FORM ONE GEOGRAPHY UPDATED NOTES

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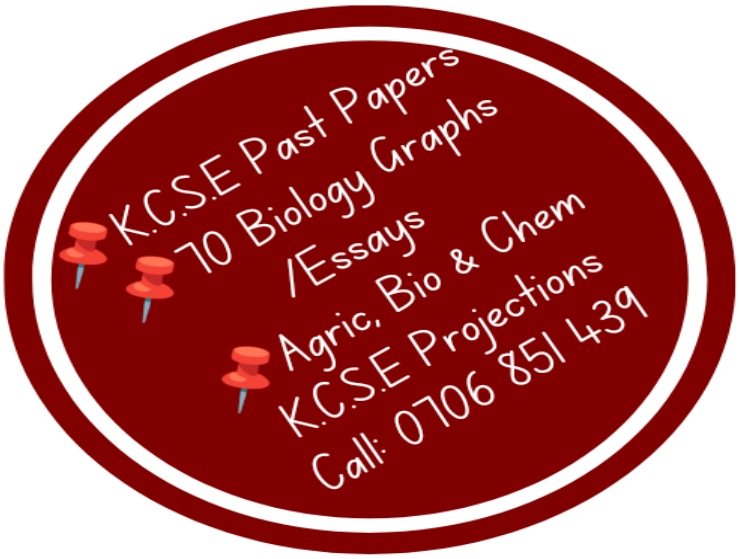


INTRODUCTION TO GEOGRAPHY

The meaning of geography.

The word *'Geography'* has its origin in the Greek language*; it is* a two word combination of *Geo* which means earth and *Graphein* or *grapho* which means to draw, describe or to write. *Geopgraphia* therefore means to draw, describe or write about the earth.

Geography is the scientific study of the earth as a home of humankind.

It is also the *study of the distribution and interrelationship of natural and human phenomena on the earth's surface.*

Geography is a science that studies how man interacts with the environment.

Environment

The environment refers all the external conditions which have influence over the behaviour of an organism (plants, animals and human beings).

There are two divisions of the environment;

a) **The physical environment** – *the natural physical conditions of weather, climate, vegetation, animals, soils, landforms and drainage.*

b) **The human environment;** *including human activities such as farming, forestry, mining, tourism, settlement, transportation, trade and industry.*

Why do we study Geography?

a) "To gain knowledge about our environment and how to control it for both the present and the future generations."

b) "To understand and explain how man interacts with his surroundings."

c) "It helps us to be aware of the physical features within our environment, how they are formed, the benefits we get from them and the threats they pose."

d) It is a career subject. "Geography provides useful skills for becoming a teacher, surveyor, planner, geologist and environmentalists, so as to earn a living."

e) "Geography teaches us the basic principles and geographical methods of studying and solving problems of national development."

f) "Geography also helps us to acquire positive attitudes and values which enable us to become useful members of the society. During fieldwork, an individual is able to develop respect for work especially group work."

g) "Studying geography of other regions in the world creates international awareness which facilitates good relations among people."

THE MAJOR BRANCHES OF GEOGRAPHY

1) **Physical geography** deals with the study of the natural physical environment (earth's landscape and atmosphere).

It includes the study of:

a. The earth in relation to the solar system.
b. The shape of the landscape (called ***Geomorphology***)
c. Weather (called ***Meteorology***)
d. Climate (called ***Climatology***)
e. The location of plants and animals (called ***Biogeography***)
f. Rocks (called ***Geology***)

Human and economic geography deals with man's economic activities such as agriculture, commerce, tourism, industrialization, transport, commerce.
It has the following sub-branches;

a. ***Historical geography*** (How land use has changed over time)
b. *Cultural geography* (How land is used in different cultures)
c. *Demography* (the effect of changes in population)
d. *Economic geography* (How man creates wealth from the environment)
e. Social geography (How changes in society affect land use)
f. *Political geography* (How politics affects land use)
g. *Settlement geography* (How changes in our villages and towns affect the landscape)

2) *Practical geography* is a smaller branch that equips learners with the practical skills that enhance their understanding and interpretation of physical and human geographical information.

It includes;

a. Statistical methods
b. Maps and map work.
c. Fieldwork.
d. Photograph work

RELATIONSHIP BETWEEN GEOGRAPHY AND OTHER DISCIPLINES

This relationship comes about when geography applies certain principles and facts from other subjects to explain or solve certain geographical problems or when these subjects apply geographical information to explain various concepts.

1. Geography and Mathematics

- Mathematical principles and formulae are used in Geography to calculate distances, areas and population densities. E.g. use of graphs and pie charts.
- Geographical knowledge about bearing and direction is in turn used by mathematicians to calculate distances around the globe.

2. Geography and history

- Historical geography exists as a branch that ways in which historical events are affecting human economic activities. Geography attempts to map these events.

•History uses geographical tools like maps and charts to show movements of people.

3. Geography and biology

While biology studies organisms, focusing on their anatomy, physiology and behaviour, geography is interested in their distribution, factors influencing the distribution and the influence of the biological organisms on human activities.

4. Geography and physics

•Physics studies matter, energy, heat, light, gravity and magnetism.

•Geography focuses on heat from the sun as it is responsible for movement of air, evaporation of water and distribution of moisture in the atmosphere.

•The earth's magnetic field, gravity and its vibrations, areas dealt with by geophysicists, help geographers to understand the causes and effects of earth quakes.

5. Geography and chemistry.

• Chemistry studies substances, their composition and behaviour.

• Geography applies chemistry in studying the chemical composition of, and changes in rocks and soils.

6. Geography and agriculture.

• Agriculture involves cultivation of crops and rearing of animals. Geography is occupied with studying farming systems, their distribution and factors affecting farming activities.

7. Geography and meteorology

• Meteorology deals with atmospheric conditions of a pace and weather forecasting.

• The meteorological information is important to a geographer in classification and mapping of climates. Climatology is the sub branch of geography that deals with this.

8. Geography and medicine

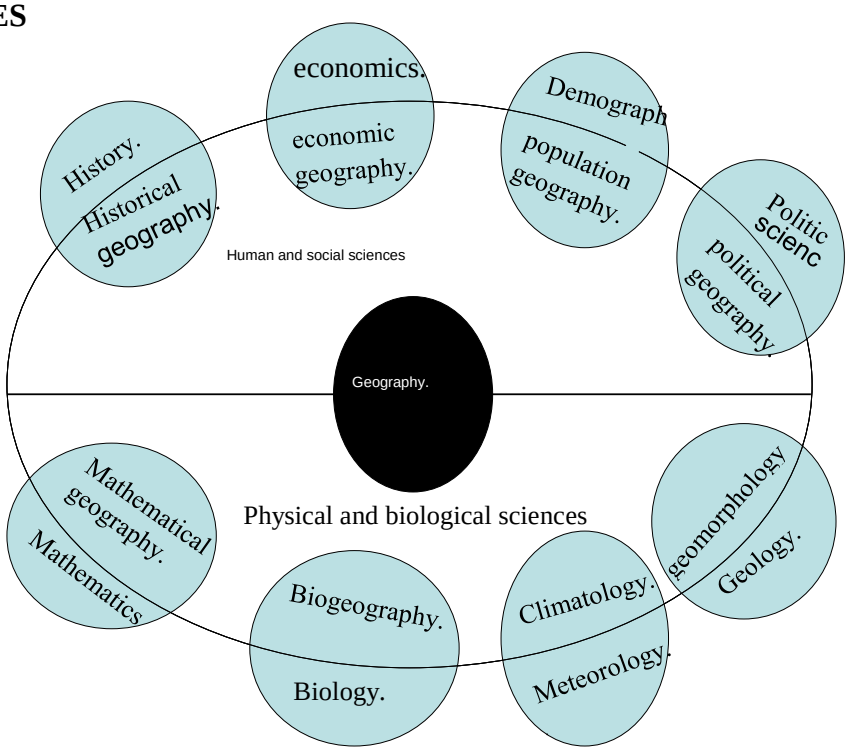
• While medicine is concerned with disease diagnosis, prevention and cure, geography attempts to establish factors influencing spread of disease and the diseases affect economic activities.

