HERITAGE GLOBAL ACADEMY

2, Ola Iya close, Off Okiki Street, Isawo Road, Owutu, Agric - Ikorodu, Lagos, Nigeria

BASIC SCIENCE SCHEME OF WORK FOR 2021/2022 SESSION

2ND TERM BASIC SCIENCE E- NOTES

Weeks	TOPICS	SUB- TOPIC
1	Resources from living things	- Examples of plant sources e.g. cash and food crops, dyes, and drugs - Examples of animal sources e.g. hides and skin, dairy product
	Economic Importance of Resources from Plants and Animals	- Importance to self - Importance to society
2	Resources from non-living things:	- Examples - Solid minerals like limestone, coal, gold, tin, etc
3	Resources from non-living things (Location in Nigeria and Their Importance)	- Location of solid minerals in Nigeria - Economic Importance
4	Light Energy	- Reflection - Refraction - Vision - Dispersion and Rainbow
5	Sound Energy	- Production of Sound - Transmission of sound - Reflection of sound - Hearing
6	Magnetism	- Load stone - Law of Magnetism - Magnetic Poles and Magnetic Fields - Care of Magnets
7&8	Electric Energy	- Flow of electrons - Circuits Series and Parallel - Fuses and circuit breaker - Electric meter reading and billing
9	Skill Acquisition	- Meaning of skill acquisition - Reasons for skill acquisition e.g. taking risks, decision making, managing emergency situation, Survival strategy, Learning to live together - Types of Skill e.g. farming, basic

		computer literacy, photography, internet browsing, desktop publishing and networking e.t.c. - Importance of skill acquisition e.g. improved quality of life appreciating human capability e.t.c.
10	Simple Machine	- Definition - Uses of Simple Machine
11	Radioactivity	- Meaning of radioactivity - Radioactive elements - Types of radiation and properties - Uses of radioactivity - Dangers of radioactive rays
12	Ethical Issues in Science and Development	- Meaning and wrong application of science. - Implications of bad scientific practices destroy individual's life. - Adverse effects on a country.

WEEK 1: RESOURCES FROM LIVING THINGS

Plants and animals are not only kept for food; they are also kept for the production of materials that could be used for clothing, shelter, medicines, coal, oil, gas and other things. The useful things that we get from living things can be called **RESOURCES**.

RESOURCES FROM PLANTS

These are vegetables that we grow from their leaves, fruits, stems and roots. We can identify four (4) major types of plant resources. These are food crops for textiles, wood crops and medicinal plants.

FOOD CROPS

1. LEAFY VEGETABLES

These are food crops that we eat either cooked or fresh as salads. They

provide us with minerals i.e. (calcium and iron) and vitamins particularly Vitamins A and C which our body's needs. Examples include lettuce, cabbage and other plants used for leafy soups.

2. FRUITS

Fruits provide the body with mineral salts and vitamins. Examples include;

pepper, tomatoes, okro, mango, banana, lemon, oranges, pineapples and guava.

3. SEEDS

We eat many of them as cooked foods. They provide us with starch, fat and protein. Examples include: beans, maize, millet, sorghum, rice, barley and wheat to make flour for baking bread and cakes.

4. UNDERGROUND CROPS

These include stem tubers or swollen stems such as yam, cocoyam and irish potato, root tubers such as cassava, sweet potato, carrot and bulbs of onion.

They are called underground crops because they grow under the ground. They provide us mainly with starch.

5. OIL PALM

These are oil palm, groundnut, cotton, coconut and olive. We produce cooking oils from their seeds or fruits.

CROP FROM TEXTILES

These are crops that we use to make cloth, ropes, baskets and dyes.

1. CLOTH

The fibers produced by cotton plants around the seed is used for making cloth.

2. ROPES

Materials for sacks and nets are made from different kinds of plants like sisal, sornel plant, guinea-hemp and jute.

3. BASKETS

Palm leaves provide materials for making hats, bags, baskets and other things.

WOOD CROPS

Some trees provide hardwood which is used for building and furnitures e.g.

Mahogamy, ebony, camphor. Some provide soft wood which is used for wood pulp and paper as well as for building. Also the leaves of some plants are used for roots, fences and for making furniture's example palm leaves. Plants also provide us with firewood which is a source of energy.

MEDICINAL PLANTS

The bark, roots and leaves of some plants are used as medicines.

RESOURCES FROM ANIMALS

Animals that commonly provide us with food are of three main types. One group consists of animals like cow, goats, sheep's, pigs. They provide us with meat, milk and butter. In addition, they provide hides and skins which we use for leather goods (bags, shoes, purses, belts, drums, garments). The word "hide" refers to "skin" refers to the skin of smaller animals like goats, sheep, rabbits, pigs. Animal bones and horns are used for furniture. Their faeces are used as manure for plants.

Another group of animals consist of poultry binds (guinea fowl, chicken, and the turkey). They provide us with meat and eggs. Their feathers are used in pillows and for decomposition. Their droppings are used as manure on farms and gardens. The third group consists of animals that live in water i.e. Fish, prawns, crayfish and crabs.

CASH CROPS

These are crops produced mainly for sale, particularly to people in other countries of the world. They include fibre crops, oil crops, wood crops and some food crops.

Some well-known cash crops include cotton, groundnut, oil palm, mahogany, ebony, rubber, coffee, tea, cola, coconut, cocoa, sugarcane, tobacco and shea butter.

FOOD CROPS AND THEIR PRESERVATION

Many food crops can only be grown during certain seasons of the year. In order to make sure that we have them in the season when they are not

growing we need to store and prepare them. We also store and preserve resources from animals.

There are many ways of preserving food crops. Traditional ways of preserving food are by salting, drying, smoking and processing. Modern methods of preserving food include refrigerating, bottling and canning.

1. SALTING

We preserve meat or fish by salting it. The salt prevents bacteria from growing on the meat so they cannot spoil it.

2. DRYING

We preserve meat and some vegetables like leafy vegetables and onions by drying them. Drying removes water which bacteria and other micro-organisms need to live. By drying the crops the bacteria and other micro-organisms cannot spoil them.

3. SMOKING

We smoke fish and meat to prevent them from becoming spolit and decay.

4. PROCESSING

By turning cassava into garri, yam and maize into flour. In processing, we change the food into a different form and store them.

5. BOTTLING

Many food crops like tomatoes are preserved by keeping them in bottles and filling up with water. When bottling, it is necessary to remove air from the bottle by filling it completely with pure water or other water must be sterilized first.

6. REFRIGERATING

Bacteria and micro-organisms that spoil food are not active when the temperature is very cold. If food are kept in deep freezers, they do not lose their removed from the can and the contents.

7. CANNING

In canning, air removed from the can and the contents are heated thus killing micro-organisms. Canned food such as milk, sardines, tomatoes and other fruits can be kept for a long time.

WEEKEND ASSIGNMENT

1. Which of the following is not a plant resource? A. Food B. Fuel C. Latex D. Fruit
2. The following are animal resources except A. fur B. horn C. skin D. fibre
3. Which of the following is the process of producing and keeping milk? A. Farming B. Poultry C. Dairy D. Skinning
4. Which of the following is not a cash crop? A. Cocoyam B. Cocoa C. Groundnut D. Cotton
5. The following are ornamental plants except ____ A. Hibiscus B. Rose C. Mango D. Pride of Barbados

THEORY

1. Briefly explain the following terms: a) food crops b) cash crops c) medicinal plants d) ornamental plants
2. State five importance of plant and animal resources.

