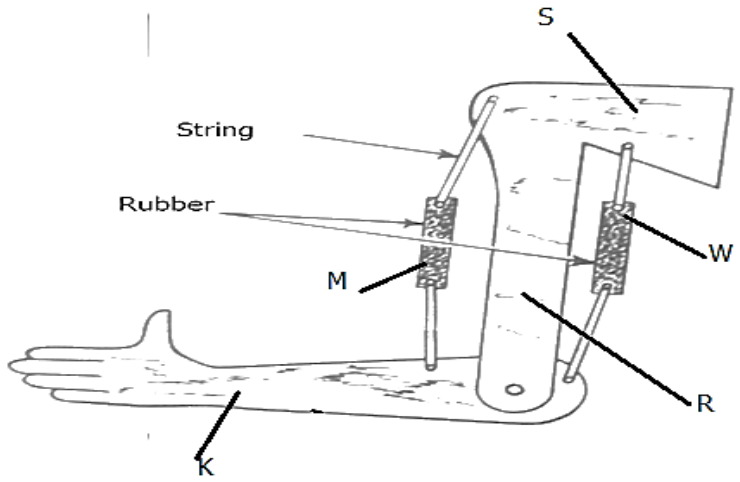
(i) When the arm is bent, the biceps contract while the triceps relax.



(ii) When the arm is straightened, the triceps contract while the biceps relax



Model arm showing how triceps and biceps work



Parts and what they represent

Rubber M: Represents biceps
Rubber W: Represents triceps
Part S : Represents scapula
Part K : Represents fore arm
Part R : Represents humerous
Strings : Represent tendons

Parts and how they work

1. When Rubber **M** is contracted, part K is raised while rubber **W** stretches.
2. When rubber **W** is contracted, part K is straightened.

INVOLUNTARY OR SMOOTH MUSCLES

1. These are muscles which are not controlled by the brain.
2. We have little or no control over them.
3. Examples of the involuntary muscles include:
   (i) Muscles of the alimentary canal (They help in food to move in alimentary canal by peristalsis).
   (ii) Muscles of the reproductive system.
   (iii) Muscles of the blood vessels.
   (iv) Muscles of the eyelid (Help in blinking)
   (v) Intercostal muscles (control contraction and expansion of lungs during breathing)
   (Vi) Cardiac muscles / heart muscles

Importance of muscles

1. They help movement of body parts.
2. Protect delicate tissues like blood vessels and bones.

Diseases of the skeletal and muscular system and their control

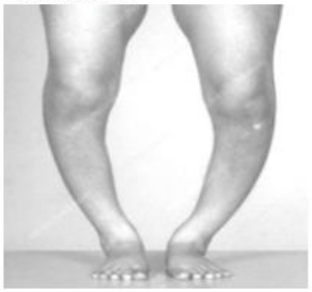
Disease	Part of the body affected	Prevention
Rickets	Bones	-Feeding on food rich in vitamin **D**, calcium and phosphorous.
Polio	Bones and muscles of limbs	-Immunisation -Boiling drinking water.
Leprosy	Bones and muscles	-Avoid body contact with infected people. - Spraying to kill cockroaches which spread leprosy.
Tuberculosis	Bones and lungs	-Immunisation -Avoid drinking unboiled milk. -Early treatment in case of infection.
Tetanus	Muscles	-Immunisation
Arthritis	Joints (cartilage)	-Proper feeding -Physical exercises
Bone cancer	Bones	-Early treatment -Regular medical check up.

Disorders of the skeletal and muscular system

(i) Strain
(ii) Fractures
(iii) Dislocation
(iv) Deformation of bones
(v) Sprains
(vi) Backaches
(vii) Cut and wounds

Illustration of bone deformation

bow legs



knock knee

club feet

Injuries of the muscles

(a) Strains
(b) Bruises
(c) Cuts
(d) Burns and scalds

POSTURE

1. This is the way a person positions the body.
2. There is correct posture for sitting, standing, walking, running and sleeping.

Illustration

Key

x wrong

✓ good

Importance of good posture

1. It prevents deformation of bones
2. It prevents backache (back and chest pain)
3. It helps the body organs to function properly.

Dangers of bad posture

1. It leads to poor bone deformation
2. It leads to back and chest pain
3. It prevents proper functioning of the body organs.

Good health habits that promote healthy skeletal and muscular system

1. Doing regular physical exercises
2. Feeding on foods rich in calcium, phosphorous and vitamin **D**.
3. Always maintain proper body posture
4. Immunisation against tetanus, polio and tuberculosis.

ELECTRICITY AND MAGNETISM

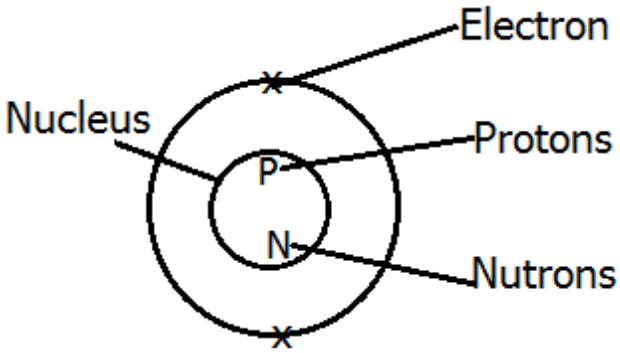
1. This is the form of energy produced by the flow of electrons.
2. Electrons:

(a) They are negatively charged particles of an atom.
(b) Electrons move around the nucleus of an atom.

3. **An atom** is the smallest indivisible particle of matter.
4. An atom has the following components:

(a) Electrons
(b) Protons
(c) Neutrons

Structure of an atom



5. **Protons** are positively charged particles of an atom
6. **Neutrons** are particles of an atom with no charge.
7. **Protons** and **neutrons** are found inside the nucleus of an atom.

TYPES OF ELECTRICITY

(a) Static electricity
(b) Current electricity

Current electricity

1. This is the type of electricity with electrons that flow.
2. Examples of current electricity include:

(a) Hydro electricity
(b) Thermal electricity
(c) Geothermal electricity
(d) Atomic electricity
(e) Chemo electricity
(f) Solar electricity

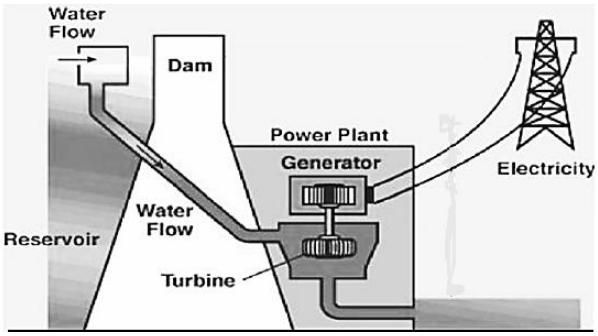
SOURCES OF ELECTRICITY

Source	Electricity provided
Running water	Hydro electricity
Fossil fuels	Thermal electricity
Wind	
Geothermal energy	Geothermal electricity
Nuclear energy	Atomic electricity
Batteries	Chemical electricity
The sun	Solar electricity
Tides	Tidal electricity

Running water

1. Running water is used to turn turbines.
2. Turbines run the generator.
3. The generator converts mechanical (kinetic) into electricity.
4. The electricity produced this way is called hydroelectricity.

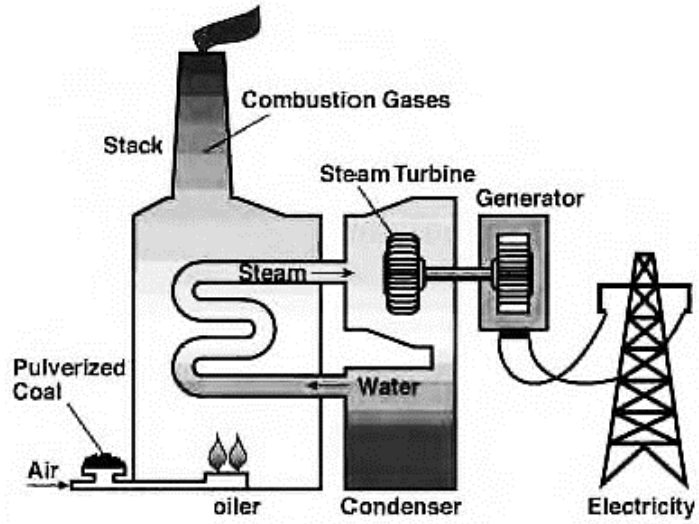
Illustration



Fossil fuels

1. These fuels include diesel, coal and petrol.
2. The fossil fuels are used to boil water to produce steam.
3. The steam produced is used to turn turbines.
4. Turbines run the generator.
   The generator converts mechanical (kinetic) energy to electric energy.
4. Fossil fuels like petrol and diesel can also be directly burnt in a generator produce electricity.
5. Such electricity produced in this way is called **thermal electricity**.

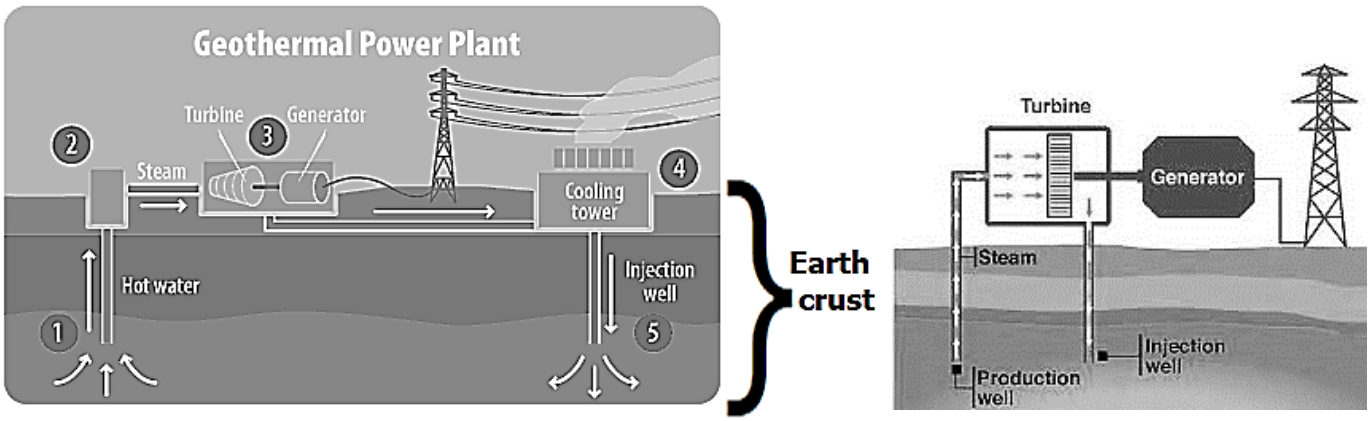
Illustration



Geothermal energy

1. Geothermal energy is the heat generated underground.
3. This heat heats up underground water and steam is formed.
4. The steam is made to move upwards through pipes and used turn turbines.
5. Then the turbines turn the run (turn) the generator.
6. Then the generator converts the mechanical (kinetic) energy into electric energy.
7. After turning the turbines, the steam is cooled and retuned underground through pipes for further reuse.

Illustration of thermal electricity generation

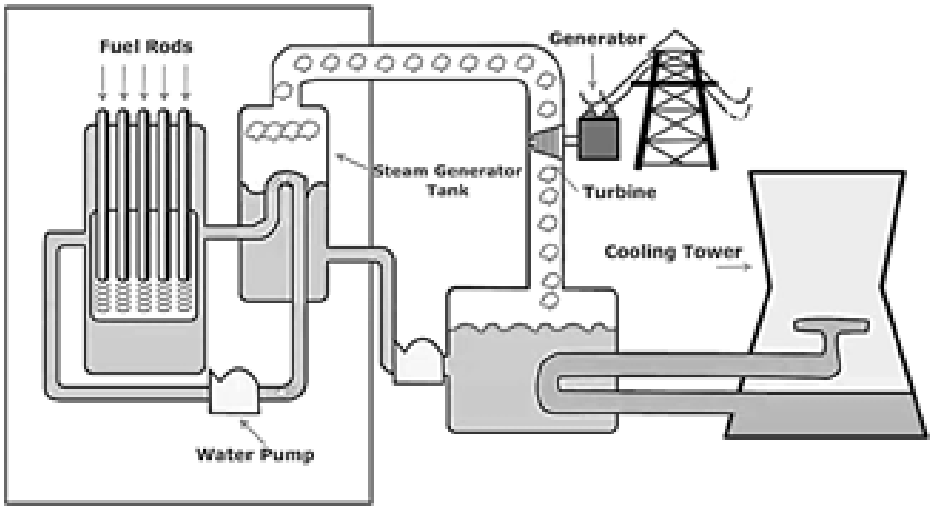


8. Electricity produced this way is called **geothermal electricity**.

Atomic/nuclear energy

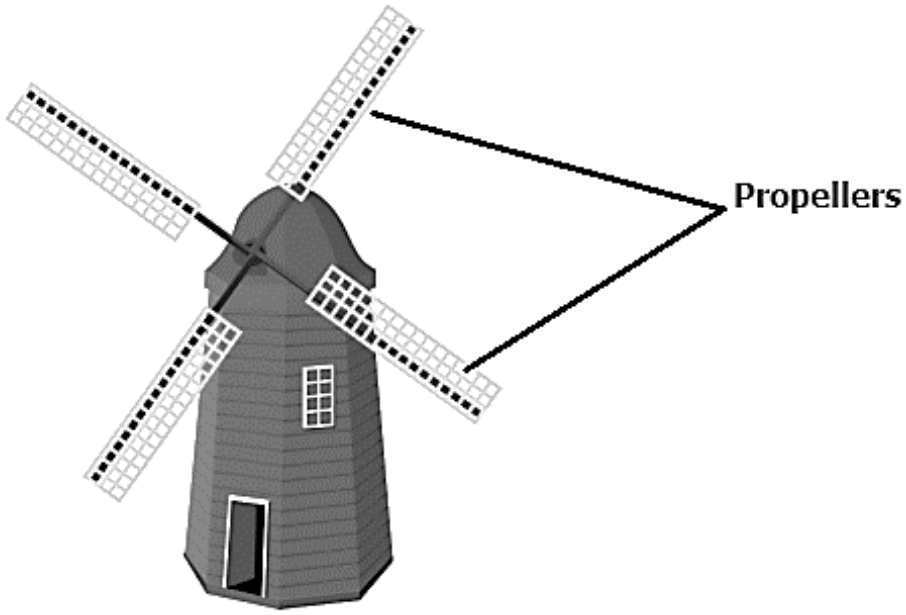
1. This energy is obtained by burning uranium to produce heat.
2. The heat produced is used to boil water and to get steam.
3. The steam is used to turn turbines.
4. The turbines run/turn the generator.
5. The generator changes the mechanical (kinetic) energy from the turbines into electricity.
5. The electricity produced this way is called **atomic/nuclear electricity**.

Electricity production using nuclear energy



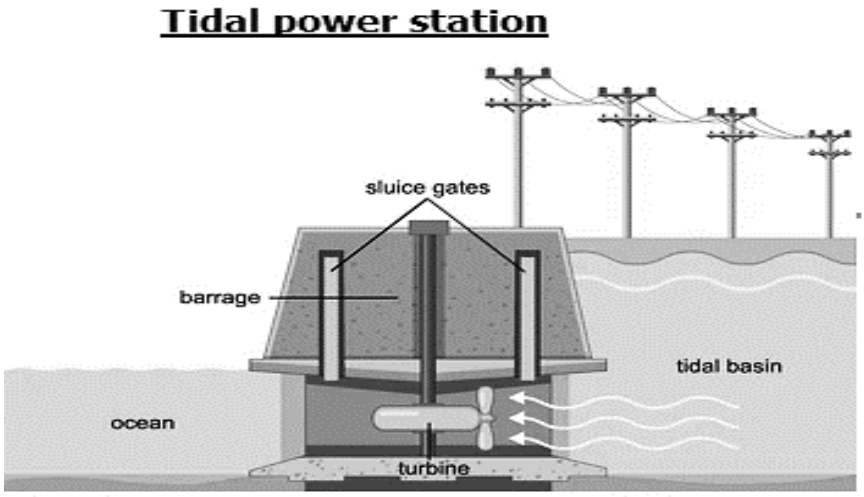
Wind

1. Wind is used to rotate blades/propellers of a wind mill.
2. The blades/propellers turn the generator.
3. The generator converts mechanical (kinetic) energy to electric energy.



Tides

1. A tide is a regular rise and fall of water level in seas or oceans.
2. Tides are caused by the attraction between the moon and the sun.
3. Tides provide tidal energy which is used to generate electricity.
3. When tides occur, the water flowing out and into the sea/ocean, is used to turn turbines.
4. The turbines the turn the generator.
5. Then the generator converts mechanical (kinetic) energy into electricity.

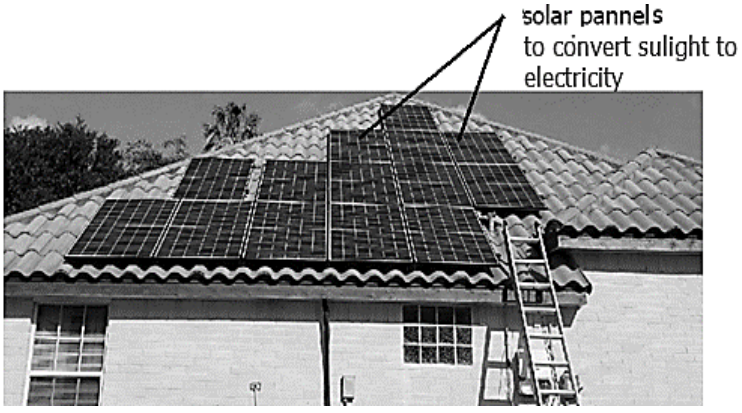


6. The electricity obtained this way is called tidal electricity.

Sun

1. The sun provides sunlight which is converted into electricity using solar panels.
2. The electricity produced this way is called **solar electricity**.

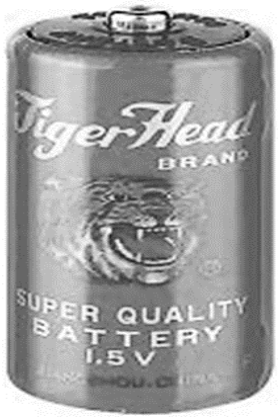
Illustration



Dry cells/wet cells (car batteries)

1. Dry cells and wet cells contain chemicals.
2. These chemicals are in the dry cells and batteries change into electricity when the cells are fitted in a complete circuit.
3. Dry and wet cells produce **chemical electricity**.

Illustrations

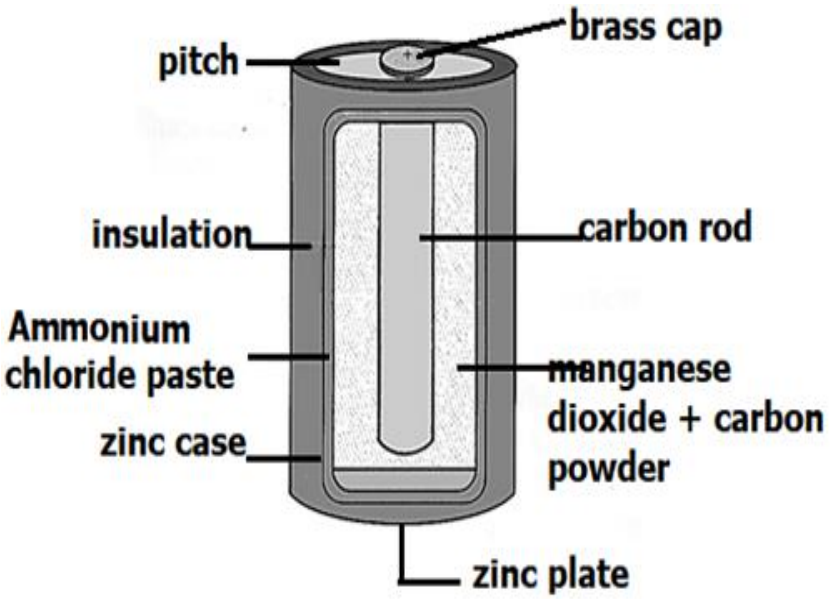


4. A new dry cell produces a voltage of 1.5v.
5. This means that:

(i) 2 dry cells produce 1.5vx2=3volts.

(ii) 3 dry cell produce 1.5v x 3dry cells = volts etc.

Parts of a dry cell



Parts of a dry cell their functions

1. Carbon rod: (i) Forms the positive terminal of a dry cell.
   (ii) **NB** the carbon rod is a nonmetallic conductor in a dry cell.

2. Zinc case: (i) Forms the negative terminal.
   (ii) It holds the content (electrolyte)

2. Ammonium chloride: Reacts with zinc to produce electricity.

3. Manganese dioxide and carbon powder: Help in depolarisation/control polarisation (formation of hydrogen gas on the carbon rod)

Note: (i) Ammonium chloride, manganese dioxide and carbon powder form an electrolyte in a dry cell.

(ii) An electrolyte is a liquid or paste conductor of electricity.

Car batteries

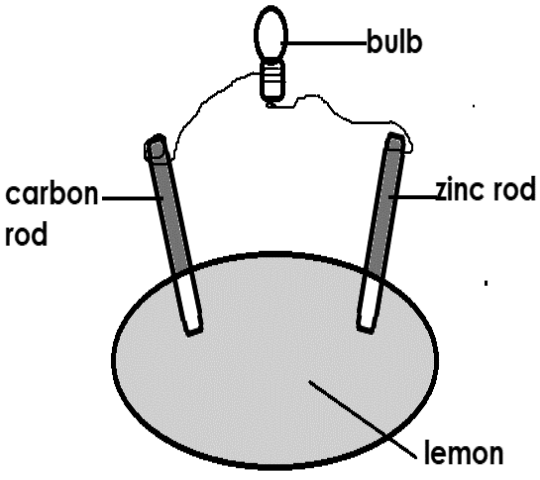
1. Car batteries are wet cells.
2. They mainly contain liquid chemicals /acids although some car batteries may contain powder chemicals.
3. They store chemical energy which is changed to electric energy when a battery is fitted in a complete circuit.

Illustration of a car battery

Wet cell from a lemon

1. This is done using a ripe lemon, zinc strip and a carbon rod/copper rod.
2. A bulb and a piece of a copper wire are needed to test for production of electricity.