9. Geography and economics

• Economics deals with the study of commodities, focusing on money and trade.

• Geography similarly focuses on the exploitation of resources, methods and factors of production, movement of commodities and their consumption.

A MODEL SHOWING RELATIONSHIP BETWEEN GEOGRAPHY AND OTHER DISCPLINES



***Task 1**: with the help of your teacher, find some pictures and photographs that illustrate the different branches of Geography and create a wall display. Also illustrate the centrality of Geography..*

THE SOLAR SYSTEM AND EARTH

Introduction

The sun, moon and stars are commonly referred to as **heavenly bodies.**

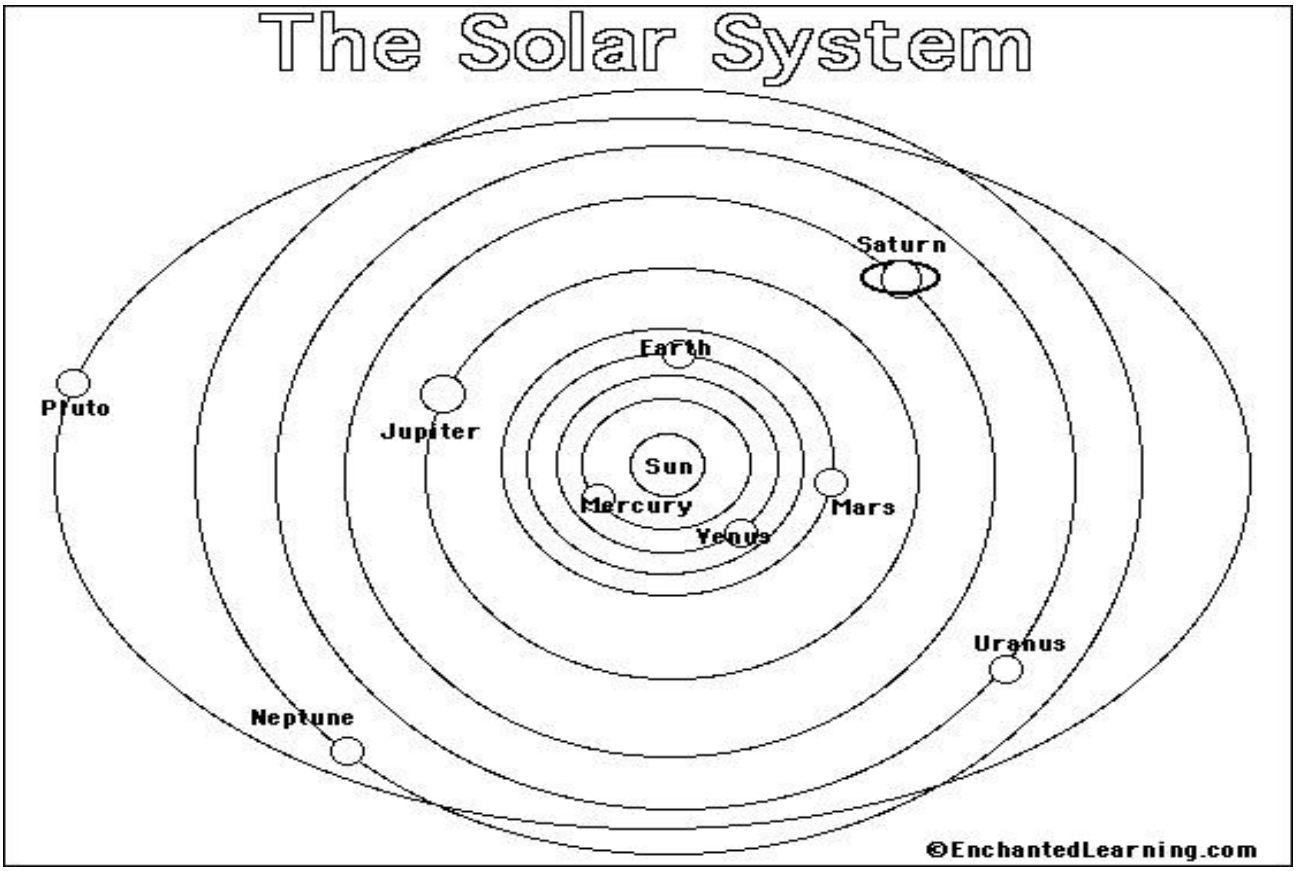
The earth, the heavenly bodies and the sky make up the **universe**.

The universe has stars and a cluster of stars is known as a ***galaxy or nebula***, with each containing many stars.

Our galaxy in which the solar system exists is the ***Milky Way***.

The solar system

Solar system refers to the grouping of heavenly bodies comprising the sun and nine planets. The sun is a star around which the planets and other heavenly bodies The solar system. evolve.



In our solar system, nine planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto), over 61 moons, many asteroids (mostly in a belt between Mars and Jupiter), comets, meteoroids and other rocks and gas all orbit the Sun.

Important points to note

- A **star** is a heavenly body possessing its own light which it transmits.

- **Planets** are large and spherical celestial bodies in space which move around a star such as the sun on their orbits.
- An **orbit** is the path in space which the planet follows as it revolves around the sun. The orbits of the nine planets are **elliptical.**
- Each planet takes a different length of time to complete one revolution; because the distance from the sun to each planet varies.
- There are other smaller bodies found in the solar system. For example, between planets mars and Jupiter, there are satellites known as **asteroids.**
- Some planet has their own satellites **(moons**) that revolve around them

THE PLANETS

1. **Mercury**

It is the smallest and the nearest planet to the sun, with a distance of about 58 million kilometres from the sun.
It takes approximately 88 earth days to complete one revolution.
It has no satellite.

2. **Venus.**

Second planet from the sun with an average distance of 108 million kilometres separating them.
It is one of the brightest planets in the sky and can be seen with the naked eye. It is structurally similar to the earth though it is slightly smaller.
It takes 225 earth days to revolve round the sun. It has no satellite.

3. **Earth.**

The planet on which we live, the only planet that supports life, is the third from the sun.
The distance from the sun is 149 million kilometres.
It takes 365.26 days to complete one revolution around the sun.
It has only one satellite, the moon.

4. **Mars.**

It s fourth from the sun and is slightly smaller than the earth.
Its distance from the sun is 227.9 million kilometres and it takes 687 earth days to complete one revolution.
It has two moons.
Between it and Jupiter there exist small heavenly bodies called *asteroids.*

5. **Jupiter.**

This is the largest planet and with a large number of satellites (sixteen).
It takes 12 earth years to revolve round the sun.
The planet has very thick layers of ice on its surface.
The distance from the sun to Jupiter is 778 million kilometres.