WEEK 2: RESOURES FROM NON-LIVING THINGS

Non-living resources found on earth include soil and found in the earth crust are minerals. Minerals have been found in large deposits in Nigeria. They are useful resources that man uses to produce materials that satisfy his needs.

FORMATION OF SOIL

Soil is formed from rocks over thousands of years through the process known as weathering.

WEATHERING

It is a chemical, physical or biological on cans of breaking down rock into the small particles that eventually make up the soil.

COMPOSITION OF SOIL

Soil is made up of the products of weathering which are inorganic in nature. They include stone, clay, sand, silt. In these particles are minerals such as magnesium, iron, phosphorus etc. also found in the soil are organic materials such as dead plants and animals, parts of plants and animal waste water, air and soil organism such as earthworm, termites, bacteria, fungi e.t.c. are found.

TYPES OF SOIL

The inorganic particles have varying amount of humus. Humus is found by the action of soil. Organism on dead plants and animals as well as animal wastes. Humus helps the inorganic particles of the soil to stick together. The amount of humus in the soil determines the properties of a soil type.

There are three (3) major types of soil

1. Sandy soil

2. Loamy soil

3. Clayey soil

PROPERTIES OF SANDY SOIL

a. It is very porous

b. Water drains away quickly

c. It is coarse and easy to work

d. It require fertile to grow crops well

PROPERTIES OF CLAYEY SOIL

a. It is a fine-grained and heavy soil.

b. Water drains away poorly. They water log easily

c. They are difficult to work on

d. It hardens and cracks daring dry season

e. It needs careful management to grow crops

PROPERTIES OF LOAMY SOIL

a. It is a mixture of sand and day particles

b. It has good crumb structure which drains well yet retains sufficient water for crop growth

c. It has plenty of nutrients and therefore good for agricultural purposes

USES OF SOIL

Soil can be used for the following reasons:

1. For cultivation

2. For grafting of animals (livestock)

3. Building of houses

4. For making pottery (pot, flower, vases, artifact e.t.c)

MINERALS

Minerals are substances that are naturally present in the earth crust are not formed from the animal or vegetable matter, examples are gold, salt, tin e.t.c.

Minerals can exist as solids or non-solid or combination of both. Minerals that exist in the solid state are called **SOLID MINERALS**.

Solid minerals to have been found deposited in some parts of Nigeria in commercial quantities and they are valuable use to man. Due to their importance the Federal Government established the Ministry of Solid Minerals to handle all matters concerning solid minerals. Man utilizes some of these minerals in their natural occurrences (crude) while some of them have been combined with other minerals i.e. process to form product which are useful to man. There are about 34 mineral resources found in Nigeria. They include colombite, gold, zinc, diamond, gypsum among others.

The scientific study of minerals is called **MINERALOGY** and the scientist who studies mineralogy is called a **MINERALOGIST**.

WEEK 3: RESOURCES FROM NON-LIVING THINGS (SOLID MINERALS)

CONTENT

Mineral Resources.

Some Mineral Resources, their Location and Uses.

General Importance of Mineral Resources.

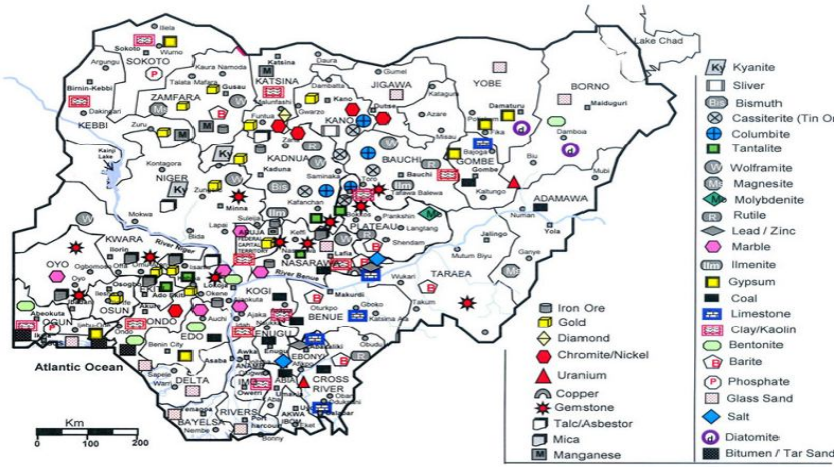
MINERAL RESOURCES

Mineral resources are resources deposited in the earth crust for the benefit of man. A mineral can exist as a single element or as a compound. It could also be deposited in a solid or liquid state. Often, solid minerals are deposited in the earth as ore. An ore is a compound of a useful element that is found deposited in the earth.

Some mineral resources, their location and their uses in Nigeria are given below

Mineral resources	Location	Uses
Gold	Bida(Niger), Ondo, katsina, kebbi,	Used for decoration and making jewellery, coinage, currency etc.
Limestone	Ogun, Gombe, Kaduna	Used for making cement. Used as filter in paints.
Kaolin	Kogi, Abia, Abuja, katsina	Used for making ceramics and plates
Iron ore	Plateau, Benue, Kogi, Anambra	For making iron and steel. Also used for making alloys for various uses
Zinc	Bauchi, Benue, Akwa-Ibom, Abia, Anambra	For making roofing sheets.
Coal	Enugu, Benue, kogi, Ondo	Used as fuel, used industrially to produce coal gas and iron.
Dolomite	Plateau, Oyo, Osun, Kwara	For refractory furnace, building materials.
Lead	Cross river, Benue, Bauchi,	Used for making battery.
Tin	Cross rivers, Kaduna, plateau, Kano	For making decorative lanterns, coating of lead and steel containers to prevent corrosion.
Bitumen	Ondo, Edo, Lagos.	It is used for tarring roads.
Quartz	Jigawa, katsina, kebbi, Niger, Osun, Oyo	It is used in making glass and silica bricks; paint scouring, saops, sand paper, porcelain, paint.
Mica	Plateau, Osun, Ogun, Kebbi, Cross river, Borno	Used as electrical insulator, telephone condensers. Used as filters in production of tyres and tubes
Clay	Almost all state of the federation.	Used for building bricks, flower pots, floor tiles, fencing brickss
Glass sand	Rivers, Niger, Ekiti, cross Rivers, Bayelsa, Abia	It is used for making bottles, synthetic Mable and other glass wares.

MINERAL RESOURCES AND THEIR LOCATION IN NIGERIA



EVALUATION

1. What are natural resources?
2. What are mineral resources?
3. State five mineral resources, their location and importance.

GENERAL IMPORTANCE OF MINERAL RESOURCE

1. It serve as a source of income for the state and country.
2. They are raw materials for industries.
3. They are required construction of roads e.g. bitumen.
4. They are used as source of fuel. E.g. coal.
5. It brings about provision of employment and income for individuals.
6. The availability of mineral resources makes life easier and more comfortable.
7. The presence of mineral resources in a country brings fame to the country.

EVALUATION

State five general importance of solid minerals.

GENERAL EVALUATION

1. List seven resources that can be gotten from animals.
2. What are mineral resources?

3. State seven mineral resources their location in Nigeria and uses.
4. What are the benefits of solid minerals?
5. What's is abstinence?