Illustration



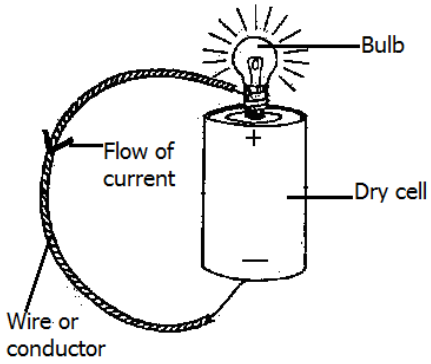
Parts and their uses

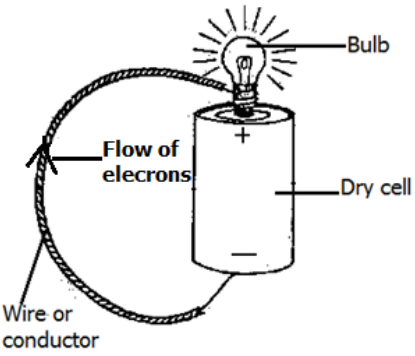
1. Carbon rod: Acts as a positive terminal.
2. Zinc strip: Acts as a negative terminal.
3. Lemon: Contains an acid that produces electricity.
4. Bulb: Produces light.
5. Wire: Conducts electricity

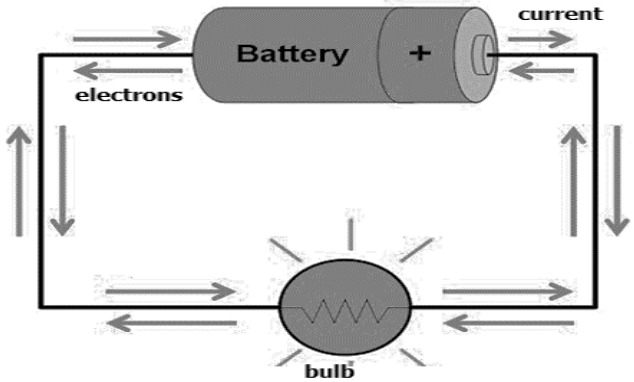
AN ELECTRIC CIRCUIT

1. This is the path taken by electric current.

Illustration of a simple electric circuit







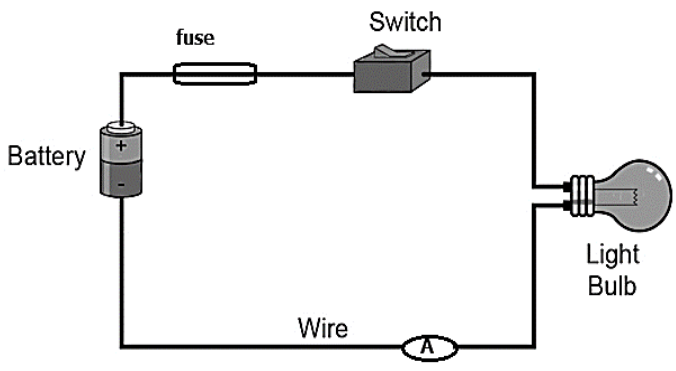
2. Components of a simple electric circuit and their functions include:

(a) Dry cells -Produce electricity.
(b) Conductor/wire -Conducts electricity.
(c) Bulb - Produces light and heat when the circuit is complete.

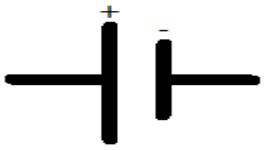
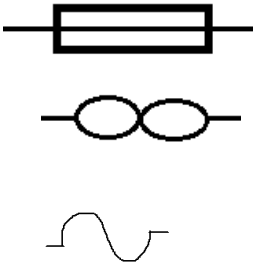
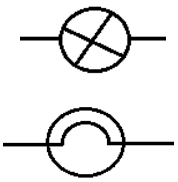
3. Components of a complex electric circuit:

(a) Bulb (b) Conductor
(c) Dry cells (d) Switch
(e) Ammeter (f) Fuse

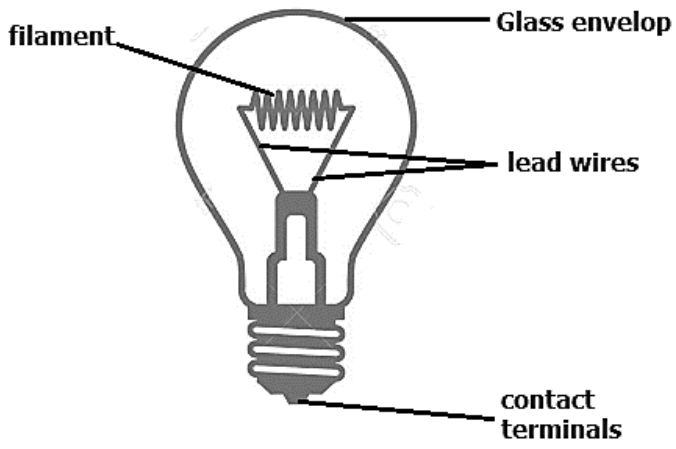
Illustration



Parts of an electric circuit, their symbols and functions

Part	Symbol	Function
Dry cells		Produce electricity **Note**: (i) Dry cells store chemical energy which changes into electric energy when fitted in a complete circuit.
Conductor		Conducts electricity/provides path for electrons.
Switch		Completes or breaks the circuit
Ammeter		-Measures the amount of current flowing in the circuit. -Current is measured in units called amperes(**amps**)
Fuse		- Protects appliances from the effect of too much current flow. **-Note:** (a) The fuse works by melting to break the circuit in case of too much flow of current. (b) SIt is made of a thin wire to melt easily.
		-Produces light when the circuit is complete. **Note:** It produces light by changing electricity int heat and then light.

The structure of a bulb



Parts and their functions

1. **Filament**

(a) Converts electric energy to heat energy and then heat energy to light energy.

(b) **Note**: (i) The filament is coiled to increase its resistance to the electricity passing through it.
(ii) It is made of tungsten. This is because it high melting point.
(iii) Tungsten is got from a mineral called wolfram.

2. **Glass envelope:** Holds the gas used in the bulb.

(a) Gases used in the bulb:
(i) Nitrogen
(ii) Argon
(iii) Neon
(iv) Krypton
(v) Helium

(b) Uses of gases used in the bulb:
(i) Prevent the bulb filament from burning.
(ii) Prevent the glass envelope from blackening.

3 **Lead wire:** Conducts current to the filament.

4. **Contact terminals**: Connect the bulb to the conductor.

Energy changes that take place in the bulb when the circuit is complete

(a) Electricity changes to heat and heat changes to light.

Factors that can fail a bulb to produce light

1. When the filament is broken.
2. When the dry cells are used up.
3. When there is a short circuit.
4. When the cells wrongly arranged.
5. When the dry cell are loosely connected.
6. When the circuit is incomplete.

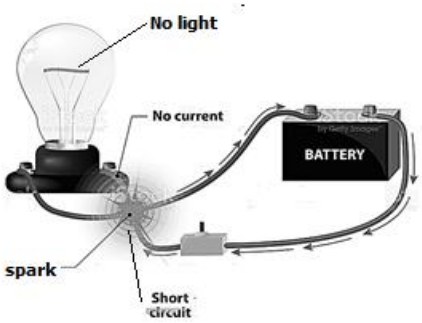
Factors that can fail a bulb to produce light in a complete circuit

1. When the filament is broken.
2. When the dry cells are used up.
3. When there is a short circuit.

SHORT CIRCUIT

1. A short circuit is a short path taken by electric current/shortcut taken by electric current in a circuit.
2. The main cause of a short circuit is contact between naked wires.
3. When a short circuit occurs, usually the current passes through the short circuit instead of the normal circuit. This is because a short circuit has a lower electric resistance than the normal circuit.

Illustration



Factors that cause of a short circuit

1. Poor wiring.
2. Poor insulation
3. Wrong connection of wires in an appliance.
4. When insulators are eaten by rats.
5. Pushing metallic objects into the socket.
6. Too much flow of current that can make insulators melt.

Effects of a short circuit

1. Can set the house/building on fire.
2. Destroys electric appliances.

Ways of avoiding a short circuit

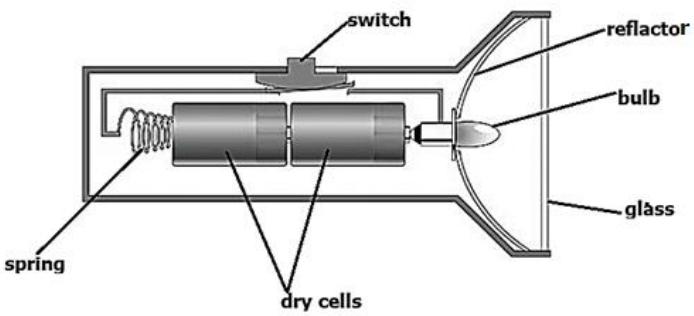
1. Ensure that wires are properly insulated.
2. Use trained people to wire.
3. Replace old wires immediately.
4. Fit fuses in electric appliances.

DOMESTIC DEVICES THAT USE ELECTRICITY

(a) Flat iron
(b) Radio
(c) Television
(d) Electric kettle
(e) Torch
(f) Electric cooker

An electric torch

1. An electric torch is an example of a simple electric circuit.



Parts and their functions

1. Spring: Presses the dry cells to complete the circuit.
2. Reflector: Spreads light out.
3. Dry cells: Produce electricity.
4. Switch: Completes or breaks the circuit.

CONDUCTORS AND INSULATORS OF ELECTRICITY

1. A conductor is a material/substance that allows electricity to pass it.
2. Conductors of electricity are used to transmit electricity from one place to another.
3. Examples of electric conductors include:

(a) Iron (b) Copper
(c) Aluminium (d) Salt solution
(e) Carbon (f) Silver
(g) Acids

Note:

(i) Silver is the best conductor of electricity. However, it is not commonly used in electric wiring because it is expensive.
(ii) Aluminium is commonly is used in transmission of electricity because it is light and does not rust.
(iii) Copper is commonly used in electric wiring because it is cheap.

Electrolytes

1. These are liquid conductors of electricity.
2. Examples of electrolytes include:

(a) Acid (b) Salt solution
(c) Copper sulphate solution (d) Ammonium chloride paste

Insulators

1. Insulators are materials/substances that do not allow electricity to pass through them.
2. Examples of insulators include:

(a) Dry wood (d) Dry paper (f) Porcelain (clay-like substance)
(b) Plastic (e) Cotton wool (g) Asbestos
(c) Rubber

Uses of insulators

1. They are used to cover electric wires.
2. They are used to make parts of electric appliances.

Reasons for using insulators to cover electric wires

1. To prevent short circuit.
2. To protect users from electric shocks.

Uses of electricity

1. It is used for cooking.
2. It is used for ironing.
3. It is used for charging phones.
4. It is used for lighting.
5. It is used to run electric appliances.
6. It is used for protection like in electric fence.

Advantages of using electricity

1. It reduces air pollution.
2. Reduces cutting trees for wood fuel.
3 Does work very fast.
4. It is clean.
3. It can be changed into other forms of energy.

Dangers of electricity

1. It leads to fire outbreak.
2. It shocks people to death.
3. It can damage electric appliances.

STATIC ELECTRICITY

1. This is the type of electricity with electrons which do not flow.
2. Examples of static electricity include:

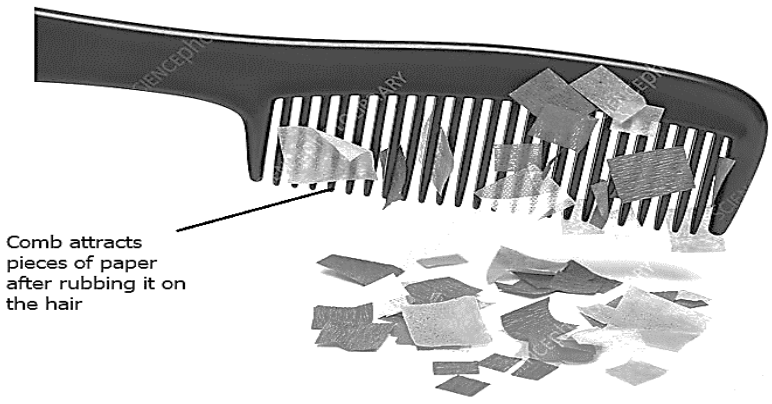
(a) Lightning.
(b) The electricity produced when a plastic rod is rubbed with a piece of cloth.
(c) The electricity produced when a plastic comb is rubbed on the hair.

3. Static electricity is produced through friction by rubbing objects especially insulators.
4. Some of the objects rubbed to produce static electricity include;

(a) Plastic objects with hair,wool,silk cloth
(b) Wood with hair, wool,silk cloth.

5. When a wood or plastic object is rubbed with the above materials, it will attract pieces of paper. That show that static electricity has been generated.

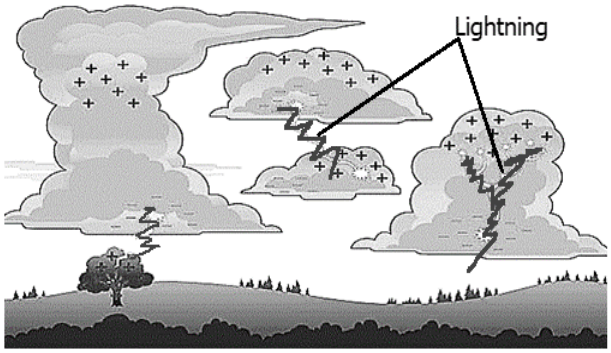
Illustration



Lightning

1. Lightning is a spark produced when clouds of different electric charges rub against each other.
   OR
   It is an electric spark caused when electrons jump from charged clouds to the earth.
2. Static electricity is a natural form of static electricity.
3. The huge spark produced causes air around to expand and contract immediately resulting into a loud sound called **thunder**.

How static lightning is produced



5. Lightning and thunder are produced at the same time but lightning is seen first because light travels faster than sound in air.

Importance of lightning

1. Lightning fixes nitrogen into soil.

Dangers (effects) of lightning

1. It kills people and animals.
2. It destroys buildings.
3. Damages of electric appliances.

How to protect against dangers of lightning

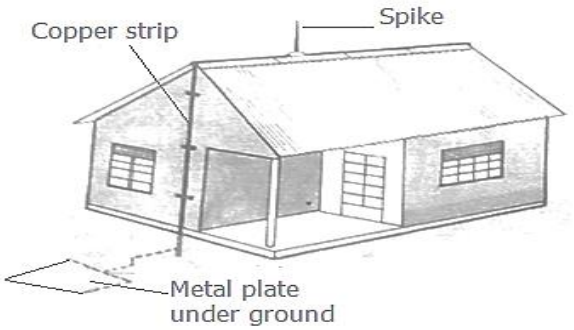
1. Install lightning conductors on tall buildings.
2. Avoid standing under tall trees when it is raining
4. Avoid playing in rain.
4. Do not answer phone calls when it is raining
5. Avoid walking in open area during rainstorm.
6. Switch off electrical devices when it is raining
7. Avoid swimming in open water when it is raining
8. Planting trees around buildings.

Lightning conductor/arrester

1. A lightning conductor is a piece of a metal that is placed on top of tall to protect them from lightning.
2. It can be made of a copper or an iron strip. This is so because copper and are good conductors of electricity.

3. It is fixed on top of a building and connected to a metal plate underground.
4. The lightning conductor is fixed on the highest point of a building because lightning usually strikes highest points.
5. It has spikes on top to attract charges from clouds and lead them to the ground harmlessly.

Illustration of a lightning conductor



Uses of static electricity

1. Static electricity in form of lightning fixes nitrogen into soil.
2. It is used during photocopying.

Safety measures for dealing with electricity

1. Wear gloves when handling electric wires.
2. Never push metallic objects into the socket.
3. Avoid touching switches and electric equipment with wet hands.
4. Disconnect electric appliances from the socket when not in use.
5. Avoid stepping on/touching broken or hanging electric wires.
6. Reporting broken wires to authorities.
7. Never touch electric sockets or switch with wet hands.
8. Avoid overloading the socket with many electric appliances.

MAGNETISM

1. It is the force that enables a magnet to attract magnetic materials.
2. A magnet is a material that attracts magnetic materials.
3. A magnet has two poles i.e North and South poles.
4. The poles are at the ends of a magnet.

MAGNETIC AND NONMAGNETIC MATERIALS

Magnetic materials

1 These are materials that are attracted by a magnet.
2. Examples include:
(a) Iron
(b) Cobalt
(c) Nickel

Nonmagnetic materials

1 Nonmagnetic materials are materials that are not attracted by a magnet.

2. Examples of nonmagnetic materials include:

(a) Rubber
(b) Plastic
(c) Wood
(d) Copper
(e) Aluminium
(f) Silver
(g) Zinc

TYPES OF MAGNETS

1. Natural magnet
2. Artificial magnet

Natural magnets

1. These are magnets that exist in naturally.
2. Examples include:

(a) The earth
(b) Load stone/magnetite

Note: The earth is a magnet because it has both North Pole and South Pole.

Artificial magnets

1. These are magnets that are made by man.
2. There are divided into:

(a) Permanent magnets
(b) Temporary magnets

Permanent magnet

1. These are magnets that do not lose magnetism when the source is removed.
2. Examples include:

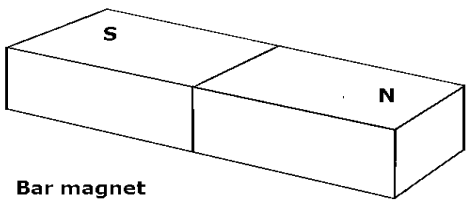
(a) U-Shaped magnet
(b) Horse shoe magnet
(c) Bar magnet
(d) Ring magnet
(e) Cylindrical magnet
(f) Circular magnet
(g) Needle magnet

Illustrations

U - shaped magnet

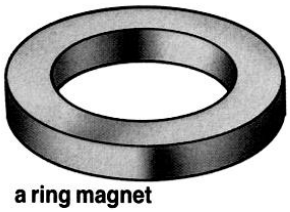
horseshoe magnet


circular magnet



Bar magnet

Needle magnet



Temporary magnets

1. These are magnets that lose magnetism when source is removed.
2. Examples include:

(a) Electro magnet

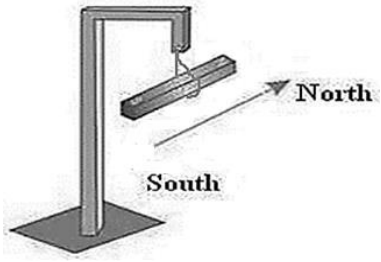
(b) Induce magnet

Note: Induced magnet can turn to permanent magnet depending on the strength of the source of magnetism and the length of time the magnet stays attached to the magnetism source.

PROPERTIES OF MAGNETS

1. A freely suspended magnet rests pointing in the North –South direction.

Illustration



Note:

(i) This property is used in compasses to show direction.

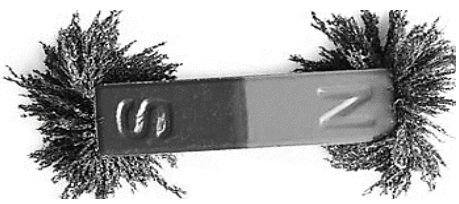
(ii) Sailors, navigators, and pilots use this property to find direction.

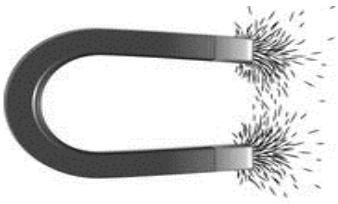
2. Magnets are strongest at the poles.

(a) This is seen when a magnet is brought close to iron filings and most iron filings collect around the poles.

(b) This shows that magnets are strongest at the poles

Illustration

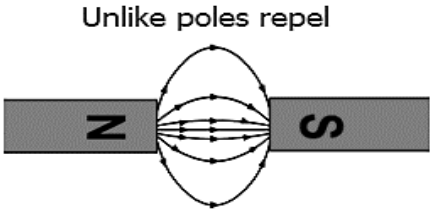




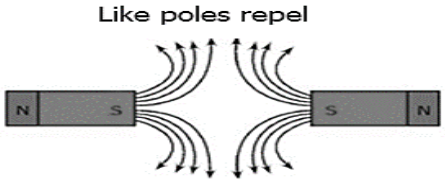
3. Like poles of a magnet repel each other while unlike poles attract each other.

Illustration

(a)

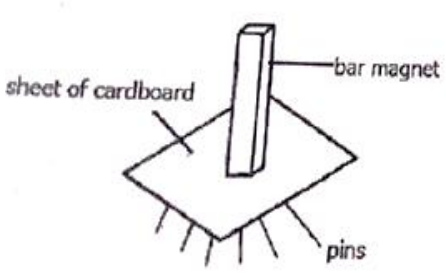


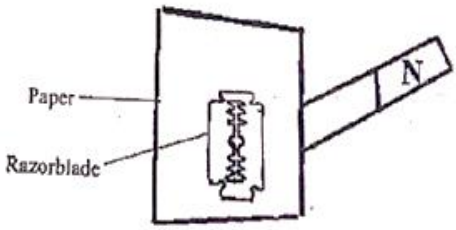
(b)

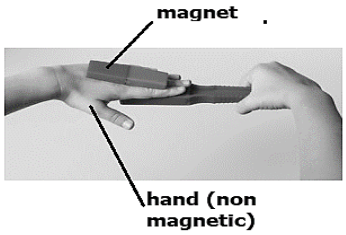


4. Magnetism can pass through nonmagnetic materials (solids, liquids and gases).

Illustration

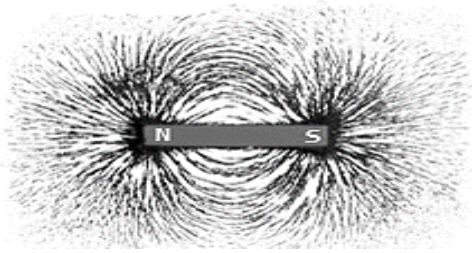


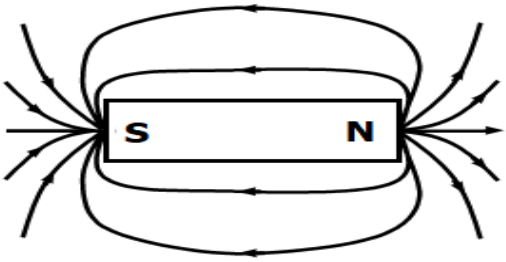




5. A magnet has magnetic field around it covered with magnetic lines of force.

Illustration





Note:

(a) A magnetic field is the area around a magnet where its force can be felt.
(b) The magnetic field is indicated by magnetic lines of force/magnetic flux which run **from** north to **south**.
(c) In the magnetic field, the effect of attraction and repulsion can be detected.
(d) Outside a magnetic field a magnet cannot repel or attract anything.

MAGNETISATION

1. This is the process of turning a magnetic material into a magnet.
2. Magnets can only be made from magnetic materials.
3. When alloys are magnetised, they become stronger magnets and do not lose magnetism easily.
4. Steel is one example of an alloy that can be magnetised.

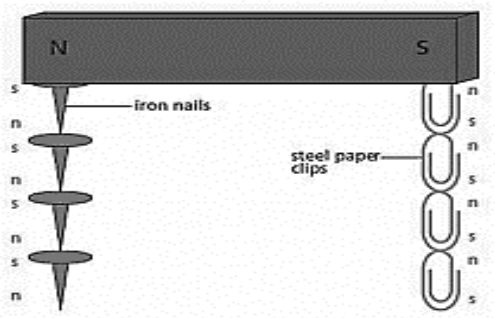
Methods of making temporary magnet

(a) Stroking method
(b) Induction method
(c) Electrical method

Induction method

1. This is the method of making a magnet by bringing magnetic materials in contact with a permanent magnet.
2. After induction then the magnetic material used becomes an **induced magnet**.
3. If the induced magnet is left in contact with a permanent magnet for long, it becomes a permanent magnet too.

