NYARUGENGE DISTRICT

KIGALI SECTOR

GS KARAMA

TEACHER: LEOPOLD HAKIZIMANA

UNIT 1: CARPENTRY TOOLS

KEY WORDS:

1. **Carpentry tools:** are the tools used by carpenters.
2. **Carpentry:** is the act of making wooden products.
3. **Carpenter:** is someone (person) who uses tools to make wooden products.

N.B: A place where carpenters work is called **carpentry workshop.**

1.1 Importance of carpenters in our society

1. They are source money.
2. They provide employment (job).
3. They provide wooden materials.
4. They provide tax for the government.

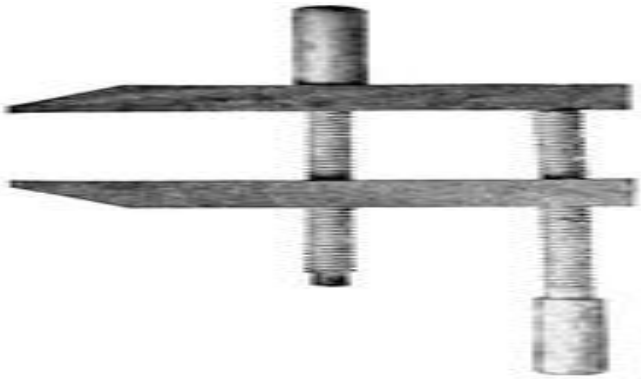
1.2 Identification of carpentry tools and their usage

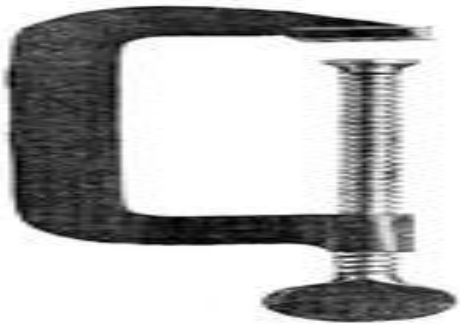
a) Supporting tools and their usage

1. Work bench: is a wooden bench with a hard surface.

USE: It supports while cutting, chiseling and planning.

2. Clamp/ Jointer: is a metal bar with adjustable jaw.

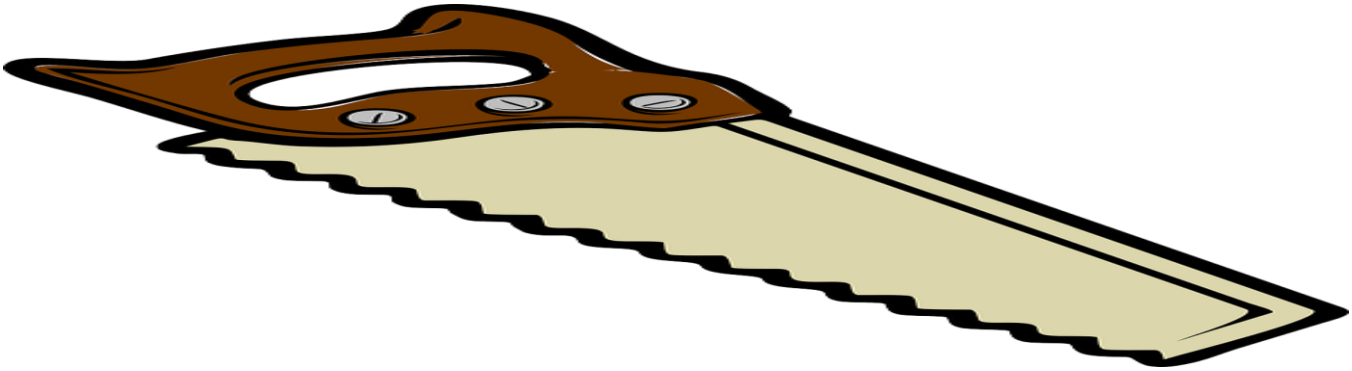




USE: It is used to hold a piece of wood to prevent its movement.

b) Cutting tools and their usage

1. Wood saw: is made up of a flat iron blade with a wooden handle.



USE: It is used to cut wood.

2. Axe: is made up of metal blade and a long wooden handle.

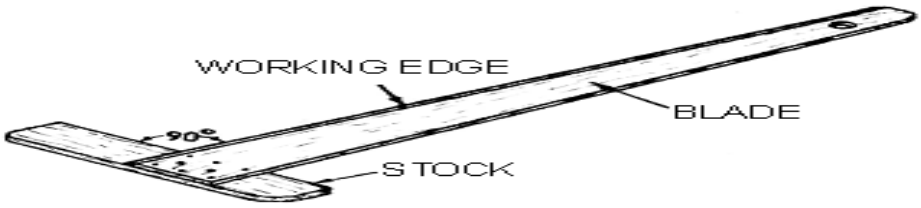
USE: It is used to cut wood and fell trees.

3. A bow saw: is a bow-shaped frame saw. It has a long metal blade.

USE: It is used for straight or curved cuts.

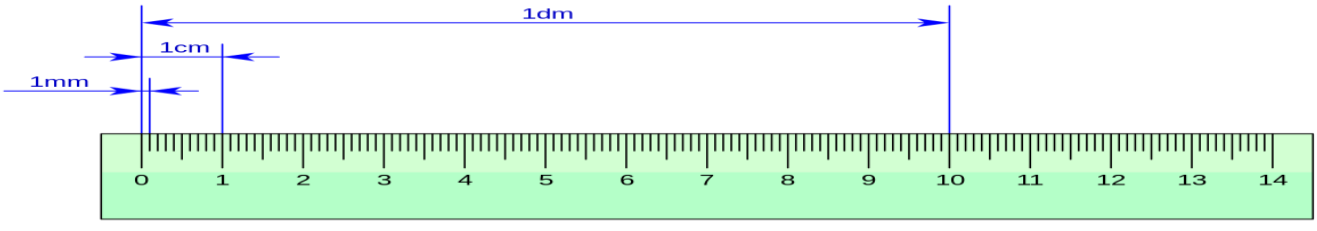
c) Measuring tools and their usage

1. T-square: is a T-shaped measuring tool. It is made up of wood or steel.



USE: It is used to measure squareness of a piece of wood.

2. A meter ruler: is made up of wood or steel.



USE: It is used to measure length of wood.

d) Smoothening and shaping tools and their usage

1. A plane: is made up of wood. It has a sharp metal blade and a wooden frame.

USE: It is used to smoothen rough surface of a wood.

2. A wood shaper: has a large motor and a vertical spindle.

USE: It is used to shape a huge amount of wood.

3. A spoke-shave: is a planer tool.

USE: It is used to shape wooden rods, for example, wheel spokes and chair legs.

e) Drilling tool and its usage

1. A brace: is a drilling tool with a U-shaped grid.

USE: It is used to drill holes in wood.

f) Levelling tool and its usage

1. A spirit level: is made up of aluminium, plastic or wood.

USE: It is used to check whether a surface is horizontal or vertical.

g) Driving tools and their usage

1. A claw hammer: has a striking a flat face at one end. The other end has a claw.

USE: It is used to drive a nail into or remove it from a wood.

2. A mallet: is a hammer-like tool with a head. It is made up of wood.

USE: It is used to drive wooden handled chisel.

3.A screw driver: has a metal blade and a wooden or plastic handle.

USE: It is used tighten and loosen a screw.

1.3 Maintenance of carpentry tools

If we do not maintain our tools regularly, they will not work properly. It also reduces the life of the tools. Therefore, it is important to maintain our tools regularly.

To maintain carpentry tools in good condition:

i)Keep each tool in its proper storage place.

ii) Oiling or greasing them to prevent rust.

iii) Replace the worn out parts of tools.

Iv) Keeping them on racks or in toolboxes.

v) Cleaning and drying them after use.

vi) Keeping them in clean and dry place.

1.4 Dangers of carpentry tools and security measures

a) Dangers of carpentry tools

i) Cutting fingers and limbs.

ii) Risk of getting injuries.

iii) Risk of hearing loss due to loud noise of machines and tools.

iv) Risk of lungs disease from saw dust.

v) Loose clothing or long hair can be caught by the moving part of tools.

b) Safety measures (precautions) while using carpentry tools

i) Avoid loose clothing.

ii) Wear safety glasses to protect your eyes.

iii) Wear boots with heavy soles to protect your feet from injuries.

iv) Use gloves to protect your fingers from injuries.

v) Use face mask to protect your nose from the saw dust.

vi) Use earmuffs to protect your ears from the loud noise.

UNIT 2: MASONRY TOOLS

KEY WORDS:

1. Masonry tools: are the tools used by masons.

2. Masonry: is action of cutting, dressing and laying bricks or stones in buildings.

3. Mason: is someone (person) who is skilled in cutting, dressing and laying bricks or stones in buildings.

N.B: A place where masons work is called **construction site.**

2.1 Importance of masons in our society

1. They are source money.
2. They provide employment (job).
3. They provide wooden materials.
4. They provide tax for the government**.**

2.2 Identification of masonry tools and their usage

a) Levelling tools and their usage

1. A water level: is made up of a glass tube filled with water. The tube is enclosed in a case.

USE: It is used to check whether a surface is levelled or not.

2. A plumb-line: Consists of a line and a plumb.

USE: It is used to find out whether the wall is upright or not.

b) Shaping tools and their usages

1. A trowel: is a flat pointed metal blade with a handle.

USE: It is used to shape mortar and concrete.

2. A jointer: is an S-shaped metal plate.

USE: It is used to shape the mortar between the bricks.

3. A brick frame: is a rectangular wooden frame.

USE: It is used to make bricks in proper shapes.

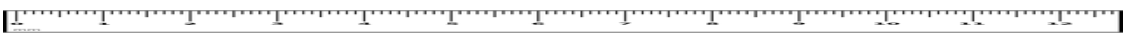
c) Smoothening tool and its usage

1. A float: has a large bull float with a long handle.

USE: It is used to smoothen a concrete surface.

d) Measuring tools and their usages

1. A meter ruler: is a wooden or metal rod marked with centimeters and meters.

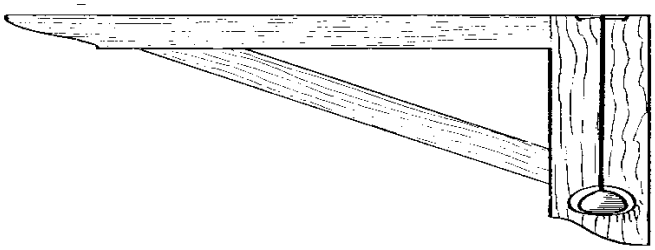


USE: It is used to measure small length.

2. Tape measure: is a long and flexible tape.

USE: It is used to measure length or height of a wall.

3. T-square: is a T-shaped metallic or wooden tool.



USE: It is used to check whether a structure is actually square or not.

e) Transporting tool and its use

1. Wheelbarrow: is a single wheel small hand pushed cart.

USE: It is used to transport mortars and bricks.

f) Mixing tools and their usages

1. A mortar mixer: consists of a metal drum and a mortar.

USE: It is used to mix building materials, especially mortar.

2. Hoe: is made up of a metal blade and a wooden handle.

USE: It is used to mix mortar and concrete.

3.A shovel or spade: is made up of a flat metal blade and a long handle.

USE: It is used to mix mortar.

g) Breaking tool and its usage

1. A brick hammer: is a hand tool. Its one end is a square-shaped. The other end is chisel-shaped.

USE: It is used to break and dress bricks.

2.3 Maintenance of masonry tools

If we do not maintain our tools regularly, they will not work properly. It also reduces the life of the tools. Therefore, it is important to maintain our tools regularly.

To maintain masonry tools in good condition:

i) Keep each tool in its proper storage place.

ii) Oiling or greasing them to prevent rust.

iii) Replace the worn out parts of tools.

Iv) Keeping them on racks or in toolboxes.

v) Cleaning and drying them after use.

vi) Keeping them in clean and dry place.

vii) Painting all metal parts to prevent rust.

2.4 Dangers of masonry tools

i) Cutting fingers and limbs.

ii) Risk of getting injuries.

iii) Risk of hearing loss due to loud noise of machines and tools.

iv) Risk of lungs disease from saw dust.

v) Loose clothing or long hair can be caught by the moving part of tools.

Causes of injuries related to masonry tools

i)Tools falling overhead.

ii) Using wrong tool for the job.

iii) Carrying sharp tools in pockets.

iv) Falling brick chips and mortars into eyes.

v) Carrying sharp tools by hand while on a ladder.

2.5 Prevention of dangers of masonry tools

i) Wear safety glasses when cutting bricks.

ii) Cutting materials away from another worker's face.

iii) Keep tool away from foot and the paths of other people.

iv) Wearing helmet to protect head.

v) Never throw masonry tools.

UNIT 3: OBJECTS PRODUCTION

i) **Object:** is a material that can be seen or touched.
ii) **Object production:** is an action of producing toys, utility objects and learning materials.

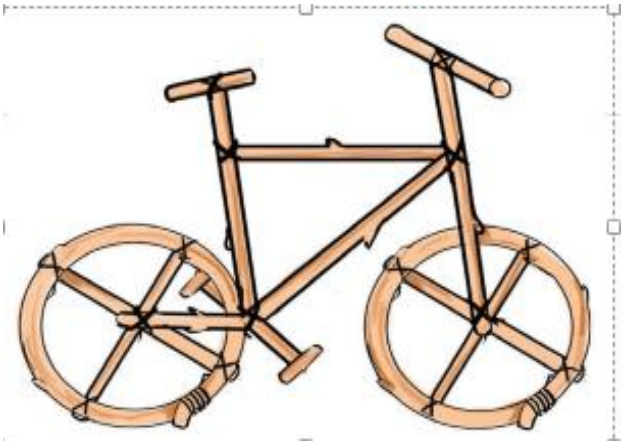
3.1 Making toys

Toys: are the objects that you can play with (play objects).

Making toys: is an action of producing play objects.