6. **Saturn.**
It is a unique planet that has a ring around it.
It is the second biggest planet in the solar system.
The distance from the sun is about 1427 million kilometres.
It takes 29½ earth years to complete one revolution.
It has eighteen satellites.

7. **Uranus.**
The seventh planet from the sun.
It is roughly 4 times bigger than the earth.
The distance from the sun to Uranus is about 2870 million kilometres.
Because of its vast distance from the earth, very little is known about it.
It has one satellite.
It takes 84 earth years to complete one revolution.

8. **Neptune.**
The distance from the sun is 4497 million kilometres.
It can only be seen using a powerful telescope.
It takes 165 earth years to complete one revolution.
It has eight satellites.

9. **Pluto.**
This is the farthest planet.
It is the smallest with an approximate size of 1/6 the size of the earth.
The distance from the sun is 5900 million kilometres.
To complete one revolution round the sun, it takes 248 earth years.
It has one satellite.

OTHER CELESTIAL BODIES.

1. Natural satellites.
A natural satellite is any natural body that orbits around a planet. The solar system has over 61 satellites, varying in size.
The seven largest, each with a diameter of more than 2500 kilometres are;

a) The earth's moon
b) The four Galilean satellites of Jupiter (Io, Europa, Ganymede and Callisto).

c) Titan on Saturn
d) Triton on Neptune.

2. **Asteroids.**

These are planet-like objects and sometimes known as **planetoids,** located between mars and Jupiter. They are believed to be pieces of a planet that broke up or existing as material that failed to form as planets when the solar system was forming. They are over 1500 in number and also orbiting around the sun. Their orbits are so erratic that the constantly collide with each other, and even with planets.
The erratic orbits are believed a product of Jupiter's Gravitative pull.

3. **Comets.**

A comet is a heavenly body which orbits round the sun. It is thought to be made up of a ball of ice with dust and frozen gases forming its nucleus. As the comet nears the sun, the dust points away from the sun, giving the comet *a head and tail morphology*. The orbit of a comet crosses the orbits of planets and at one point it moves so close to the sun.

4. **Meteors.**

Also known as **shooting stars**, they refer to a streak of light seen in the sky on a clear night.
Meteors are a product of **meteoroids** that burn themselves out(*meteoroids are small bodies of matter which break away from their path in the solar system and enter the earth's upper atmosphere at very high speed*).
The burning out is due to great friction between them and the atmosphere, caused by the high speed of entry into the earth's atmosphere.
The burn up in the regions of between 75 and 115 kilometres above the surface of the earth.
The much more brilliant meteors produced by larger meteoroids are known as **bolide.**

5. **Meteorites.**

This is a remnant of a meteoroid that failed to burn up completely and reaches the earth's surface.They are products of meteoroids that enter the earth's atmosphere at *low velocity* and therefore *minimal friction* that cannot cause them to burn up.
Only 25% of their mass reaches the surface as the rest is burned up.They vary in size from a few grams to 20,000 kg. Sometimes very large meteorites landing on the ground cause formation of craters.

THE EARTH.

Origin of the earth and the solar system

The two main theories are;

1. **<u>The passing star theory.</u>**

The theory was advanced by *jeans and Jeffrey's*.

The theory states that the sun existed earlier than the planets. A big star with greater gravitational pull than that of the sun passed nearby and attracted large quantities of materials in form of gases from the sun. The materials split into portions as they cooled and condensed to form planets.
They were then set into orbits around the sun. The smaller materials formed the heavenly bodies like the moon and asteroids. As cooling continued, heavier materials collected at the centre and formed the core of the earth. The less dense materials collected around the core to form the mantle, then the crust.

2. The nebular cloud hypothesis.

The hypothesis Suggests that the solar system started out as a nebular cloud, (a *large, rotating cloud of dust and gas that looked like an* ***Andromeda spiral***). Due to acceleration in its rotation, Nebula thus flattening into a disk oriented perpendicularly to its axis of rotation.The planets and sun were concentrated from the dust and gasses in the cloud by gravitational attraction.
The interior of the earth is believed to be still hot due to the following reasons;

a) Pressure of the overlying materials generates high temperature.

b) During formation of the earth, the interior cooled slowly that the outer part, retaining the original temperature.

c) Radioactivity/breaking down of nuclear of atoms release a lot of energy which generates heat. **The shape of the earth.**

The shape of the earth is described as spherical, though not a perfect sphere. It is slightly wider at the equator and flattened at the poles giving it a shape called a **geoid** or **oblate spheroid** ***Proofs that the earth is spherical.***

a) *Circumnavigation*. Anybody traveling at constant direction, from any point on the earth's surface will eventually come back to the same starting point.

b) If the earth was flat, the *sun would rise and set at the same time* over its entire surface. However, the sun rises east and sets west, with the rays angle varying from 0 to 90 degrees, proving a curved surface.

c) The horizon of the earth is always circular to an observer. It continues to expand with increasing height. These are features of a sphere.

d) In lunar eclipses, the *earth's shadow on the moon is always seen to be circular* and the only object which casts a circular shadow is a sphere.

e) All other planets of the solar system are spherical. Since the earth is one of the planets, *it may be assumed to be, like the rest, spherical in shape.*

f) Examining *photographs taken in space from rockets* at very high latitude-320km and more- shows the earth's horizon as a curved line.

The size of the earth.

The latest calculation and satellite observations give the following mathematical data for planet earth:

- Approximate distance from the sun-149 560 000kilometres.

- Polar circumference-39995 kilometres.
- Equatorial diameter- 12756kilometres.
- Inclination of the equator from the horizon-23˚
- Length of day-24 hours.
- Length of year-365.26 days.
- Surface area of the earth-510 x 10 sq. kilometres. 71% comprise water surface.

MOVEMENT OF THE EARTH

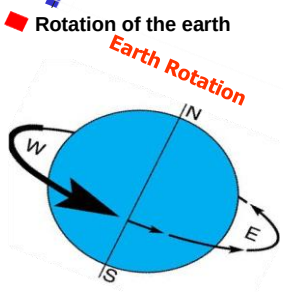
There are two types of earth movements;

a) Earth rotation.

b) Revolution.