Illustration



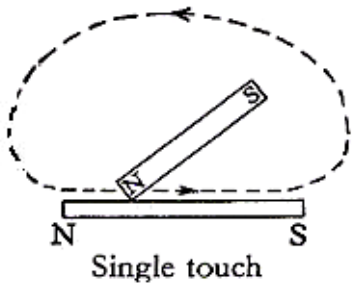
Stroking method

1. This is the making of a magnet by rubbing a permanent magnet over the surface of a magnetic material from one end to another.
2. This is done in two ways namely:
   (a) Single touch method
   (b) Double touch method

Single touch method

1. This is the stroking of a magnetic material using one permanent magnet.
2. It is done several times in the same direction with one pole of a magnet.
3. The pole obtained at the end of a magnetic material is opposite to that of the stroking pole.

Illustration

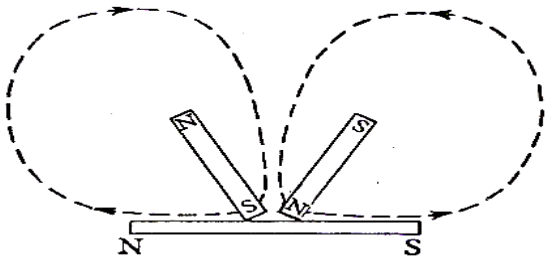


Single touch

Double touch method

1. This is the stroking of a magnetic material using two permanent magnets.
2. The stroking starts from the middle and the hands move in opposite directions.

Illustration



Double touch method

Note

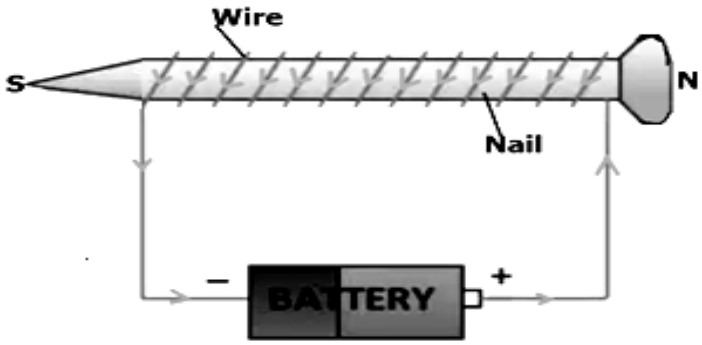
(a) Where the stroking ends the magnetic material acquires a pole opposite to that used in stroking.

(b) In stroking, magnetism can be increased by stroking more times.

Electrical method

1. This is the method of making a magnet by using electricity.
2. The method involves winding an insulated wire around a magnetic material and connecting the two ends of the wire to the source of electricity.
3. The coil made by winding the wire around a magnetic material is called a **solenoid**.
4. When the solenoid is connected to source of electricity, the magnetic material inside the solenoid gets magnetised if circuit is complete.

Illustration



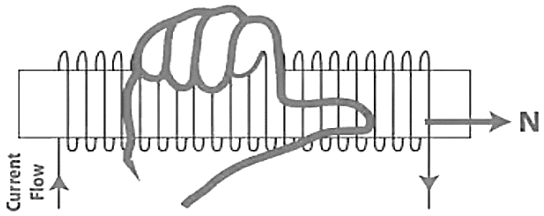
5. The magnet formed in this method is known as electromagnet.
6. This magnet is a temporary magnet because it loses magnetism once the circuit is broken.

How to determine poles of an electro magnet

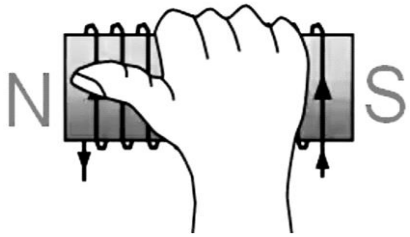
1. This is done by using the right hand grip rules. This is done by gripping using four fingers of the right hand following the flow of current in the solenoid and opening the thumb.
2. In this process the thumb points to North Pole.

Illustrations

(a)



(b)



How to increase the strength of an electro magnet

1. By increasing the number of turns in the coils.
2. Increasing the number of dry cells/ increasing voltage.

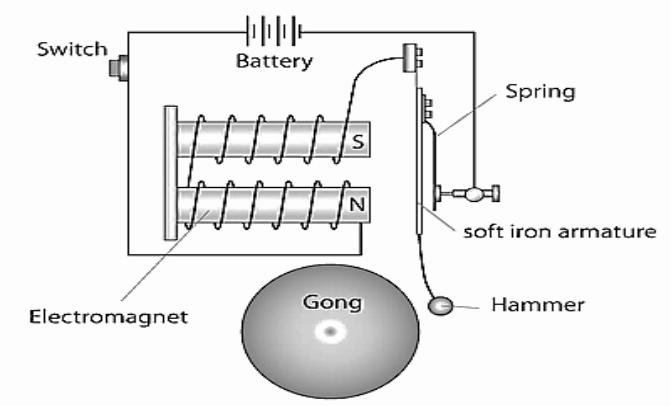
Use of electro magnets

1. They are used to make electric bells.
2. They are used to in electric cranes to lift heavy magnetic materials like metal scraps.
3. They are used to make electric clocks and watches.

Devices that use electromagnet

(a) Electric clocks
(b) Electric bells
(c) Electric cranes
(d) Electric trains

The electric bell



Parts and their functions

1. Hammers: Hits the gong.
2. Gong: Produces sound when hit.

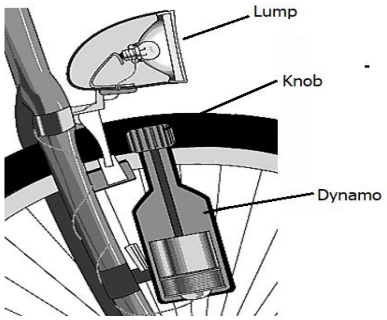
How the electric bell works

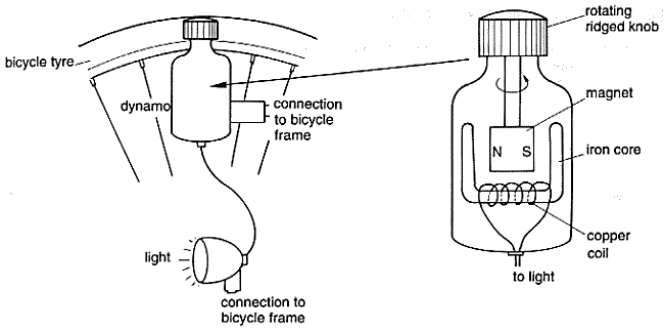
1. When the circuit of an electric bell is complete, an electromagnet is formed in the bell.
2. The electromagnet then attracts the soft iron armature and the hammer hits the gong.
3. When the hammer hits the gong, the circuit is broken and the hammer goes back to its original position.
4. When the hammer goes back to its original position, the circuit is again completed and the process is repeated.

Generating electricity using a dynamo

1. A dynamo is simple generator.
2. It produces electricity by changing mechanic energy (kinetic energy) to electricity. The electricity produced is used for lighting in bicycles.
3. It consists of a wire coil which rotates between poles of a permanent magnet.
4. Dynamos are commonly used in bicycles for lighting.

Structure of a dynamo





Parts and their functions

1. **Knob**: Rotates the magnet/wire coils.
2. **Wheel:** Rotate the knob of the dynamo.
3. **Magnets:** Produce current when rotated.
4. **Wire coils**: Produce current when rotated.
5. **Lamp connected to the dynamo**: For producing light.

How to make a produce more electricity

1. Riding faster.

How to make a dynamo produce more electricity

1. Riding faster
2. Using strong magnets to make the dynamo.
3. using many turns of wire coils.

Appliances that use electricity, magnetism and those that use both

Use electricity	Use magnetism	Use both
Electric cookers	Magnetic compasses	Electric motor
Flat iron	Magnetic tapes	Electric bell
Heaters	Telephone receivers	Microphones
Driers		Loud speakers
Washing machine		Refrigerators

Demaganitisation

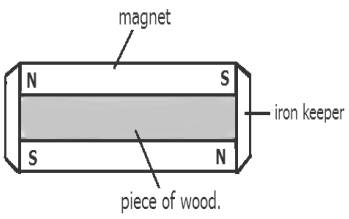
1. This is the process of making a magnet to lose its magnetism.
2. Ways of demagnetisation include:

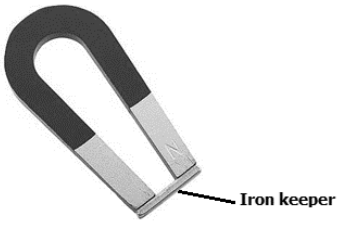
(a) Repeated hammering/dropping of a magnet.
(b) Heating the magnet to red hot.
(c) Placing magnets in alternating current and removing it.
(d) Keeping like poles together for a long time.
(e) Leaving the magnet to rust.
(f) Keeping the magnet in East-West direction for a long time.

Proper way of keeping magnets

1 Keeping magnets with unlike pole together.
2. Keeping magnets using iron keepers separated by an insulator.
4. Painting magnets to prevent them from rusting.
5. Keeping magnets in a dry place.

Illustration





Uses of magnets

1. They are used to make loud speakers, ear and microphones.
2. They are used to make dynamos to generate electricity.
3. They are used to make electric bells.
4. They are used by doctors to remove magnetic materials from people's eyes.
5. They are used in compasses to show direction.
6. Powerful electromagnets are used in cranes to lift heavy magnetic materials in factories.
7. They are used to separate mixtures with magnetic and non magnetic materials.
8. Magnets are used in mining mercury.
9. Magnets are used to hold cutlery.
10. Magnets are used to hold fridge doors.
11. Magnets are used to fasten belts and bags.
12. Magnets are used by mechanics to hold screws.

ENERGY RESOURCES IN THE ENVIRONMENT

1. Energy resources are things that provide us with useful energy.
2. The energy got from energy resources can be used directly or converted into other forms of energy before use.

Renewable and non-renewable energy resources

1. Renewable energy resources are energy resources that can be replaced naturally once exhausted.
2. Examples include:

(i) Wind energy
(ii) Hydro electricity
(iii) Steam
(iv) Tidal energy
(v) Solar energy (sun heat and sunlight) or sunshine.

Non-renewable energy resources

1. These are energy resource that cannot be replaced naturally once use up.
2. Examples include:

(i) Coal
(ii) Petroleum
(iii) Natural gas
(iv) Atomic /nuclear energy

Energy resources with their sources

Energy resource	**Source**
Solar energy (Heat and light)	Sun
Hydro electricity	Running water
Tides/tidal energy	Water in ocean and seas
Steam	Water
Wind energy	Atmosphere/air
Coal, petroleum and natural gas	Fossil fuels
Wood fuel, bio fuel, biogas and food	Plants/biomass
Animal energy, food and biogas	Animals
Nuclear energy	Minerals (Uranium)

Energy resources from the sun

1. The energy resource from the sun is solar energy (heat and light).
2. The sun is the main source of energy on the earth. This is because all energy resources directly or indirectly originate from the sun.
3. Solar energy is used as follows:

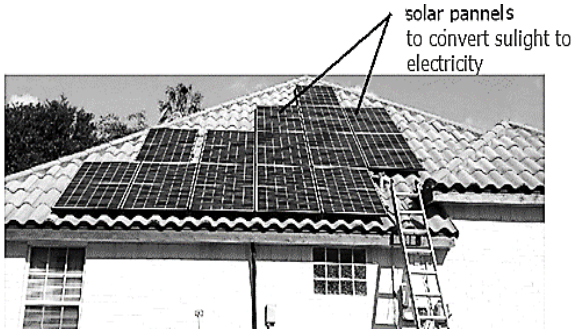
(a) Heat from the sun is used:
- (i) For drying clothes
- (ii) For sun drying harvested crops.
- (iii) It is in solar cookers for cooking.
- (iv) Solar energy is used in water heaters.
- (v) Solar energy helps in rain formation.
- (vi) Provides warmth for people and animals.

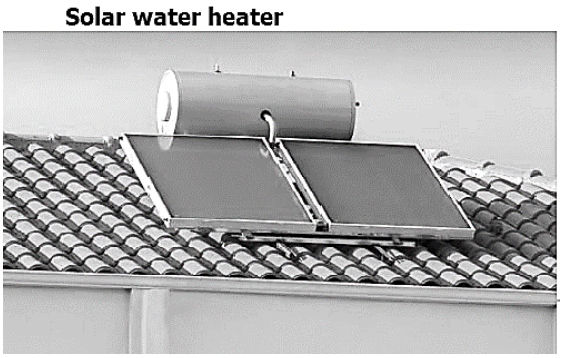
(b) Light from the sun (sunlight) is used to generate solar electricity.

Illustrations of solar panel, solar cooker solar dryer and solar water heater

Solar cooker

Solar panel





Advantages of using solar energy

1. Does not produce smoke which pollutes the air.
2. Reduces the number of trees cut for wood fuel.
2. There are no expenses after buying and installing solar equipment.

Disadvantages of using solar energy

1. It is expensive to build large solar power station or buy solar panels.
2. It is not reliable during rainy weather and at night.

Energy resources from water

1. Energy resources from water include:
   (a) Tidal energy
   (b) Hydro electricity
   (c) Steam

Steam

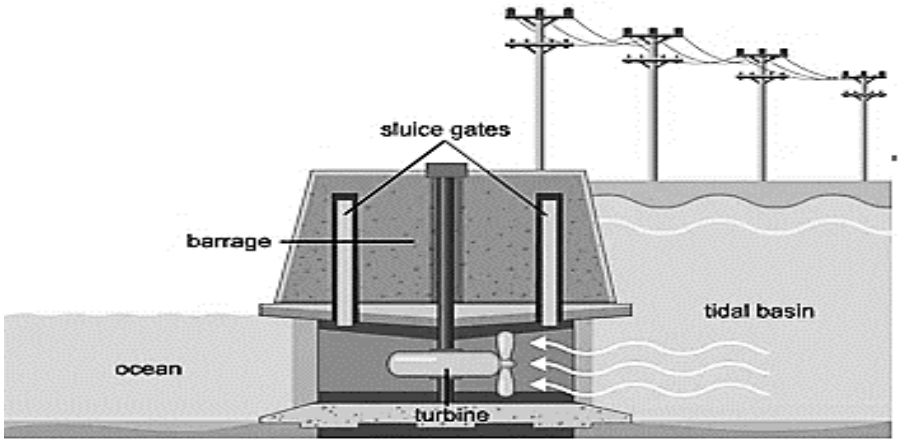
1. Steam is hot vapour from boiling water.
2. Steam is used as follow:

(a) To drive turbine to generate electricity.
(b) To run steam engine.
(c) To cook food.

Tidal energy/tides

1. A tide is a regular rise and fall of water level in seas or oceans.
2. Tides are caused by the attraction between the moon and the sun.
3. Tidal energy is used to generate electricity.
3. When tides occur, the water flowing out and into the sea/ocean, it used to turn turbines.
4. The turbines the turn the generator.
5. Then the generator converts mechanical energy into electricity.

Tidal power station



Hydroelectricity

1. It is obtained from running water.
2. It is used as flows:

(a) For cooking
(b) For ironing
(c) For lighting
(d) Running machines.

Energy resource from minerals

1. The energy resource got from minerals is mainly nuclear energy or atomic energy.
2. Nuclear energy is got from minerals like **uranium** or **plutonium**.
3. Nuclear energy is used:

(a) To produce atomic electricity.
(b) To make atomic bombs.
(c) To power nuclear submarines.

Energy resources from fossil fuels

1. Energy resource from fossil fuels include:

(a) Petroleum
(b) Coal
(c) Natural gas
(d) Peat

Petroleum

1. Petroleum products like:

(a) Paraffin is used for heating and lighting.
(b) Petrol and diesel are used for running cars, generating thermal electricity and running generators.

2. Petroleum products are obtained by fractional distillation.

Coal

2. Coal is used as follows:

(a) It is used in factories for heating and generating thermal electricity
(b) It is used to heat water to run steam engines.
(c) It is used in iron smelting
(d) It is used to bake ceramics.
(e) Coal gas is used for cooking.

Disadvantages of using fossil fuels

1. Burning fossil fuels produces at a lot of smoke which pollutes the air.
2. Mining coal leads to land degradation.
3. They pollute water.

Energy resources from plants/biomass

1. Biomass are plants that which are grown and used as fuel or used to produce biofuel.
2. Energy resources from plants include:

(i) Charcoal
(ii) Firewood
(iii) Sawdust
(iv) Briquettes
(vi) Wood shavings
(v) Biogas
(vii) Food
(viii) Biofuel

2. Charcoal, firewood, sawdust, briquettes, wood shavings are used for cooking.
3. Biogas is also used for cooking and lighting.
4. Food from some plants is eaten to provide energy.

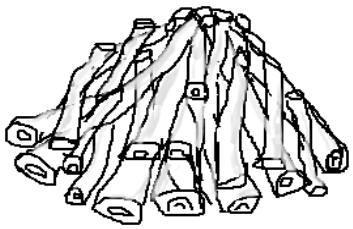
Charcoal

1. Charcoal is made by burning wood under limited supply of oxygen.
2. This is done by cutting trees into pieces, the pieces are then heaped, covered with grass and soil before firing them.

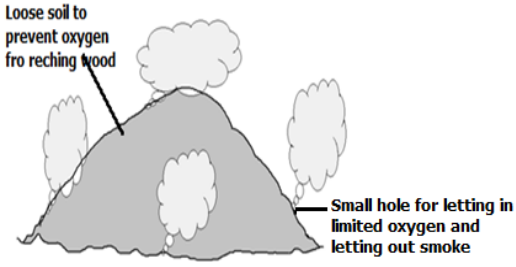
Use of soil and grass in the process

(a) Grass prevents soil from reaching wood.
(b) Soil limits oxygen supply to the fire.

Illustrations



Chopped pieces of wood piled up before they are covered and fired



Pieces of covered with grass and soil while burning under limited supply of oxygen

Note: Small holes let in limited oxygen and let out smoke.

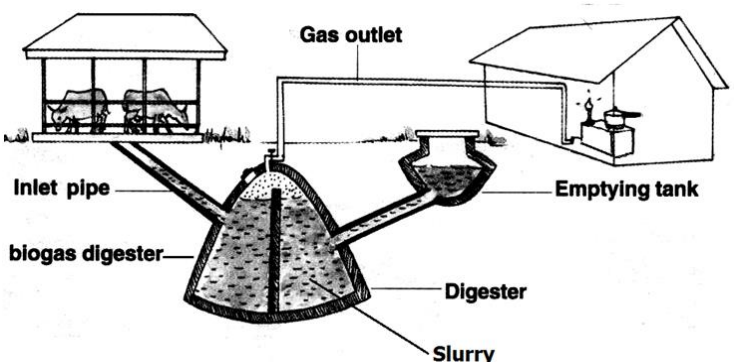
Dangers of charcoal making

1. It encourages deforestation
2. It leads to air pollution.

Biogas

1. Biogas is a gas fuel that is produced by fermentation (anaerobic decomposition) of plant materials and animal dung.
2. Materials used may include weeds, banana peels, rice husks, chicken droppings, leftover food, urine and animal dung.
3. These materials are collected in an air tight biogas digester (container) where they are made to ferment with the help of anaerobic bacteria.
4. When these materials ferment, biogas is produced.
5. Biogas mainly contains methane gas.
6. Biogas is used for lighting and cooking.

Illustration



Parts and their uses

(i) Inlet: It is where slurry is put in the biogas digester from.
(ii) Emptying tank: It's where old slurry is removed.
(iii) Gas inlet: Passes biogas to the cooker.

(iv) Biogas digester: Holds slurry/it's where fermentation takes place.

Energy resources from animals

1. These include:
(a) Food
(b) Biogas
(c) Animal energy

Uses of animal energy

(i) For ploughing
(ii) For transport.

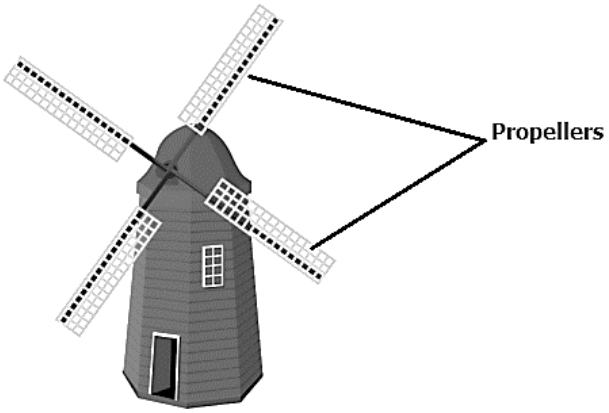
Energy resource from wind

1. The energy resource from wind is called wind energy.

Uses of wind energy

1. Wind is used for winnowing.
2. Wind is used for sailing boats.
3. Wind is used for flying kites, paper planes and balloon.
4. Wind is used for running windmills to generate electricity.

Illustration of a windmill



Uses of a wind mill

1. It is used to generate electricity.
2. It used to pump water from underground.
3. It is used to grind corn/maize.

Ways of conserving energy resources

1. By re-afforestation
2. By afforestation
3. By agroforestry
4. By using energy saving stoves.
5. Using alternative sources of energy.

6. Covering food when cooking.
7. Avoid bush burning.

SIMPLE MACHINES AND FRICTION

A machine

1. A machine is a device that simplifies work.
2. Machines simplify work by:

(a) Reducing the force needed to do work.
(b) Increasing the speed at which work is done.
(c) Changing the direction of force.

Groups of machines

1. Simple machine
2. Complex machines

Complex machines

1. These are machines with many parts and need special training to use.
2. Examples include: Cars, bicycle, aeroplane, motocycle etc.

Simple machines

1. These are machines with few parts and don't need special training to use.
2. Examples include:

(a)	knife	(e)	windlass
(b)	ladar	(f)	pulleys
(c)	slasher	(g)	wheel barrow
(d)	hammer	(h)	car jack

Groups of simple machines

(a)	Levers	(f)	Pulleys
(b)	Inclined planes	(e)	Wheel and axle
(c)	Wedges	(d)	Screws

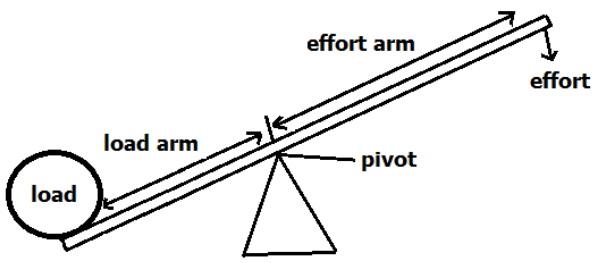
LEVERS

1. A lever is a rigid rod turning freely at fixed point.

2 A lever has got three main parts namely:

(a) Load
(b) Effort
(c) Pivot or fulcrum.

Structure of a lever (crowbar)



2. A pivot/fulcrum is a fixed point on which a lever turns.
3. Effort is the force applied on a lever to lift/ move (overcome) the load.
4. Load is the force which is overcome (lifted/ moved) by the effort.

Note:

1. The distance between effort and the pivot is called effort arm.
2. The distance between the load and the pivot is called effort arm.