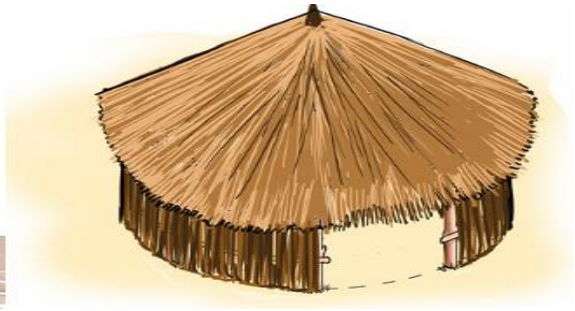
N.B: We can make toys from: leaves, straws, sticks, clay, banana fibrous, …….

a) Making a toy bicycle



Materials needed: sorghum sticks, pair of scissors and a card board.

b) Making a toy house



Materials needed: sorghum sticks, straws and a knife.

3.2 Making utility objects

Utility objects: are the materials that can be used in every daily activity.

a) Making a spoon in a wood

Materials needed: a piece of soft wood, a machete, a sharp flattened nail and a hammer.

b) Making a hoe handle in a wood

Materials needed: a piece of soft wood, an axe, a clamp and spoke-shave.

3.3 Making learning materials

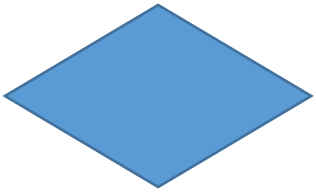
Learning materials: are materials that help us to learn better.

Examples: Rhombus, parallelogram and trapezium.

a) Making rhombus from a sheet of paper

Rhombus: is a four-sided flat shape whose all sides have equal length.

Materials needed: a rectangular sheet of paper and a pair of scissors.



b) Making a parallelogram in a sheet of paper

Parallelogram: is a four-sided flat shape whose opposite sides are parallel.

Materials needed: a rectangular sheet of paper and a pair of scissors.

c) Making a trapezium from a sheet of paper

Trapezium: is a four-sided flat shape whose one pair of sides are parallel.

Materials needed: a rectangular sheet of paper and a pair of scissorS.

N.B: Crease: is a line or ridge produced on paper by folding.

3.4 Maintenance of utilities and learning materials

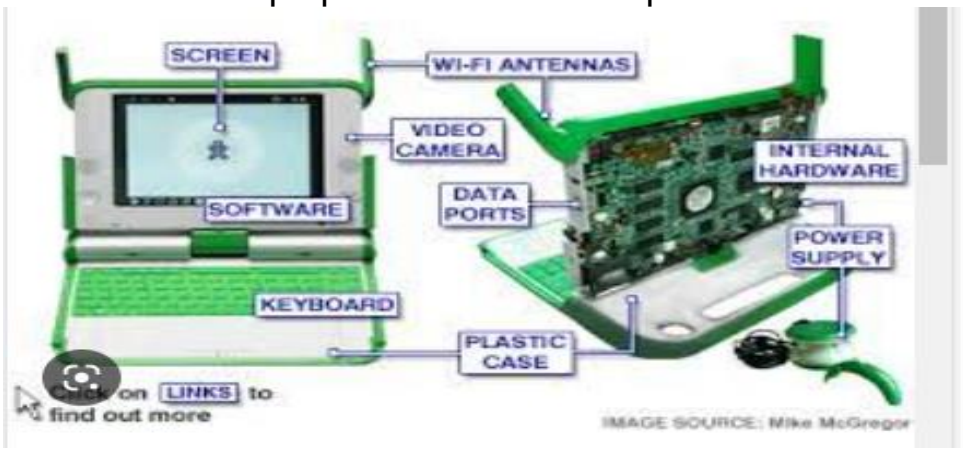
The prepared utilities and learning materials are soft. So we must take extra care to keep them safe. They should be:

i) Keep them in dray and clean place.
ii) Handle with care.
iii) Clean them with.

UNIT 4: COMPUTER MY FRIEND

Intoduction: A computer is an important device that can store data in its internal memory

OLPC : One Laptop Per Child and its parts



4.1: Meaning of data, Memory

Data are facts and figures that need to be processed by a computer

Eg: Letters { a,b,c,d,e,f,……
Numbers (0,1,2,3,4,5….)
Symbols($,!,&,…….",@)

Data is entered into computer by using devices like Keyboard and mouse

- Memory refers to parts of the computer that are used to store data or information.

Roles of memory:

- Memory is used to store data or information inside the computer

There are two types of of memories in the computer these are :

Computer memory :(RAM and ROM), Hard disk

A.Hard disk: Is storage device found inside all computers
Is used to store computer programs
It has a large memory space used to store data

B. **Computer memory (RAM and ROM):**

ROM: in full is **Read Only Memory**

Is a permanent storage because when power goes off the written data can not lost .

It only allows reading of its content
The user can not change its content

RAM:in Full is Random Access Memory

Is a temporary memory because when power goes off the written data disappears
Role of RAM is to store data that needed to be completed
When you write information in the computer but without saving are temporary saved on RAM .

EXTERNAL STORAGE

Are all devices that are not permanently fixed in/ on a computer
Eg:Memory card,Flash disk,Cds,DVDs,……..

A.Memory Card: is electronic device used for storing digital information
Memory card is also known as **SD card or Frash card**

B.Flash disk: is electronic device used for storing digital information and documents
It is connected to the Xo laptop through USB port

C. CDs and DVD :

CDs in full means Compact Disk
DVD in Full means Digital Video Disk

Are inserted in a CD card reader in order to access stored information

4.1.SHARING A DOCUMENT:
The Xo Laptop allows for connectivity between it and neighbouring Xo Laptops using Collaboration system

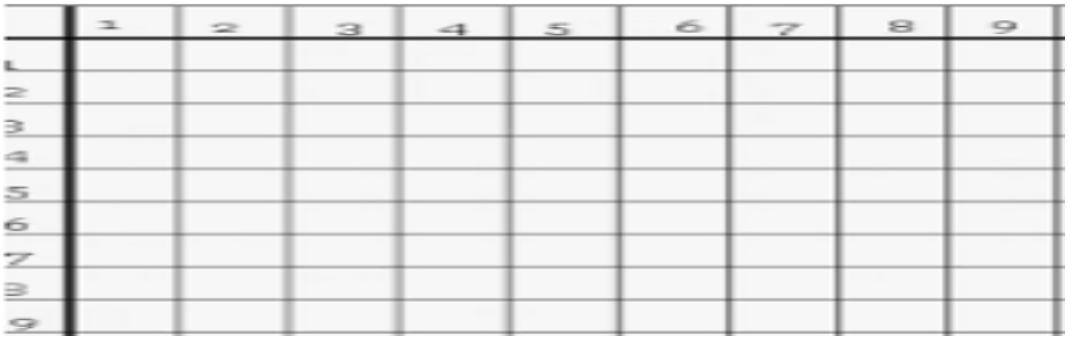
Collaboration allows you to share what you are doing with others where you are also see what friend are doing as your neighbouhood

*** Send invitation and Share with the neighbourhood**
-Create a document or story
-Go to neighborhood view click a friend's Xo icon on your computer to send invitation request
- Tell/ask your friends to click the icon in the frame of his /her Xo Laptop
-Then join option and work

UNIT 5: WRITING SKILLS:

A COMPUTER is used to write and store data .
The data should be entered in the computer by typing them .
The data can be as photos, Microsoft excel (Tables as well) and Microsoft word

1: **Create tables: Insert tables columns and rows, delete tables columns and row**



The table is made up of Columns and rows

Creating and Inserting **Columns** is done by vertical lines but rows is done by horizontal lines

To insert row and column:

- Select the row above or the column to the right of where the insertion should occur then,
- Choose **Home→Cells** and click the arrow to the right of the **Insert** button to open the drop-down list for the **Insert** button.
- From the menu bar choose **Insert Rows** or **Insert Column.**
- Steps for inserting pictures and images
- To insert pictures or images, you have to follow the following steps.
- (i)Click where you want the picture to be.
- (ii) Hover your pointer on insert image tool bar.
-

- (iii) Click on Insert image. The Journal will then open up, showing you a list of all of the pictures saved on your computer.
- (iv) Choose the picture you want to add to your document by clicking on its icon.
-
- (v)Your picture will be added to your document

UNIT SUMMARY NOTE

A table is made up of row and column
To insert row and column you have to follow the following steps:

1. Select the **row** above or the **column** to the right of where the insertion should occur then,
2. Choose Home→Cells and click the arrow to the right of the **Insert** button to open the drop-down list for the **Insert** button.

To insert pictures or images, you have to follow the following steps.
(i)Click where you want the picture to be.
(ii) Hover your pointer on insert image tool bar.
(iii) Click on Insert image. The Journal will then open up, showing you a list of all of the pictures saved on your computer.
(iv) Choose the picture you want to add to your document by clicking on its icon.
(v)Your picture will be added to your document
To add a text on an image, you follow these steps.
-Move the pointer closer to the image.
-then you can type the text you want.

NB : With practices all learners will know how to create table, insert rows and columns, delete rows , columns and table itself

With practices all students will be able make resizing rows and columns

Final with practice try to insert pictures and images
Resize and position an image or picture
Providing the text relating to image or pictures

UNIT 6: COMPUTER RESEARCH

1: Browse and use of emails: Creating email account, login and logout

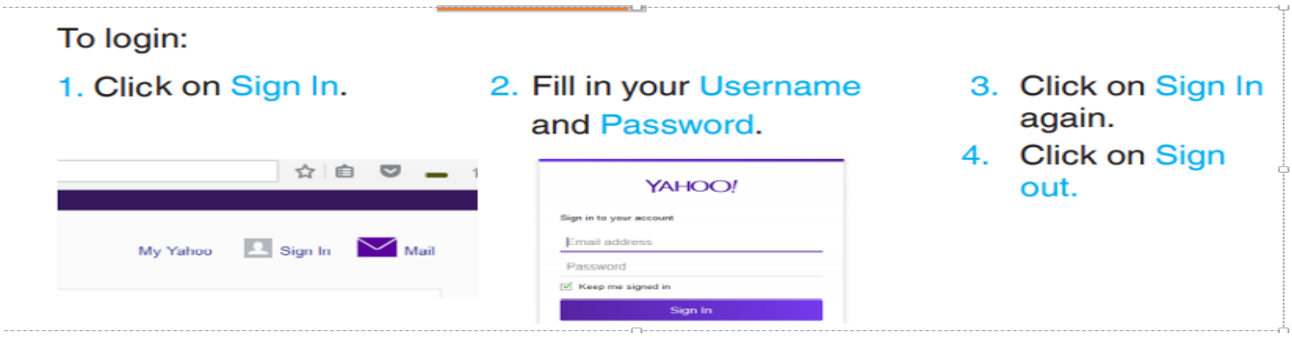
Materials needed

-Laptops, XO laptops, Desktop computer and internet .

Procedure of creating email

E-mail: is a message that is sent electronically using e-mail applications such as Yahoo, Gmail, or Hotmail.

Logging in and logging out your email:



Lesson summary

Back Next TN

- E-mail is a message that is sent electronically using e-mail applications such as Yahoo, Gmail, or Hotmail.
- To create your new e-mail account:

(i) Open a browser (ii) On the address bar, type a web mail address, for example www.yahoo.com (iii) On yahoo home page, click on sign up link. A sign up form will open up for you to start filling in your personal details. (iv) Click “submit” when you finish entering your correct details.

- To login also means to sign in. To logout also means to sign out

Inbox is a folder where your newly delivered e-mail messages appear. The Inbox is normally opened automatically when you login to read your e-mails.

WE CAN USE THE FOLOWING Browse TO MAKE COMPUTER RESEACH http://www.google.com

https://reb.rw/main-menu/resources/primary-school-books/

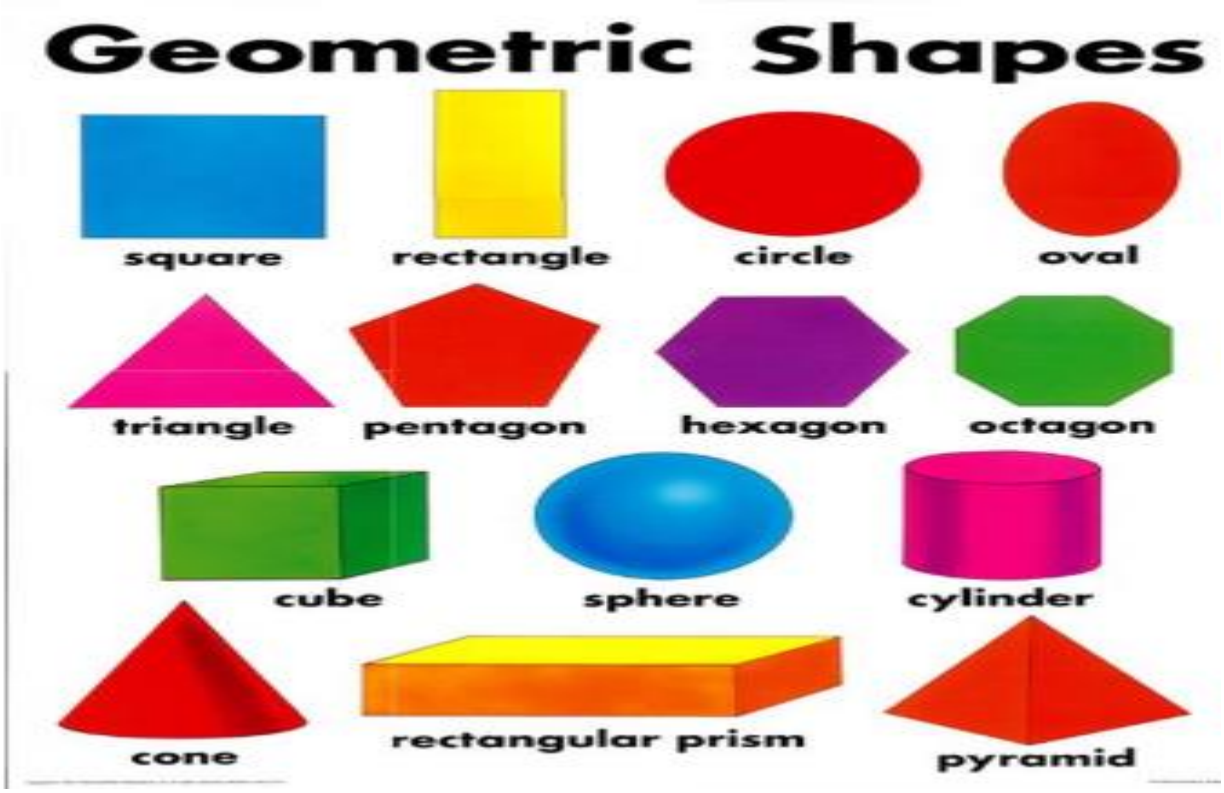
http://wiki.laptop.org

www.yahoo.com

https://geology.com/world/world-map.shtml
https://www.google.rw/maps/@-1.949696,30.1006848,12z

UNIT 7: Programming for children:

1. Introduction : Programming for children is one of digital world where everything involves use of electronic devices . These devices operate using stored Programmes
2. **Drawing geometric shapes: parallelogram**
   - Using Turtle Art instructions we can drow geometric shapes and drawing regular polygons by sequencing blocks correctly.