WEEKEND ASSIGNMENT

____ is used for making cement A. Gold B. Limestone C. Coal D. Petroleum

Solid minerals create the following except A. job opportunity B. machines C. income D. fame

Bitumen is found in_____ A. Adamawa state B. Bornu state C. Edo state D. Taraba state

Car batteries are made of ___ A. Salt B. Lead C. Coal D. Sand

Roofing sheets are coated with A. Lead B. Zinc C. Coal D. Diamond

THEORY

1. Mention seven mineral resources, their location and their uses.
2. Mention five uses of solid minerals.

WEEK 4: LIGHT ENERGY

CONTENT

Introduction.
Properties of light.
Reflection.
Refraction.
Lenses and glasses.
Vision.
Dispersion.

Light can be defined as a form of energy which produces electromagnetic radiation capable of causing visual sensation. Light is a kind of electromagnetic wave (waves that can travel in vacuum). Light is the fastest substance known to man. Light travels at a speed of 3×10^8 m/s (300,000,000 metres per second or 299,792.5 km/s). Light travels in a straight line in what is called **Rectilinear propagation of light** until it encounters an obstacle. When light cannot pass through an object, shadow is formed. An object that does not allow light to pass through it is an **opaque** object while those objects that allow light to pass through them are called **transparent** object.

An object that can produce light on it's own is called **luminous** e.g. sun, light bulb, fire. While an object that does not produce light but may reflect it is called **non luminous** e.g. the moon, mirror, chair etc.Light waves are also called light rays. A line with an arrowhead is used to represent a ray of light. A collection of light rays is called **light**

beam.

There are there type of beam. They are:

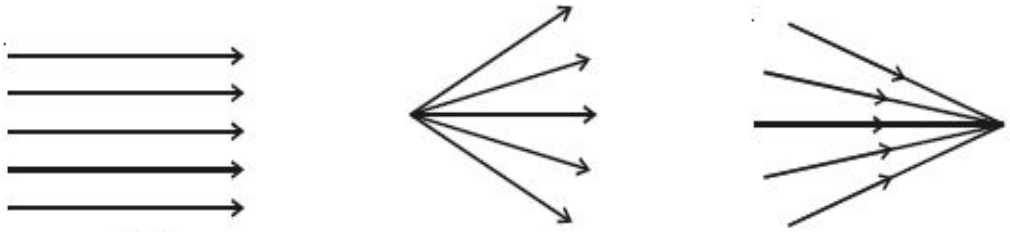
i. **Parallel beam**: This is the type of beam in which the light rays are parallel to one another.
ii. **Divergent beam**: This is the type of beam in which the ray scatters from a point which is usually the source, a convex mirror or a concave lens.
iii. **Convergent beam**: This is the type of beam in which the rays converge or meet at a point called **focus.**

PROPERTIES OF LIGHT

Light has the following properties:

1. Reflection.
2. Refraction.
3. Diffraction.
4. Dispersion.
5. Interference.
6. Polarization.

EVALUATION

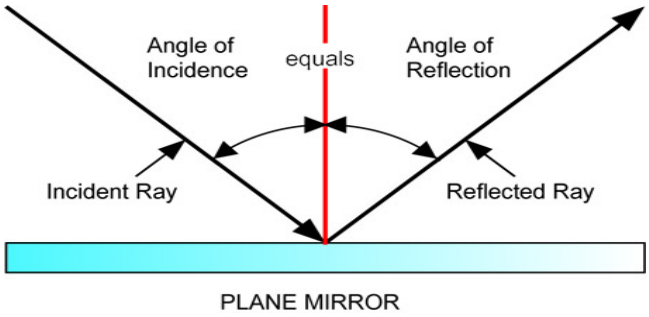


(a) Parallel beam (b) Divergent Beam (c) Convergent Beam

1. What is light?
2. What are the types of light beams there is?
3. List the properties of light.

REFLECTION OF LIGHT

Reflection of light is the change in the direction of light after dashing against a surfray. Reflection involves two rays of light: an incoming **incident** ray and an outgoing **reflected** ray.



LAW OF REFLECTION

1. The angle of incident ray, the normal and reflected ray at the point of incidence all lie on the same plane.
2. The angle of incidence (i) and the angle of reflection (r) are equal but on opposite sides of the normal. i = r
   N.B: The normal is an imaginary line at right angle to the mirror at the point of incidence.

TYPES OF REFLECTION

1. Regular or specular reflection: This is when parallel beam of light is reflected in one direction. Such reflection takes place on smooth, polished surface such as a plane mirror.
2. Diffuse reflection: This is when a parallel beam of light is reflected in different directions. Such reflection takes place from a rough surface, such as water surface or paper surface.

EVALUATION

1. What is reflection?
2. State the laws of reflection
3. What the types of reflection?

REFRACTION

Refraction is the bending or change in the direction of wave when it moves from one medium to another where its speed is different. A medium is a material or space that

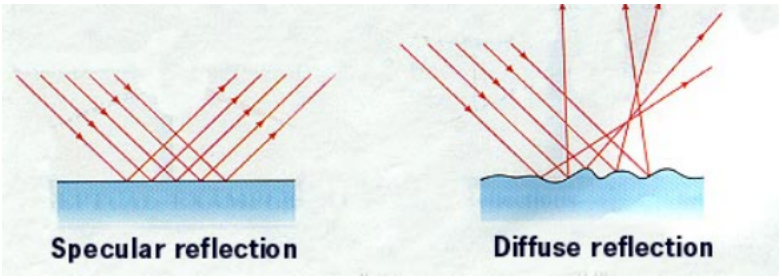
allows wave pass through it. Refraction is responsible for image formation by lens and the eye.

When you dip your legs into a pool, it disappears bent in the pool. A fish in an aquarium seem to radically change position as it is being viewed from different view points. These are as a result of refraction.

LAWS OF REFRACTION

1. The first law of refraction states that the incident ray, the refracted ray and the normal at the point of incidence all lie on the same plane.
2. The second law states that the sine of the angle of incidence (i) to the sine of the angle of refraction (r) is a constant for a given pair of media.

This is also known as Snell's law and the ratio of "I" to "r" is called the refractive index.



EVALUATION

1. What is refraction?
2. State the laws of refraction.

LENSES AND GLASS PRISMS

Lenses are curved glasses that disperse or converge light to a focus.

There are two main types of lenses:

i. Concave lens (diverging lens): This is a lens that bulges outward. A concave lens diverges or scatters light. It is used to correct shortsightedness (myopia)
ii. Convex lens (converging lens): This lens bends inward. It converges light to a real focus. It is used to correct longsightedness (hypermetropia).