Classes of levers

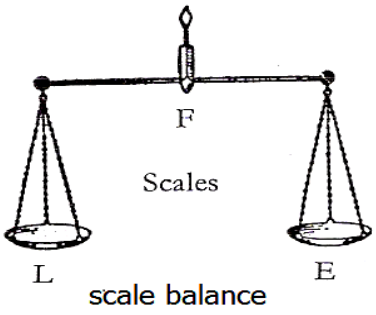
(a) First class levers
(b) Second class levers
(c) Third class levers

First class lever

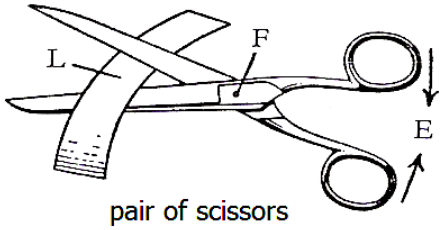
1. This is a lever with the pivot between the load and the effort.
4 They simplify work by changing the direction of effort/force.
2. Example of first class levers include:

(a) Borehole
(b) Pair of scissors
(c) Pair of pliers
(d) Crowbar
(e) Sea saw
(f) Beam balance
(g) Lid opener
(h) Claw hammer

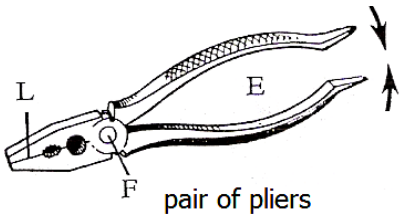
Illustrations



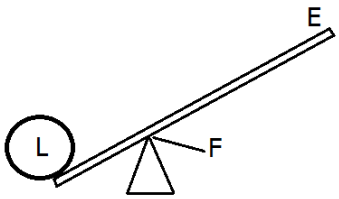
scale balance



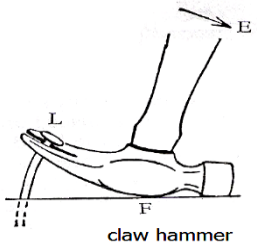
pair of scissors



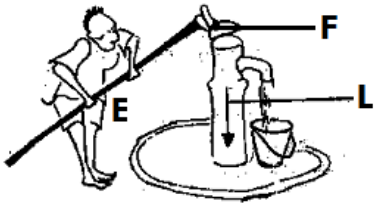
pair of pliers



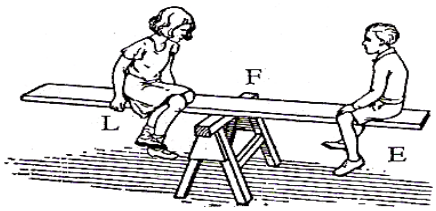
crow bar



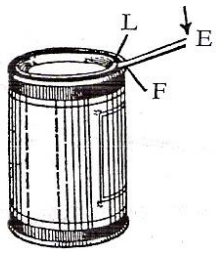
claw hammer



bore hole



see saw



lid opener

Characteristics of second class levers

1. The pivot is between the load and the effort.
2. Have longer effort arm than the effort arm.
3. Effort and load move in different directions.

Advantages of first class levers

1. Changes the direction of force which makes work easy.

Disadvantage

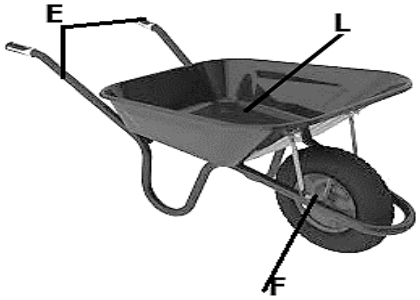
1. The load moves through a short distance.

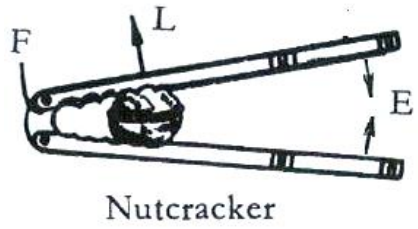
Second class levers

1. This is a lever with the load between the effort and the pivot.
2. Examples of second class levers include:

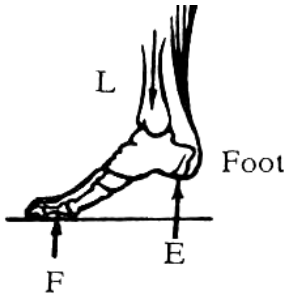
(a) Wheel barrow
(b) Nut cracker
(c) Bottle opener
(d) Human foot
(e) Spanner
(f) Crowbar where the load is between effort and pivot

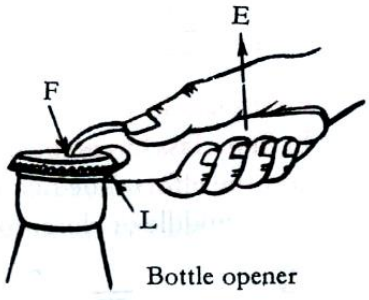
Illustration





Nutcracker





Bottle opener

Characteristics of second class levers

1. The load is between the fulcrum and the effort.
2. Have longer e arm than the effort arm.
3. Effort and load move in the same direction.

Advantages

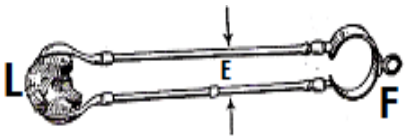
1. Changes the direction of force.

Third class levers

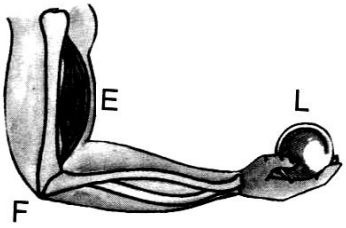
1. These are levers with the effort is between the pivot and the load.
2. Examples of third class levers include:

(a) Fishing rod
(b) Human arm
(c) Spade
(d) Pair of tongs
(e) Hoe

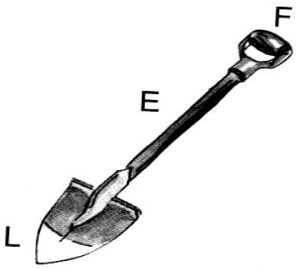
Illustration



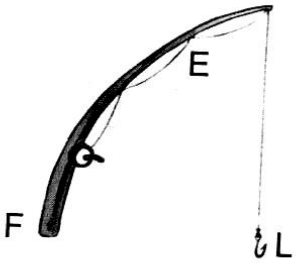
pair of tongs



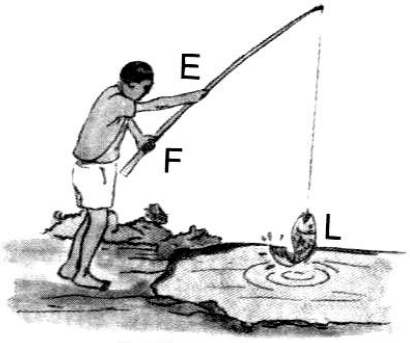
Human arm



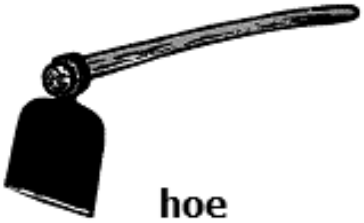
Spade



Fishing rod



fishing rod


hoe

Characteristics of third class lever

1. Effort lies between the load and the effort.
2. They have longer load arms than the effort arms/the load moves through a longer distance than the effort.

Advantage of a third lever

1. The effort moves through a short distance.
2. It increases speed of doing work.

Mechanical advantage of lever

1. This is the ratio of load to the effort/number of times a machine simplifies work.
2. Mechanical advantage= $\frac{\text{Load}}{\text{Effort}} = \frac{L}{E}$

Examples

(a) Find the M.A of a crow bar if it is used to lift a load of 36N using an effort of 18N

Answer:

M.A =L/E =~~36N~~/~~18N~~ =2

Note: Mechanical advantage has no units.

(b) What is the M.A of wheel barrow that is used to overcome a load of 500N with an effort of 250N

Answer:

M.A =L/E = ~~500N~~/~~250N~~ =2

3. Given the above formula, effort and load can be calculated as follows:
   (a) Effort = Load/Mechanical advantage = L/M.A
   (b) Load = Effort x Mechanical advantage = E x M.A

Examples

(i) Find the effort used to overcome a load of 24N by using a lever with a M.A of 4.

Answer:

From M.A =L/E: E=L/M.A = 24N/4=6N

(ii) Which load was lifted by a man if he used an effort of 10N and a machine with a M.A of 4?

Answer:

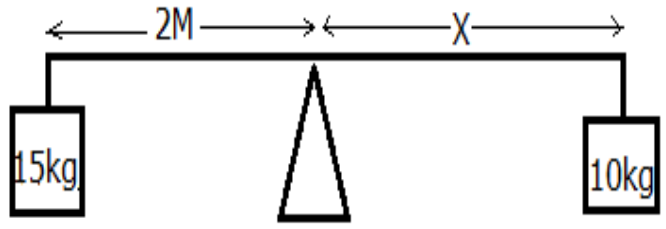
From M.A =L/E: L= M.A x E =10Nx4 =400N

The law / principle of moments or law of levers

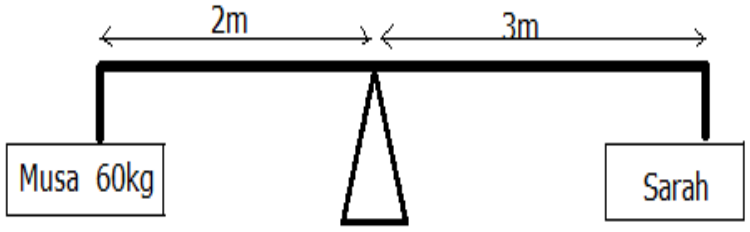
1. It states that "For the lever to balance, the sum of clockwise moments must be equal to the sum of anticlockwise moments"
2. This means Effort x Effort arm = Load x Load arm

Application of law of levers

1. If the lever shown below is to balance, find the length of X



2. Sarah 3m from the pivot on a seesaw. Her brother Musa who is 60kg sat 2m from the pivot as seen below. What is Sarah's weight, if the seesaw is balancing?



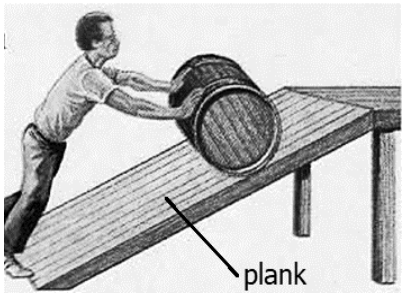
Uses of levers

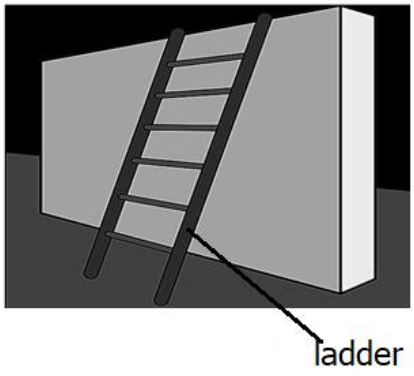
Lever	Use
Scissors	Fur cutting
Claw hammer	Removing nails from nails
Wheel barrow	For transporting things/carrying loads
Spanner	For fixing nuts
Crowbar	For lifting things
Bottle opener	For opening bottles

INCLINED PLANES (SLOPES)

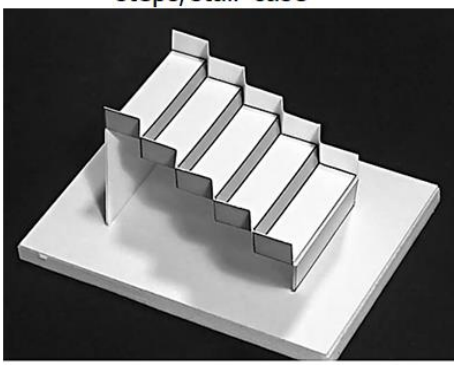
1. An inclined plane is a slanting surface connecting a lower level to a higher level.
2. Example include:
   (a) Ladder leaning on a wall or tree
   (b) Stair case/ stairs
   (c) Plank leaning on a wall.
   (d) Ramp
   (e) Winding road

Illustrations

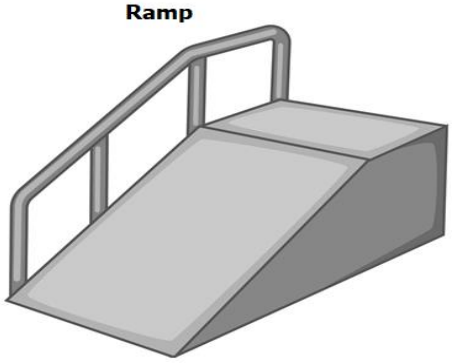




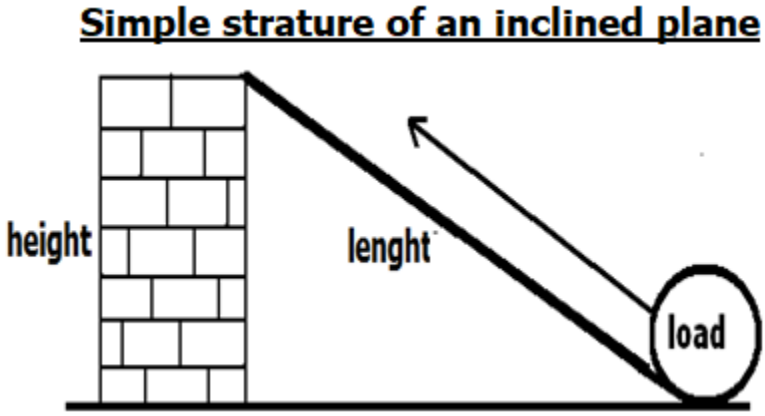
steps/stair case



Ramp



Winding road



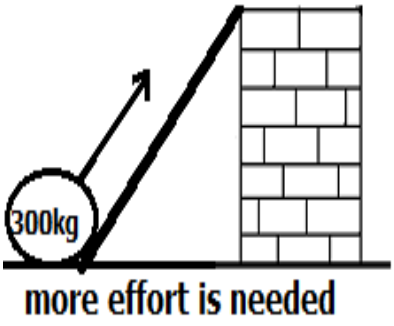
How inclined machines work

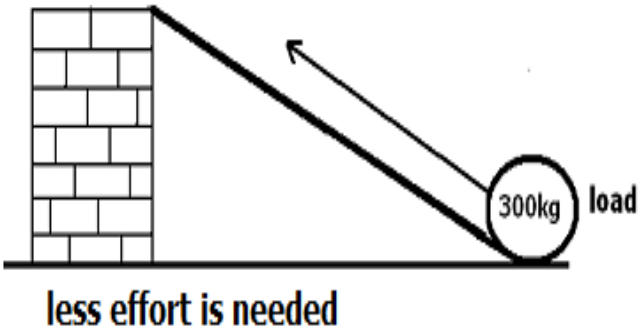
1. The distance moved by the load is equal to the height of the slope.
2. The distance moved by the effort is equal to the length of the inclined plane.
3. Inclined plane machines simplify work by reducing effort needed to do work.

How to reduce effort while using an inclined plane

1. Increasing the length of the slope.
   Note: The steeper the slope, the more effort is used.

Illustrations





Mechanical advantage of a slope

1. The mechanical advantage of a slope (inclined plane) is equal to the ratio of length of the slope to the height of the inclined plane (slope)
2. M = $\frac{\text{Length of the slope}}{\text{Height of the slope}}$ or $\frac{\text{Load}}{\text{Effort}}$

Example

1. If Odong used a plank of 10m to raise a 50kg bag of coffee to a height of 5m on a lorry. Calculate its mechanical advantage.

Answer

M.A=$\frac{\text{Length}}{\text{Height}}$ =L/H = 10m/5m = 2

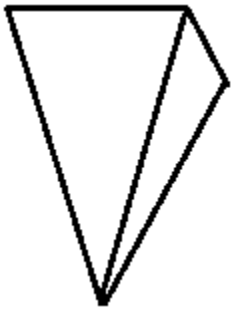
Uses of inclined planes (slopes)

1. Planks are used to load things on trucks.
2. Stairs are used for climbing storeyed buildings.
3. Winding roads are used to climb hills and mountains.
4. Ladders are used to climb buildings.

Wedges

1. A wedge is a tool or simple machine used for cutting, piercing or splitting.
2. A wedge is called a double inclined plane because two inclined planes that come together to form a sharp edge.

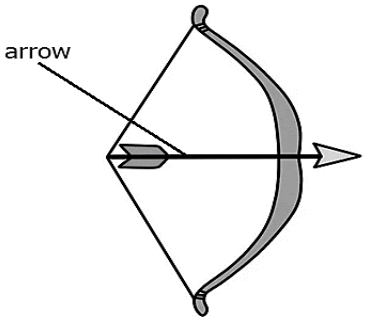
Structure of a wedge

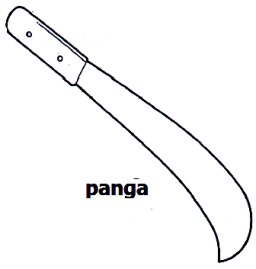


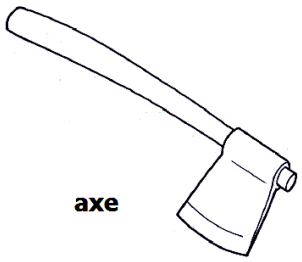
3. Examples of wedges include:

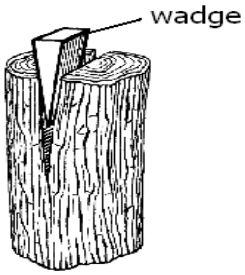
(a)	Knife	(d)	Spear
(b)	Axe	(f)	Arrow
(c)	Needle	(g)	Razor blade
(h)	Panga	(i)	Nail
(j)	Chisels	(k)	Bullets

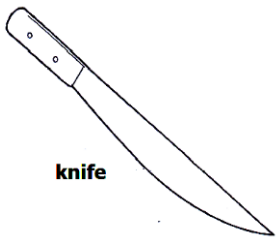
Illustrations











Uses of wedges

1. Knives and pangas are used for cutting.
2. Axes are used for splitting wood and cutting big trees.
3 Nails are used for joining pieces of wood together.
4. Needles are used for sewing.
5. Spears are used for hunting.

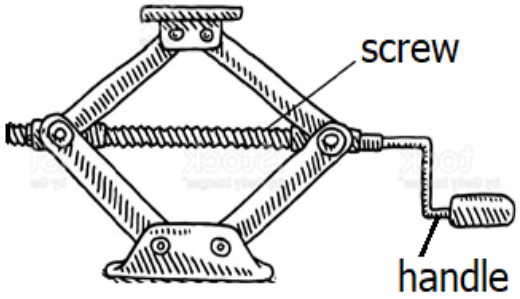
Screws nuts and bolts

1. Screws, nuts and bolts are winding inclined planes.
2. Screws have a slanting surface which narrows towards one end while bolts have uniform thickness.
3. They have spiral threads.
4. Screws, nuts and bolts use the same principle as the inclined plane machines.
5. Examples of machines with screws include:

(a) Screw car jack
(b) Bolt
(c) Nuts
(d) Screw nails
(e) Clamp
(f) Brace

Illustrations

screw nail



brace

bolt

Uses of screws

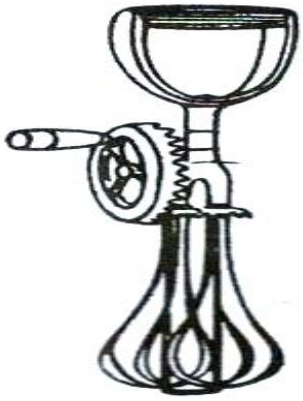
1. Screw nails are used to hold pieces of metals together.
2. Car jacks are used to lift car during repair.
4. Clamps are used for joining pieces of wood together.
5. Drills are used to make holes in wood.

Wheel and axle machines

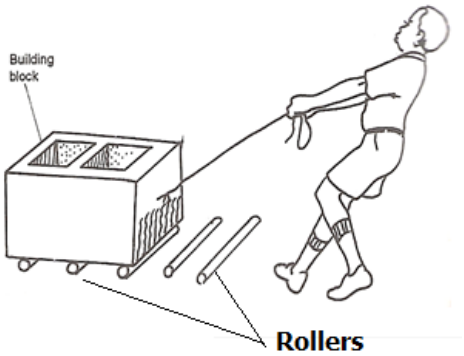
1 An axle is a rod fixed to wheel in the centre.
2. A wheel is a circular frame that turns on/with an axle.
3. In wheel and axle, when a large wheel makes a complete revolution then the small wheel makes several turns.
4. The larger the wheel, the less effort used.
5. Example s of wheel and axle machines include:

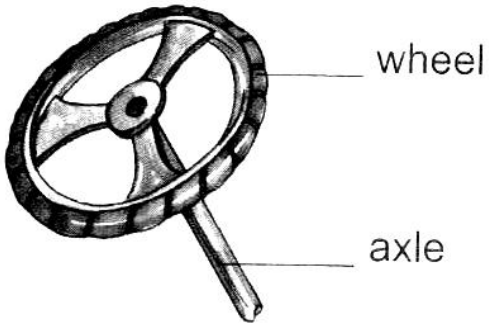
(a) Car steering wheel
(b) Windlass
(c) Radio knob
(e) bicycle pedal
(f) Door knob
(g) Egg beater
(h) Gear wheels

Illustrations

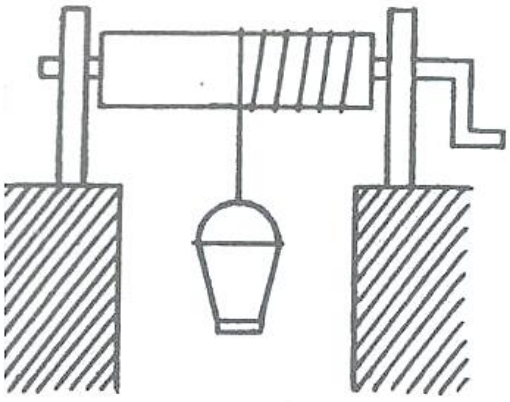


egg beater





steering wheel

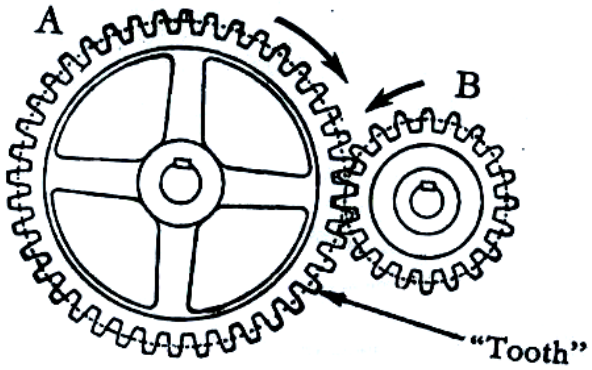


wind lass

Gears

1. Gears are wheels with teeth around their edges/circumference.
2. The teeth of one wheel interlock with the teeth of another wheel.
3. In the directly connected gears, when one wheel turns, it makes the other wheel move but in a different direction.