Definition of terms

A polygon is geometrical figure which has five or more equal sides and angles. Polygons include pentagons (5 equal sides), hexagons (six equal sides) and so on.

You obtain the angle of the polygon you want to draw by dividing 360 by the number of sides you wish to have.

Hexagon has 6 sides so to know the angles, we get $\frac{360}{6} = 60$

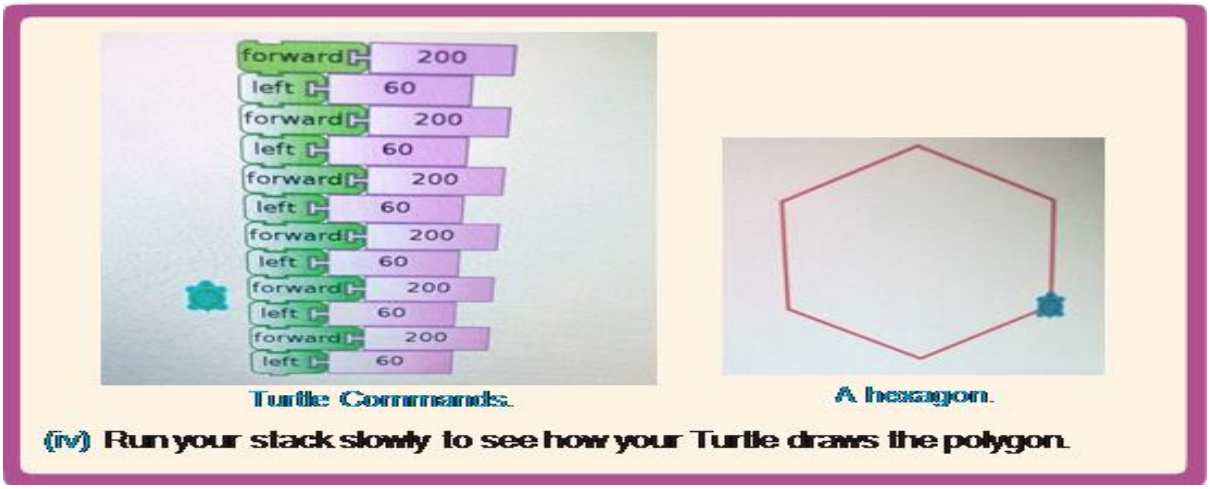
3: Steps for drawing hexagon and pentagon in Turtle Art

Use the Forward Command and Left/Right command. Using the Forward and Right/Left commands to draw a 6 sided polygon you can also use the Repeat command.

i. Select the instruction block written on Forward. Enter the number of pixels that you want your Turtle to move e.g. 200.

ii. Select the Left or Right command. Enter the angle as 60°.

iii. Enter the two steps above 6 times.



Use the Forward Command and Left/Right command. Using the Forward and Right/Left commands to draw a 5 sided polygon you can also use the Repeat command.

i. Select the instruction block written on **Forward**. Enter the number of pixels that you want your Turtle to move e.g. 200.

ii. Select the Left or Right command. Enter the angle as 72°.

iii. Enter the two steps above 5 times.

Lesson summary

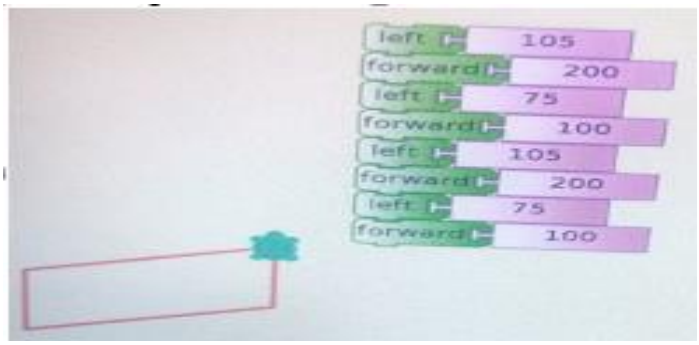
- What have we learnt to draw in this lesson?
  - Drawing: (a) hexagon (b) pentagon.
- Which program have you used?
  - Using turtle blocks.
  - Using Turtle Art instructions.
  - Calculating the size of angles

Description of parallelogram

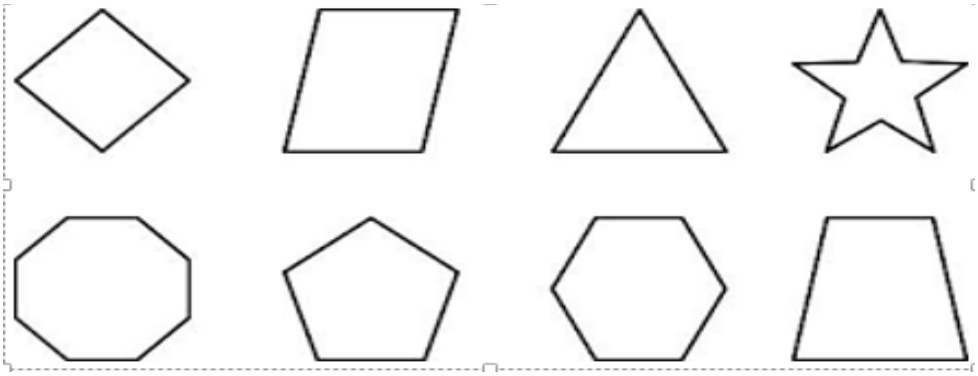
- A parallelogram is a slanted rectangle.
- Two of its opposite sides are parallel to each other.
- Opposite angles are also equal.
- It has two pairs of parallel sides (sides which never meet)
- In all Parallelogram's opposite angles are equal to each other.
- In all Parallelogram's opposite angles are equal to each other.
- Angles which are not opposite in the Parallelogram will add up to 180 degree.
- To obtain the size of the angles of a parallelogram, you $\frac{360}{4}$ = 90

HOW TO Draw a parallelogram in Turtle Art

i. Select the Left or Right command block. Enter the angle as 105°.
ii. Select Forward command block. Enter the number of pixels that you want your Turtle to move e.g. 200.
iii. Select the Left or Right command block. Enter the angle as 75° (180–105).
iv. Select the Forward command block and enter the pixels as 100.
v. Repeat the above instructions one more time.



4.Drawing geometric shapes: Trapezium

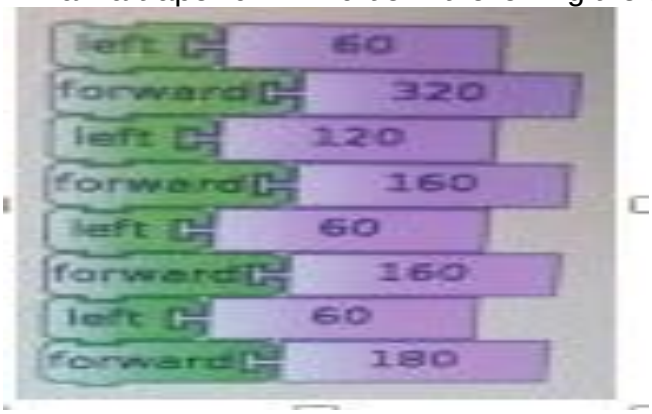


Description of a trapezium

- A trapezium is a quadrilateral, which is defined as a shape with four sides.
- It has one set of parallel sides.
- When drawing a trapezium of any kind in Turtle Art activity it is important to note the following:• Angles on a straight line add up to 180 for example a + c + 48 = 180
  - Vertically opposite angles are equal for example a = d, b = c
  - Corresponding angles are equal for example c = f
  - Co-interior angles add up to 180 for example d + f = 180
  - Alternate angles are equal for example b = f

Steps to draw a trapezium

- Draw a trapezium in Turtle Art following the steps below



i. Select the Left or Right command block. Enter the angle as 65°.

ii. Select Forward command block. Enter the number of pixels that you want your Turtle to move e.g. 320.

iii. Select the Left or Right command block. Enter the angle as 90° (180–90).

iv. Select the Forward command block and enter the pixels as 160.

v. Repeat the above instructions one more time

5: Arithmetic Operations with Turtle Art

Addition using Turtle Art

Addition is the mathematical way of putting things together

In arithmetic, addition is finding the total of two or more numbers. The sign for addition is "+". The name for the sign "+" is "plus". Another name for the total is the sum. Addition in Turtle Art means assembling the right blocks using the number pallet that contains operators.

We use the addition operator and the number block to add two numbers

End of Unit Summary:

WITH TURTLE ART WE CAN

- Drawing geometric shapes in Turtle
- Arithmetic operations in Turtle Art
- Match a sprite with the meaning of the topic.
- Create a dialogue and cartoons matching the sprite.
- Manage correctly components of the scratch window.
- Importance of command blocks
- Background setting (import, camera, paint).
- Changing the background of an image
- Sound setting , record and import.

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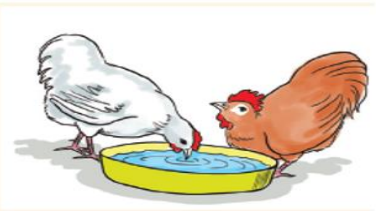
UNIT 8: WATER

Water: is the precious gift of nature.

All living things need water to live, means that all living things cannot live without water.

8.1 Importance (uses) of water







a) As human food: we use water for cooking food and drinking.

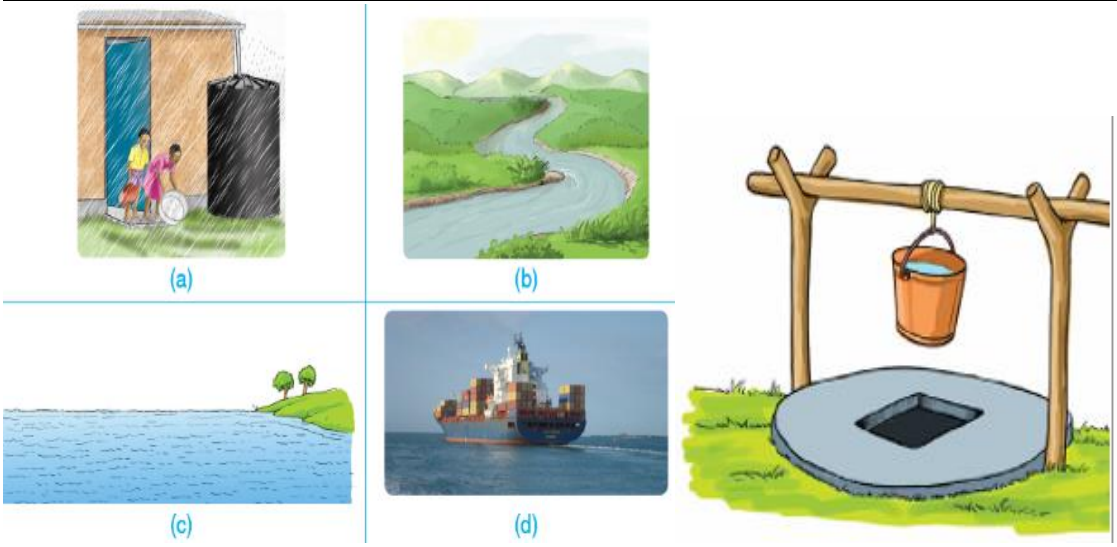
b) In sanitation: we use water in sanitary activities like bathing, washing, cleaning toilets and mapping floors.

c) In farming: water is essential for plant's growth so, we use water plants in our garden and agricultural fields.

d) In industries: we use water in many industries to produce medicines, soft drinks, cement and paper. 

8.2 Sources of water

Sources of water - Natural sources of water - Source of water for kids - man made sources of water.mp4



Sources of water: are the places where we can get water. There are natural and artificial (man-made) sources of water.

a) **Natural sources of water:** we can get water from **rivers, lakes, ponds, oceans, seas and stream.**
b) **Artificial (man-made) sources of water:** we can get water from **dams, wells, canals, borehole and water taps.**

8.3 Properties of water

Properties are also called characteristics. Here we consider for properties of pure water.

i) Pure water is colorless.
ii) Pure water is odorless (has no smell).
iii) Pure water is tasteless.
iv) Pure water is a good solvent.
v) Pure water has melting point of 0 ^{0}C.
vi) Pure water has a boiling point of 100 ^{0}C.

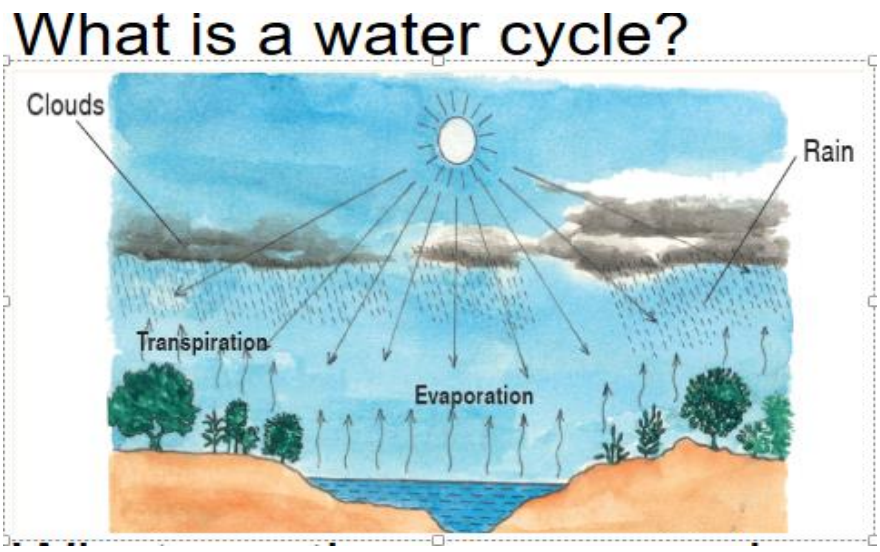
8.4 Rain water

Rain: is the main source of water. We get a plenty of rain in the wet season.