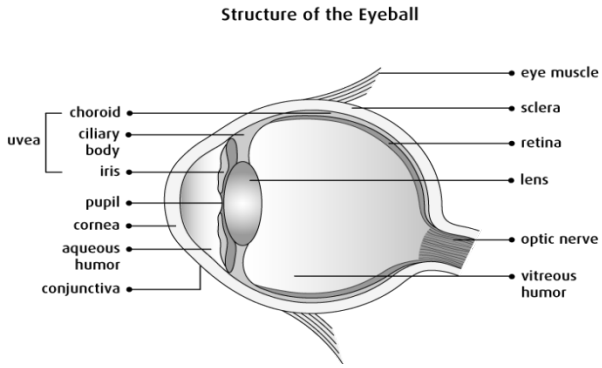
There are also two types of glass prisms:

(i) Rectangular glass prisms (ii) Triangular glass prisms

EVALUATION

1. What is a lens?
2. Mention the types of lenses.

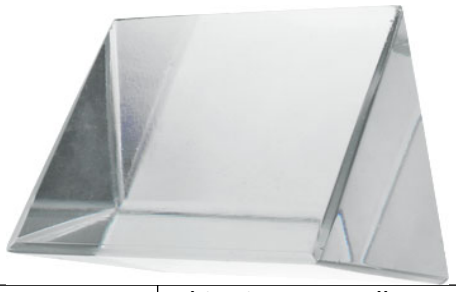
VISION



Vision is the ability to create an image. The organ of the body that is concerned with vision is the eye. Light enters through a clear covering of the eye called the **cornea**. It then passes through the adjustable opening in the **iris** called the **pupil.** Beyond the pupil is the lens which is a bit soft and flexible. The lens focus image on the **retina** while like a film or screen at the back of the eye.

The eye and camera are alike in function and arrangement of part. Both are compared for a lot of reasons.

Part of the eye	Similar part in camera	Function
Cornea		A clear covering of the eyes
Iris	Diaphragm	This is coloured part of the eye. It control the amount of light entering into the eyes
Lens	Lens	The lens converges light at the retina for images to be formed
Retina	Film or Screen	The retina is the part of the eyes where images are formed.



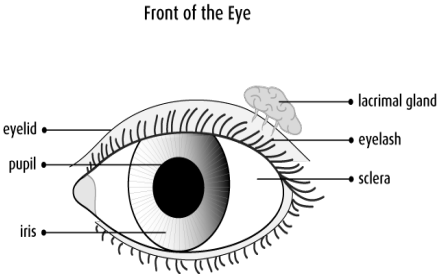
Pupil	Aperture	This is a small opening in iris that controls the amount of light that enters

		into the eyes.

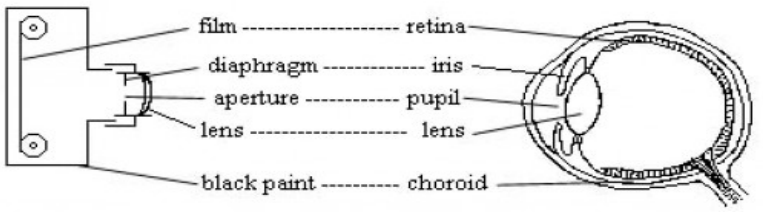
DISPERSION OF LIGHT

This is the splitting or separation of light into different colours. Each colour bends by different degrees when refracted. The colours of light that are gotten after separation are called spectrum. Dispersion of light can be done by passing light through a triangular prism.

RAINBOW



A natural phenomenon that demonstrates the dispersion of light is the the formation of rainbow. The rainbow is an arc of light with an angular radius of 42° centred on a direction which is opposite to that of the sun in sky (I.e it is centered on the direction of propagation of the sun rays). Thus, if the sun low in the sky (I.e close to the horizon) we see almost a full circle. If the sun is higher up in the sky we see a smaller arc. If the sun is more than the angular radius 42° above the horizon, then there will be no rainbow (for viewers on ear surface).



Observers on a hill may see part of the rainbow below the horizontal i.e an arc greater than a semicircle. Passengers on airplane can sometimes see a full circle. The colours of the rainbow vary smoothly from red on the outside and violet on the inside. There are seven colours of the rainbow; red, orange, yellow, green, blue, indigo and violet.

In the dispersion of light, a ray of enters into a triangular glass prism and it is dispersed into colours seven colours written as **ROYGBIV.**

EVALUATION

1. What is vision?
2. What is dispersion of light?
3. Mention five parts of the eye and the function they perform

GENERAL EVALUATION

1. What is dispersion of light?
2. List five part of the eye.
3. What is genetic counseling?
4. State three factors that affect sense of individual worth.
5. State four communication technique.

READING ASSIGNMENT

Precious Seeds Basic Science for JSS Three by J.O Otugboyega et al. chapter 19 Pages 111-113

WEEKEND ASSIGNMENT

1. Which of the following is not a colour of the rainbow A. Red B. Blue C. Brown D. Indigo
2. The property of light in straight line is A. Rectitude propagation B. Rectilinear propagation C. Resisted promulgation D. Responsible promulgation
3. The part of the camera that performs the function of the pupil is A. Aperture B. Lens C. Cornea D. Diaphragm
4. The initial ray of light from the source is called A. Incident ray B. Reflected ray C. Refracted ray D. Emergent ray.
5. An object that absorbs all blue light will appear A. Black B. Blue C. Yellow D. White

THEORY

1. What is light?
2. Explain the formation of rainbow
3. Mention the types of lenses
4. What is reflection? Mention the types of reflection
5. Draw a well labelled eye

WEEK 5: SOUND ENERGY

CONTENT

Introduction.
Transmission of sound.
Reflection of sound.
Hearing.

INTRODUCTION

Sound is a wave caused by vibration of matter. It is a property of vibrating objects. These

objects may be solid, liquid or gases. If there is an elastic medium (i.e a medium which is capable of being compressed between the vibrating object and a suitable apparatus such as a microphone, ear of animals) noise or sound will be detected.

Sound may be produced in a variety of ways, normally as a result of some mechanical disturbances on an object, causing it to vibrate.

For example:

A blow by a hammer on a piece of iron causes the iron (and the hammer) to vibrate for a short while.
A guitar string vibrates under the rubbing action of the bow.
A tightly stretched skin on a drum is set to vibrate when it is struck.
Vocal cord of humans vibrate when air from the lungs pass out through the larynx
An explosion sets the surrounding air into vibration.

TRANSMISSION OF SOUND

This is the passage of sound from one point to another e.g. from one room in a building to another or from the street into a room in the building.

The transmission and production of sound can be demonstrated in the laboratory using a tuning fork. The tuning fork has two steel prongs which when struck with a hard surface gives sound. During the vibration, the prongs of the tuning fork present a hazy appearance due to their rapid to and fro movements. If the vibrating prongs are dipped into a beaker of water, the water is seen to be violently agitated. The transmission of natural vibration from the tuning fork to the water is called **Resonance.**

Sound is transmitted through matter such as air, water or solid metals. The matter or material through which sound is transmitted is called a medium. Sound travels faster in solid than in liquid and faster in liquid than in gases. The speed of sound in dry air is 332 m/s, 1484 m/s in water and 5,120 m/s in iron.

EVALUATION

1. What is sound?
2. Explain the transmission of sound.

REFLECTION OF SOUND

When sound reflects off a special curved surface called a parabola, it will bounce out in a straight line no matter where it originally hits.

Many entertainment stages are designed as a parabola so that the sound will go directly into the audience instead of bouncing on the stage. If the parabola is closed off by another curve surface it is called an ellipse. Sound will travel from one focus to another no matter where it strikes the wall.

A whispering gallery is designed as an ellipse. If your friend stands at one focus and you stand at the other, his whisper will be heard clearly by you. No one in the rest of the room will hear anything. Reflection of sound is responsible for echoes.

An **echo** is a sound that is reflected back to it source. While multiple overlapping echoes is called **reverberation**.

HEARING

Hearing is the ability to perceive sound by detecting vibrations, change in the pressure of the surrounding medium through an organ called the ear. The inability of the ear to hear is called deafness. There are three main components of the ear: the outer ear, the middle ear and the inner ear.