EARTH'S ROTATION

The term *Earth rotation* refers to the spinning of our planet on its axis. One rotation takes exactly twenty four hours and is called a *day.*

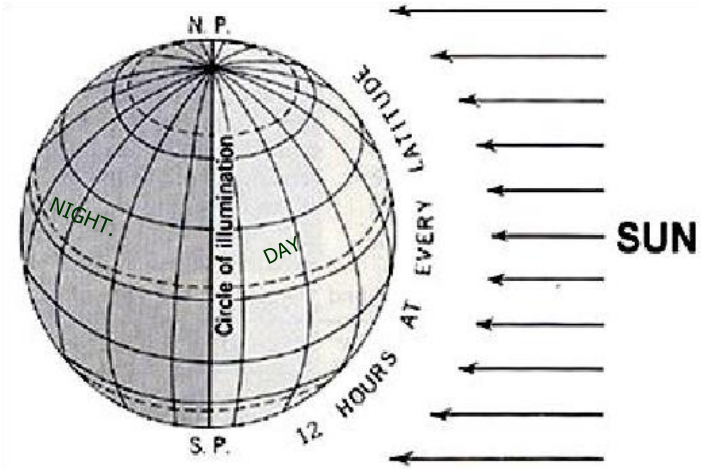


Through 360˚, the earth takes 24 hours to make one rotation. This implies that for every 15˚ of rotation, it takes one hour or for every four minutes, it takes 1˚

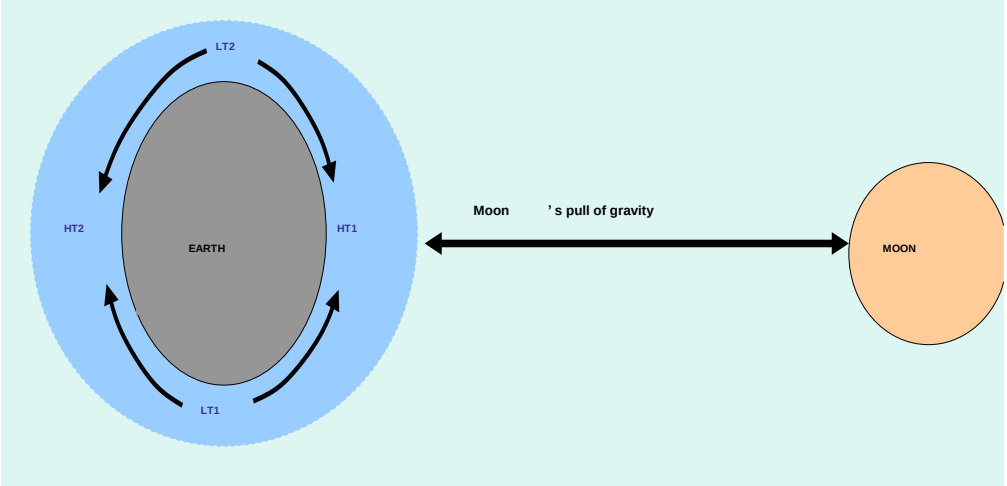
EFFECTS OF ROTATION.

1. ***Day and night.*** The Earth's rotation is responsible for the daily cycles of day and night.

DAY AND NIGHT- ILLUSTRATION



2. ***High tide and low tide.*** A tide is a rhythmic rise and fall of sea level caused by the gravitational forces of the moon and the sun upon the rotating earth.



3. ***Deflection of winds and ocean currents***. As the earth rotates from west to east, winds and ocean currents are deflected. In the southern hemisphere, they are deflected to the left. In the north, they are deflected to the right.

4. ***Time difference between longitudes***. The rotation of the earth causes a difference in time of 1 hour in every 15˚ interval between longitudes.
   This is because the earth takes 24 hours to go through 360˚. Through 1˚the earth takes 4 minutes. Places on same longitude record same time known as **local time.** Local time at **Greenwich Meridian** (longitude 0˚) is called the **Greenwich Mean Time**.
   Any movement westwards from GMT witnesses a loss of 4 minutes in every 1˚.
   Towards the east, one gains 4 minutes in every 1˚

Calculation of time using longitude.

- Time calculation involves finding the difference in degrees of the longitudes of the two given points.
- This difference is then multiplied by 4 minutes, the time taken by the earth to rotate through 1˚.
- Determine if the place whose time you are finding is found on the east or on the west of Greenwich Meridian. If on the east, add the time to the given time. If on the west, subtract.

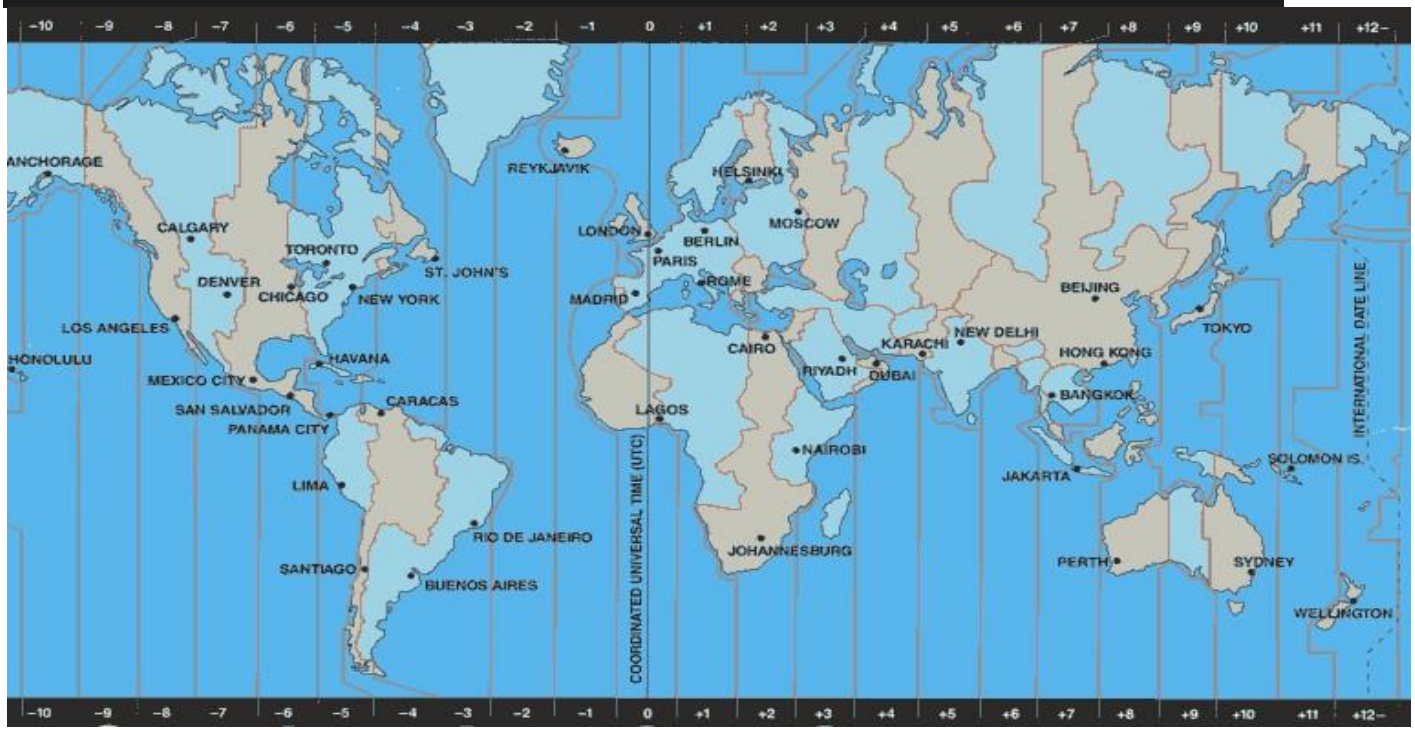
Standard time and time zones.

Time zones are the internationally agreed divisions of the world into zones, each approximately 15˚wide with regular intervals across the oceans and irregular ones over land.

The irregularities over land are to avoid splitting any one country into different time zones as this could create confusion. The world has 24 time zones. The time recorded by countries in the same time zone is called **standard time**.

The world time zone map.

World time zones



International Date Line.