Water cycle

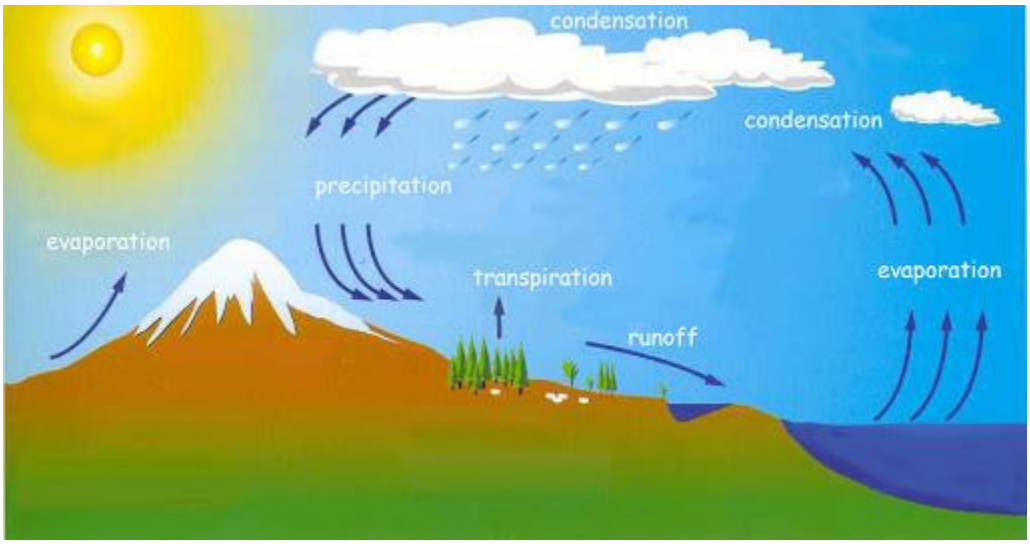
Water cycle: is the continuous process by which water moves from the land to the atmosphere and back to the land again.

Processes involved in water cycle



1. **Evaporation:** is the change of liquid (water) to vapor (gas). By heat of the sun, water gets heated up and changes into water vapor.
2. **Transpiration:** is the loss of water from the plant leaves in form of vapor.
3. **Condensation:** is the change of water vapor to liquid water. Water vapor goes up in the sky. It comes in contact with cool air and changes into small water droplets.
4. **Precipitation:** are all forms of water vapor condensed in the sky. They fall down on earth as rainfall, snow, hail, etc.

Diagram of water cycle



Effects of rain water

Rain water has both positive and negative effects.

Positive effects of rain water

- **i)** Rain fills lakes, rivers and ponds with water.
- **ii)** It helps the plants to grow.
- **iii)** It keeps our atmosphere cool.
- **iv)** It removes dust from our surroundings.
- **v)** It is used at home for drinking, cooking and cleaning.

Negative effects of rain water

- **i)** Too much rain causes flood.
- **ii)** Too much rain causes soil erosion.
- **iii)** Too much rain destroy infrastructure.
- **iv)** Too much rain disrupts people's activities.
- **v)** When there is too much rain, water borne diseases tend to emerge and spread.

N.B: Water borne diseases: are diseases caused by drinking or using dirty (contaminated) water.

Examples: Dysentery, salmonella, typhoid fever, cholera, hepatitis A and diarrhea.

8.5 Ways of protecting the environment from rain water

i) Planting trees: the roots of plants hold the soil firmly. When the soil particles are hold together firmly, they cannot be washed away easily by water.

ii) Making terraces: terraces are built on very steep slopes or hilly sides of the farm. They slow down the flow of water.

iii) Making ditches: people make ditches to reduce the flow of water.

N.B: Ditches: are narrow channels dug in the ground.

iv) Cultivating anti-erosive plants: such plants include grass, sweet potatoes, pumpkins, cow peas and beans.

N.B: Anti-erosive plants: are the plants that grow and cover the surface of soil.

8.6 Water pollutants

Water pollution: is the contamination of water bodies as a result of human activities.

Water pollutants: are dirty (harmful) substances that make water to be polluted (contaminated).

The following are some water pollutants

i) **Human faeces and animal dung:** germs from faeces enter in water bodies by rain water and contaminate it.

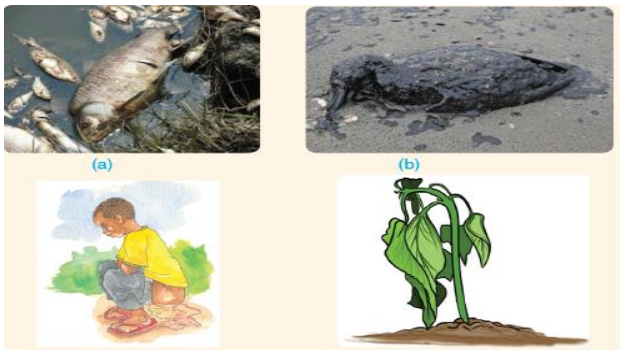
ii) **Domestic wastes:** those are vegetables peels, maize cobs and food leftover into water bodies also cause water pollution.

iii) **Industrial waste:** industries create chemical waste during manufacturing processes. If these wastes are channeled into water bodies such as rivers, lakes and ponds, they contaminate water.

iv) **Agricultural chemicals:** farmers use chemicals like fertilizers, insecticides and pesticides to increase yield of the crops. These get into water bodies when they are washed away by heavy rain.

v) **Dead bodies of animals:** sometimes people throw dead bodies of animals into water. When they rot, the water gets contaminated.

8.7 Dangers of water pollution



i) Spreading of water borne diseases.

ii) Polluted water can harm domestic as well as wild animals. They become sick and can die.

iii) Affect water animals (aquatic animals) like fish, turtles and crocodile.

8.8 Prevention of water pollution

i) Avoid bathing, watering animals and washing clothes in water sources.

ii) Practicing proper hygiene for example use of toilets, latrines and urinals.

iii) Use dustbins instead of dumping waste into water.

iv) Practicing farming methods that reduce soil erosion like contour and terrace farming.

v) Don't dump solid waste in water sources.

vi) Clearing accidental oil spills as soon as they happen.

vii) Fencing around water sources.

8.9 Purification of water

Purification of water: is the removing of suspended wastes and germs from water.

Methods of water purification

i) **Boiling:** is the process of killing germs from water by heating.
ii) **Filtration:** is the removing of solid wastes from water. The clear water is passed through the cloth and the insoluble solid particles like dust and sand remain above cloth.

N.B: Filtered water is not safe for drinking because it has germs.

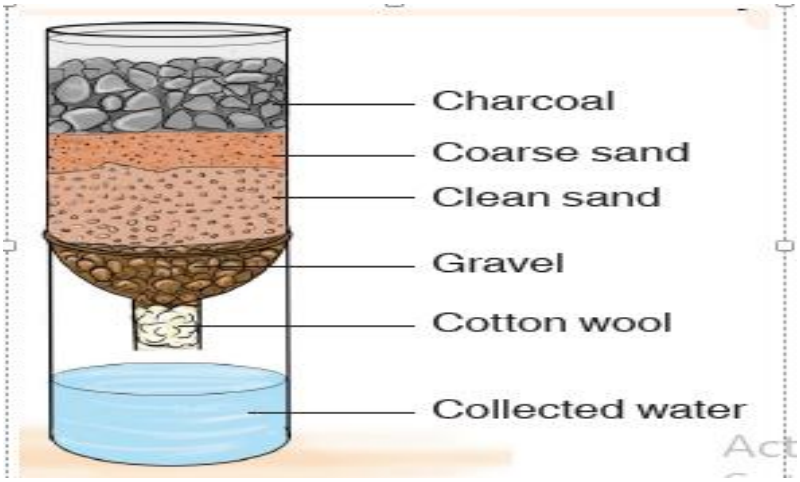
iii) Chlorination: is the process of killing germs from water by using chemical treatments.

The chemicals kill harmful micro-organism in water making water safe for drinking and domestic use.

8.10 Making a water filters

Materials needed to make simple water filter:

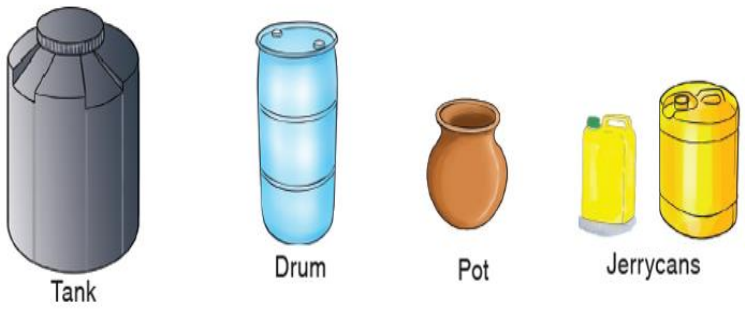
- Charcoal
- Coarse sand
- Clean sand
- Gravel
- Cotton wool
- A container to collect water
- A holed container in which the purifiers are put (You can use a bucket or a water bottle)



i) A large plastic bottle.
ii) A coarse sand.
iii) Beaker.
iv) Clean cotton wool.
v) Small gravel.
vi) Clean sand
vii) Sharp knife or razor blade.
viii) Charcoal
ix) Paper filter.

N.B: Do not drink this water because it contains germs in it.

8.1 Water storage



Water storage: is the storing of water safely for future use.

a) Storing potable water for drinking

i) Store the cleaned and purified water in clean container such as jerry cans, buckets and clay pots.

ii) Always cover the water containers.
iii) Never put hands into the drinking water container.
iv) Use ladle or gourd with long handle to scoop out water from a container. Do not drink directly with it. Use a cup or a glass.
v) Storage container should be washed or rinsed regularly.

b) Storing general purpose water

i) Store water in large containers e.g. barrels large plastic tanks and underground tanks.
ii) Always cover the containers.
iii) Clean the water tank regularly using bleaching powder.

UNIT 9: SOIL

Soil: is the most layer of the earth's surface.

9.1 Preparation of soil for cultivation

Soil preparation: is the process of making the soil suitable for cultivation.

These are the various steps of soil preparation:

i) **Land clearing:** in this stage, people clear the bushes, tree stumps and shrubs from the land. It makes digging and ploughing easier. We use machetes and slasher.
ii) **Primary cultivation (ploughing):** after clearing the land, farmers plough the land with animals and plough. The ploughing is done before the wet season starts. It loosens the soil, but leaves some soil clods.

CLODS: are the big lamps of soil.

iii) **Secondary cultivation (harrowing):** to turn and break the soil clods, the farmers re-plough the land. It is done a tractor with harrow and harrow driven by animals. It makes the soil fine and soft for easy planting. It also helps to allow easy application of manure and fertilizers.
iv) **Levelling (seedbed preparation):** in this stage, the farmers level soil to prepare the seedbeds. It done with the help of a rake. Levelling remove the big soil and stones. It also helps in controlling weeds.

9.2 Fertilization of soil for cultivation

Fertilization of soil: is the process of adding fertilizers to the soil.

It provides nutrients to the soil. It helps the plant grow well.

Types of fertilizers

i) **Natural (Organic) fertilizers:** they are also called **manure.** They are formed from dead plants and animal wastes. The main organic fertilizers are: animal wastes, plant wastes and sewage sludge.
EXAMPLES:
   a) **Green manure:** is formed from green plants.
   b) **Farmyard manure:** is formed from animal beddings, their dungs and urine.
   c) **Compost manure:** is formed from rotting garbage and degradable waste.

ii) **Chemical, inorganic (artificial) fertilizers:** these are artificial material added to the soil for plant growth.
Groups of chemical fertilizers
   a) **Straight fertilizers:** are fertilizers that contain only one major type of nutrients. **EX: SSP** (Single Super Phosphate) and Urea.
   b) **Compound (complex) fertilizers:** are fertilizers that contain two or more major types of nutrients.
   Ex: NPK: Nitrogen Phosphorous and Potassium.

      CAN: Calcium Ammonium Nitrate.

      DAP: Diammonium Phosphate.

9.3 Importance of fertilizers

i) It improves the growth of plants.

ii) It provides nutrition to the crops.

iii) It develops the fighting capacity of crops against pests like weeds, insects and diseases.

iv) It improves soil fertility.

v) It increases agricultural productivity.

9.4 Rules of applying fertilizers

We must follow some rules while applying fertilizers on crops. These includes:

i) Use organic fertilizers before using artificial (chemical) fertilizers.
ii) Always choose the appropriate fertilizers for each crop.
iii) Respect the dose.
iv) Apply fertilizers when the soil is moist.
v) Wear gloves while handling fertilizers.
vi) Watch weather before applying fertilizers.
vii) Never apply fertilizers if the soil is already fertile.

UNIT 10: ANIMALS

Poultry: is the activity of keeping chickens.

Chickens are the most common domestic birds in Rwanda. Chickens provide eggs, meat and fertilizer.

N.B: i) A male chicken is called **cock.**

ii) A female chicken is called **hen.**

iii) A house of chicken is called **coop.**

10.1 Conditions of a good chicken house

i) It should have enough space.

ii) It should be protected from bad weather, thieves and wild animals.

iii) It should be well-ventilated.

iv) It should be clean and dry.

v) The house should be sterilized with proper disinfectants.

vi) It should have suitable drainage system.

vii) It should have clean water supply.

viii) It should have good temperature management system.

10.2 Types of breeds

Breeds: is the stock of animals having distinctive appearance.

a) **Based on the origin:**

i) **Local breeds:** those have their origin in Africa. These are kept for both meat and eggs (dual purpose chickens).

ii) **Exotic breeds:** are breeds that are imported into Rwanda from other countries.

b) **Based on commercial purposes:**

i) **Egg-laying breeds (layers):** they are kept mainly for eggs. **EX:** White Leghorn, New Hampshire and Rhode Island Red.

ii) **Meat-type chicken (Broilers):** they are kept mainly for meat. **EX:** Cornish Cross, Light Sussex, Cornish Rock, Jersey Giant.

iii) **Dual purpose type of chicken:** they are kept for both meat and eggs. **EX:** Black Austral up, Ancona, Minorca.

10.3 chicken reproduction

Chicken reproduction: is the process laying eggs followed incubation.

Steps of chicken reproduction:

a) **Laying eggs:** a chicken (hen) lays eggs. It can lay an average of 300 eggs per year.
b) **Incubation of eggs (Brooding):** is the keeping eggs under conditions that allow them to hatch into chicks.