The **outer ear** includes the visible part of the ear (or the pinna), the auditory canal and the eardrum. Sound travel in waves and when these waves arrive at the eardrum they cause vibration. The eardrum amplifies the incoming air pressure waves to a single firm with a certain extent (amplitude): this allows fir the differentiation of sound.

The **middle ear** consists of a smaller air-filled chamber that is located behind the eardrum. Within the chamber are three smallest bones in the body known collectively as ossicles. The ossicles are; malleus (hammer), incus (anvil) and stapes (stirrup). The stapes is the smallest bone in the body. The ossicles aid the transmission and amplification of the vibration from the ear drum to the inner ear.

The **inner ear**, which comprises the cochlea (a coiled canal filled with fluid) which is connected to auditory nerve cells which pass on the signal to the brain.

EVALUATION

1. Explain the reflection of sound.
2. Explain ear, the parts of the hear and their function.

GENERAL EVALUATION

1. Explain the mechanism of hearing.
2. How does reflection of sound occur?
3. What is work?
4. Explain how energy is transfer in a working vehicle.
5. What is power

READING ASSIGNMENT

Precious Seeds Basic Science for JSS Three by J.O Otugboyega et al. Chapter 20. Pages 114-116

WEEKEND ASSIGNMENT

1. Which of the following cannot produce sound? A. Guitar B. Brain C. Turning fork D. Metals
2. Which of the following is part of the outer ear A. Stapes B. Pinna ,C. Auditory nerves D. Hammer
3. The reflection of sound back to be source is called ___ A. Echo B. Reverberation C. Noise D. cacophony
4. The speed of sound in vacuum is A. 332m/s B. 1484 m/s C. 5120 m/s D. 0 m/s
5. Sound of distorted frequency is called A. Noise B. Echo C. Music D. Reverberation

WEEK 6: MAGNETISM

MAGNETISM

CONTENT

Introduction.
Law of magnetism.
Magnetic poles and field.
Care of magnet.

A magnet is a substance or material that attracts metals like iron and other ferometals. Magnetism is the ability of a substance to attract a metal that contains iron.

LODESTONE

Lodestones are rocks that are magnetic. They are made of magnetite (Fe_3O_4) a form of iron oxide. A piece if iron is then referred to as a lodestone. The Chinese appear to have been the first to discover the lodestone. These qualities of lodestone led to its use as an early form of compass by Chinese sailors. This is because when the stone is magnetized it will be attracted to the earth's magnetic field pole. Also, when it is suspended in the air

it slowly turns and points towards the pole.

LAWS OF MAGNETISM

When a bar magnet is suspended so that it can freely rotate and then freely come to rest. It is noticed that it remains in a North-South direction. Also, when the pole of another bar magnet is brought near the north pole of the suspended bar magnet, the magnet would not attract each other, that is, they repel. But when the north pole of the bar magnet is brought towards the south pole of the suspended bar magnet, they would attract each other.

Therefore, in each case, when like poles are brought near each other there is repulsion. When unlike poles are near each other there is attraction. These led to the laws of magnetism which states that:

"Like poles repel each other while unlike poles attract each other". E.g. north-north or south-south will repel while south-north or north-south will attract.

MAGNETIC POLE AND MAGNETIC FIELD

To identity magnetic poles, a magnet can be brought near a magnet whose poles have already been identified (a standard magnet). If attraction occurs, it means that the pole of the magnet beside the identified pole of the standard magnet is not alike e.g. North pole of the standard magnet will be attracted to the south pole of the other magnet and vice versa. If repulsion occurs, it means both poles are alike and by this the unknown poles of the magnet are consequently identified.

MAGNETIC FIELD

This is a condition found in the region around a magnet, characterized by the existence of magnetic poles. It can also be described as the region or space around a magnet in which magnetic force is felt.

THE CARE OF MAGNETS

There is the need to care for magnets so that they would not lose their ability to magnetise. The following ways are necessary for caring for magnets.

1. Magnets should be heaped with like-magnets. They should be kept away from the edge of flexible magnets because it can actually reverse the polarity.
2. Replacement covers can be purchased for many of the polar power magnets because magnet covers and materials may eventually be worn and torn
3. They should be clean by wiping them gently with a damp soapy sponge and should not be immersed in water.

4. They should be stored by spreading magnetic signs flay on a smooth metal surface.
5. They should not be left in hot weather or brought close to fire as it can destroy their properties.

EVALUATOIN

1. Lodestone is a ___ A. Magnetic rock B. Magnetic plate C. magnetic field D. magnetic ray
2. One of the following is a method of magnetization A. heating B. hammering C. induction D none of the above

3. Like poles ____ A. attract B. repel C. join D. contact
4. The following are ways to care or magnet except A. should be kept with other magnets B. should be kept clean C. should be left in hot water D. none of the above
5. The chemical formula or magnetite is A. Fe_2O_3 B.FeO C. Fe_3O D. Fe_3O_4

WEK 7 & 8: ELECTRICAL ENERGY

CONTENT

Introduction.
Concept of Electron Flow.
Concept of Current, Resistance and Potential Difference.
Series and Parallel Arrangement in Electric Circuit.
House Circuit: Fuse and Circuit Breaker.
Electric Meter Reading and Billing.

INTRODUCTION

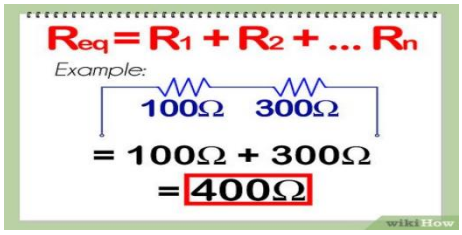
Electricity is the flow of electric current. Electric Current is the continuous flow of charges (electrons). It is also the rate of flow of charges. Electricity has several applications in the modern day society. Electrical energy is needed by industries, hospitals, offices, homes, schools, research institutes and so on. Power generation in Nigeria is by electricity Distribution Company of Nigeria (EDCN), which is saddled with responsibility of generating power, distribution of power and billing of power consumption.

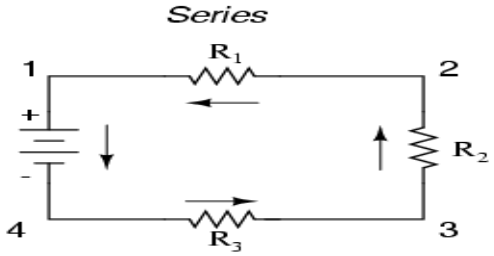
Concept of Electron Flow

When current is flowing in a wire, electrons are moving rapidly. Electrons have negative charges. Negative charge is usually shown with a minus sign. Electrons flow round a path called circuit.

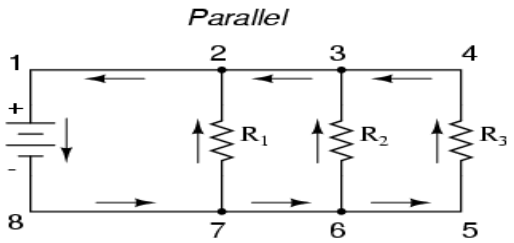
Concept of Current, Resistance and Potential Difference

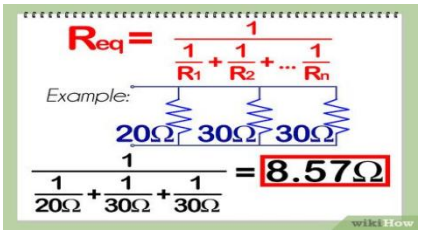
Current: current is the continuous flow of electrons. It is also defined as the rate of flow of charges. It is represented as **I**. It measured in **ampere** (**A**)**.** It is measured using an instrument called ammeter. Depend on the source of generation, there are two types of current: Direct current (DC) and alternating current (AC). Direct current is gotten from small generators, batteries and inverters while the alternating current comes from the transmission lines and transformers.