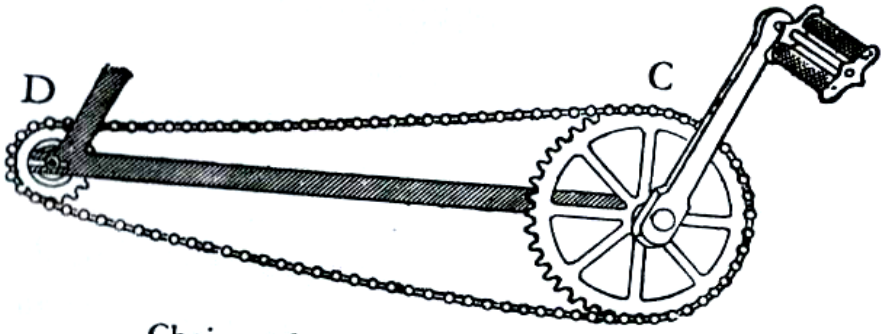
Illustration



toothed wheels

4. Toothed wheels which are joined by a chain or belt move in the same direction like those of a bicycle.

Illustration



Chain and sprocket of bicyle

5. Gears simplify work by:

(i) Increasing the speed at which the machine moves.

(ii) Changing the direction of force (effort).

(ii) Reducing the effort applied to do work.

10. Examples of machines with gears include:

(a) Wall clocks

(b) Bicycles

(c) Motor vehicles

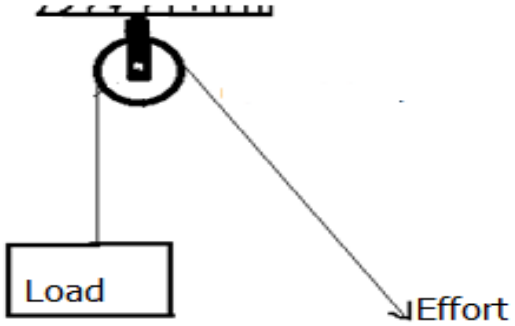
Uses of wheel and axle machines

1. Windlass is used to draw water from a well.
2. Steering wheels are used to steer cars.
3. Radio knobs are used to tune radios.
4. Gears are used to increase speed and change direction.
5. Egg beater is used to prepare eggs for frying.
6. Wheels help vehicles in movement.

Pulleys

1 A pulley is a wheel with a grooved rim.
2. It has a rope /chain passing through its groove.
3. Parts of a pulley include:
   (a) Grooved rim
   (b) Axle
   (c) Block

Illustration



Parts and their importance

1 Groove in the rim: Prevents the string/rope from slipping off the rim.
2. Axle: It's the rod around which the wheel rotates.
3. The block: Its where the pulley is fixed.
4. **Note** the string is used to pull the load.

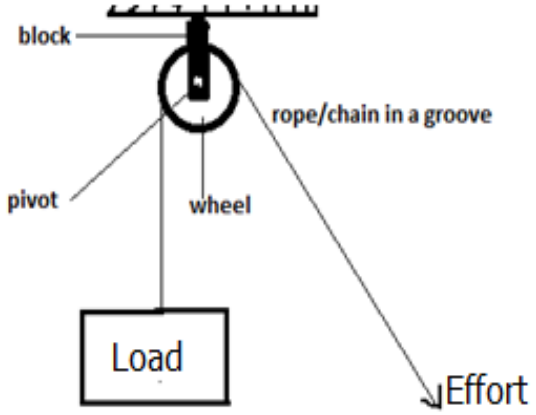
Types of pulleys

(a) Single fixed
(b) Single movable
(c) Block and tackle system

Single fixed pulley

1. This is a pulley that is fixed in one position.
2. The arrangement of parts of a single fixed pulley is the same as that of the first class levers.
3. The load and effort move in the opposite direction.

Illustration



Characteristics of a single fixed pulley

1. The effort applied is equal to the load.
2. The mechanical advantage of a single fixed pulley is always **ONE**.
3. The distance moved by effort is equal to the distance moved by the load.

Advantage of a single fixed pulley

1. It changes the direction of force (the user lifts the load by pulling downwards).
2. It does work fast.

Disadvantage

1. It does not reduce the effort used to do work/the effort used must be equal to the load.

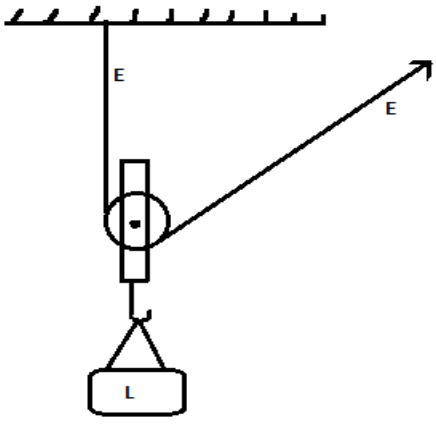
Uses of single fixed pulleys

1. It is used to raise/hoist flags.
2. It is used to lift building materials to the top of buildings.
3. It is used to lift soil from underground when digging latrines.
4. They are used to draw curtains
5. They are used in scaffoldings.

Single movable pulleys

1. This is the pulley that moves with the load.

Illustration



Characteristics of a single movable pulley

1. The distance moved by the effort is twice the distance moved by the load.
2. The effort applied is half the load. This is because the effort is equally shared by the two rope sections that support the wheel (pulley).
3. It has a mechanical advantage of two.
4. The load and the effort move in the same direction.

Advantage of a single fixed pulley.

1. The effort applied is half the load.
2. It has a mechanical advantage of two.

Disadvantage

1. It is slow.
2. Does not change the direction of effort

Calculations involving M.A, of a single movable pulley

1. How much load is overcome by an effort of 80N using a single movable pulley?

Answer

E = 80N
M.A =2
L =?

L = M.A x E
= 80N x2
= 160N

2. Find the effort required for lifting a load of 320kg using a single movable pulley.

Answer

L = 320kg
M.A =2
E =?

E =L/M.A
$= \frac{320}{2}$kg
=160kgf

Uses of a single movable pulley

1. It is used to lift building materials to the top of a building.
2. It is used to lift soil when digging a latrine.

Advantage of a single movable pulley

1. It reduces the effort used.

Disadvantages of a single movable pulley

1. It does not change the direction of force.
2. It is slow.

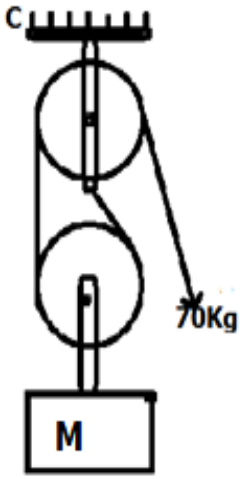
Comparison between a single fixed pulley and single movable

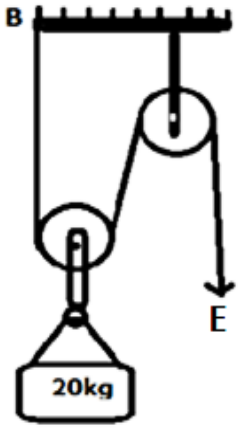
Single fixed pulley	Single movable pulley
Work is done fast.	Work is done slowly.
It changes the direction of effort.	Does not change the direction of effort
Effort used is equal to the load.	Effort used is half the load.
Has mechanical advantage of one.	Mechanical advantage is equal two.
The pulley is fixed.	The load moves with the load.
Works with a downward force	Works with an upward force.

Block and tackle system

1. This is a combination of fixed and movable pulleys
2. There can be one or more of each in a block.
3. The more the movable pulleys in the system, the less the effort used.

Illustrations





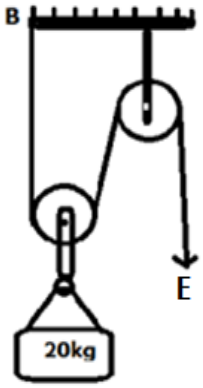
Characteristics of a block and tackle system

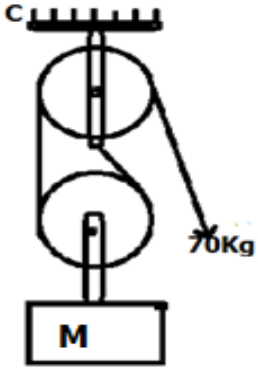
1. It is made up of both a movable and a fixed pulley.
3. Its mechanical advantage of block and tackle system is determined by the number of pulleys the rope passes over.

Finding mechanical advantage, effort and load of the block and tackle system

Examples

1. Study the following block and tackle systems and answer questions that follow.





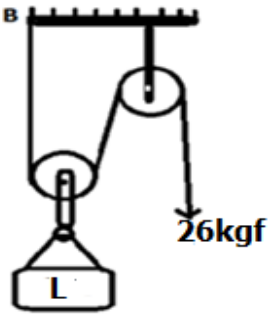
(a) State the mechanical advantage of:
(i) Mechanical advantage of pulley system **B**.
(ii) Mechanical advantage of pulley system **C**.
(b) Calculate:
(i) Effort needed to raise the load in pulley system **B**.
(ii) Load in pulley system **C**.

2. How much effort is needed to raise a load of 1600kgs using a block and tackle system with one fixed pulley and one movable pulley?

Answer

L =1600kg
M.A =2
E =?

$$E = \frac{L}{M.A} = \frac{\cancel{1600}kg}{\cancel{2}} = 800kgf$$

2. 

Work out the value of load represented by **L** in the diagram.

Answer

E = 26kgf
M.A = 2
L = ?

L = M.Ax E
= 2 x26kgf
= 52kg

Uses of block and tackle system

1. They are used to in cranes to lift building materials.
2. They are used in lifts to move upstairs.
3. They are used in tow trucks to pull cars with mechanical problems.
4. They are used in forklift to load and unload things.

Advantage of using a block and tackle system

1. Work is done faster (Due to single fixed pulley in it)
2. Reduces effort needed to work.
3. It changes the direction of force. (Due to single fixed pulley in it)

Parts of the body compared to the machines

1. Teeth are compare to wedges.
2. The arms act as the third class levers.
3. The feet act as the second class levers.
4. The head acts a first class lever.

FRICTION

1. Friction is the force that opposes motion/movement between object in contact.
2. It slows down or prevents movement when two objects are moving against each other.

Uses of friction

1. Friction helps us to walk.
2. Friction helps in writing.
3. Friction helps man to light a match stick.
4. Friction helps in sharpening cutting tools.
5. Friction helps in braking of vehicles.
6. Friction helps climbing.
7. Friction helps man to grip things firmly.

Ways of increasing friction

1. Putting treads on shoe soles and tyres.
2. Tarmacking roads.
3. Putting grooves on handles and steps.
4. Increasing the weight of the load.
5. Making smooth surfaces smooth.

Illustrations

Dangers of friction

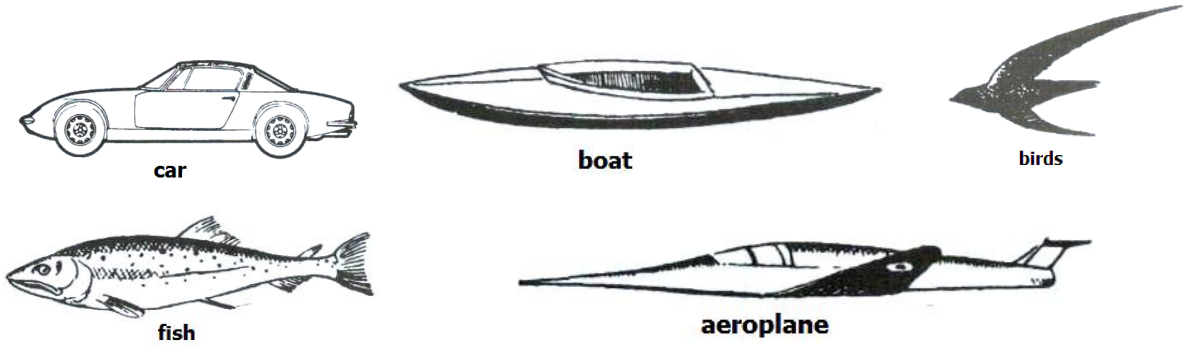
1. Friction causes unnecessary heat.
2. Friction causes wear and tear.
3. Fiction causes unwanted noise.
4. Makes work hard/delays work.
5. Wastes energy.

How friction is reduced

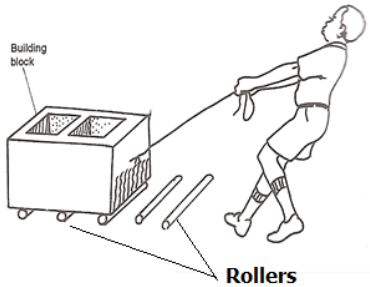
1. Lubricating surfaces. (Oiling or greasing).
2. Making rough surfaces smooth.
3. Streamlining objects that move in air or water.
3. Using ball bearings.
4. Using rollers and wheels.

Note: Rollers and ball bearings reduce friction by reducing the area of contact between moving surfaces.

Streamlined moving objects



Using of rollers



Using ball bearings

EXCRETORY SYSTEM

1. This is the body system with body of organs for excretion.
2. Organs that help in excretion/excretory organs include:
   (a) Skin (largest body organ)
   (b) Lungs
   (c) Liver
   (d) Kidneys
3. Excretion is the process by which waste products/harmful substance are removed from the body.
4. Waste products removed from the body include:

(a) Urea and uric acid (nitrogenous compounds from break down of amino acids)
(b) Excess water
(c) Bile
(d) Lactic acid

5. When the above waste/excretory products are not removed from the body, they turn toxic or poisonous to the body.

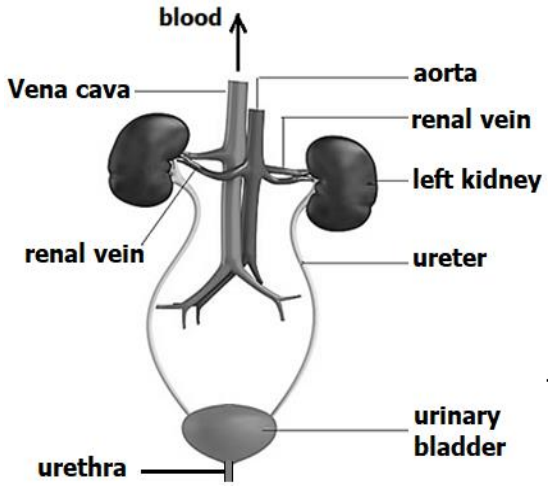
Excretory organs and the waste products they excrete

Excretory organ	Excretory product
Skin	Excess water, excess salts, lactic acid, urea
Lungs	Carbon dioxide, excess water
Liver	Bile
Kidneys	Urea, Excess water, excess salts uric acid.

The urinary system

1. This is part of the excretory system responsible for removal of urine from the body.
2. It is made up of the urinary bladder, ureter and the kidneys.

The structure of the urinary system



Parts and their functions

Urinary bladder: Stores urine until it is passed out.
Ureters: Pass urine from kidneys to the urinary bladder

The Kidneys

1. Kidneys are two dark bean – shaped organs found lying at the back of the abdominal cavity.
2. Functions of kidneys include:

(a) Filtration of blood

(b) Regulate the amount of water and salt in blood/keeps constant amount of water and salt in blood.

Note: We urinate more frequently on a cold day and less on a hot day because;

(i) On a cold day kidneys reabsorb little water.

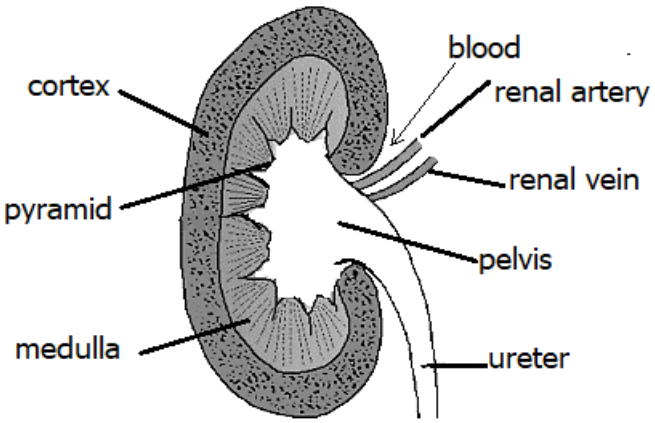
(ii) On a hot day kidneys absorb much water back into blood.

2. Each kidney is divided into two main parts namely:

(a) Cortex (Outer region)

(b) Medullar (Inner region)

The structure of a kidney



Parts and their functions

Cortex: This is where filtration of blood takes place.

Medullar:

(a) This is where reabsorption of useful materials take place.

Note: The useful materials reabsorbed include:

(i) Water

(ii) Amino acid

(iii) Glucose.

Pelvis; This is where urine is first stored for a short time.

Renal artery: Supplies the kidney with blood.

Renal vein: Drains/caries blood away from kidneys.

Ureter: Conducts/ passes urine to the urinary bladder.

Diseases of kidneys

1. Bilharziasis
2. Nephritis
3. Kidney cancer

Disorders

1. Kidney failure.
   This takes place when the kidneys fail to filter blood which leads to accumulation of harmful substance in blood.
2. Kidney stones

(i) This is due to formation hard substances by salt in the kidneys.
(ii) This causes pain in the lower back.

Care for kidneys

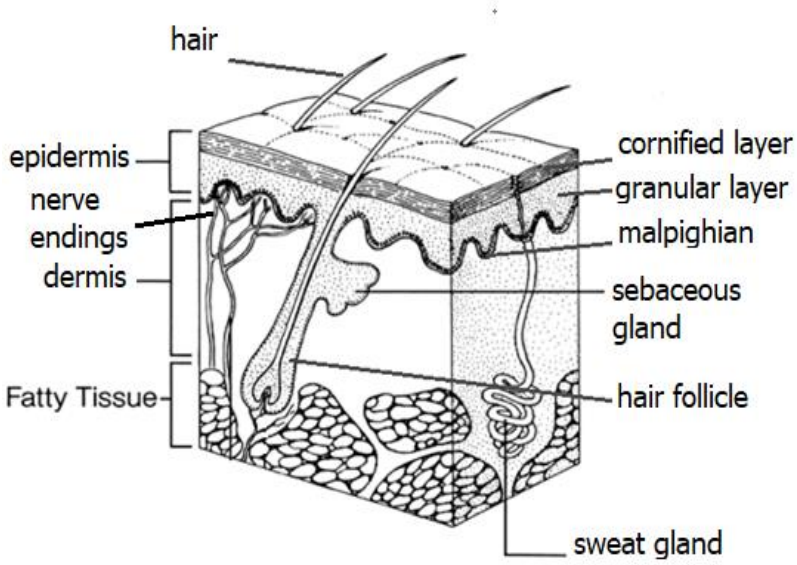
1. Drinking enough water.
2. Avoid holding back urine for a long time.
3. Boil drinking water to avoid bilharziasis.
4. Avoid eating a high amount of salt in food.
5. Going for regular medical check ups / getting early treatment in of an infection.

The skin

1. The skin is the largest body organ and covers all body parts.
2. It mainly divided into two main layers namely:

(a) Epidermis
(b) Dermis

The structure of the skin



Parts and their importance

The epidermis

1. This is the outer most layer of the skin.
2. It is sub divided into:

(a) Cornified layer
(b) Granular layer
(d) Malpighian layer

Cornified layer

1. This is first layer of epidermis which makes the outer tough covering of the skin. It's made up of dead cells.
2. It protects the skin from physical injuries and germ infection.
3. It reduces water loss from the body sweating.

Granular layer

1. This the second layer of the epidermis made of living cells.
2. The cells that for this layer later die and form cornfied layer.

Malpighian layer

1. This layer is also made up of living cells.
2. It contains a pigment called melanin which determines skin colour.
3. Melanin also protects us from ultra violet rays from the sun.

The dermis

1. The dermis is second and inner layer of the skin.
2. It contains:

(a) Nerve endings for feeling (touch, pain, temperature and pressure)
(b) Blood capillaries for supplying the skin with food and oxygen.
(c) Sebaceous gland that produce sebum (oily substance) which keeps the skin moist and water proof.
(d) Sweat glands which produce sweat.
(e) Hair follicle that contains cells from which the hair grows.
(f) Fat layer (subcutaneous layer) which insulates the body against coldness.

Functions of the skin

1. Removes from waste products from the body/excretes sweat.
2. It is used for feeling.
3. Protects the inner parts from physical injuries, ultra violate rays and germs.
4. Manufactures vitamin D.
5. Regulates body temperature.
6. Store fats which insulate the body against coldness.
7. Makes the body water proof.

How the skin regulates temperature

1. On a hot day:

(a) By producing sweat/sweating.
(b) By widening/dilating of blood vessels for blood to the skin surface/vasodilation. This makes blood lose heat to the air easily.
(c) The hair lies flat close to the skin.

Importance of sweating

(i) It eliminates/removes excess water from the body.
(ii) Eliminates /removes excess salts from the body.
(iii) It cools the body.

2. **On a cold day:**

(a) By formation of goose pimples.
(b) By making the hair stand out. This prevents heat from escaping.
(c) By shivering. This helps the body to generate heat.
(d) By reducing sweat production.
(f) By narrowing blood vessels/vasoconstriction. This reduces the amount blood flowing near the skin surfaces.

Skin diseases

1. Ringworm
2. Scabies
3. Leprosy
4. Eczema
5. Impetigo
6. Chicken pox
7. Athlete's foot disease
8. German measles/rubella
9. Scurvy
10. Warts
11. Small pox
12. Measles

Skin disorders

1. Burns and scalds
2. Cuts and wounds
3. Pimples

Care for the skin

1. Bating daily
2. Avoid bleaching
3. Avoid too exposure to too much heat or coldness.
4. Early treatment of cuts and wounds.
5. Avoid body tattooing.
6. Smearing jelly or oils on the skin after bath.

The liver

1. This is a reddish brown organ found in the abdomen below the diaphragm on right side.
2. The liver excretes bile which it stores in the gall bladder.
3. The liver is the largest internal body organ.

Functions of the liver

1. It regulates blood sugar level. This is done with help of insulin hormone from the pancreas.
2. Detoxifies blood/removes poison from blood.
3. It store iron.
4. Produces bile (excretory function)
5. It generates heat.
6. Converts fats into soluble substances that are used during respiration.
7. It carries out deamination.

Diseases of the liver

1. Hepatitis
2. Liver cirrhosis
3. Liver abscess
4. Gall stones

Care for the liver

1. Boiling drinking water to avoid hepatitis A.
2. Getting immunised against hepatitis B
3. Avoid alcoholism

Lungs

1. Lungs belong to both excretory and respiratory system.
2. Functions of lungs include:

(a) They excrete/remove carbon dioxide and excess water from the body.
(b) Carry out gaseous exchange

Diseases of the lungs

(a) Bronchitis
(b) Pneumonia
(c) Whooping cough (pertussis)
(d) Emphysema
(e) Tuberculosis
(f) Lung cancer
(g) Asthma (passes from parents to their through blood)

Care for the lungs

1. Avoid smoking.
2. Covering the nose and the mouth to control germs that spread through droplet infections.
3. Through immunisation against respiratory diseases.
4. Doing physical exercises.
5. Avoid poorly ventilated places.
6. Early treatment in case of an infection.

LGHT ENERGY

1. Light is the form of energy that enable us to see

Sources of light

1. These are things that produce light.
2. There are natural and artificial sources of light.

Natural sources of light

1. These are sources of light that exist by nature.
2. Examples include:

(a) Sun
(b) Fireflies
(c) Lightning
(d) Glowworms
(e) Stars
(f) Erupting volcanoes

Illustrations


Electric bulb


candle


torch


lamp

3. The sun is the main source of light on the earth.
   Note:The moon is not a source of light. This is because the light from the moon is reflected from the sun.