Types of incubation (brooding)

i) **Artificial incubation (brooding):** the eggs are put in a special machine called **incubator** for them to hatch.
ii) **Natural incubation (brooding):** the broody hen sits on eggs for 21 days for them to hatch.

Conditions for natural incubation to be successful

a) Clean water and feeds.
b) Clean dry nest made of soft materials.
c) A place with dim light.
d) A place which is free from disturbance.

N.B: Broody hen: is a hen that shows a natural tendency to sit on eggs for them to hatch.

Incubator: is a special machine that helps eggs to hatch.

Cannibalism: is the chicken that eats its eggs.

10.4 Proper feeding of chickens

Chicken feeds include: grains like maize and millet, crushed cereals, small insects and soft vegetation.

Apart from feeds that can be obtained locally, chicken can be feed on commercial feeds.

Concentrates: are the commercial chicken feeds.

Types of commercial chicken feeds according to the breeds

1. Layers

Age of chicken	Types of food	Content
0-6 weeks	Chick mash	Protein from whole maize and soya.
6-20 weeks	Grower mash	Protein from whole maize and wheat grain.
After 20 weeks until culling	Layer mash	Calcium from wheat, sorghum and oats.

2. Broilers

Age of chicken	Types of food	Content
Bellow 2 weeks	Starter mash	Protein from whole maize and corn.
6 weeks until the disposal	Broilers mash	Protein from whole maize and corn.

N.B: i) Feed chicken at proper time.

ii) Keep the feeders and watering troughs clean.

10.5 Chicken diseases

Chickens are susceptible to diseases.

Causes of chicken diseases

i) Poorly feed.
ii) Overcrowded.
iii) Kept in a dirty house.

iv) Feed in unclean feeders.

The following are common chicken diseases, their symptoms and preventive measures:

a. Parasitic diseases

Diseases	**Cause**	**Signs and symptoms**	**Prevention**	**Treatment**
Coccidiosis	Coccidia	Bloody diarrhea, weight loss, dropping wings, rough feathers.	Keep the bedding clean and dry, keep any sick chicken warm.	Vaccinate the chickens, feed chickens with feeds containing coccidiostats.

Ascarids	Askaris (round worms)	Diarrhea, weight loss, slow growth and big bellies.	Do not mix young and older chickens, give clean feeds to the chickens.	Vaccinate the chickens, treating them using dewormers.

b. Infectious diseases

Diseases	**Cause**	**Signs and symptoms**	**Prevention**	**Treatment**
Salmonella	Bacteria	Look weak, diarrhea, they have purple combs and wattles	Isolate the infected chickens, cleaning feeds and feeders.	Vaccinate the chickens.
Infectious bronchitis	Bacteria	Coughing, sneezing, stop laying, nasal discharge.	Isolate the infected chickens.	Vaccinate the chickens.

Vaccination programs for chickens

Age of chicken	Types of vaccine
1 day- 16 weeks	Salmonellosis vaccine
1 day- 9 days	Coccidiosis vaccine
16- 20 weeks	1. Infectious bronchitis vaccine 2. New castle disease vaccine

10.6 Prevention of chicken diseases

i) Keeps chicken clean.

ii) Cleaning chicken house.

iii) Feed the chickens properly.

iv) Add preventive drugs to chicken feeds or their drinking water.

v) Quarantine (isolate) sick chickens.

N.B: Quarantine: is the process of isolating infected chickens away from normal chickens.

10.7 Importance of chicken farming

i) It is a source of employment (job).

ii) It is a source of income (money).

iii) It gives us meat and eggs.

iv) It is a source of manure.

v) Chicken feathers can be used in decoration.

vii) Chicken feathers can be used in costumes in traditional music and dance.

10.8 Chicken farming process

i) Select land which is away from the population.

ii) Build cages and coops.

iii) Add feeders and water containers to the coops.

iv Select chicks

v) Feed chicks with nutritious foods.

vi) Vaccinate chickens to keep diseases free

vii) Sell chickens and their products in the market.

Methods (system) of rearing chickens

a) **Free-range system:** in this system, chickens are left to move freely in an area and feed by themselves.
b) **Deep litter system:** in this system, chickens are put in a permanent structure. The chickens are provided with clean feeds and water in their housing.
c) **Fold system:** in this system, chickens are enclosed in a movable structure. The structure is moved to a new place every day to prevent spread of diseases and pests.
d) **Battery system:** in this system, each chicken is kept in a cage with sloping floor for collecting eggs. This is an expensive method of rearing chicken.

10.9 Factors to be considered before starting the chicken farm

i) Capital: money for buying breeds and their feeds.

ii) Raw materials: materials for building coops

iii) Feed and feeding: getting feeds and organizing how you will feed your chickens.

iv) Types of breeds: selecting layers or broilers

v) Equipment and facilities: having feeders, drinkers, egg trays, heat source, waste disposal, incubators, culling cage, clean water, feeds….

vi) Land: selecting the land which is away from population and where there is easy disposal of waste.

vii) Market: knowing where there is market for selling chickens and their products.

UNIT 11: PLANTS AND ENVIRONMET

Plant: is a living thing that grows in the ground, usually has leaves or flowers and needs sun and water to survive.

Environment: is everything that around us.

11.1 Importance of plants

a) Human food (food crops)

b) Animal feeding

c) Medicines

d) Cash crops

e) Protection of environment

a) **Human food (food crops):** they provide carbohydrates, fats, proteins, vitamins, and minerals to the humans.

Types of food crops

i) **Cereals:** these are crops grown their grains. Ex: rice, wheat, maize, oats, barley, millet, sorghum.

ii) **Legumes:** these crops mainly produce their seeds in pods. Ex: peas, green grams, beans, groundnuts, black beans.

iii) **Fruits:** these include: pawpaw, oranges, mangoes, bananas, pineapple, passion fruits, pears, apples, avocado. **Fruits have two scars while seeds have one scar.**

iv) **Vegetables:** these include: spinach, kales, cabbages, broccoli, lettuce, cauliflower, eggplant, onions, tomatoes.

v) **Tubers:** these are plants that store food in their roots (root tubers) or stem (stem tubers).

1. **Root tubers:** carrots, cassava, radish, turnips, beetroot, arrow roots, sweet potatoes.
2. **Stem tubers:** yam, and Irish/English potatoes.

b) Animals' feeding: human and cattle like cows, buffaloes, horses feed on plant. They plant eaters. **N.B: Plant eaters:** are living things that eat plant.

c) Medicinal plants: we use them as medicine in our day-to-day life.

Plants	**Uses**
Eucalyptus (Inturusu)	Its oil helps relieve pain of rheumatism and stiffness.
Iboza riparia	Its leaves are used to heal sore chest, stomachache and malaria.
Cinchona (Kenkina)	It contains quinine which is used to treat malaria.
Aloe Vera (Igikakarubamba)	It is used for digestive problems and loss of appetite.
Ocimum suave (Umwenya)	Its leaves are used to treat cough and diabetes.

d) Cash crops: these are crops grown mainly for sale. The farmer sells the crops to industries for processing.

Groups of cash crops

i) **Beverage crops:** they are processed in industries for beverages. Ex: tea, coffee, cocoa and barley.

ii) **Fibre crops:** they are grown to produce thread or fibre. Ex: cotton, sisal and flax.

iii) **Oil crops:** they are grown mainly for oil production. Ex: sunflower, groundnuts, coconut, cashew nuts and cotton.

Cash crops and their products

1. Coffee: coffee drink
2. Sugar cane: sugar
3. Cotton: clothes
4. Tobacco: cigarettes
5. Pyrethrum: insecticide
6. Tea: tea drink

e) **Protection of environment:** making air clean, protecting against soil erosion, help in rain formation by transpiration.

11.2 Common importance of trees on the environment

i) Improve weather condition: trees produce moisture during transpiration. This moisture forms rain clouds. Trees also act as windbreaker by slowing down the speed of the wind.

ii) Protect soil erosion: the roots of plants hold the soil together and prevent soil erosion.

iii) Shelter of wild animals and birds: both birds and animals make their shelter in the trees.

iv) Recycle air through photosynthesis: plants need water and carbon dioxide to make food through photosynthesis.

Photosynthesis: is the process by which green plants make their own food. It takes place in the leaves.

Raw materials (natural resources) of photosynthesis: water and carbon dioxide.

Products of photosynthesis: sugar and oxygen.

Conditions of photosynthesis

i) **Sun light:** speed up reaction.
ii) **Chlorophyll:** attracting sun light.

Carbon dioxide + Water → **sugar + Oxygen**

N.B: Plants take in **carbon dioxide** and give out **oxygen.**

11.3 Other importance of trees

i) Ornamental trees: trees that are grown for decoration. Ex: Rose, Lavender, Cherry trees.

ii) Fruit trees: mango, orange and banana.

iii) Agro-forestry: is the planting trees with other crops.

iv) Fuel and timber tress: they are used as fire wood or for making timber.

N.B: Casuarina is the best fuel tree in Rwanda.

11.4 Effects of afforestation and deforestation on the environment

Afforestation: is the activity of planting trees where there is not exist.

Deforestation: is the cutting down trees.

Importance of afforestation

- **i)** It increases the amount of rain fall.
- **ii)** It keeps environment cool.
- **iii)** It controls soil erosion.
- **iv)** It maintains a balance between oxygen and carbon dioxide.
- **v)** It prevents floods.

Causes of deforestation

- **i)** To make more land available for farming.
- **ii)** To make more land available for housing and urbanization.
- **iii)** To clear land for mining.
- **iv)** To get wood and charcoal.

Effects of deforestation

- **i)** It increases the amount of rainfall which can lead to drought.
- **ii)** It causes flood.
- **iii)** It causes soil erosion.
- **iv)** Displacement of wild animals which lead to loss of tourist.
- **v)** Lack of charcoal and firewood.

Prevention of deforestation (conservation of trees)

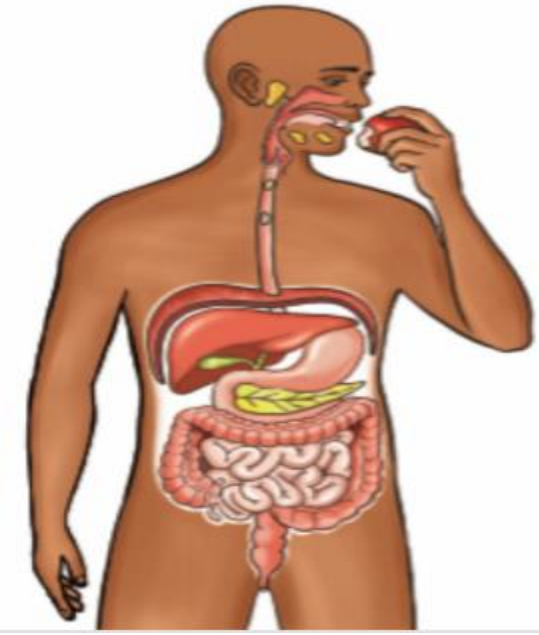
i) **Re-afforestation:** planting trees where there were existed.
ii) **Afforestation:** planting trees where there were not existed.
iii) **Making laws of protecting forest:** one cannot cut trees without getting permission from the government.

Different ways of maintaining trees

i) Planting trees by digging hole in the soil.
ii) Fencing the trees to protect it from stray animals.
iii) Watering the trees regularly.
iv) Remove weeds and grasses around the trees.
v) Add organic manure to the trees.
vi) Trim the trees regularly.

UNIT 12: DIGESTIVE SYSTEM

Digestive system: is the system which concern for how a food is broken down into nutrients that the body can absorb.



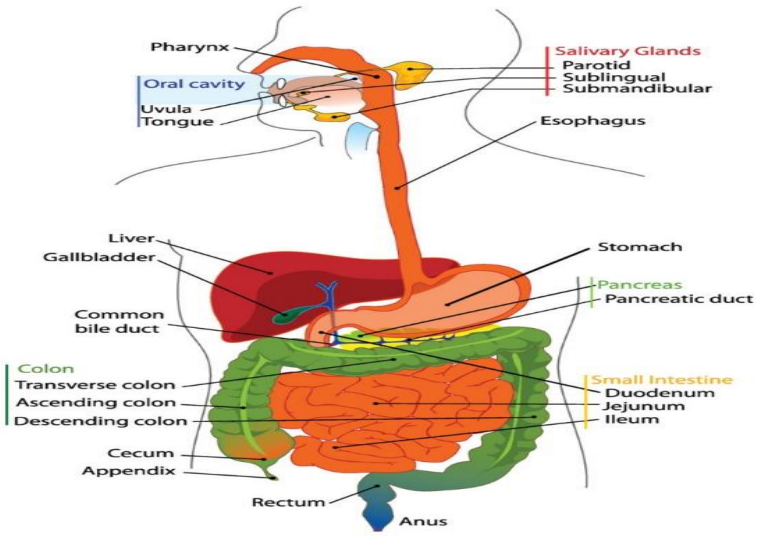
Digestive system is made up of:

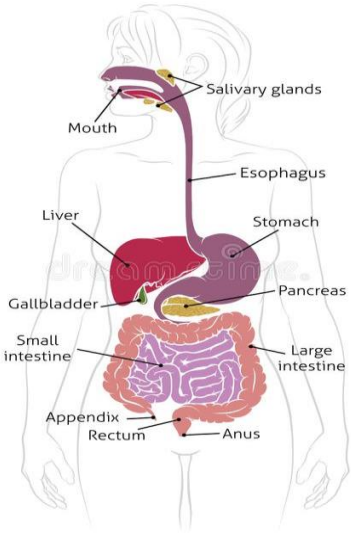
i) **Alimentary canal:** are all the parts food pass through. Ex: mouth, oesophagus, stomach, small intestine (ileum and duodenum), large intestine (colon, caecum and rectum) and anus.