Resistance: this is the opposition to the flow if electric current in a circuit.Is represented as **R.** It is measured in **ohms** with an instrument called **ohmmeter.** An electrical component designed to introduce a known value of resistance into a circuit





is called a **resistor.**

Potential difference (P.D): This is the energy required to move charges from the positive terminal to the negative terminal. P.d is represented as **V** and measured in volt using an instrument called **Voltmeter.**

Series and Parallel Arrangement in Electric Circuit.

Series Arrangement of Resistors.

Series connection is the connection of resistors from one end to another.

$R_T = R_1 + R_2 + R_3$

R_T means total or effective resistance.

Parallel Arrangement of Resistors.

This is the arrangement in which resistors are arranged side by side such their corresponding ends join together at two common junctions.

$1/R_T = 1/R_1 + 1/R_2 + 1/R_3$

EVALUATION

Differentiate between parallel and series arrangement.
Define the following (a) current (b) potential difference (c) Resistance.
What is electricity?

HOUSE CIRCUIT: FUSE AND CIRCUIT BREAKER.

220V of electricity enters our homes from the transformer and it us sent into the meter.

In order to prevent power surges or electrical problems, fuses and circuit breakers are used. A fuse is a safety device in an electric circuit. It consists of a thin resistance wire that will permit only a certain amount of electric current to pass through it, otherwise it will melt. Fuses are placed in the main electrical supply to protect wiring in the house. A circuit breaker has a switch that automatically goes off when there is an electrical problem it can be turned on later.

Billing of Electric Meter Reading

Electrical energy, like other forms of energy is measured in joules or watt – second, watt – hour or for commercial purposes, kilowatt – hour.

Electrical energy = current x voltage x time
Electrical energy = I x V x t

At home, electrical power is measured and billed. Power is the rate at which work is done.

Electrical power = current × voltage

Electrical power is measured in **watt** using an instrument known as **wattmeter.**

One watt is the power consumed in an electric circuit when one joule of work is done in one second. Larger units of power are the kilowatt (kW) and megawatts (MW).

1KW = 1000 watts = 10^3 W

1MW = 1000000 watts = 10^6 W= 10^3 KW.

In order to bill an electric Meter, electric energy consumption is measured and sold

by the Electricity Distribution Company of Nigeria (EDCN) in units of kilowatt-hour.

Example: A radio set is used for 12 hours per day for 65days. Find the quantity of energy consumed and the cost, if the radio set is rated 35W. Assume that the cost of 1 kWh is 50 kobo.

Solution

Quantity of energy consumed = power × time

Energy consumed= 35W × 12hours × 65days

Energy consumed= 27300Wh

Dividing by 1000 to make it KWh = 27300Wh

1000

Therefore, the quantity of energy consumed= 27.3kWh

Cost= quantity of energy consumed × the cost of 1 unit of energy

Cost of 1 unit of energy= 50kobo

Cost of energy consumed= 27.3kWh × 50kobo= 1365kobo= N13.65

Electric meter reading

Electric meter is a device installed in homes, industries, schools and offices to read the quantity of electrical energy used by local consumers of electricity. To read the meter, the previous unit is subtracted from the current unit, which will give the actual meter reading of the meter.

For example, if the previous unit or reading on the meter is 48,626.8 units and the current reading is 59,014.1 units, the actual meter reading for the month will be given as follows:

Current reading - Previous reading = Actual reading

50,014 - 48,626.8 = 1,387.3

Therefore, the meter reading for the month is 1387.3

EVALUATION

1. State the difference between fuse and circuit breaker.
2. What device is used to measure electrical power?

EVALUATION

3. The instrument used for measuring electric current is A. Ammeter B. Wattmeter C. Voltmeter D. Ohmmeter
4. The kind of current generated by EDCN is _____ current A. Parallel B. Series C. Direct D. alternating
5. ___ is the opposition to electric current A. Potential difference B. Electrical power C. Resistance D. Fuse.
6. A device which is used to prevent power surges from damaging appliances is called A. Meter B. Fuse C. Coil D. Wattmeter
7. The type of connection commonly used at home is ____ A. Parallel

WEEK 9: SKILL ACQUISITION

CONTENT

Meaning Skill Acquisition
Reasons for Skill Acquisition
Types of Skill
Importance of Skill Acquisition

Meaning of Skill Acquisition

A skill is a special ability acquired through training in order to do something in a better way. Skill is also defined as the ability to bring about some end result with maximum certainty and minimum outlay of time and energy. There is a different between talent and skill. Skill is usually acquired through training from either a formal or an informal setting. Talent is an inborn ability to do certain things. It is possible to be talented but not skilled. The training acquired will help the talented individual to improve on his/her ability. An acquired skill is perfected through constant practice and training. Psychologists believe that when you practice a skill continuously for seven years or 10,000 hours it becomes part of you. Someone who has undergone training to acquire a skill is called a professional or an expert while someone who knows little or nothing about a skill is called a novice. The process of moving from being a novice or unskilled person to a skilled person or a professional is called skill acquisition. Skill acquisition is the process of learning and mastering a particular skill.

Reasons for Skill Acquisition

1. **To earn a living:** Skill could be acquired in order provide a means of livelihood for the individual. The individual uses the money earned from using his skills

to meet basic needs.

2. **For employment:** Acquiring a skill provides an individual with the opportunity of being self-employed. Skill acquisition reduces the stress of seeking for a job all over the place. The more engaged a person is in a profession, the more skillful he/she becomes. Such a person can even earn more money by training others. The person becomes a decision maker and a manager of emergencies
3. **For independence:** skill acquisition enables one to be independent, not relying on friends and family for survival

Other reasons for skill acquisition include:

1. Risk taking
2. Decision making
3. Managing emergency situation
4. Survival strategy
5. Learning to live together
6. Improvement of quality of life.
7. Appreciating human capacity

EVALUATION

- What is skill?
- What are the reasons for skill acquisition?

Types of Skills

There are different skills that can be acquired and they include:

Automobile repairs (mechanical works)
Painting
Hair dressing/barber's work
Photography
Publishing
Catering
Panel beating
Book binding
Farming
Computer literacy
Fine art
Welding
Brick laying
Plumbing
ICT
Metal work
Electrical installation
Video coverage
Fish farming
Trading
Shoe making
Fashion designing

Upholstery/carpentry
Hat/bead making
Desktop publishing

Importance of Skill Acquisition

1. Improvement in skills and knowledge.
2. Improvement in communication.
3. Improvement on the quality of life.
4. Survival strategy.
5. Means of livelihood.
6. Self-gratification and independence.
7. Meaningful contribution to the society.