Artificial sources of light

1. These are sources of light that are made by man.
2. Examples include:
   (a) Electric bulb
   (b) Hurricane lamps
   (c) Fire
   (d) Candles
   (e) Torches

Incandescents and fluorescents

1. Incandescents are sources of light that produce light with heat.
2. Examples include:
   (a) Sun
   (b) Burning coals/fire
   (c) Stars

Fluorescents

1. These are sources of light that produce light without heat.
2. Examples include:
   (a) Glowworms
   (b) Fireflies
   (c) Reflector jackets
   (d) Deep sea fish
   (e) Fluorescent lamps/tubes

LUMINOUS AND NON-LUMINOUS OBJECTS

Luminous objects

1. Luminous objects are objects that produce their own light.
2. Examples include:

(a) Sun (d) Candles
(b) Stars
(c) Burning coals

Non luminous objects

1. Non luminous objects are objects that reflect light from others sources of light.
2. Examples include:

(a) Moon
(c) Planets
(b) Plane mirror

3. They do not produce their own light but reflect it from the sun.

Uses of light

1. It enables animals to see.
2. It is used in photography and videography.
3. It is used in traffic lights.
4. Sunlight is used for generating solar electricity, used by plants to make their own food and helps our skins to make vitamin D.
5. Light at night is used for security.
6. Strong light is used in X –rays machines. X-ray machines are used to observe internal organs of patients

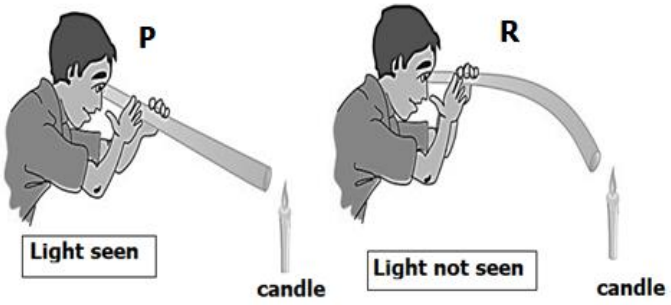
How light travels

1 Light travels in a straight line.

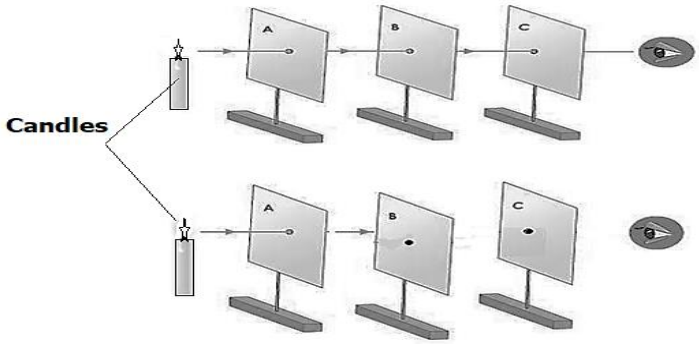
(a) It travels in straight lines called rays (⟶)
(b) A ray is a straight path of light.

Experiment to show that light travels in a straight line

Note one: In P light is seen while in R light isn't seen. This is the pipe in **P** is straight while that in **R** is crooked.



Illustrations



Note two: (i) When the holes in the cardboards are a straight line, light from the candle is seen
(ii) When the hole of the middle cardboard is out the line, light from the candle is not
this proves that light travels in a straight line.

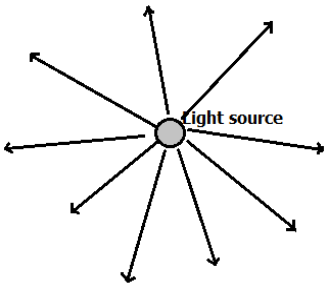
(c) Other situations that prove that light

(i) We see around the corner.

(ii) Formation of shadows due to obstructed light rays.

2. Light travels in all directions from the source.

Illustration



3 Light travels through water, air and vacuum.

Beams of light

1. A beam of light is a group of light rays.
2. There several types of beams namely:

(a) Parallel beam

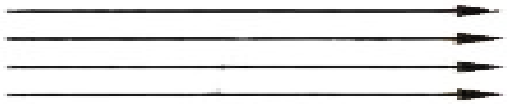
(b) Diverging beam

(c) Converging beam

Parallel beam

1. This is a group of rays that are parallel to each other.

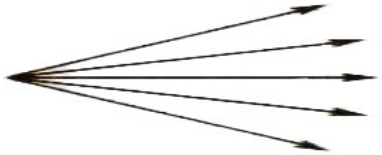
Illustration



Diverging beam

1. This is the beam with rays that come from the same point and spread to different directions.
2. Torches and car headlamps produce diverging beams of light.

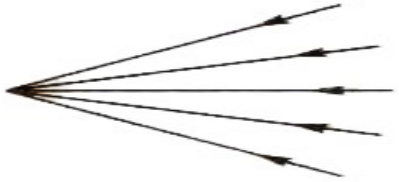
Illustration



Converging beam

1. This is the beam with rays that come from different directions and meet at the same point.
2. Convex lenses and solar cookers produce converging beams.

Illustrations



Effects of different materials on light

1. Materials that affect light in different ways include the following:

(a) Transparent materials
(b) Translucent materials
(c) Opaque

Transparent materials

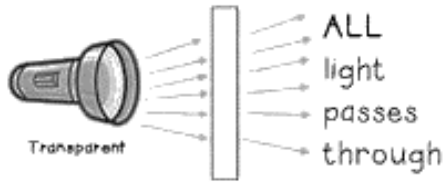
1. These are materials that allow all light to pass through them.
2. Examples include:

(a) Clear glass
(b) Clear water
(c) Air

3. Transparent materials are useful to people as follows:

(a) Clear glass is used to make windows, doors, car wind screen, thermometers and sun glasses.

Illustration

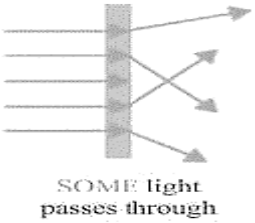


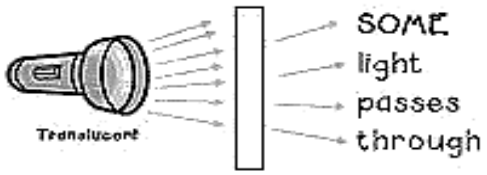
Translucent

1. These are materials that allow little light to pass through them.
2. When light meets a translucent material, it is scattered.
3. The scattering of light is called diffusion of light.
4. We are unable to see though translucent materials because they scatter light/allow little light to pass through them.
4. Examples translucent materials include:
   (a) Frosted/tinted glass (d) Cloured water
   (b) Waxed/oiled paper (e) Cloured polythene paper
   (c) Thin cloth (f) Ground glass

   Note: Frosted glass is used in toilets and bathrooms for privacy.

Illustration





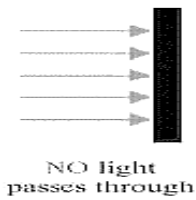
Opaque objects

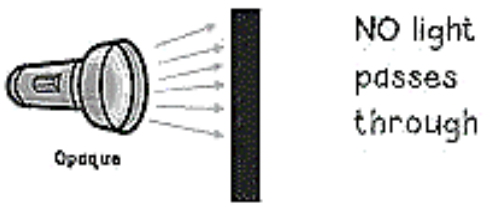
1. These are materials that do not allow any light to pass through them.
2. Examples include:

(a) Stones (d) Metals
(b) Wood (e) Concrete
(c) Animals

3. When light meets an opaque it is obstructed and a shadow is formed.
4. Some light is absorbed while the rest is reflected/bounced back

Illustrations





Importance of opaque objects

1. They lead to formation of shadows which provide shades.
2. They are used to provide privacy.

Shadows

1. A shadow is a dark region formed when light is blocked by an opaque object.
2. Once light is blocked/obstructed on one side of an opaque object, a shadow is formed on the opposite side of the object.

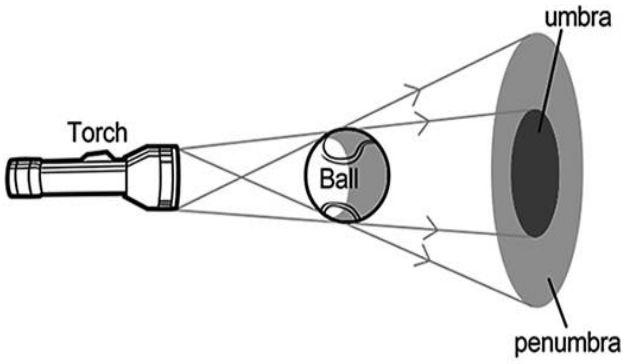
Regions/types of a shadow

(a) Penumbra
(b) Umbra

Penumbra

1. This is the partially dark and outer region of a shadow.
2. It is formed when the source of light is larger than the object.

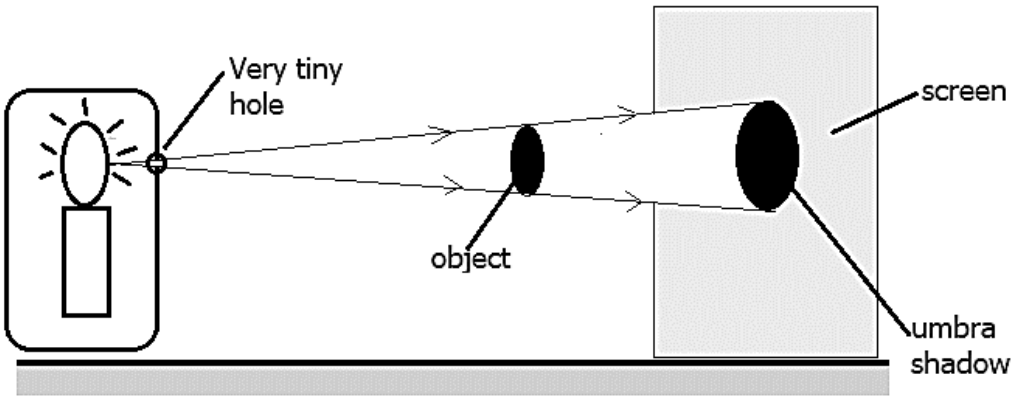
Illustration



Umbra

1. This is the total dark and inner region of a shadow.
2. It is formed when the source of light is smaller than the object.

Illustration



Characteristic of shadows

1. They take the shape of the object.
2. Their sizes depend on the size of the source of light/distance from the source of light /position of the object from the object.
3. They have two regions namely umbra and penumbra.

Note Shadows caused by blockage sunlight are:

(a) Longest at sun rise and sun set

(b) Shortest at midday/noon. This is because the sun is directly overhead.

Eclipse

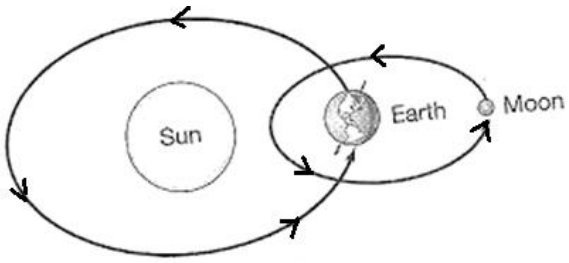
1. An eclipse is a natural shadow formed when sunlight is blocked by the earth or moon.
2. Eclipse means **cut off**
3. There are two types of eclipse namely:

(a) Solar eclipse (Eclipse of the sun)

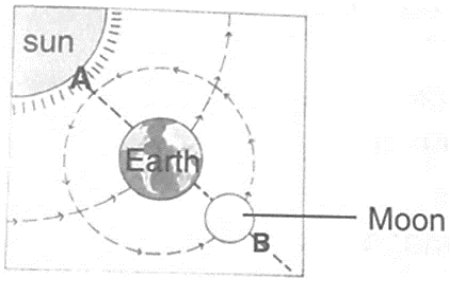
(b) Lunar eclipse (Eclipse of the moon)

Illustrations

(a)



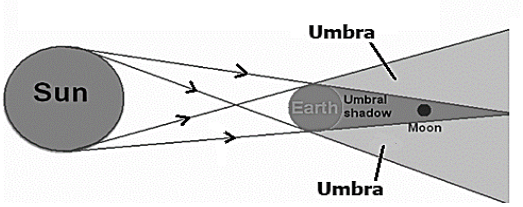
(b)



Lunar eclipse

1. This the eclipse that takes place when the earth is between the moon and the sun in a straight line.
2. In this case the earth obstructs light from the sun and prevents it from reaching the moon.

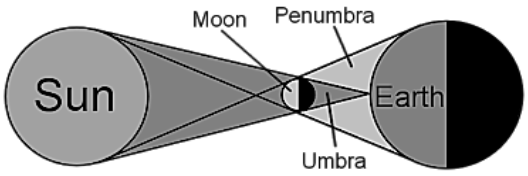
Illustration



Solar eclipse

1. This is the eclipse that takes place when the moon is between the earth and the sun.
2. In this case the moon obstructs light from the sun and prevents it from reaching the earth.
3. When this take place, the parts on earth that receive umbra shadow, get total darkness while those that receive penumbra get partial darkness.

Illustration



Reflection of light

1. Reflection of light is the bouncing of light.
2. There two types of reflection namely:

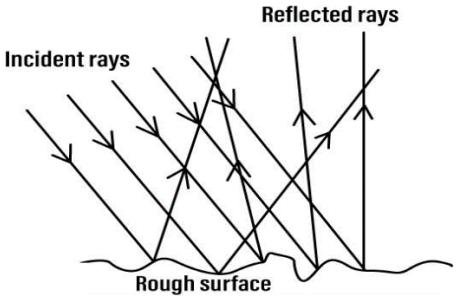
(a) Regular reflection

(b) Irregular reflection

Irregular/diffuse reflection

1. Irregular reflection is the reflection of light that takes place when light rays hit a rough shiny surface.
2. When light rays hit a rough shiny surface, they are reflected while scattered.
3. It takes place on muddy water and cracked mirror.

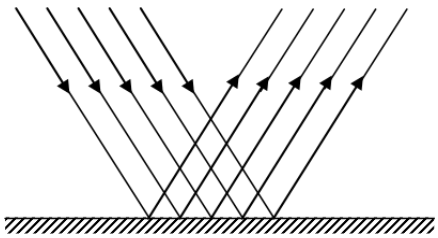
Illustration



Regular reflection

1. This is the reflection of light that takes place when light hits a smooth and shiny surface.
2. It takes place on smooth surfaces like that of a mirror.
3. Images formed on plane mirrors are clear because of regular reflection.

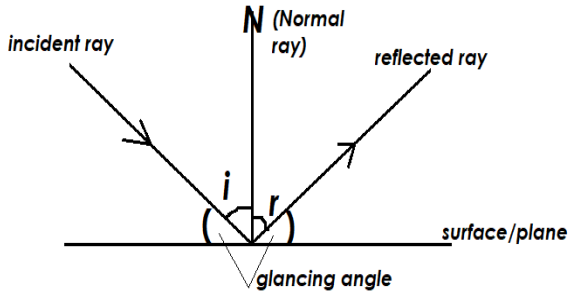
Illustration



Regular reflection of ray of light on a smooth shiny surface

1 The ray that strikes the surface from the source is called incident ray.
2. The ray that bounces off the surface is called the reflected ray.
3. The perpendicular line between the incident and reflected ray is called the normal.
4. The angle (*i*) between the incident and the normal is called angle of incidence.
5. The angle (*r*) between the normal ray and the reflected ray is called angle of reflection.

Illustration

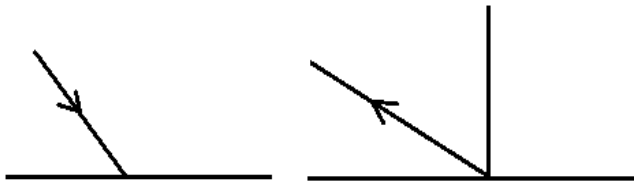


Laws of reflection

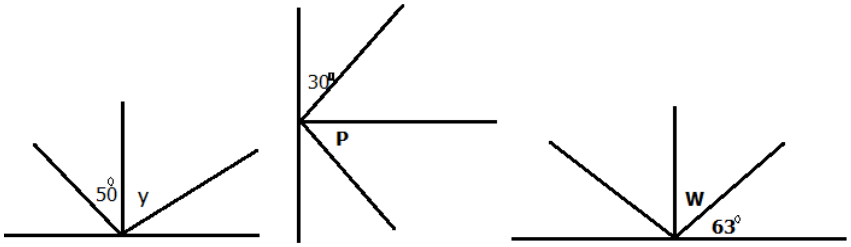
1. The incident ray, the reflected ray and the normal all lie in the same plane at the point of incidence.
2. The angle of incidence is equal to the angle of reflection.

Application of laws of reflection

1. Complete the ray diagrams below.



2. Find the of angle marked Y in the ray diagrams below.



General importance of reflection

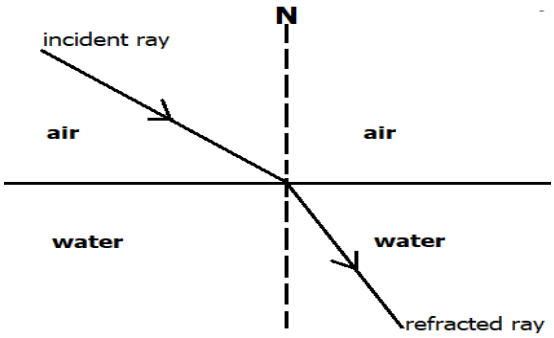
1. It helps us to see things.
2. It helps in photography.
3. It is used periscope

REFRACTION

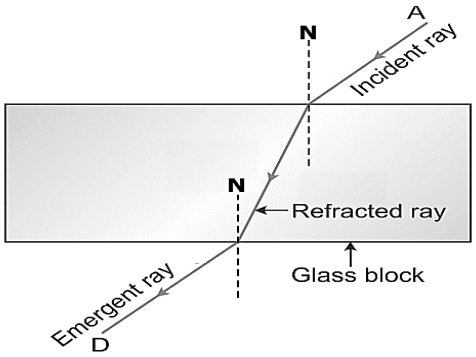
1. Refraction is the bending of light rays as they travel from one medium (substance) to the other.
2. When a ray of light travels from a less dense medium, it bends towards the normal and away from the normal when it travels from denser medium to a less dense medium.
3. Refraction is caused by the change of speed of light as it passes from one medium to the other.
4. Change in speed is caused by different densities of different media.

Illustrations

(a)



(b)



The law/principle of refraction

1. The incident ray, the normal and refracted ray all lie in the same plane at a point of incidence.

Effects of refraction

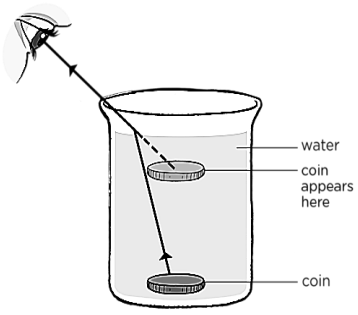
1. It makes pools of water appear shallower than they are.
2. Makes a straight stick appear broken/bent when placed in a glass of water.

Illustration

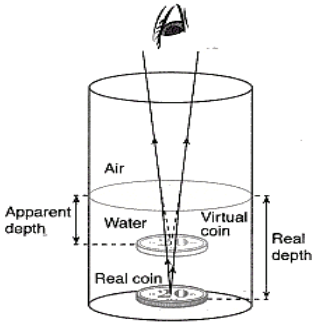
3. Leads to formation of mirages.
4. It leads to formation of a spectrum (dispersion of light) as light passes through glass/water.
5. It makes objects put in water appear to be nearer to the surface than it really is.

Illustration

(a)

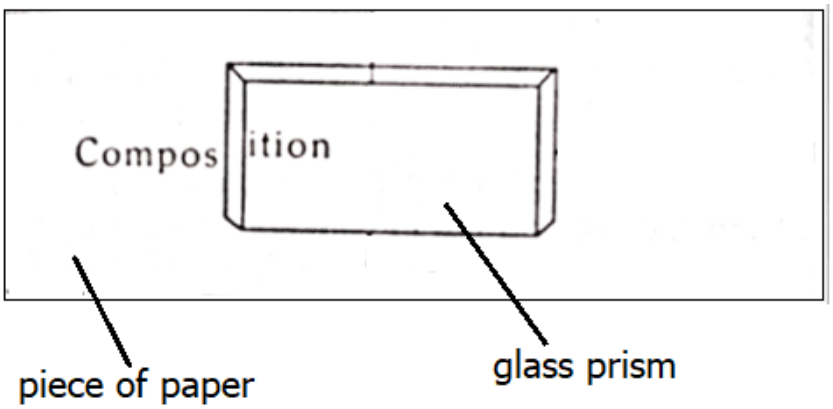


(b)



6. It makes words shift upwards/ look raised when seen through a triangular glass prism.

Illustration



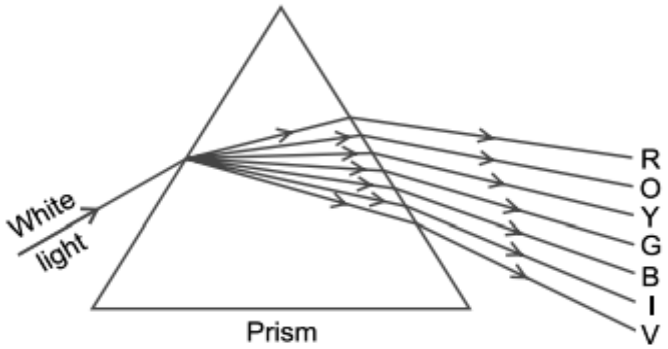
Dispersion of light

1. This is the splitting of a white light ray into seven colours.
2. This is done using a glass prism.
3. When a white light ray passes through a glass prism, it is split into seven clours of a spectrum.
4. A spectrum is a band of seven colours.
5. As the white light ray splits into seven colours, each colour bends at its own angle.
6. This is because each colour has a different speed.
7. The colours with low speed bend more than those with high speed.
6. The colours of a spectrum from top to bottom include:

(a)Red	(e)	Blue
(b)Orange	(f)	Indigo
(c)Yellow	(g)	Violate
(d)Green		

7. These can remembered using letters in ROYGBIV (**R**ead **O**ver **Y**our **G**rammar **B**efore **I**t **V**anishes).

Illustration



Note: (a) (i) A spectrum can also be formed by using a glass of water placed on a windowsill in the direction of sunlight.

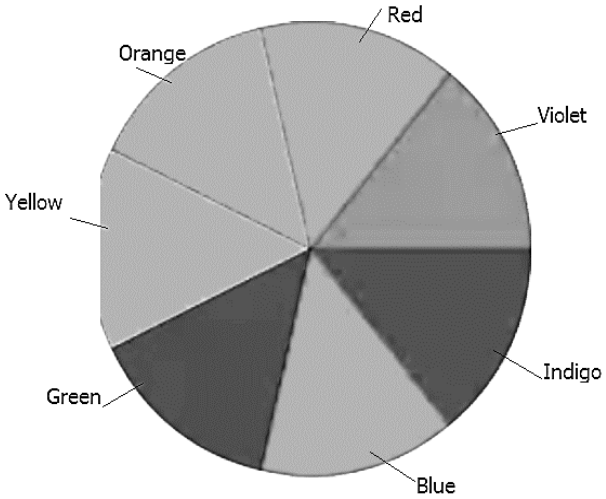
(ii) When sunlight hits water in the on one side as it passes through water in the glass, it is refracted and a spectrum is formed on the opposite side of the glass.