This is the line following approximately longitude 180˚ except where it has to cross through a group of islands or a country. Where it curves, the aim is to avoid splitting a country or islands belonging to one country into different time zones. On crossing this line, one loss or gains a day.

REVOLUTION.

The orbiting of the Earth around the Sun is called a *revolution* and it takes 365.26 days to complete one cycle. A normal year is therefore 365 days while a leap year (every fourth year) has 366 days.

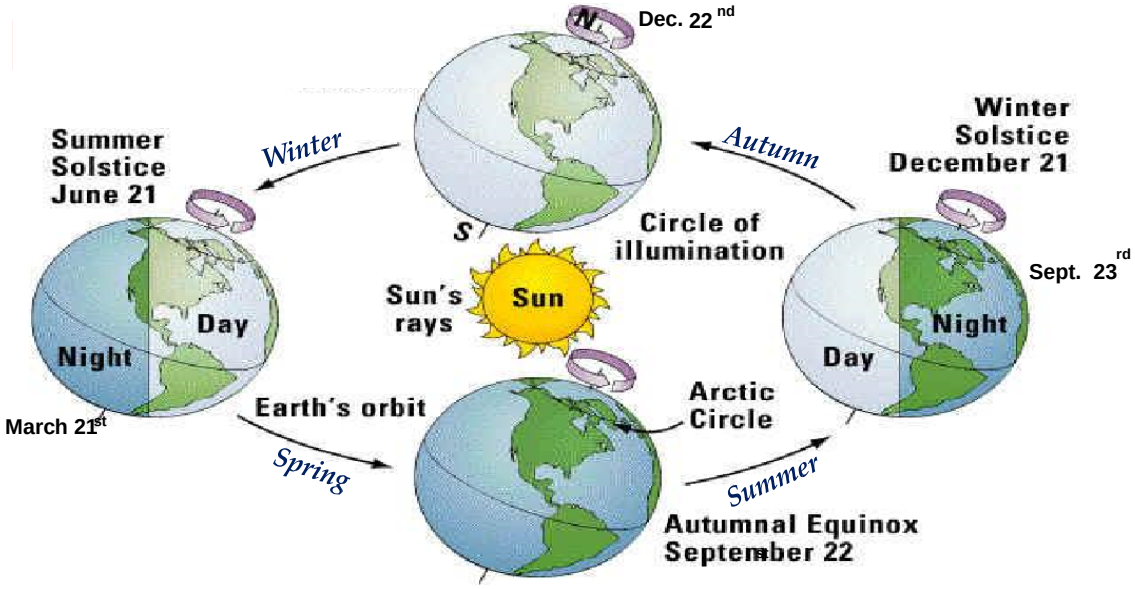
When the Earth is revolving, its axis is not at right angles to this surface, but inclined at an angle of about 23.5° from the **perpendicular**.

The results of the movement of the earth around the sun and inclination of its axis are;

1) It causes the **seasons,** by controlling the intensity and duration of sunlight received by locations on the Earth.

The four resultant seasons are *spring, summer, autumn* and *winter.*

The four seasons



The seasons are mainly experienced in the high and mid latitudes. When the sun is overhead at the equator on March 21st, it is the beginning of spring in the temperate regions of the northern hemisphere when snow melts and vegetation begins to blossom and animals spring to life. It is autumn at the same time in the mid latitudes of the southern hemisphere. Winter is the season when the temperatures are very low.

2) It results in the s**olstices** and **equinoxes. .**

On June 21st and December 22nd, the sun's overhead position is over the tropic of cancer and Capricorn respectively. This time of the year is known as solstice. During the *summer solstice (June 21st)* the Earth's North Pole is tilted 23.5^0 towards the Sun. all places above latitude 66.5^0 N in 24 hours of sunlight, while locations below latitude of 66.5^0 S are in darkness.

During the December 22nd solstice (*winter solstice),* The North Pole is tilted 23.5^0 away from the Sun. On this date, all places above latitude 66.5^0 N are now in darkness, while locations below latitude 66.5^0 S receive 24 hours of day.

During the equinoxes, the axis of the Earth is not tilted toward or away from the Sun. (On September 23rd and March 21st). Day lengths on both of these days, regardless of latitude, are exactly 12 hours.

3) Varying length of day and night

The axis of the earth is inclined to its ecliptic plane at a certain angle.

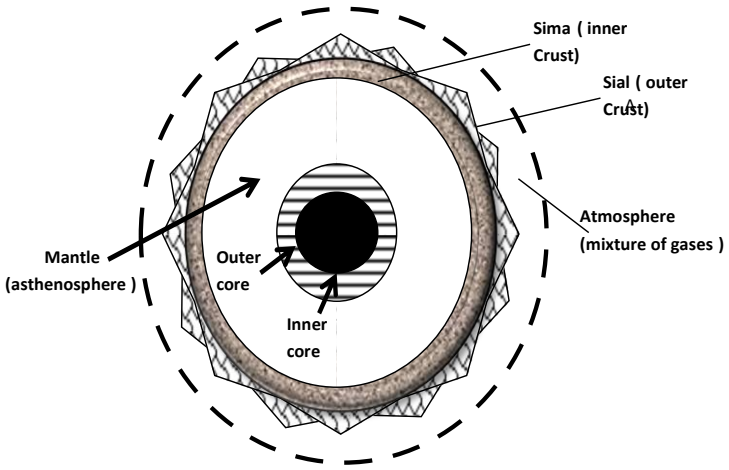
If the axis of the earth was perpendicular to the elliptical plane, all parts of the earth would receive equal nights and days at all times of the year.

However, variations are witnessed governed by the apparent position of the overhead sun. For example in December, the north experiences longer nights than the south because the sun is overhead in the south.

4) Changes in position of midday sun.

The annual change in the relative position of the Earth's axis in relationship to the Sun causes the height of the Sun or solar altitude to vary in our skies.

The structure of the earth.



Earth's radius is about 6,371 km and the radius of the core is about 3,486 km (the inner core radius is about 1,217 km.

The earth is made up of three main layers namely; the ***crust, mantle***, and ***core***. Other layers ate the ***Atmosphere*** which is the layer of gases surrounding the earth and the **hydrosphere** which is the layer of water covering the earth.

1. **Earth's Crust**:

The crust ranges from 16–24 km in thickness though it may extend upto 80km here high mountains exist and reduce upto 6km thick where deep ocean trenches exist.. It is the outermost layer.

The two subdivisions of the crust are;

a) The thin inner ***oceanic*** crust. It mainly consists of *silica* and *magnesium*; it is therefore called **sima** (si-silica and ma-magnesium). It has an average density of 2.7 gms/cc.

b) The thicker ***continental crust***. The main mineral constituents of the continental mass are silica and alumina; it is thus called **sial** (si-silica, 65–75% and al-alumina). Its density is between 2.8 and 3.0 gms/cc.

NB; the density of the rocks of the earth appears to increase with increasing depth. The uppermost mantle together with the crust constitutes the *lithosphere.* The crust-mantle zone of discontinuity is called the *Mohorovicic discontinuity* or *Moho.*

2. **Mantle**

Earth's Mantle extends to a depth of *2,890 km*, and is the thickest layer of the Earth. The mantle is composed mainly of *olivine-rich rock*.

The temperature of the mantle increases with depth. The average density of the mantle is 3.0gms/cc – 3.3gms/cc.