FURTHER EVALUATION

1. A special ability acquired through training is called A. Method. B. Process. C. Entertainment. D. Skill.
2. One of the following is not an acquired skill A. Photography B. Sleeping C. Catering D. Weaving
3. Someone who has acquired a skill is called a A. Professor B. Cohesion C. Profession D. Professional
4. Which of the following is not a reason for acquiring skills? A. Survival strategy B. Dependency on friends C. Self-employment D. Training others
5. A person who has little or no knowledge about a particular skill is called A. Professional B. Expert C. Guru D. Novice

WEEK 10: SIMPLE MACHINES

Machines can be described as any devices that make work easier and more convenient use in doing work more for us to do. Many devices or tools that we use in doing work more conveniently at home are machines, although we do not think of them as machines because of their simplicity. Examples include the knife, tin-cutter, hoe, cutlass, bottle opener, opener, packer, Screwdriver, and the hammer.

Some machines make work easier by reducing the amount of force that must be applied in order to move a load. Others make work more convenient by changing the direction of the force applied or increasing the speed or distance of movement.

Objectives

By the end of this lesson, you will be able to:

1. define machines and simple machines;

2. identify simple machines; and

3. list some simple machines and their uses.

Types of machine

Machines can mainly be classified or grouped into simple machines and complex machines. Examples of simple machines are brooms, hoes, knives, axes, levers, the inclined plane, wedges, screws, wheel and axes, levers and the pulley.

Complex machines include the following: car jack, pump and sewing machines.

Meaning of simple machine

A simple machine is a device which uses a force applied at one point called effort to overcome another force called load at some other point. A simple machine enables a large load to be Overcome by a small effort.

Hence, a machine makes it possible for us to do work more easily. With a machine, a large load or resistance is overcome by a small effort. Simple machines are not as big and complicated as big ones. They are simple devices or tools that can be used in the home, offices, schools or other places. Examples include levers, pulleys, the wheel and axle, inclined planes, the hydraulic press and wedges.

Levers

Levers are collections of simple machines that are readily used in homes. Examples of simple machines that are commonly used in homes are the hoe, broom, cutlass, spoon, tin-cutter, hammer, the plier, and Scissors. These are simple machines that are unique in the arrangement of their three most important components, which are load, effort and pivot or fulcrum.

1. Load: This is the point where work is overcome.

2. Effort: This is the point where force is applied.

3. Fulcrum: This is the turning point. It is also called pivot.

Classes of levers

The lever is of three classes, depending on the relative positions of the effort, load and fulcrum.

1. First class levers: These are simple machines in which their fulcrum is between the effort and load, e.g. scissors, and pliers.

2. Second class levers: The load is between the fulcrum and the effort, e.g. wheel barrows, and nutcrackers.

3.Third class levers: The effort is between the load and the fulcrum, e.g. sugar tong, and the human forearm.

Uses and maintenance of simple machines

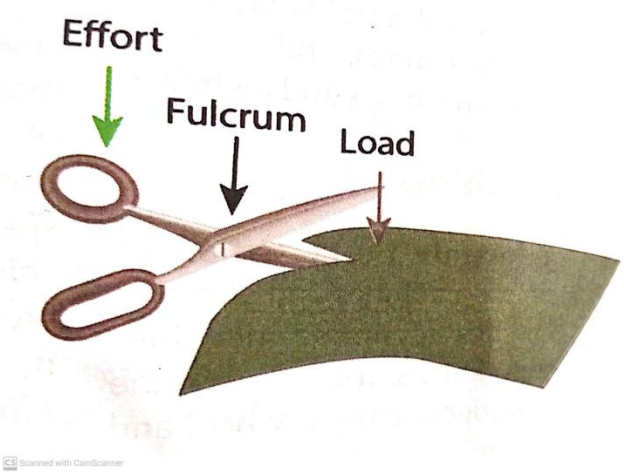
Machines are generally very useful in our daily activities, hence, they need to be

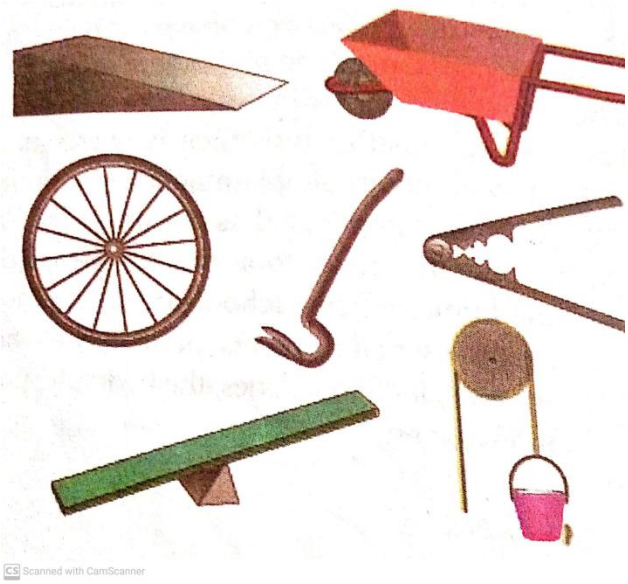
maintained so that they will serve and be effective. Some uses and maintenance of simple machines are given in the Table below:

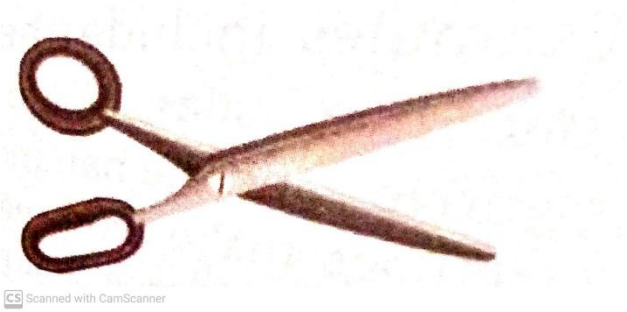
Uses and maintenance of simple machines

S/N	Machine	Uses	Maintenance
1	Hoe	It is used in gardens and farms to weed grass or make heaps and ridges.	Wash and clean it when dirty especially after use.
2	Cutlass	This is used in cutting trees, bushes, and grass, at home or on the farm.	After use, it should be washed, wiped dry and filed to avoid being blunt.
3	Wheelbarrow	It is used in carrying loads, e.g. sand, domestic goods. Also, it is sometimes used in selling things in the market.	Wash thoroughly after use. Clean properly and keep dry. Lubricate the moving parts to reduce friction or rust.
4	Bottle opener	This is mainly used for opening bottle corks.	Keep in a dry, cool place when not in use. Also apply grease to prevent rust.
5	Knife	It is used mainly for cutting things like meat, vegetables, fruits, and bread.	Wash thoroughly and clean after use. Sharpen the blunt edges. Keep it in a dry and cool place.
6	Pliers	This is used in cutting materials, tightening of bolts and nuts, sometimes for breaking hard objects.	Always make sure it is clean and dry. Lubricate to reduce friction. Also, sharpen blunt cutting edges.

Samples of simple machines







Revision questions

1. Which of the following is not an example of simple machine?

A. Lever

B. Pulley

C. Bicycle

D. Wheel and axle

E. Wheel barrow

2. The arrangement of first class levers is

A. load between screw and pivot

B. pivot between load and effort

C. effort between pivot and load

D. load between pivot and effort

E. none of the above

3. Simple machines make work

A. harder

B. easier

C. longer

D. softer

E. bigger

4. The point where a lever rocks back and forth is the

A. effort

B. load

C. work

D. fulcrum

E. joint

5. The following except one are of third class levers.

A. Sugar tong

B. Nutcracker

C. Human forearms

D. Fishing hook

E. None of the above

6a. Define simple machines.

b. Give four examples of simple machines.