N.B: Peristalsis: is the process by which food move down through alimentary canal.

ii) **Digestive gland:** are the gland which make secretions that help in digestion of food. Ex: Salivary glands, gastric glands, liver, gall bladder and pancreas

10.1 Parts of digestive system and their functions





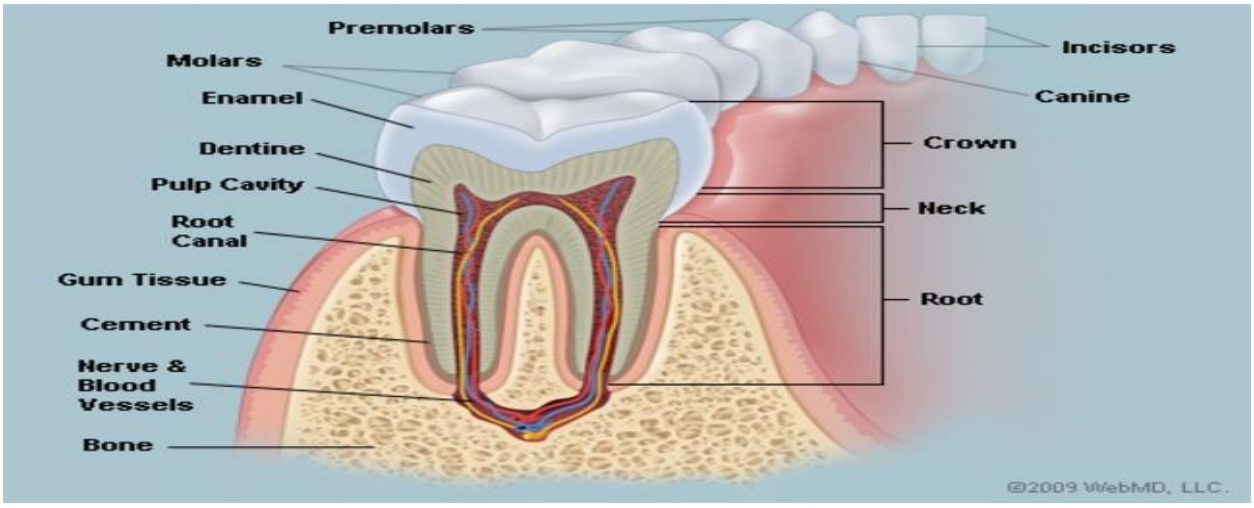
1.Mouth: chewing the food. It is done by helps teeth and saliva.

Types of human teeth and their functions

Types of teeth	Incisors	Canines	Premolars	Molars	Total

Numbers	8	4	8	12	32

Parts of tooth



2. Salivary gland: secrete saliva which moistens the food.

3. Food pipe (oesophagus): carries food from the mouth to the stomach.

4. Liver: it produces bile which helps in digestion of fats.

5. Gall bladder: it sores bile.

6. Bile duct: it carries bile from gall bladder to duodenum.

7. Stomach: produce hydrochloric acid which kill germs in the food.

9. Gastric gland: produce gastric juice.

8. Pancreas: produce pancreatic juice.

N.B: Pancreas also produces **insulin** and **glucagon** which control sugar regulation.

9. Small intestine: produces digestive enzymes and also absorbs digested food.

N.B: Small intestine consists:

i) **Duodenum:** produce hormones and receives secretions from the liver (bile) and pancreas (pancreatic juice).

ii) Jejunum: absorb sugars, amino acids and fatty acid.

iii) Ileum: digest food coming from the stomach and other parts of small intestine.

10. Large intestine: reabsorbs water.

N.B: large intestine consists:

i) Colon: reabsorb fluid and process waste products from the body and prepare for its elimination.

ii) Caecum: absorb fluids and salts that remain after completion intestinal digestion and absorption.

11. Appendix: act as a storehouse for good bacteria.

12. Rectum: stores undigested food until eliminated.

13. Anus: eliminates undigested food.

12.2 Functions of digestive system

i) Digestion: is the process by which is broken down into smaller particles.

ii) Absorption: is the process of uptaking the nutrients from the food.

12.3 Stages of digestion

1) Ingestion

2) Digestion

3) Absorption (assimilation)

4) Elimination (egestion)

1) Ingestion: is the entering of food in the mouth. We should ingest clean food and digestible food.

2) Digestion: is the process by which is broken down into smaller particles.

a) Digestion in the mouth: the ingested food is chewed using teeth and mixed with **saliva** from salivary glands.

Saliva: is the digestive juice that moistens the food.

The tongue rolls the food into small rounded balls called **boluses.** Saliva also contains digestive enzymes called **amylase** that break down starch into simpler form.

Enzymes: are chemical substances that speed up digestion.

b) Digestion in the stomach: the food enters in the stomach from the oesophagus. The lining of the stomach produces **hydrochloric acid.**

Hydrochloric acid: kills germs that may be present in the food. The stomach serves as a temporary store food. From time to time, food is released into the small intestine.

c) Digestion in small intestine: small intestine is divided into two parts: upper part **(duodenum)** and the lower **(ileum).**

Most digestion in small intestine takes place in **the duodenum.** In the duodenum, bile and pancreatic juices mix with food. Pancreatic juices help in further digestion of food.

The ileum is involved in the absorption of digested food. After digestion in the ileum, fats, proteins and carbohydrates are ready for absorption.

N.B: Digestion starts in the mouth and ends in the small intestine.

3) Absorption: is the uptaking the nutrients from the food to the blood. It is also known as **assimilation.** The digested food is absorbed into the blood stream through the walls of the ileum.

N.B: Absorption takes place in the small intestine.

4) Elimination: is the entering of unabsorbed food and water into the large intestine. The large intestines consist of **the colon** and **the rectum.**

In the colon: most of water is reabsorbed into the blood stream. The remaining food waste passed down to the rectum.

Egestion: is the removal of undigested food outside the body.

12.4 Hygiene of digestion

i) Chew the food properly.

ii) Do not drink water while taking meals.

iii) Eating balanced diet.

iv) Do not overeat.

v) Drink a lot of water daily.

vi) Wash hand before and after eating.

vii) Exercise regularly.

12.5 Groups of food (balanced diet)

A balanced diet: is a meal that contains all the nutrients needed by the body.

A meal: is food eaten during any occasion in the day.

Different foods have different functions. Based on their functions foods are grouped into:

i) **Body building foods:** those foods help to grow and build strong muscles. These foods provide us **protein**. **Ex:** meat, fish, eggs, pulses, beans,…….

ii) **Energy giving foods:** those foods give us energy to jump, run and play. Those foods provide us **carbohydrate** and **fats. Ex:** cassava, yam, potato, cooking oil,……

iii) **Protective foods:** those foods make our body strong to fight against diseases. These foods provide us **vitamins** and **minerals. Ex:** banana, spinach, cabbage, carrots,…….

12.6 Components (elements) of balanced diet

Food groups should contain the following:

a) **Carbohydrate:** provide the body with energy to work. These foods also keep the body strong and warm. **Ex:** sweet potato, maize, rice, yam, wheat,……
b) **Proteins:** they necessary for the growth and repair of body tissues. **Ex:** beans, milk, fish, eggs, meat,……

c) **Vitamins:** these foods protect the body against diseases. **Fresh fruits** and **vegetables** are the main sources of vitamins. **Ex:** oranges, water melon, pineapple, avocado, strawberries,……

Types of vitamins

Water soluble vitamins: vitamin C and B complex.

Fat soluble vitamins: vitamin A, D, E and K.

d) **Minerals:** they present in many foods. They are required by the body in the small quantities. **Ex:** calcium, phosphorus, iron, iodine, potassium, sodium and zinc.

The following table shows some minerals, their uses in the body and their sources:

Minerals	**Uses in the body**	**Sources**
Calcium	**.** Building strong bones and teeth. **.** Helps in clotting of blood.	Milk and milk products, whole grain cereals and small fish eaten whole.
Phosphorus	Formation of strong bones and teeth.	Milk, beans and eggs.
Iron	Helps in formation of blood.	Liver, kidney, meat, eggs spinach and other green vegetables.
Iodine	Prevention of goiter.	Common salts and onions.

e) **Lipids (fats and oils):** provide the body with energy. They also make the skin shiny and healthy. **Fats** exist in solid form while **oils** are in liquid form. **Ex:** avocado, sunflower, sesame, corn, coconut, ground nuts, milk product (butter, ghee and cheese).

f) **Water:** the body needs water in order to stay healthy.

Functions of water in the body

i) Regulating our body temperature.

ii) Digestion of food.

iii) Carrying nutrients and oxygen to various parts of our body.

iv) Absorption of nutrients by our body.

v) Removal of toxins and wastes from our body.

12.7 Nutritional deficiency diseases and their prevention

Nutritional deficiency diseases: are diseases caused by lack of enough nutrients in the diet.

If we do not get a balanced diet to eat, we shall become weak. We shall suffer from nutritional deficiency diseases.

The following are some common nutritional deficiency diseases:

Diseases	**Cause**	**Signs and symptoms**	**Prevention**
Kwashiorkor	Lack of **protein** in the diet.	Thin body, swollen face and belly, slow body growth, hair turns reddish brown, loss of muscle mass.	Eating food with proteins. Ex: meat, fish, eggs, milk, soya bean, legumes.
Marasmus	Lack of **protein** and **carbohydrate** in the diet.	Thin body with prominent ribs, face looks like that of an old man or woman, rapid loss of weight.	Eating balanced diet with protein and carbohydrate. Ex: meat, fish, eggs, milk, soya bean, legumes.
Goiter	Lack of **iodine** in the diet.	Swelling of thyroid gland, difficulty in swallowing and breathing, change in voice such as hoarseness.	Eating sea foods and iodinated salts.
Rickets	Lack of **vitamin D, calcium** and **phosphorous.**	Pain in bone, bending of legs and backbones, swelling at the wrist, knees and ankles, dental deformities.	Daily have an early morning sun light exposure, eat foods that include an adequate amount of calcium and

			vitamin D. Ex: milk, eggs, fish,…
Anaemia	Lack of **iron** in diet.	Feeling weak and tired, headache, paleness, shortness of breathing.	Eating protein supplements and balanced diet. Ex: green leafy vegetables, meat, fish, milk and eggs.

12.8 Prevention of nutritional deficiency diseases

i) Take different types of fruits and vegetables.

ii) Get calcium rich foods.

iii) Take protein rich foods.

iv) Find a balance between food and physical activity.

v) Avoid tobacco use.

vi) Maintain a healthy weight.

12.8 Preparation of balanced diet

We can make a balanced diet by using food from each group of food.

Example: fish, bread, cabbage and mango.

N.B: A balanced diet protects us from nutritional deficiency diseases.

UNIT 13: REPRODUCTIVE SYSTEM

13.1 Human reproductive system

Reproductive system: is a system that concern for how a living things produce new living things.

Reproduction: is the process by which a living things produce new living things.

a) Functions of reproductive system

i) To produce ovum and sperm cells.

ii) To transport and sustain these cells.

iii) To nurture the developing offspring.

iv) To produce hormones.

Fertilization: is the union of sperm and ovum.

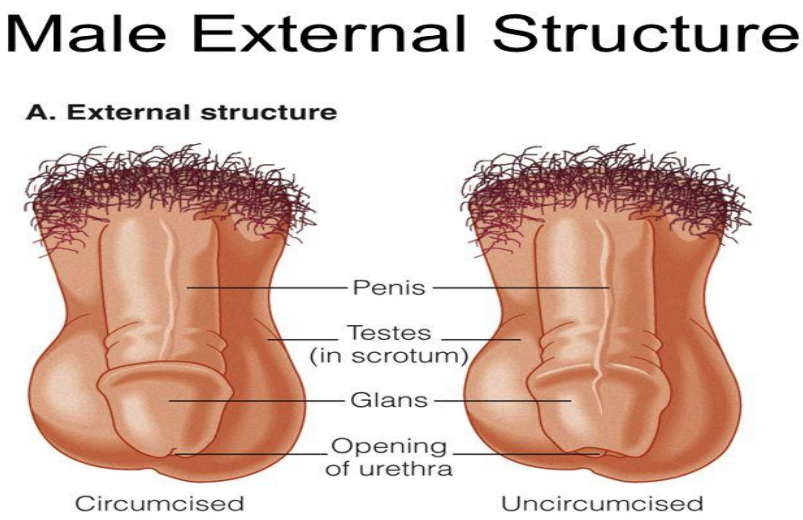
Sperms: male cells.

Ovum: female cell.

N.B: After fertilization, the fertilized egg forms a zygote which grows into an embryo. The embryo then gradually develops into a complete baby in the mother's womb.

Zygote → embryo → fetus → infant

b) Male reproductive external organs



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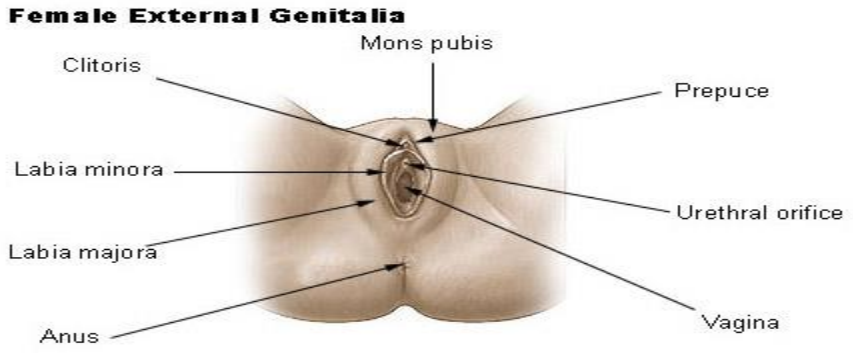
a) **Penis:** is external male sex organ. **Role: i)** Elimination of urine.

ii) Sexual intercourse.

a) **Scrotum:** It is the muscular sac that contains testicles (testes). **Role:** Protect testicles or testes.
b) **Testes:** Those are two oval shaped glands. **Role:** Produce sperm.
c) **Urethral opening:** conducting urine from bladder to the outside of the body.
d) **Female reproductive external organ**



The main external organ is the vulva. **Vulva:** it is the female reproductive external organ including the labia (majora and minora), clitoris, anus, urethral opening and vaginal opening.

13.2 Hygiene of the female genital organ

i) Wash or clean the external parts of reproductive organ every day with clean and water.

ii) After the bath, dry the genital area with a clean towel.

iii) Remove genital hair whenever it grows.

iv) During the menstruation change the pad or napkin regularly after 3-4 hours.

v) Don't sit on unclean public toilets.

vi) Avoid touching your genitals with dirty hands.

13.3 Hygiene of the male reproductive system

i) Wash or clean the externa parts of reproductive organ every day with clean and water.

ii) After the bath, dry the genital area with a clean towel.

iii) Remove genital hair whenever it grows.

iv) Shaking the penis gently after urination to expel the remaining drops of urine.

v) Clean under the foreskin gently for those who are uncircumcised.