Rocks in the upper mantle (region of the mantle within 1000km of the surface) are cool and brittle enough to break under stress, while rocks in the lower mantle are hot and soft (but not molten) and flow when subjected to forces instead of breaking. Most of the heating in the mantle is due to radioactive decay. The zone of discontinuity between the mantle and the core is called ***Guttenberg discontinuity***.

3. **Core**

Earth's Core is thought to be composed mainly of an *iron (80%),* and *nickel alloy*. Seismic measurements show that the core is divided into two parts;

a) A *liquid outer core* extending to a radius of ~3,400 km. the temperatures there are adequate to melt the iron-nickel alloy.it surrounds the inner core.

b) A *solid inner core* with a radius of ~1,220 km. though its temperature is higher than the outer core, tremendous pressure, produced by the weight of the overlying rocks is strong enough to crowd the atoms tightly together and prevents the liquid state. the inner core rotates slightly faster than the rest of the planet

WEATHER

DEFINITION.

It is the daily atmosphere conditions of a place for a short period of time.
There are several elements that are used in determining the condition of the atmosphere.
They are:

- Temperature
- Wind
- Sunshine
- Humidity
- Precipitation
- Cloud development and cover
- Atmospheric pressure.

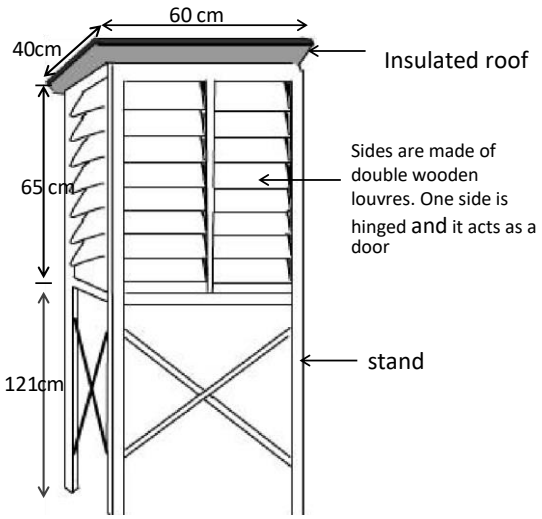
How does climate differ from weather?

Weather is the current atmospheric conditions, including temperature, rainfall, wind, and humidity at a given place.

Climate, on the other hand, is the general weather conditions over a long period of time. Weather data such as temperature variations and precipitation rates for the past 30 years are used to compile an area's "average" weather. **Weather Stations**

These are locations that are carefully chosen so that accurate and reliable data on weather elements are collected, observed, measured and recorded from there.
Weather stations must be clear of obstructions that could block the wind or cast shadows. They are fenced off so that animals cannot get in and damage the equipment.

The weather instruments are found on land in weather stations.
An important part of a weather station is a **Stevenson Screen**, which holds the thermometers.



The Stevenson screen

This is a white box with slatted/louvered sides. The white colour reflects the direct sun's rays and slats/louvers on the sides allow air to pass through freely. The box is raised on stilts/stands so that it is easier to read the instruments and there is no effect from the ground. Accurate ***temperature*** *and* ***humidity*** *readings can then be taken.*

Instruments placed outside the Stevenson screen

1. The Raingauge to measure amount of precipitation/rainfall.
2. The weather vane shows the direction.
3. The anemometer allows the wind speed to be measured.
4. A Campbell stokes sunshine recorder measures the duration of sunshine.
5. The evaporimeter that measures the rate and amount of evaporation.

Inside the screen we find the rest of the instruments which are thermometers

1. **The wet and dry thermometers**, (also called hygrometers) allow the calculation of the humidity of the air.
2. **The maximum and minimum** allow the 24 hour temperatures to be recorded. This is sometimes called a 'Six's thermometer.
3. **The mercury barometer** and an **aneroid barometer** to measure pressure.

The Stevenson screen serves two purposes;

a) To ensure the delicate instruments kept in it are safe.
b) To provide the shade conditions required for accurate temperature readings.

The weather elements.

A. SUNSHINE.

This Refers to the direct rays of sunlight reaching the surface of the earth. Sunshine duration and intensity depends on factors such as latitude, aspect and cloud cover.
Places of the same sunshine intensity on a map are joined by lines referred to as **Isohels.**

B. TEMPERATURE.

This is the degree of sensible heat within the atmosphere.
It is a Measure of hotness expressed in terms of any of several arbitrary scales, such as Fahrenheit, Celsius, or Kelvin.
The sun is the source of heat energy that maintains the temperature of the earth's surface and atmosphere. The sun's energy is transmitted in the forms of short-wave rays, a process called insolation or solar radiation.

Only a small fraction of solar radiation reaches the earth's surface. Why?
What factors determine the amount of solar radiation reaching the surface?

1. The intensity of the sun's radiation in the space and the earth's average distance from the sun.
2. The transparency of the atmosphere i.e. transmission, absorption, scattering and reflection of the sun's rays by particles found in the atmosphere.
3. The position of the earth on its orbit which produces different seasons. This causes insolation to vary with the time of the day and period of the year.
4. The inclination or angle of the surface on which the sun's ray fall.
5. The area and nature of the surface on which the rays fall.

Lines drawn on a map showing places with the same temperatures are called

Isotherms.

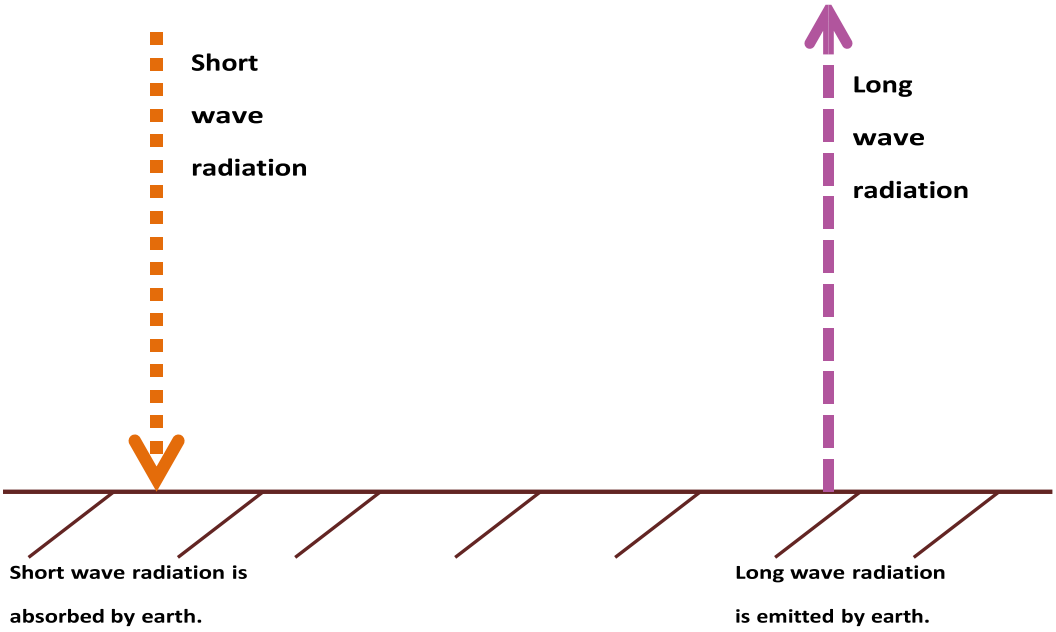
The atmosphere is heated through three main processes;
~ Radiation
~Conduction.
~ Convection.