(b) By reflecting sunlight using a mirror partly dipped in water.

Recombination

1. This is the combination of the colours of a spectrum to form white light.
2. It is done by making a colour disc/wheel and spinning it.
3 Recombination proves that a spectrum comes from white light.

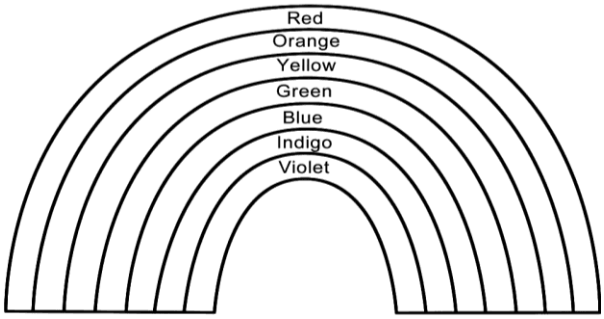
Illustration of a colour disc/wheel



Rainbow

1. A rainbow is a natural spectrum formed when sunlight is refracted by raindrops.
2. It is usually formed when there is little rain and little sunshine.
2. In this case rain drops act as a glass prism in splitting sunlight into seven colours.

Illustration



Primary and secondary colours

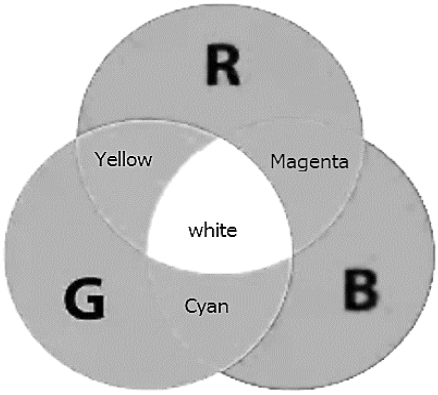
1. Primary colours are colours which cannot be got by mixing other colours.
2. They include: Red, Green and Blue.

Secondary colours

1. These are colours that can be got by mixing primary colours.
2. They include:

(a) Cyan (Blue +Green)
(b) Magenta (Red + Blue)
(c) Yellow (Green + Red)
(d) White is got by mixing all colours.

Illustration



How we are able to see colours

1. Objects appear in particular colours because they absorb all other colours and reflect those colours.

2.(i) Blue objects absorb other colours and reflect blue.

(ii) Green objects absorb other colours and reflect green.

(iii) White object appear white because they reflect all and absorb none.

(iv) Black objects appear black because they absorb all colours and reflect none.

Importance of refraction

1. It enables optical instrument to function properly.
2. It enables eyes to focus images on the retina.

Dangers of refraction

1. It makes water bodies look shallow which can lead to drowning.
2. It leads to mirage on roads which can lead to accidents.

Optical instruments

1. These are instrument that need light to function.
2. Examples include:

(a) Periscope
(b) Camera
(c) Binocular
(d) Projector
(e) Magnifying glass (hand lens)
(e) Telescope
(f) Microscope
(g) Spectacles
(h) Plane mirror

Plane mirror

1. These are flat mirrors.
2. When rays of light from an object fall on plane mirror, they are reflected and an image is formed.
4. An image is a picture of an object formed when light from the object is reflected or refracted.

Characteristics of images formed by plane mirror

1. They are virtual / not formed on the screen.
2. They are laterally inverted.
3. The distance between image and the object from the mirror is the same.
4. The images are erect/upright.
5. The image has the same size, shape and colour as the object/resembles the object.

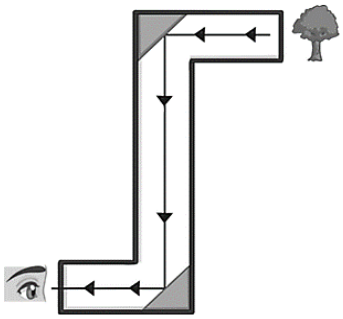
Uses of plane mirror

1. They are used as dressing mirror.
2. They are use in salons when shaving.
3. They are used in periscopes.

Periscope

1. This is an instrument that is used to see things overhead.
2. They are made using two plane mirrors fixed facing each other at an angle of 45^0.
3. A periscope works on a principle that light can be reflected.

Illustration



Uses of a periscope

1. They are used in submarines to see things on the surface of water.
2. They are used by soldiers to see things on land while hiding in trenches.
3. They are used to see things around corners.
4. They are used by short spectators to watch matches.

Lenses

1 A lens is a transparent piece of glass.
2. Lenses can be made from clear, clear plastic or any other curved transparent material.
3. There are two main types of lenses namely:

(a) Concave lens
(b) Convex lens

Note:

(a) When rays are passing through the lens, they bend / are refracted towards the thicker surface.
(b) The ray of light that passes through the centre of a lens is not bent/refracted.

Convex /converging lenses

1. These are lenses that are curved out wards.
2. They are thicker in the centre than in their edges

Illustration

Different shapes of convex lens

Magnifying glass / hand lens

1. This is an optical instrument used to make small things look larger.
2. It is made of a convex lens and a frame for holding the lens.

Illustration

2. When the magnifying glass is placed near a small object, light rays from the object through the magnifying glass, they are widened before they reach the eye. This makes the object appear bigger.
3. When it is used to see distant objects, the object appears very small. This is because the object is beyond the focus of the lens.
4. They are used in:

(a) Microscope
(b) Binoculars
(c) Telescope

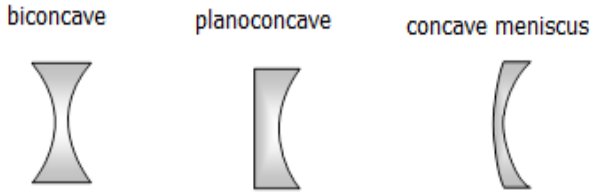
5. Binoculars and telescopes are used to see distant objects while a microscope is used to very small objects.

Concave lens/diverging lens

1. These are lenses that are curved inwards/lenses that are thin in centre and thick around the edges.
2. It is thinner in centre than the edges.

Illustration

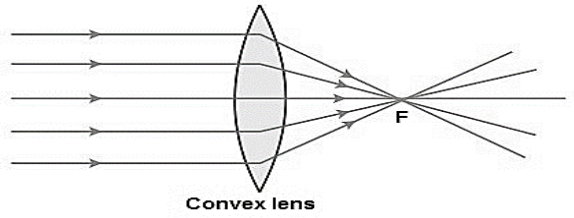
Different shapes of concave lenses



Effect of a convex lens on light right rays

3. When light rays fall on one side of a concave lens, they are converged on the opposite side. This is why they are also called converging lenses
4. The rays converge and meet at a point called focal point.

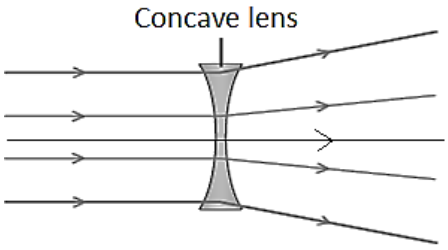
Illustration



Effects of concave lens on light rays

1. When light rays fall on one side of a concave lens, they diverge on the opposite side.
2. This is why concave lenses are also called diverging lens.
3. Things seen through concave lenses look smaller.

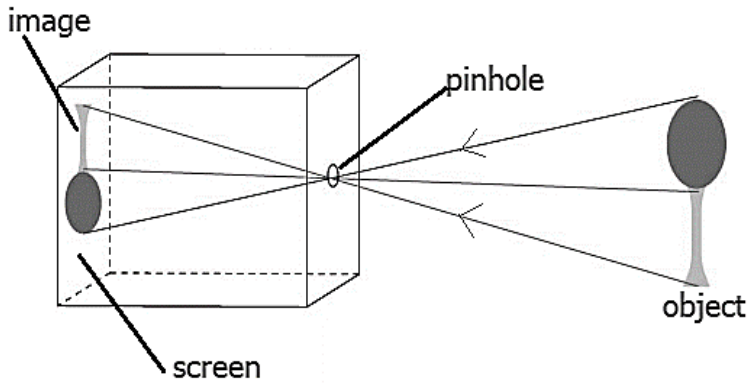
Illustration



The pinhole camera

1. This is a model camera with a tiny hole that allows light into it.
2. It can be made using a box with a tiny hole on one side and a transparent paper on the other side to work as the screen.
3. An extension of a dark box is made on side of the screen for better viewing of the image.
4. A pinhole camera is made dark inside to prevent internal reflection.
5. A pin whole camera works on a principle that light travels in a straight line.

Structure of a pinhole camera



Parts and their functions

1. Hole: Allows light into the camera.
   Note: The smaller the hole, the clearer the image. A wide hole gives unclear image.
2. Screen (oiled paper): It's where the image is formed.

Characteristics of images formed in a pinhole camera

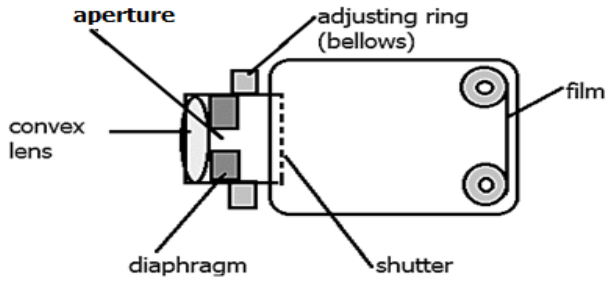
1. They are real.
2. It is smaller than the object.
3. They are upside down/inverted.

Lens camera

1. It is optical instrument used for taking photographs/videos.
2. It is made up of the following parts:

(a) Diaphragm
(b) Aperture
(c) Convex lens
(d) Shutter
(e) Film
(f) Focusing ring/bellows

Structure of a lens camera



Parts and their functions

1. Diaphragm : Regulates amount of light entering the camera.
2. Aperture : Allows light into the camera.
3. Convex lens : Focuses the image on the film.
4. Shutter : Prevents light from entering the camera when it is not in use.
5. Focusing ring/bellows : Adjusts the distance between lens and the film (Screen)

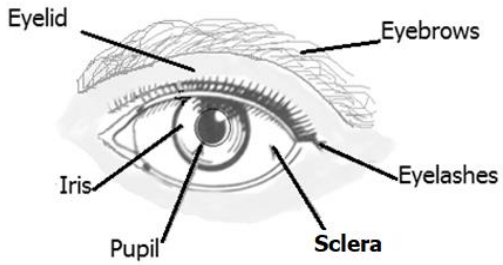
Characteristics of images formed in a lens camera

(a) They are real.
(b) Diminished
(c) Upside down/inverted

The human eye

1. An eye is an organ for seeing.
2. It is enclosed in the part of the skull called socket.

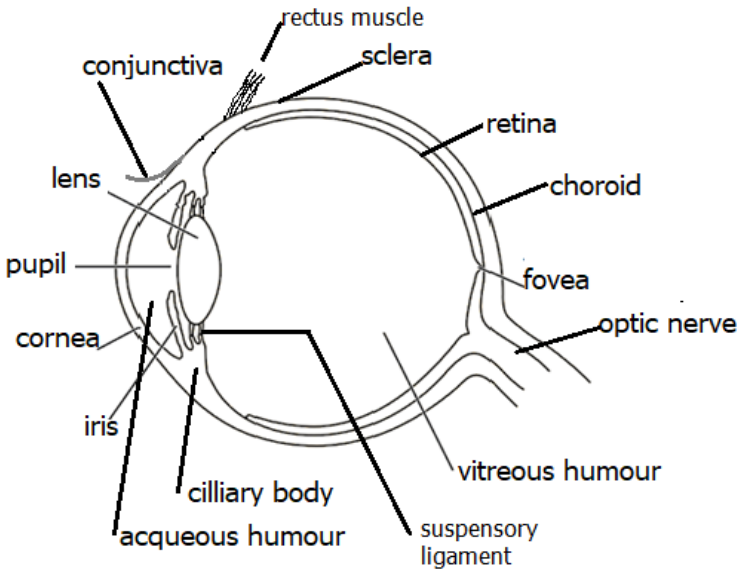
External parts of the eye



Parts and their functions

1. Eyelid : Protects the eyeball.
2. Eye lashes : Trap foreign bodies/prevent foreign bodies from entering the eye.
3. Eye brows : Prevent sweat from entering the eye.

Internal parts of an eye



Parts and their functions

1. **Cornea**: Refracts the light entering the eye.
2. **The pupil**:

(a) It is an opening in the centre of the iris.
(b) It allows light into the eye.

3. **Sclera** : It prevents internal reflection of light.
4. **Choroids** (i) It contains blood capillaries that supply the eye with oxygen and food.
   (ii) Prevents internal reflection. This is because it is black pigmented.
5. **Retina**: It is where the image is formed.
6. **Yellow spot/fovea**: (a) It is a small bend in the retina.
   (b) It has the highest concentration of light sensitive cells (cons).
   (c) It is where the clearest images are formed.
7. **Optic nerve**: Sends sight messages from the retina to the brain for interpretation.
8. **Blind spot**: (a) It is the point at which the optic nerve leaves.
   (b) There is no image formed at this point.
10. **Iris**: Controls the amount of light that enter.
11. **Lens**: Refract the light to focus the image on the retina.
12. **Aqueous and vitreous humour**

(a) Aqueous humour is a thick liquid while vitreous humour is a thick jelly.
(b) They help to maintain the shape of the eye and refract light rays.
(c) They refract light entering the eye to focus the image to the retina.

13. **Suspensory ligament**: Hold the lens in its position.
14. **Ciliary muscles**: Adjusts the thickness of the lens/helps in accommodation.
15. **Conjunctiva**: Forms the lining of the eyelids.
16. **Rectus muscle**: Controls the eye movement.

Comparison between the human eye and a pinhole camera

1. The pupil changes to regulate amount of light entering the eye while the hole of a pinhole camera does not.
2. The eye has a lens while a pinhole camera does not.
3. The eye focuses the image by changing of the lens while a pinhole camera focuses the image by change of the distance between the camera and the object.
4. The eye has eyelids to close the eye while a pinhole camera is always open.
5. Both form real images.
6 Both form inverted images.
7. Both form diminished images.

Comparison between the eye and the lens camera

Human eye	**Lens camera**
Has convex lens	Has convex lens
Has iris	Has diaphragm
Has a pupil	Has aperture
Forms upside down /inverted images	Forms upside down/inverted images

Has retina	Has film
Has eyelid	Has a shutter
Forms real images	Forms real images

Eye defects

1. These are abnormalities that prevent the eye from eyes seeing properly.
2. Common eye defects include:

(a) Abnormal shape of the eye ball.
(b) Irregular shape of the cornea.
(c) Weak eye lens

3. Common eye defects include:

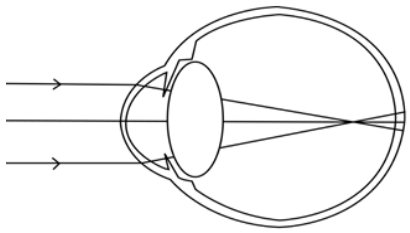
(a) Short sightedness/ myopia
(b) Long sightedness/hypermetropia
(c) Astigmatism
(d) Presbyopia

Short sightedness

1. This is the inability to see distant objects clearly.
2. Images from distant objects are formed in front of the retina.
3. Long sightedness is caused by:

(i) Having too long or big eyeball.
(ii) Thick eye lens.

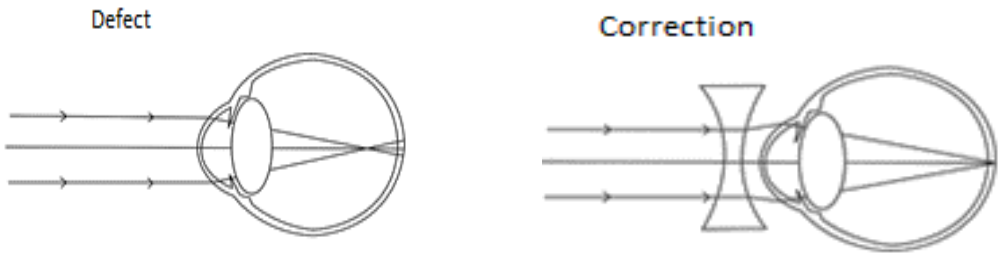
Illustration



Correction of shortsightedness

1. Short sightedness is corrected spectacles with concave/diverging lenses.
2. Concave lens lenses are used because they first diverge light rays before they enter the eye.

Illustration



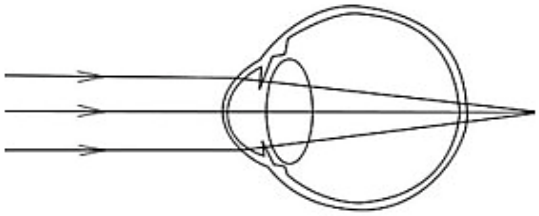
Long sightedness

1. This is the inability to see nearby objects clearly.
2. In long sightedness the images of nearby objects are formed behind the retina.
3. Long sightedness is caused by:

(a) Too short or small eyeball.

(b) Very thin lens/**weak lens**

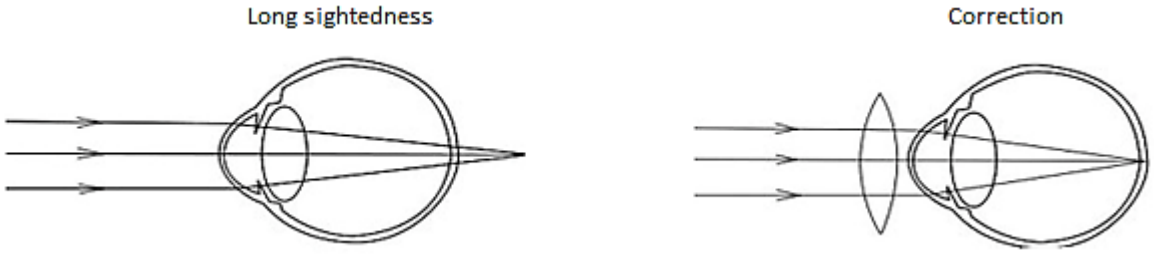
Illustration



Correction of long sightedness

1. Long sightedness is corrected by wearing spectacles with convex lenses.
2. A convex lens is used because it converges the rays before they enter the eyes.

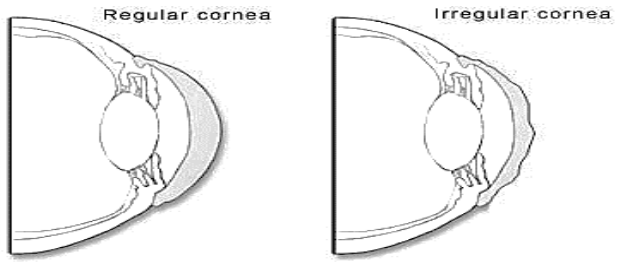
Illustration



Astigmatism

1. This is the defect that is caused by irregular shape of the cornea.
2. It leads to formation of unclear images/poor vision due to irregular cornea.
3. It is caused by surgery, disease or genetics.

Illustration



Correction of astigmatism

1. Wearing contact lenses/surgery.

Colour blindness

1. This is the inability to differentiate between colours.
2. This is caused by lack of cons/light cells in the retina which are responsible seeing in bright light.
3. A person with this defects identifies red colour alone.

Eye diseases

(a) Trachoma
(b) Conjunctivitis
(c) River blindness
(d) Cataracts
(e) Night blindness

Conjunctivitis

1. It is caused by caused by bacteria or virus.
2. It affects the membrane that lines the eyelid called conjunctiva.
3. It spreads through dirty face towel, handkerchiefs and fingers.

Signs and symptoms

1. Watery discharge from the eyes.
2. The white of the eye turns pink.
3. Burning and itching pain in the eyes.

Control

1. Isolation of the victim.
2. Avoid shaking hands with infected people.
3. Avoid sharing handkerchiefs, basins and face towels.

Trachoma

1. It is caused by a bacterium called Chlamydia
2. It spreads through sharing face towels, handkerchiefs, basins and eye contact with house flies.

Signs and symptoms

1. Reddish eyes
2. Itching pain
3. Tears from the eyes.

Control

1. Daily washing of eyes with clean water soap.
2. Early treatment with antibiotics applied on eyes.

River blindness

1. It is caused by worms (Onchocerca Volvulus) which are spread by black flies.
2. Signs of river blindness include:

(a) Swellings/lumps on the skin.
(b) Skin rash
(c) Itching of eyes.
(d) Damage on the iris

Control of river blindness

1. Clearing bushes a long rivers
2. Spraying to kill black flies.

Cataracts

1. This is the eye disease that makes the eye lens grey (cloudy) and opaque.
2. This lowers ones sight and if not treated, it leads total blindness.

Care for eyes

1. Washing eyes with clean water daily.
2. Avoid sharing face towel, handkerchiefs and basins.
3. Avoid reading in too dim or bright light.
4. Wearing sun glasses and caps to protect eyes from strong sunlight.
5. Feeding on foods reach in vitamin D.

Sty

1. It is caused by bacteria.
2. It causes a small swelling containing pus (small boil) on the eyelids.
3. It is brought about by improper washing of the face.

INTERDEPENDENCE OF LIVING THINGS IN THE ENVIRONMENT

1. This is the way things in the environment benefit from one another.
2. Environment means man and his surroundings.
3. Components of the environment include:

(a) Plants
(b) Animals
(c) Water
(d) Air
(e) Soil

4. Plants and animals make up the are the living components of the environment while air, water and soil make up the non living components of the environment.

How animals depend on plants

1. Animals get food from animals.
2. People sell plant products to get money.
3. Provide firewood to people.
4. Plants provide shade to animals.
5. Animals get medicine from plants.
6. Animals get oxygen from plants during photosynthesis.
7. Some plants provide habitats to some animals.

How plants depend on animals

1. Flowering plants depend on animals for pollination.
2. Some plants depend on animals for seed dispersal.
3. Plants depend on animal (people) for care.
4. Plants get carbon dioxide from animals for photosynthesis.
5. Plants gets manure from animals.

How animals depend on other animals

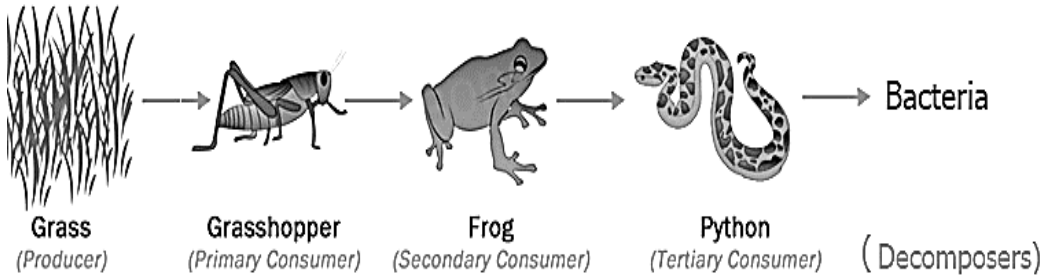
1. Man depends on dogs for security.
2. People depend on animals as energy sources (for transport and ploughing).
3. Some depend on others as parasites or predators.
4. People depend on animals for skins, wool, mohair and silk.