13.4 Secondary characteristics at puberty

Puberty: is a period where a boy or a girl reaches sexual maturity. When girls and boys into puberty, they are capable or reproducing sexually. This stage occurs earlier in girls than in boys.

Adolescence: is a period when a girl or a boy is between being a child or an adult.

Boys: 9-14 years

Girls: 8-13 years

Stages of growth in human

Infancy: 0-2 years

Childhood: 3-6 years

Middle childhood: 7-11 years

Adolescence: 12-18 years

Adulthood: 19-40 years

Similarity of puberty characteristics in both girls and boys

- **i)** Increase of height and weight.
- **ii)** Hair grows under armpits.
- **iii)** There is an increase in body smell.
- **iv)** Change of voices.
- **v)** Growing of pubic hair.
- **vi)** Pimples may appear on the face.

Difference between puberty characteristics in boys and girls

Boys	**Girls**
Ejaculation start (wet dream)	Menstruation start
Enlargement of shoulders	Enlargement of hips..

Development of chest.	Development of breast
Voice become deep	Voice become soft

N.B: **i) Ejaculation**: is the releasing of semen (sperm and fluid) from the penis.

ii) Menstruation: is the releasing of blood from the vagina during monthly period. Regularly, it occurs in 28 days after ovulation.

iii) Ovulation: is the releasing of ovum from the ovary.

Emotional changes in girls during puberty

- **i)** Shyness due to enlargement of body parts.
- **ii)** Some may lose confidence and become self-critical.
- **iii)** Girls may be embarrassed by their menstrual flow.
- **iv)** Some girls become conscious about their weight and physical appearance.
- **v)** Attraction to the opposite sex. Girls get attracted to boys.

Emotional changes in boys during puberty

- **i)** Shyness due to deepening of voices.
- **ii)** Boys may be embarrassed by their rapid development. Some become clumsy.
- **iii)** Showing behavior related to the identity. They begin to identify with adult role models and heroes.
- **iv)** They easily angered due to sudden mood swings.
- **v)** Winning becomes important. They derive satisfaction in playing competitive games.

13.5 Safe responsible behavior

Safe responsible behavior: is the knowledge and skills that you need to develop so as to make right decisions concerning your life.

Safe responsible behavior in boys and girls include:

- **i)** **Abstinence:** not making sex (behaving sex) before marriage.

ii) **Making informed choices:** learn to say no to situations that may leave you with lifetime consequences.
iii) **Choose good friend:** choose friends who encourage you to do what is right.
iv) **Develop positive values and behavior:** by reading motivational books, participating in communal work, sports and other recreational activities that help you to learn.
v) **Avoid risky behavior:** such as drug abuse, fighting, and participating in crimes such as robbery or theft.

Effects (consequences) of risky behavior

i) Death by mob justice.
ii) Being jailed (imprisonment).
iii) Rejection by family members or the community.
iv) Drug addiction, which can lead to death.

13.6 Love and infatuation

Love: is a faithful commitment to another person. It is driven by mutual feeling for each other. Love can last over a long time.

Infatuation: is intense feelings for another person. It is driven by sexual desire and physical attraction. It doesn't last over a long period of time.

UNIT 14: LIGHT

Light: is a form of energy.

Energy: is ability to do a work.

Forms of energy

i) Light energy
ii) Electrical energy
iii) Chemical energy
iv) Mechanical energy
v) Elastic energy
vi) Wind energy

vii) Solar energy
viii) Hydro-power energy

14.1 Importance of light

i) It allows us to see all objects.

ii) It allows plant to make photosynthesis (sunlight).

iii) Sunlight give us vitamin D.

Sources of light

i) **Natural source of light:** sun and stars
ii) **Artificial sources of light:** electric light, torch, candle, lamps……

N.B: The moon is not source of light because it uses the light from the sun.

14.2 Light propagation

Propagation: means to move, spread or travel.

a) Light travels in a straight line.
b) Light travels in all directions.
c) Light travels in form of a ray or rays.

Ray: is an element of beam.

Beam: is a set or group of rays.

14.3Types of medium for light transmission

i) **Transparent medium:** is material that allows light to pass through them. **Ex:** glass windows, colorless drinking glasses, air, clear water and windscreens.
ii) **Translucent medium:** is material that allows some light (little light) to pass through them. **Ex:** frosted glass, waxed paper and thin piece of cloth or paper.
iii) **Opaque medium:** is material that does not allow light to pass through them. **Ex:** stones, wood, metal sheets, books, timber and the human body.

14.3 Laws of light propagation

i) Reflection

ii) Refraction

Reflection of light

Reflection: is the bouncing back of light when it falls on a surface.

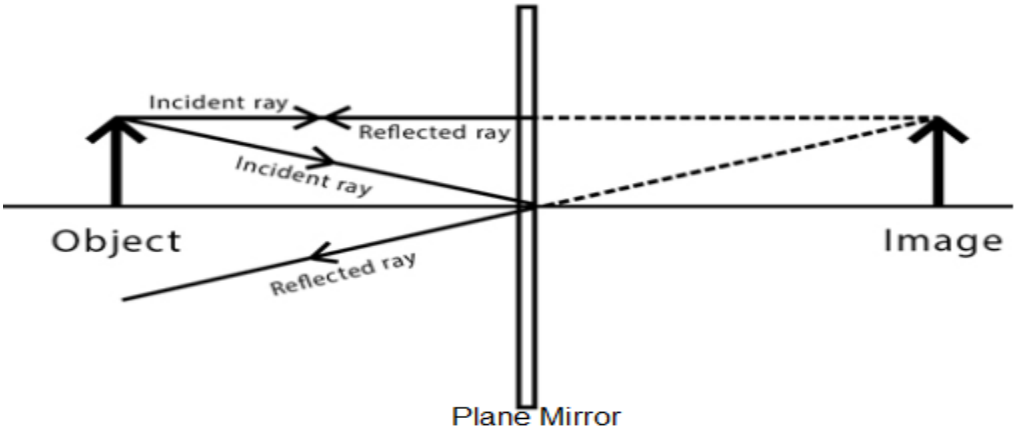
N.B: Smooth shiny surfaces reflect most of light that falls on them. They are good reflector of light.

a) **Incident ray:** is the ray falling on the mirror.
b) Reflected ray: is the ray bouncing off the surface.
c) Incident angle: is angle between the normal and incident ray.
d) Reflected angle: is angle between the normal and reflected ray.
e) Normal: is the line which is perpendicular to the mirror.

N.B: Brightly colored surface reflect light better than **dull surfaces.**

Plane mirror

Plan mirror: is a mirror with a flat reflective surface.

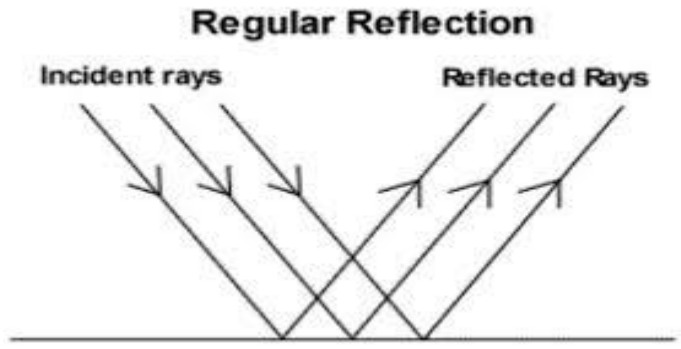


Characteristics of image formed in a plane mirror

- **i)** The image and their objects have the same size.
- **ii)** It is virtual: formed behind the mirror.
- **iii)** Object distance in front of mirror is equal to image distance behind the mirror.
- **iv)** It is upright.
- **v)** It is laterally inverted: its appearance is reversed left to right or right to left.

Types of reflection

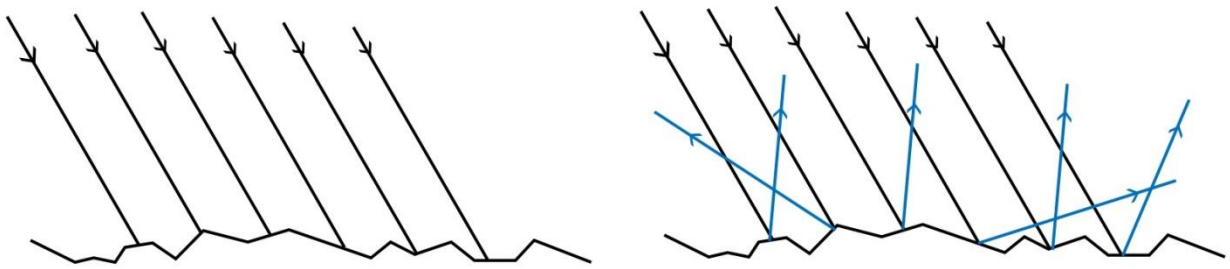
- **i)** **Regular reflection:** it occurs when light falls on **a flat (smooth) shiny surface** such as mirror.



N.B: The beam of light is reflected as paralleled beams.

ii) Irregular (diffused) reflection: it occurs when light falls on **a rough surface.**

Diffused or Irregular Reflection



N.B: Reflected light spreads in different directions.

Refraction of light

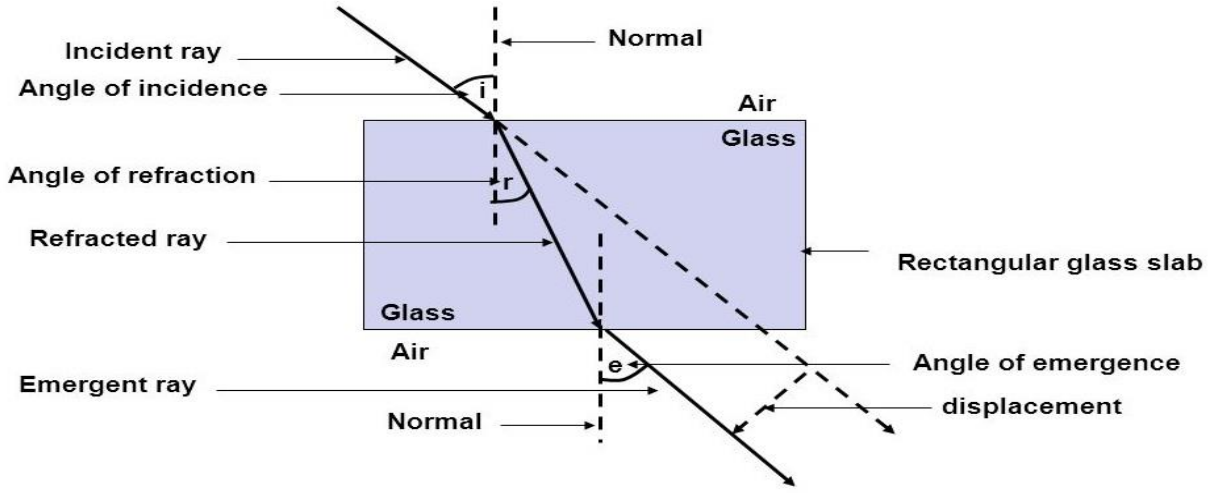
Refraction: is the bending of light ray when it travels from one medium to another.

A medium of light: is a substance that allows light to pass through it.

It may pass through air to glass, air to water, glass to water or vice versa.

When light moves from air to clear glass, its speed is interfered with and it slows down. This interference causes it to change its direction of movement. As it changes direction, it bends. This bending is the refraction of light.

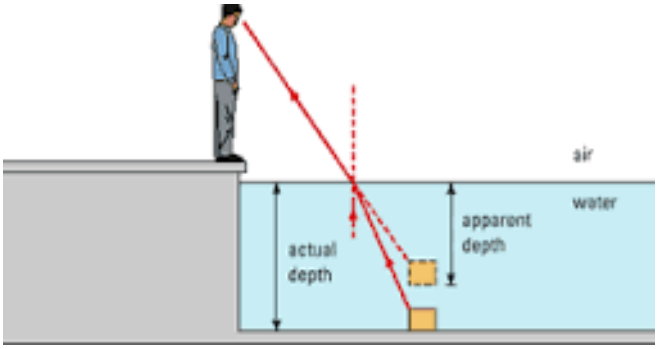
The diagram below shows how light bends when it travels from air to glass and from glass to air:



Apparent and real depth

Apparent depth: is the depth of an object in a denser medium as seen from the rarer medium. Its value is smaller than real depth.

Real depth: is the actual distance of an object beneath the surface, as would be measured by submerging a perfect ruler along with it.



Application of refraction in real life

- **i)** A pencil in water appears bent because of refraction of light.
- **ii)** A coin at the button of a container with water appears raised because of refraction of light.
- **iii)** Riverbeds appear shallow because of refraction of light.
- **iv)** The floor of the swimming pool appears raised because of refraction of light.
- **v)** When the sun shines through droplets of rain water it causes **rainbow** to appear.

N.B: Rainbow: is a big arc of seven colors (spectrum).

Spectrum: is a band of seven colors.

Dispersion of light: is the splitting of a white ray of light into the seven colors of the spectrum.

Those colors are **(ROYGBIV):**

1) Red
2) Orange
3) Yellow
4) Green
5) Blue
6) Indigo
7) Violet

UNIT 15: ELECTRICITY

Electricity: is the form of energy. It is generated from different sources.

15.1 Importance of electricity

i) It is used to power radios, televisions, computers and phones.

ii) It is used to light homes, schools and other important places.

iii) It is used to power vehicles and machines.

iv) It is used for heating in ovens and micro waves.

v) It is used for air conditioning and refrigeration.

vi) It is used to press clothes (ironing) and to dry clothes in dry cleaning shops.

vii) It is used to solder (press together) metals.

viii) It is used in factories to produce various.

15.2 Production (sources) of electricity

a) Bicycle dynamo: producing electricity by changing mechanical energy into electrical energy. It done by rotating a wheel of bicycle.

b) Solar panel: producing electricity by changing light energy from the sun into electrical energy. The electricity produced can be stored in a battery (storage unit). It is then used when there is no sunlight especially at night.