1. Radiation.

This refers to the transfer of energy via electromagnetic waves.
Examples: o sun warms your face o apparent heat of a fire
Radiation travels in waves that are very small and are transmitted from one place to another without the help of a medium (travel in a vacuum).
The earth emits heat by long-wave radiation called terrestrial radiation which is invisible.
The earth radiates its maximum heat at a much longer wavelength than the sun.

Difference between solar and terrestrial radiation

~ Solar radiation is short wave while terrestrial radiation is long wave.
~ Solar radiation is partially visible as sunlight
~ Solar radiation takes place only daytime.



2. Conduction.

It is the transfer of heat through matter, without moving it (matter). It is the transfer of heat energy through motion, from one molecule to another.
Air in the atmosphere is heated by direct contact with the earth.

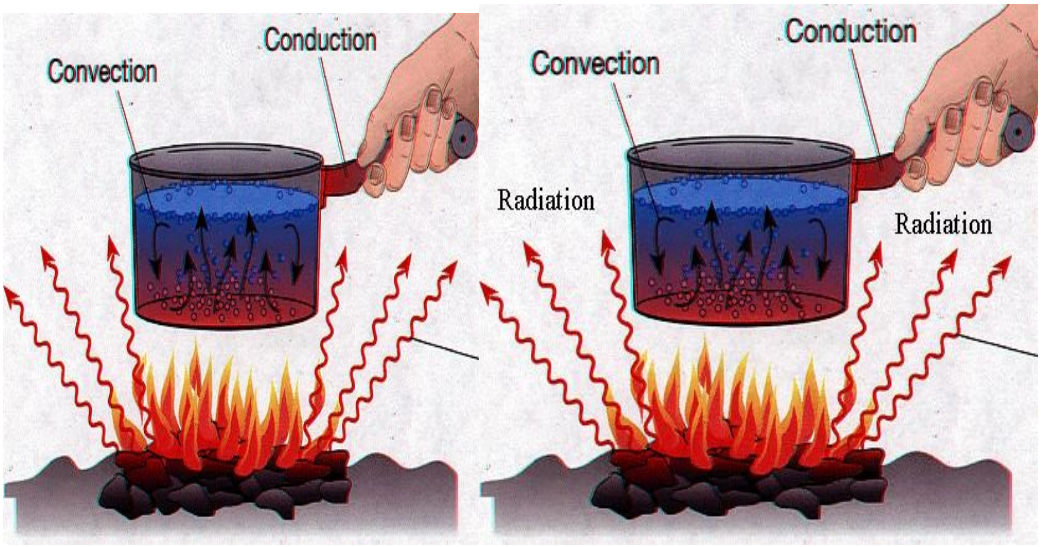


Illustration of conduction, radiation and convection.

3. Convection.

This is the transfer of heat through mass movement of a substance**.** The "substance" could be air or water. It takes place when air is heated by the earth, becomes less dense, and then rises to higher levels transferring heat with it. Cold air above the surface descends down to replace warm rising air. This movement of lighter air upwards and dense air down wards creates cycles called convectional currents.

INCOMPLETE NOTES

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MAPS AND MAP WORK.

Map work involves drawing pictures, naps and plans.

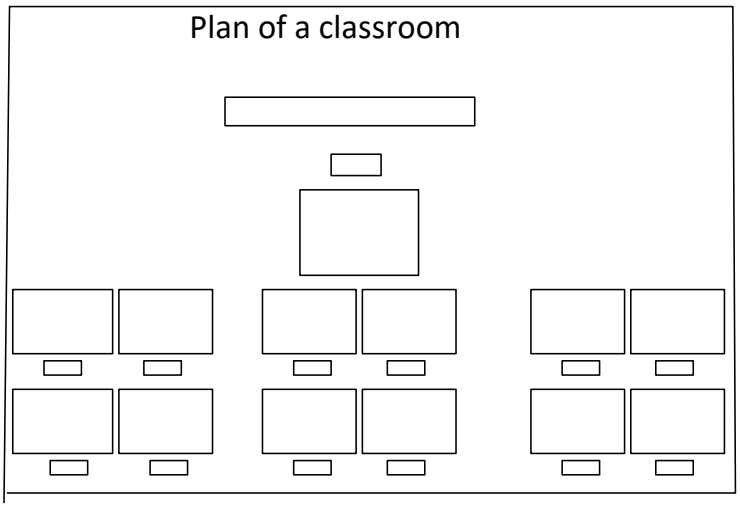
1. ***Pictures***. These are images of an actual object represented either as a drawing , painting or a photograph. It can be bigger than smaller or equal to the object depending on the size of the object and desired size.
2. ***Maps***. These are representations of a part of the earth or whole earth on a flat surface like a sheet of paper or chalkboard usually drawn to scale. It is drawn as if the area being represented was viewed from above. Emphasis is on specific desired items. E.g a physical map emphasizes mountains, rivers valleys and plains etc.
3. ***Plan.*** This is a map of a place or picture drawn to scale for specific use and giving specific information. It is selective and shows many details. E.g a plan of a house showing room details, windows and doors.

Distinction between pictures plans and maps.

A picture gives details in their visible shapes and sizes.

A map gives details which a map marker would like to depict and drawn as if the drawer was above the ground (objects and features are indicated by symbols).

A plan is a chart drawn and meant to give very minute details about very small areas like towns or villages. Also, like a map, a plan is drawn as if the drawer was directly above the ground.



Main types of maps and their uses.

a) Topographical maps.

Topography is the description of the surface features either natural or human made. Natural features include rivers, lakes, mountains etc. manmade features include Houses, towns etc. Such maps are used in the following ways.

~ They are used by travelers to find way /direction.

~ They can be used to calculate distance to destination.

~ They are useful in locating physical features like landforms.
~ They give us information about distribution of geographical phenomena like vegetation and land uses.

b) Atlas maps.

An atlas is a collection of maps, usually drawn to scale, in one volume. The maps cover larger ground on a small sheet and contain a wide range of information.
Such maps are used in the following ways.
~ ***Relief maps*** concentrate on aspects of relief and gives information on distribution of physical features like mountains, valleys and plains.
~ ***Climatic maps*** show information on temperature, rainfall, winds and atmospheric pressure. They provide information about different climates of different parts of the world.
~ ***Vegetation maps*** show distribution of natural vegetation and provide this information to geographers.
~ ***Political maps*** show political divisions usually countries, regions and districts. They are used to locate other countries and compare their shapes and sizes.
~ ***Population maps*** show distribution and settlement including towns.
~ ***Economic maps*** show distribution of various human activities of economic significance. E.g farming, transport, mining, livestock rearing etc.

c) Sketch maps.

These are maps drawn to give specific information and not usually drawn to scale. They are not usually proportional to the land area being represented. A good sketch map should have the following qualities;

- .st be neat and clear.
- .st be accompanied by a title.
- .st be enclosed in a frame.
- ɔuld have a key to explain meaning of
- ɔols used.
- ɔuld have a compass point showing north.

Uses of a sketch map.

Since they are easily drawn, they are used to store a lot valuable information which can be summarized.

MARGINAL INFORMATION.