Food chain

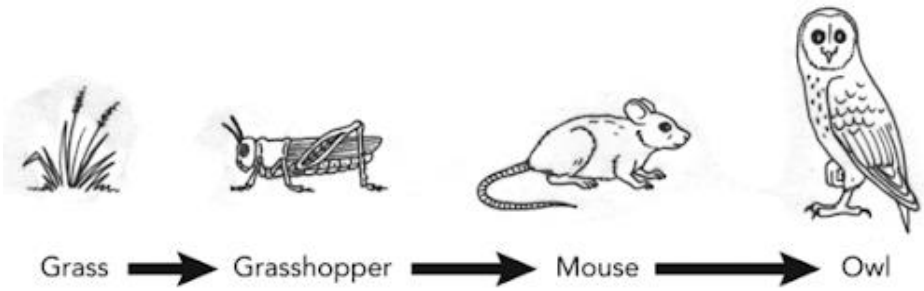
1. This is the transfer of energy from one organism to another through a feeding relationship.
2. It shows interdependence among organisms through feeding.
3. In any food chain the sun is the main source of energy.
4. A food chain is mainly made up of producers, consumers (primary, secondary tertiary consumers) and decomposers.

Illustration

(a)



(b)



Producers

1. Producers organisms that make their own food and these are plants.
2. Plants are called producers/source of food in the because they make their own food.
3. Producers/plants get energy directly from the sun.

Consumers

1. Consumers are organisms all organisms that directly or indirectly depend on producers.
2. They are grouped into:
   (a) Primary consumers
   (b) Secondary
   (c) Tertiary Consumers

Primary consumers

1. These are organisms that feed on producers/plants.
2. Primary consumers are herbivores. They include:

(a) Grasshoppers
(b) Goats
(c) Cattle
(d) Rabbits
(e) Antelopes
(f) Locusts

Secondary consumers

1. These are organisms that feed on primary consumers.
2. These are carnivores/flesh eaters.
3. Examples include:
   (a) Lion
   (b) Snake
   (i) Leopard
   (ii) Cheetah

Tertiary consumers

1. These are organisms that feed on either primary or secondary.
2. They are also carnivores.
3. Examples include:

(a) Birds of prey
(b) Lion
(c) Man

Decomposers

1. These are organisms that break down dead organisms into humus.
2. Examples are bacteria and fungi.

How plants depend on others

1. Plants with weak stems climb others to get support and enough sunlight.
2. Big plants provide shade and shelter them from wind.
3. Parasitic plants depend on others for water and nutrients

Interdependence between living and non living things

How living things depend on water

1. Plants depend on water for photosynthesis.
2. Animals drink water.
3. Some animals live in water as their habitat.
4. People use water to generate electricity.
5. People use water bathing, cooking and washing.

How living things depend on air

1. Animals use oxygen from air for respiration.
2. People use carbon dioxide for putting out fire.
3. Plants carbon dioxide from air for photosynthesis.
4. Plants depend on wind for pollination.
5. Plants depend on wind for seed dispersal.
6. People depend on wind for winnowing.
7. People depend on running water to generate electricity.

How living things depend on soil

1. People use soil to grow crops.
2. Some animals live in soil as their habitats.
3. People use soil to grow crops.
4. Plants depend on soil for nutrients.

How living things depend on the sun

1. Plants depend on sunlight for photosynthesis.
2. People depend on the sun for light and warmth.
3. People depend on the sun to generate solar electricity.

How non living things depend on living things

1. Soil depend on animals and plants for humus.
2. Soil depend on bacterial for decomposition.
3. Air depends on plants for oxygen during photosynthesis.
4. Water depend on people for protection against pollution.
5. People protect soil against pollution and erosion.
6. Air depends on people for protection against pollution.

Agroforestry

1. This is the growing of trees together with crops/growing of trees and keeping livestock on the same piece of land.

   Or

   Raring of animals and growing of trees together with crops on the same piece of land.
2. Examples of trees grown in agroforestry include:

(a)	Accacia	(e)	Avocados
(b)	Cariandra	(f)	Mangoes
(c)	Lucerne	(g)	Eucalyptus
(d)	Oranges	(h)	Pine

Characteristics of trees grown in agroforestry

1. They mature fast.
2. Some are leguminous trees.

Importance of agroforestry

1. The farmer harvests trees and crops at the same time.
2. Trees grown provide shade for animals and crops.
3. Trees grown control soil erosion.
4. Trees grown act as wind breaks.
5. Trees grown protect crops against hail stone.
6. Leguminous crops help to fix nitrogen into soil.
6. Trees grown provide firewood, and poles.

Mixed farming

1. This is the growing of crops and rearing animals/livestock on the same farm.

Advantages of mixed farming

1. The farmer uses crop remains as feeds for his animals.
2. The famer gets manure for his crops easily.
3. If crops fail, the farmer gains from the animals.

Disadvantages of mixed farming

1. Animals can easily destroy crops.
2. It is tiresome to look after animals and crops at same time.
3. It lead requires a lot of money in terms fencing.

Rearing and care for animals

1. Animals can be cared as follows:
(a) Through regular vaccination.
(b) Through proper feeding to control malnutrition.
(c) Providing them with proper shelter to protect them from bad weather.
(d) Deworming and spraying them regularly to control parasites.
(f) Treating them early in case of an infection.

Caring for trees in agroforestry

1. Care for trees involves the following:

(a)	Pruning	(d)	Weeding them
(b)	Protection of trees against fire	(f)	Staking
(c)	Fencing trees when still young	(h)	Controlling tree pests

Pruning

1. This is the removal of unwanted and the diseased branches or leaves from a plant.
2. Tools for pruning include:
   (a) Pruning saw
   (b) Secateurs
   (c) Shears

Advantages of pruning trees

1. Pruning reduces weight on a plant.
2. Helps to control pests and diseases.
3. Encourages trees to grow straight.
4. Creates space in the garden

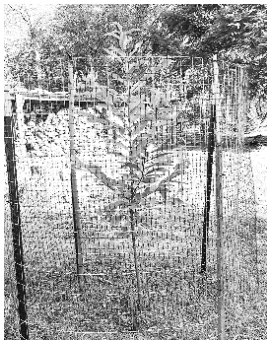
Protecting of trees against fire

1. Creating fire break zones.
2. Avoid setting fire near trees.

Fencing

1. This is the use pieces of sticks to put a barrier around trees.
2. It is done to protect trees from animals.

Illustration

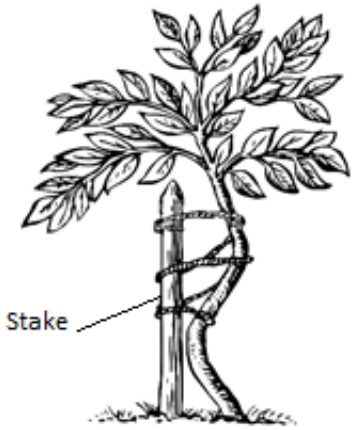


Staking

1. This is the act of providing support to a plant.
2. Staking is done in tree growing to:

(a) Protect trees from being broken by wind.
(b) To make trees grow straight.

Illustration



Control of tree pests and diseases

1. Pests that attack trees include:

(a) Caterpillars which destroy tree leaves.
(b) Termites which attack tree roots.
(c) Wood wasps which destroy tree stems.

2. These can be controlled as follows:

(a) Spraying trees with pesticides.
(b) Uprooting and burning diseased trees.
(c) Planting disease free materials.
(d) Fencing tree seedlings

Weeding

1. This is the remove of unwanted plants from the garden.
2. It done as follow:

(a) Digging weeds.
(b) Uprooting the weeds.
(c) Slashing weeds.
(e) Planting resistant tree varieties.

Proper tree harvesting

(a) Pollarding
(b) Lopping
(c) Coppicing
(d) Selective felling

Pollarding

1. This is the cutting of top branches or tip of a tree.
2. Branches should be cut at an angle for rain water to flow off the cut branches easily
2. It is done to:

(a) Make trees grow thick.

(b) Prevents fruit trees from growing too high/keeps fruit trees short for easy harvesting.

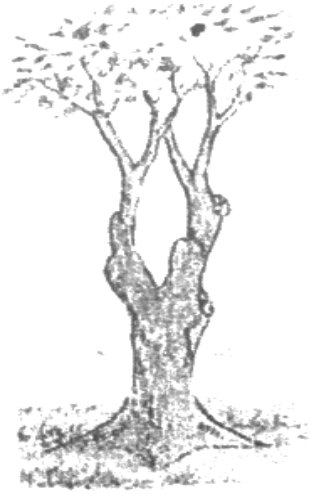
3. Branches cut during pollarding can be used as firewood.

Illustration

Lopping

1. This is cutting of side branches of a tree.
2. Lopping makes trees to grow straight.
3. Most and only mature side branches are cut but this does not kill/dame the tree

Illustration



Coppicing

1. This is the cutting of a tree at stump level.
2. The tree should be cut at angle to allow rain water flow off easily for the tree not to rot.
3. Coppicing encourages new shoots to grow from the stump.

Illustration

Selective felling

1. This the act of harvesting mature trees and leaving young ones to continue growing.
2. Seedlings are planted in the spaces left by the felled trees.

Illustration

Advantages of selective felling

1. It controls deforestation.
2. It gives young trees to grow to maturity.

Preparation of wood for different purposes

1. After harvesting, wood is prepared in different particular ways according to the purpose.
2. Wood can be prepared for the following:

(a) Wood for firewood
(b) Wood for poles
(c) Wood for timber

Wood for firewood

1. It felling trees they are cut in small pieces.
2. The pieces are then split using an axe and let to dry.

Wood for poles

1. After cutting trees, they are copped into poles of the required sizes.
2. The bark is then removed.
3. These are then preserved using different methods.
4. Wood for poles is preserved as follows:

(a) Painting poles
(b) Varnishing poles.
(c) Treating poles using engine oil.

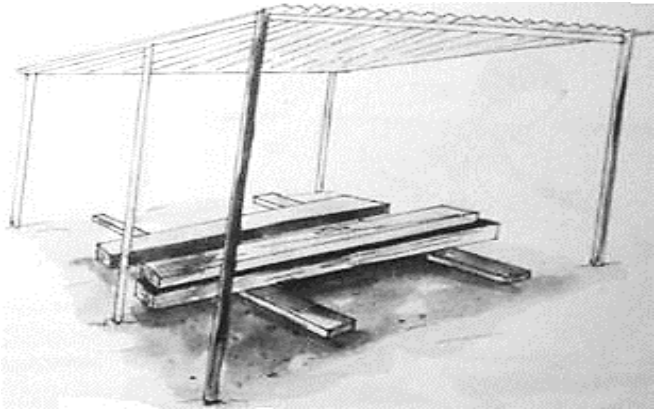
4. Importance of wood treatment/preservation include:

(a) Prevents wood from rotting/protects wood from moulds.
(b) Protects the wood/poles from wood pests like termites and wood beetles

Wood for timber

1. After felling trees, they cut into logs of specific sizes.
2. The logs are then cut into timber using saws.
3. The timber is then seasoned after which it is taken for use.
4. Seasoning is the act of drying timber under a shade.
5. Timber is dried under a shade (seasoned) to prevent it from warping and cracking.

Timber under seasoning



Starting and managing a school/ home lot project

1. A wood lot is an area for growing trees.
2. A wood lot project is a tree growing project.

Advantages of a wood project

1. It promotes practical learning of science.
2. The trees grown provide shade, fruits and firewood.
3. It is source of income.
4. It promotes environmental conservation.

Factors considered to start a woodlot project

1. Water source
2. Land
3. Capital
4. Labour
5. Access to the road

Clearing land

1. This is the removal natural vegetation growing in an area.
2. This makes planting trees easy and enables to grow without competition with natural vegetation.
2. Clearing land involves cutting bushes, slashing grass and uprooting tree stumps.
3. Tools used in clearing land include: Pangas, axes, slashers and pickaxes.

Factors/qualities considered when selecting trees/tree seeds for planting

1. It should able to mature fast.
2. It should be able to give high yields.
3. It should be resistant to diseases and pests.
4. It should be multipurpose (have many uses).

Maintaining a tree growing project

1. This involves activities that can be done for trees to grow properly.
2. These include the following:

(a) Early planting.
(b) Watering seedlings in case of drought.
(c) Use of fertilisers.
(d) Mulching to keep moisture in soil and controlling weeds.
(f) Pruning
(g) Using chemicals to protect trees from termites.
(h) Using proper tree harvesting methods.

Farm record keeping

1. This is the act of keeping written information about a farm.
2. Farm records are the written information kept on a farm.

Importance of record keeping

1. They help to find if the farmer is losing or gaining.
2. The help a farmer to avoid repeating mistakes.
3. They help a farmer to budget and plan for the farm.
4. They are used for fair taxation.
5. They enable a farmer to get a loan easily.

POPULATION AND HEALTH

Community health and social problems

1. Population is a group of living things living in an area at a given time.
2. Human population is the number of people in an area at a given time.
3. Health is the state of being free from diseases or body disorders.
4. Community is a group of people work and live together in an area.
5. Examples of communities include:

(a) Schools (d) Towns
(b) Village (e) Cities
(c) Market places

5. People in a community share same needs, resource and social health problems.
6. Social problems are challenges that face people in a community.

Community health

1. This is the state of being free from diseases and body disorders of the people in a community.
2. Conditions that promote community good health include:

(a) Proper nutrition
(b) Provision of safe water
(c) Control of common diseases
(d) Safe motherhood
(e) Personal and family hygiene
(f) Good health lifestyles

Social problems in a community

1. Social problems are issues that affect the relationship among people in a community.
2. Examples social problems include the following:

(a) Quarrels and fights (e) School drop outs
(b) Broken marriages (f) Increased number of orphans
(c) Teenage pregnancies g) Alcoholism/drug abuse
(d) Poverty (h) Prostitution

2. Causes of social problems include the following:

(a) Bad lifestyles
(b) Inadequate social services
(c) Poverty

Alcoholism

1. This is a disorder that is caused by too much drinking of alcohol/addiction to alcohol.
2. Alcoholism results into the following problems:

(a) Poor performance at work.
(b) Leads to road accidents in a community.
(d) Leads child or spouse abuse.
(e) Family neglect.

Teenage pregnancy

1. This is the pregnancy in girls between 13 and 19 years old.
2. Problems caused by teenage pregnancy include:

(a) Expulsion from school.
(b) Loss of chance for to get right choice partner for marriage.
(c) Failure to care for children produced.

Types of common sicknesses in a home

1. Water associated diseases
2. Malnutritional diseases
3. Air borne diseases
4. Insect borne disease

Water associated diseases

1. These are diseases that have connection with water.
2. They are grouped into:

(a) Water borne diseases
(b) Water habitat vector diseases
(c) Water cleaned diseases
(d) Water contact diseases

Water borne diseases

1. Water bore diseases are diseases that spread through drinking contaminated water.
2. Examples include:

(a) Cholera
(b) Dysentery
(c) Typhoid
(d) Polio
(e) Hepatitis A

Water habitat vector diseases

1. These are diseases spread by vectors that breed in water.
2. Examples include the following:

(a) Malaria
(b) Elephantiasis
(d) Dengue fever
(e) River blindness
(f) yellow fever

Water contact diseases

1. These are disease that spread through bathing or swimming in contaminated water.
2. Examples include:

(a) Bilharziasis
(b) Swimmer's itch
(c) Sore ear

Water cleaned diseases

1. These are diseases that spread due lack of enough clean water for keeping clean.
2. Examples include the following:

(a) Ring worm
(b) Scabies
(c) Eczema
(d) Trachoma
(e) Conjunctivitis
(f) Impetigo

Insect borne diseases

1. These are diseases spread by insects vectors.
2. Examples include:

(a) Malaria
(b) Trachoma
(c) River blindness
(d) Elephantiasis
(e) Diarrhoea
(f) Leprosy

Airborne diseases

1. These are diseases that spread through contaminated air.
2. Examples include:

(a) Influenza/flu
(b) Measles
(c) Whooping cough
(d) Mumps
(e) Pneumonia

Malnutritional / deficiency diseases

1. These are diseases caused/poor feeding by lack certain food values in the diet.
2. Examples include:

(a) Kwashiorkor
(b) Marasmus
(c) Scurvy

Causes of sicknesses in a home and communities

(a) Germs
(b) Poor feeding
(c) Lack of enough physical exercises
(d) Bad/poor lifestyles
(f) Heredity

Control of common sickness in a home

1. Keeping personal, family and community hygiene.
2. Drinking boiled water.
3. Proper feeding.
4. Immunisation of children
5. Doing physical exercises
6. Having enough rest.
7. Observation of good lifestyle

Community health and social problems among young people

1. These are mainly antisocial behaviour.
2. Antisocial behaviour are acts that are not acceptable to the community.
3. Examples of antisocial behaviour include:

(a) Lying
(b) Fighting
(c) Stealing/theft
(d) Abortion
(e) Drug abuse/alcoholism
(f) Violence
(g) Disobedience to the authority/juvenile delinquency
(h) Truancy/avoiding school
(j) Bullying
(k) Arson/setting fire on peoples property
(m) Wandering/running away from home
(n) Defilement
(p) Prostitution
(q) Rape/forcing someone into sex.
(x) Sexual deviation

Juvenile delinquency

1. A juvenile is a young person.
2. Delinquency is an unlawful conduct/act.
3. Juvenile delinquency is an unlawful conduct of a child.
4. Examples of delinquencies include:

(a) Truancy
(b) Arson
(c) Abortion
(d) Theft/stealing
(e) Rape

Causes of antisocial behaviour

1. Over strictness by teacher or parents.
2. Frustration
3. Bad peer pressure
4. Poor social environment
5. Pampering children
6. Failure to enforce laws

Sexual deviation

1. These are abnormal and unacceptable sexual practices.
2. Examples include:

(a) Bestiality (Sex between an animal and a person)
(b) Incest (Sex between close relatives)
(c) Homosexuality (sex between people of the same sex) like lesbianism and gayness.
(d) Masturbation
(e) Oral sex

Ways of avoiding sexual deviations

1. Teaching children the dangers of sexual deviations.
2. Boys and girls in a home not sleep in same room.
3. Avoid watching pornographic videos.

ACTIVITIES TO ADDRESS HEALTH CONCERNS

1. Health concerns are challenges that affect health of people in a community.

Health concern	***Activities to address health concerns***
Poor feeding/inade-quate food	- Working hard to produce enough food - Preparing a balanced diet
Lack of clean and safe water	-Boiling drinking water - Provision of boreholes -Planting grass around water sources -Fencing water sources -Treating water with chlorine -Through demography.
Drug abuse	-Guidance and counseling -Arresting drug abusers -Sensitise about people the dangers of drug abuse -Forming health clubs against drug abuse
Proor sanitation	- Digging latrines for proper faeces disposal. -Constructing racks. -Draining stagnant water around homes. -Slashing bushes around homes. -Providing dust bins/rubbish pits for proper rubbish disposal. -Arresting people that damp rubbish carelessly. -Health education -Health survey
Poor personal hygiene	-Bathing every day. -Washing hand before eating and after visiting a latrine. -Brushing teeth every day. -Ironing clothes
Vector borne diseases	Slashing bushes around homes, spraying with insecticide
Water borne diseases	Boiling drinking water, treating water with chlorine, avoid deficating in the bush.
Air bone diseases	
Lack of health education	-Formation of health clubs -Conducting village health meeting. -Sharing health information through dammar, plays and radio or TV programmes

Health survey

1. A health survey is the inspection/study of people's health status in an area..
2. It is done by:

(a) Asking people questions

(b) Observation of people's living conditions.

Importance of health surveys

1. It enables leaders to find the common diseases affecting people.
2. It enables leaders to know the health facilities/services needed in an area.
3. It helps the government to plan for health for health in an area.

Health education

1. This is the act of passing or sharing health information among people.
2. It can be through health clubs, health parade, village health meetings, drama, plays, poems, radios or TV programmes and child to child programmes.

Child to child programme

1. This is a health education programme in which older children teach young ones good health lifestyles.
2. Older children can teach young ones how brush teeth, how to bathe, wash hands and clothes, use a toilet.

Importance of health education

1 Creates awareness on how diseases spread.
2. It creates awareness among people on how to control diseases.
3. It enables people to learn good health styles.

Demography

1. Demography is the study of human population.
2. It involves study of changes in births, deaths, marriages and diseases that affect people.
3. It is can be done on:

(a) Housing conditions of people
(b) Available health services

Demography on housing

1. Permanent houses show that people's health is good while temporary and poor houses show that people's health is poor.
2. Congested houses/slum show poor health conditions while well spaced show good conditions.
3. Hygienic conditions of houses tell health living conditions of people in an area.

Demography on/collecting information on available health services

1. Information on available services can be collected on:

(a) Health education
(b) Treatment of infections
(c) Immunisation
(d) Family planning
(e) Antenatal care.
(f) The new old and infections reported in an area.
(e) Response of people towards curative and preventive services.
(f) The number of health centres in an area.

Importance of collecting information on available health services

1. It helps leaders expand services
2. It helps leaders to improve on health services provided.

Importance of demography

(a) Enables the government to find plan for health services needed.
(b) Enables the government to know the housing conditions in an area.
(c) Helps the government to know diseases that affect people and their causes.
(d) Helps the government know available health serves of an area.

How to avoid Social and health problems

Problems	***Dangers***	***How to avoid them***
Adultery	-Spreads STDs -Leads to broken marriage -Murder	-Be faithful to one's partner -Punishing adulterous partners.
Fighting	-Injuries -Imprisonment -Death	-Be fare to others -Avoid quarrels
Prostitution	It spreads STDs	-It should be banned. -Teaching children the dangers of prostitution. -Giving young mothers a chance to go back to school. -Creating opportunities for child mothers.
Defilement	-Dropping out of school -Spread of STDs -Damage to victim's sexual organs -Unwanted pregnancies -Imprisonment	-Teaching children to reject gifts given in exchange for sex. -Parents should give full protection to their children.
Rape	-Spreads STDs -Unwanted pregnancies -Imprisonment	-Avoid walking alone at night. -Avoid alcoholism -Avoid boys in isolated places.
Drug abused	-Poor job performance. -Loss of a job. -Crime increase -Violence -Poor health	-Avoid bad peer groups. -Avoid idleness.

Rioting	-Imprisonment -Injuries -Death	-Practicing democracy. -Addressing peoples problems. -Conducting free and fair elections.
Theft	-Injuries -Death -Imprisonment -Loss of respect	-Parent should support their children to complete education. -Avoid bad peer groups. -Engaging in income generating activities
Primitive/barbaric beliefs	-Child/albino sacrifice -Female genital mutilation	-Sensitising community members about dangers of primitive beliefs. -Ensuring all child go to school.

Health clubs

1. This is a club that encourages pupils in schools to do activities that promote good health.
2. This club may include any pupils others members include teachers, health prefect and school nurse.
3. Activities of a health club include:

(a) Conducting a health parade.
(b) Organising cleaning sessions at school.
(c) Sorting rubbish.
(d) Holding health club workshops.
(f) Designing posters with health messages.
(g) Composing plays, drama and poems about health.

END