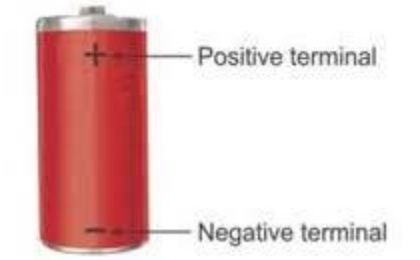
c) Wind power: producing electricity by changing wind energy into electrical energy.

d) Hydro power: producing by changing energy of running water to generate electricity.

e) Thermal (heat) power: producing electricity by changing heat energy into electrical energy.

f) Dry cell: producing electricity by changing chemical energy into electrical energy. Dry cell has two terminals: **positive (+ve**) and **negative (-ve)** terminal.

Dry cell



It produces a force which pushes electricity through the circuit. The pushing power is called **voltage (V).** The unit of voltage is called **volts** (v). Each cell has 1.5 V.

Types of dry cells

Primary cells: are the cells that cannot be recharged.

Secondary cells: are the cells that can be recharged.

N.B: Dry cells store **chemical energy** and produce **electrical energy.**

15.3 Common tools and materials used in electricity

a) Tools used in electricity

i) A plier: is used to cut, hold or tighten wires.

ii) Screw driver: is used to loosen or tighten screws.

iii) Wire stripper: is used to remove the plastic cover from electric wire.

iv) Tester: is used to check whether electricity is flowing through a conductor or not.

v) Rubber gloves: prevent us from electric shocks.

b) Materials used in electricity

1) An electric meter: is used to measure the consumption of electricity in a building.

2) Fuse: it breaks the circuit if electricity exceeds the safe limit. It breaks electricity by melts it when there is too much current flowing through a circuit. When the fuse melts, the circuit is broken. By breaking the circuit, electrical damage is prevented.

3) A plug: is used to connect appliances to the sockets. Materials used in electricity are either conductors or insulators.

Conductors: are used to make conducting wires, contacts in switches and fuses, plugs and sockets.

Example of conductors of electricity: silver, aluminum, copper

N.B: The best conductor of electricity is **silver.**

Insulators: are used to insulate electric cables and prevent short circuiting.

A plug usually has **three wires** connected in a cable. These include the live, neutral and earth wires.

i) **A live wire (L):** is colored **red** or **brown.** It carries electricity from the electricity supply point (mains) to an appliance.
ii) **The neutral wire (N):** is colored **black** or **blue.** It carries electricity from the appliance and back to the electricity supply (mains). This help to complete the circuit.

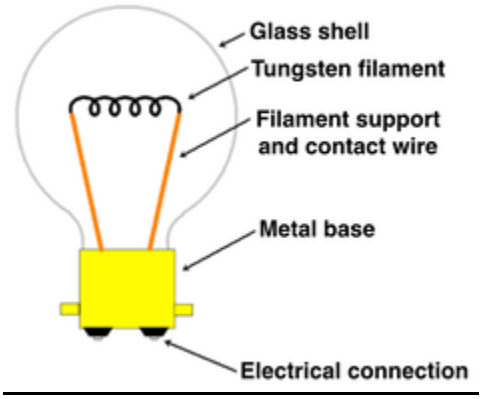
iii) **The earth wire (E):** is colored **green** or **yellow.** It conducts away excess current to the earth (underground). This prevents electric shock.

15.4 Components of simple electric circuit

Electric circuit: is a path through which electricity flows.

i) **Dry cell:** is a source of electricity. It produces electricity from the chemicals stored inside it.
ii) **Switch:** it either breaks or complete the circuit.
iii) **Connecting wires:** It provides path to electricity to complete the circuit.
iv) **Bulb:** it gives light when the circuit is complete. It has two forms of energy: **light** and **heat energy.**
N.B: A bulb has very thin metal in its center called **filament.**
This filament is coiled in order to increase resistance. This filament is made from **tungsten** and has the mineral called **wolfram.** A bulb also has **nitrogen** and **argon** gas which prevent the filament.

Parts of bulb



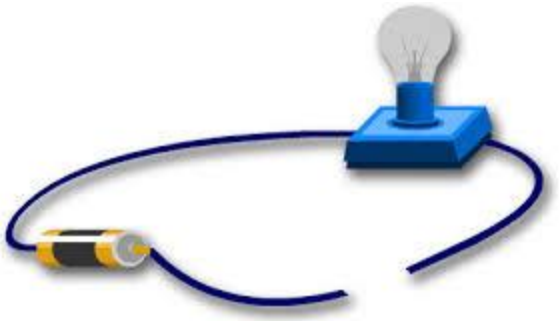
Controlling electric circuit

An electric circuit can be controlled by switch. The switches help to control the flow of electric current by switching it on or off.

i) When you **switch on,** you **complete the circuit.**
ii) When you **switch off,** you **break the circuit.**

OBSERVATIONS

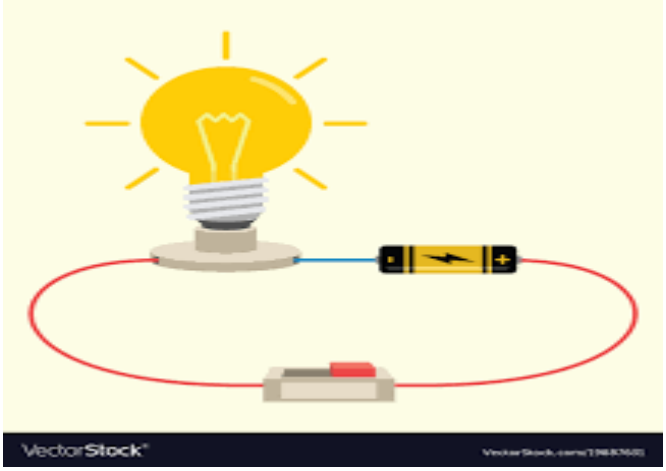
SET UP: A



Question: Does the bulb light in set up A light?

Answer: The bulb does not light when you disconnect the switch end from the dry cell. This is also because the circuit is incomplete.

SET UP: B

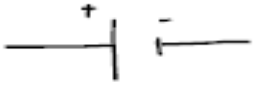
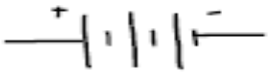
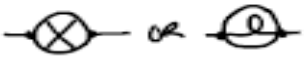
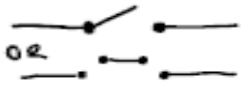
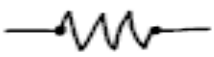


Question: Does the bulb light in set up B light?

Answer: The bulb light when you connect the switch to the dry cell. This is also because the circuit is complete.

Common materials used in electric circuit functions and their symbols.

Electric Schematic Circuit Symbols

Symbol	Function	Description
	Cell	• Source of current electricity
	**Battery**	• Two or more cells joined together. • This battery is made of three cells.
	**Light Bulb**	• Converts electrical energy into light & thermal energy
	**Motor**	• Converts electrical energy into mechanical energy
	**Switch** • Knife or button	• Can be opened to stop a current or closed to allow current to flow.
	**Fuse**	• Prevents too much current from flowing through a circuit • Will break during a surge and protect the circuit
	**Ammeter**	• Measures current (amperage) o Flow of electrons
	**Voltmeter**	• Measure voltage (volts) o Potential energy
	**Resistor**	• A device the impedes (slows) the flow of electrons
	**Ground Connection**	• Connects the circuit to the earth

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15.5 Dangers of electricity

When mishandled electricity can cause dangers such as:

i) Burns

ii) Electrocution

iii) Fires
iv) Deaths
v) Destruction of electrical appliances.

15.6 Ways of preventing the dangers of electricity

i) Avoiding inserting nails and other metallic objects into sockets.

ii) Avoiding touching electrical appliances with wet hands.

iii) Avoiding repairing electrical appliances while plugged.

iv) Avoiding operating electrical appliances with damaged cables (wires).

UNIT 16: MATERIALS

Materials: are the things which around us.

16.1 Classification of materials

Natural materials can be classified broadly into two:

a) Metals
b) Non-metals.

a) Non-metals: is material that lacks metallic characteristics.

Properties of non-metals

i) They are poor conductors of both heat and electricity.
ii) They are soft and break easily.
iii) Most have a dull appearance.

Examples of non-metals: bricks, paper, plastics, wood and glass.

b) Metals: is a material that is typically hard and shiny. In nature metals are found on or in the earth crust.

Properties of metals

i) They are shiny.
ii) They are sonorous: most make bell-like sound when hit.

iii) They good conductor of both heat and electricity.

Examples of metals: aluminium, zinc, iron, tin, copper, lead, silver and gold.

16.2 Uses of common metals

i) Iron: is used to make roofing materials like hoes, shovels, screws, nails, iron sheets….

ii) Copper, silver and bronze: are used to make coins and medals.

N.B: Copper is used to make electric wires and water pipes.

iii) Gold and silver: are used to make jewelry and other decoration items.

iv) Tin: is used to make cans and tin lamps.

v) Aluminium: is used to make saucepans.

16.3 Maintenance of metals

i) Painting: is the process of coating the iron surface with paint.

ii) Galvanization: is the process of applying protective zinc coating to steel or iron.

iii) Store in dry place: all metallic tools and equipment need to be stored in a dry safe place.

iv) Oiling: moving or rotating metallic parts should be oiled to reduce friction.

16.4 Calculation of density

Density = $\frac{Mass}{Volume}$ **D =** $\frac{M}{V}$

Density: is the mass of substance per unit volume.

Mass: is the quantity of matter in a body.

Volume: is the amount of space that is occupied by a container.

N.B: i) The standard unit of density is grams per cubic centimeter **(g/cm^3)** **(** $g/_{cc}$**)** or kilograms per cubic meter (**kg/m^3**).

iii) Instrument used to measure density is **densitometer.**

Example: A metallic block has a mass of 500g and volume of 50cm^3 Calculate the density of the block.

Solution

Given: Mass = 500g **Question:** Density =? **Formula:** **D =** $\frac{M}{V}$

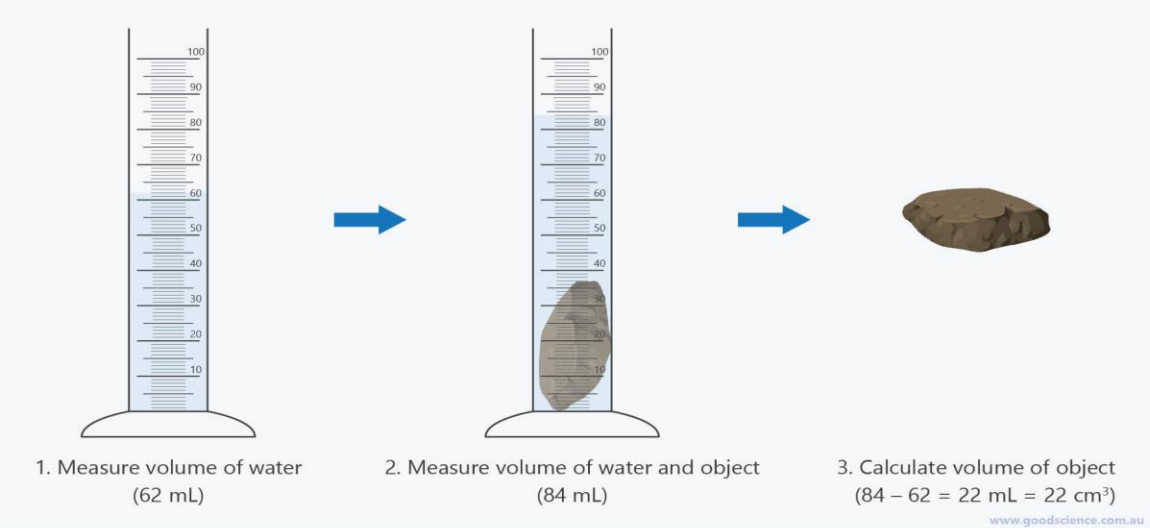
Volume = 50cm^3

Calculation: D = $\frac{M}{V} = \frac{500g}{50cm3}$ = 10g/cm^3

Measuring the volume of irregular materials

Volume of irregular materials is obtained by using **displacement method.**

a) **Materials needed:** water, measuring cylinder and stone.
b) **What to do:**
   - **i)** Collect water in a measuring cylinder.
   - **ii)** Note the initial (first) level of water in the cylinder. Record it as **initial volume of water.**
   - **iii)** Tie a piece of thread around a stone.
   - **iv)** Lower the stone gently into the measuring cylinder or container.
   - **v)** Note the final (last) level of water in the cylinder. Record it as **final volume of water.**



Measuring Volume of Irregular Solids

Volume of stone = final volume- initial volume

V of stone = V_2 - V_1

Example: A piece of stone weighs 90g. When put in a measuring cylinder, the water level rose from 48cm^3 mark to 78cm^3 mark. Find the density of the stone.

Solution

Given: Mass = 90g **Question:** Density =? **Formula:** **D =** $\frac{M}{V}$

Volume: V1= 48cm^3

V2= 78 cm^3

V of stone = V_2 - V_1 = 78 cm^3 - 48cm^3 = 30cm^3

D = $\frac{M}{V} = \frac{90g}{30cm3}$ = 3g/cm^3

16.5 Relative density

Relative density: is the ratio between the density of substance to the density of a given reference material.

Normally, the reference material is **the density of pure water.**

Relative density = $\frac{density\ of\ a\ substance}{density\ of\ water}$

N.B: **i)** Instrument used to measure relative density is called **hydrometer.**

ii) The density of water is 1g/cm^3 or 1kg/m^3.

Example: the density of kerosene is 0.8g/cm^3. If the density of water is 1g/cm^3 , calculate the relative density of kerosene.

Solution

Relative density = $\frac{density\ of\ a\ substance}{density\ of\ water}$ = $\frac{0.8g/cm3}{1g/cm3}$ = **0.8**

Floating and sinking

- **i)** **Floating:** to remain on the surface of water. The objects which **float** on water surface are **less dense** than water.
- **ii)** **Sinking:** To go down below the surface of water. To become submerged. The objects which **sink** are **denser** than water.

16.6 Application of relative density

The following are some real life applications of relative density:

- **i)** Making the ship hallow reduces its density which help it to float.
- **ii)** It is used to determine the purity of some substances. **Ex: lactometer** is used to measure density of milk to find out if it is pure or water has been added.
- **iii)** The knowledge of relative density is applied to determine the mineral content in a rock.
- **iv)** It is considered during the design of swimming and diving equipment.
- **v)** Materials used for building the parts of aeroplanes should have a low density. A good example of such material is aluminium.

OUR HOPE IS A BETTER FUTURE