7a. What is a lever?

b. Describe the three classes of lever.

8a. List five (5) simple machines.

b. Mention the uses and maintenance of the simple machines listed above

WEEK 11: RADIOACTIVITY

INTRODUCTION

Matter is made up of minute particles called atom. In the nineteenth (19^{th}) century, it was realized that atoms of some substances give out rays, which make the structures of their atoms change. These substances are called **radioactive substances**.

It all happened in the nineteenth century when Becquerel, a French scientist was

carrying out some studies on Uranium. He used some photographic paper to wrap Uranium. To his amazement, the paper was darkened.

MODERN VIEW OF THE ATOM

Initially the atom was thought to be a single particle that could not be divided into smaller components. Rutherford in 1911 was the first to give the modern view of the atom. It is now that the atom is made up of a nucleus around which electron, which carry negative charges, move. In the nucleus are located protons, which carry positive charges and neutrons, which carry no charges. It is necessary to note that the number of protons is the same as the number of electrons, i.e. the positive charges balance the negative charges, making the atom electrically neutral.

MEANING OF RADIOACTIVITY

Radioactivity is the spontaneous decay or disintegration of the nucleus of the atom of an element during which it emits α (alpha), β (beta) or γ (gamma) rays or a combination of any or all the three, and energy (or heat).

RADIOACTIVE ELEMENTS

There are natural radioactive elements and there are artificial ones. Natural

radioactive elements include radium, uranium, plutonium, thorium, etc. artificial

radioactive elements made by using neutrons and protons to bombard the normal atoms of sulphur, iodine and cobalt include sulphur-35, iodine-131, Cobalt-60, etc. they are artificial isotopes and so are called **radioisotopes**, since they are radioactive elements.

Both natural and artificial radioactive elements disintegrate by giving out **alpha, beta** and **gamma** rays.

TYPES OF RADIATION AND PROPERTIES

The major particles or rays given out by radioactive elements are alpha particles, beta particles and gamma rays. Alpha rays are helium nuclei. A helium nucleus consists of two protons and two neutrons (i.e. an atomic mass unit of 4 and an atomic number of 2). The beta rays consist of electrons only while the gamma rays are electromagnetic waves with no charge.

The alpha particles are heavier than beta particles and gamma rays. The three particles or rays have enough energy to penetrate some materials. Of the three particles or rays, alpha particles have the least penetrating energy.

The alpha particles can be stopped by thin paper. This is because its energy is used up quickly in ionising atoms of air. The beta particles are heavier than gamma rays, though not as heavy as alpha particles. Beta particles penetrate more than alpha particles, but not as much as the gamma rays. Beta particles can only be stopped by metal plates.

Of all the three radiations, gamma particles penetrate the most. They are stoppable only by thick lead blocks; they however ionize the least. The mass of gamma particles is quite negligible relative to those of alpha and beta radiations.

USES OF RADIOACTIVITY

Radioactivity has tremendous uses in medicine and in the industry, some of which are as follows:

1. TREATMENT OF CANCER

Cancer of the skin or an organ such as the breast is treated with gamma rays. Once every month or at intervals prescribed by the doctor, the part of the body affected by cancer is exposed to gamma rays for a short time. This treatment called **radio therapy** is continued until the affected part of the body is healed.

2. STERILISATION OF FRUITS DRINKS AND WATER

In the past, germs in bottles drinks and canned foods were killed by a process called **pasteurization**. The bottled drink or food was warmed to a temperature that killed the germs.

In some cases, chemicals were added to canned food (e.g. tomatoes) or drinks such as orange juice. The added chemicals affected the taste of the food or drink.

Nowadays, a much simpler and cheaper process can be used. Gamma rays are passed through canned food, or bottled drink or water, without affecting the taste.

3. STERILISATION OF SYRINGES AND MEDICAL EQUIPMENT

Sterilization of syringes and medical equipment was done in the past with

boiling water. It is believed that application of heat to the water in these

instruments to $100^{o}C$ (boiling point of water) will kill the germs and bacteria. It is now easier to use gamma rays to kill bacteria in syringes and medical equipment.

4. CARBON DATING

Carbon dating is a method used to find the age of very old objects. The

radiation given out in a given time interval is proportionate to the whole radiation that has been given out in the time pasts. This is because reduction in radiation is proportional to the age of the object. The time corresponding to the radiation given out so far can be obtained. This makes the age of such objects possible to calculate.

DANGERS OF RADIOACTIVE RAYS

1. Though alpha particles may not be able to penetrate into the body as they are stopped by the skin's outer layer, they are dangerous and injurious to organs.

2. The beta particles can penetrate the body where they damage and destroy cell tissue.

3. Gamma rays are even more dangerous inside the body; they penetrate

deeper into the body than the other two rays. They destroy than the cells

of bodies exposed to them.

WEEK 12: ETHICAL ISSUES IN SCIENCE AND DEVELOPMENT

INTRODUCTION

Have you ever wondered why people use guns, bombs and nuclear weapons? Some unfortunate persons have lost their lives or have been wounded by accidental discharge of bullets. The issue of legalization of abortion has become quite controversial in some countries. Many people are becoming concerned about the right and wrong application of science.

PRACTICE OF SCIENCE

Practices of science include production of fertilizer, poison gas, hydrogen bombs, insecticides and surgical equipment. Scientists also produce harvesters, grenades, aeroplanes, booby traps, cars and missiles. Other practices of science include purification of water and giving treatment and care to the sick.

Some of the practices maybe described as good while others may be described as bad.

RIGHT AND WRONG APPLICATION OF SCIENCE

The practices of Science and its related development have gone very far. Many scientists carry out all kinds of experiment to find out more about human beings, about the universe and so on. Some of these experiments try to create or form an animals, plants and even human beings without going through the normal reproductive processes. This area of science is referred to as “cloning or genetic engineering”.

You can imagine if a human beings can create another human being, then will be doubting of the existence of God. The question arises: what is right and wrong in the quest for scientific knowledge? There is diversity in human culture, custom, intelligence, philosophy e.t.c. therefore, what may seem right to an individual may not be right to another individual. In any relationship, one should always consider the right of the other individual. This brings about the issues of ethics in science.

IMPLICATIONS OF RIGHT AND WRONG APPLICATION OF SCIENCE

The implications of the right application of science are many. The right application of science leads to the use of medical science to cure ailments. It leads to ease of movement by the use of made it easy to communicate

with any part of the world in a matter of seconds through Information and Communication Technology (ICT).

On the other hand, the wrong application of science has led to destruction of innocent lives as discussed in the following examples:

1. ABORTION

Some Christians say that abortion is the killing of a human being. Others say that abortion may save the life of a mother, or limit the size of a family to manageable proportions or save the career of a girl.

The decision of whether abortion is right or wrong is not taken by science; but by lawmakers. Science itself is not a fault. It is how individuals or governments use science that may be open to question.

2. MERCY KILLING

Mercy killing is the use of medical science to terminate the life of a patient

who is known to have a terminal disease. Those who support mercy killing

hold that if someone is sure to die, why let the person suffer? Others say the individual may miraculously survive.

3. WAR

Science has produced weapons of destruction such as guns, grenades and

nuclear bombs. Governments, not scientists, decide when and if to use them.

Individuals hold their personal views and have the right to do so. Some

believers, for instance, do not participate in war. That is their faith.