This is the information given in the margin of a map. It gives additional information besides what is already shown on the map. It tells many things about the map and includes the following;

a) ***Map series***. This is the number identifying the map sheet with other map sheets in the same group. It is enclosed in a box. E.g (Y731(D.O.S 423)).

b) ***Edition***. This gives the year the map was published or reprinted E.g Edition 1971.

Map identification

Series
Sheet Y731 (D.O.S. 423
137/2 and Uganda 83/2 (part of)
Edition 1971
Sheet 137/2
And Uganda Sheet 83/2 (part of)

FIELDWORK

INTRODUCTION

Fieldwork is a scientific approach through which geographical knowledge and skills can be acquired practically in the field. The field is the major source of primary geographical information (data).

Types of field work.

1. **Field excursion**.

This is a field trip, study trip or a study tour where students are taken out of school to visit areas in the vicinity or places far away.

It serves the function of;

a) Reinforcing what is learnt in the classroom with practical experiences by seeing and observing.

b) Helping to gain more geographical knowledge of the area visited.

c) It helps in identifying and appreciating the existence of geographical features, human activities and the scenery.

d) It helps in Identifying problems of geographical interest which may form a subject for discussion at a later stage.

2. **Field research**.

This is A more advanced fieldwork involving problem solving approach. For example, by a medical team concerned with a disease outbreak.

3. **Field study**.

It is a study conducted within the neighbourhood and involving group or individual collecting information to achieve pre-set objectives. Data collected is analyzed and conclusions drawn.

Geographical significance of fieldwork.

The findings or results may help us to understand the geography of the area in the following ways:

- Update the information about the area of study (current situation). Highlight the new problems facing the people in the area (threats).
- Shows new solutions and prospects of developing the area (opportunities).
- Help in the understanding of geographical relationship existing in the area.

Importance of fieldwork.

a) Field work helps students to be observant, to select relevant information, to record accurately what has been observed and to draw meaningful conclusions from the observations..

b) It Breaks classrooms monotony of memorizing and listening to the teacher by providing practical situations.

c) Fieldwork Makes study of geography real by enhancing what has been learnt in the classroom. This is achieved through seeing real objects in their natural settings and studying them.

d) Fieldwork within the school environment Encourages students to appreciate their environment.

e) It Enables learners to get first hand information from the field.

f) It enables one to apply the knowledge leant in the classroom to real life situations.

g) Fieldwork encourages critical thinking or enquiry and gives students a sense of personal achievement.

h) Due to exposure in the field, the learners are assisted in understanding problems on a larger scale, e.g those affecting a locality, a country or a region.

i) Fieldwork enables us to understand the relationship between physical and human geography. In reality.

FIELDWORK PROCEDURE

Preparation of Fieldwork

For any field work study to be undertaken, both technical and organizational decisions should be considered. These include the following:

a) Identifying the topic to work on.

b) Identifying the area where to carry out fieldwork.

c) Setting up the objectives of the study

d) Formulation of hypothesis.

e) Preparation for the field study.

f) Actual field work.

Step 1: Identify the topic

The topic of study is an important guide, gives direction in carrying out field work. It is sometimes referred to as the problem. First identify the subject matter. Design the topic to establish the scope (what to study). Identify the area of study (where to look for data from) Think of the most informative and appropriate area for the topic. It can be even the current topic being covered in class. The teacher finds suitable study area. E.g. A *study of rocks around the school.*

Step 2*:* Identifying the area where to carry out fieldwork.

The area where carry out the study has to be chosen carefully to ensure success of the study. The area must contain sufficient information and within a convenient distance.

Step 3: Set specific objectives of the study

Objectives summarize what is to be achieved by the study and should address key factors of the topic. Students are led to suggest *short and precise instructions* to facilitate the

collection of data in the field. They should be in a logical sequence. The objectives are intended to direct the student's activity towards acquiring specific skills. Objectives should be stated in action verbs that are specific enough to be achieved. A standard objective should start with the words "**to find out**" "**to investigate**", "**to identify"** Examples:

ACTION VERBS	AVOID VAGUE VERBS (ABSTRACT)
To: - Identify Find Determine Investigate Calculate Analyze, etc.	To: - Know Appreciate Understand Study These vague verbs do not direct student's activity towards acquiring specific data.

Objectives are exact statements of the activity and what is supposed to be observed.

The objectives of the study of Kimilili market are as follows:

a) To locate Kimilili market.
b) To draw a sketch map showing site of the market.
c) To explain factors for establishment of the market.
d) To identify problems facing the market in the contemporary period.
e) To find out how the market is dealing with these problems, etc.

Step 4: formulation of hypothesis.

A hypothesis is an idea, guess or suggestion from which reasoning or explanation is sought. Or it is a statement of an outcome which is anticipated. It can be a tentative answer or the proposed solution to the problem which the study is designed to test or prove. A hypothesis can be stated in *a declarative or substantive form.* E.g. the majority of the goods sold in the market are vegetables.

A hypothesis can be stated in positive form or in a negative form (null hypothesis). It can also be stated in a question form. A good hypothesis should be simple but not obvious. It must leave room for acceptance or rejection of the suggestion.

Step 5: preparation for the field study

These are the preparations you will make once you decided to carry out the field study. The kind of preparation you make depends on the type of fieldwork you intend to make. The main purpose of planning is to take note of points and activities that would be relevant for the fieldwork exercise such as;

a) Seek for official permission to carry out fieldwork from relevant authorities, i.e. school administration and administration officials of the area of study.
b) Conduct a reconnaissance.
c) Hold discussions in class.
d) Decide on the methods of data collection.
e) How much time to spend on each activity/prepare a work schedule.
f) Prepare questionnaires
g) Make budget for fieldwork exercise if there is need and pass it on to relevant authorities.
h) Fix the date for fieldwork and a program for fieldwork to be put in place.

a) re-connaissance/Pilot study

Pilot study is a pre-survey, or collecting of preliminary information. I.e. students and teachers visit the area of study well in advance;

a) To familiarize with the area and save time during the actual study.
b) To judge and gauge how the actual fieldwork could be conducted.
c) To gather general information and relevant documents from officials.
d) To help one in deciding on the appropriate methods of data collection.
e) To determine the appropriate routes to be taken.
f) Helps in assessing the suitability of the area as a source of the information you require.
g) Helps in identifying the problems that are likely to be experienced.
h) It is possible to assess the cost of the study and plan for it appropriately.
i) It helps in formulating relevant objectives and hypothesis. They can be revised after the pre-survey.
j) It helps in general planning and preparation of a **work schedule**.

b) ***Class discussions.***

This are held after the reconnaissance. The type of data to be collected is identified and a decision on the suitability of the formulated objectives and hypothesis is made.
Adjustments, if necessary are made.
Methods of data collection are decided at this stage**.**

c) ***Determine the different methods (skills) to be used in fieldwork to collect data***

Methods should be relevant to the topic of study and objectives. Explain the procedure taken to use the method. Information (specific data) obtained by the using a given method should be brought out.

Some of the basic commonly used methods in geographical fieldwork studies include:

a) Direct observation.
b) Recording.
c) Map orientation and reading.
d) Interviewing.
e) Sampling.
f) Pacing.

d) ***Identify the tools and equipment to be used in the collection of data.***

Examples: Stationary – pens, pencils, and clip boards, note book, base map. Measuring equipment- tape measure, foot-ruler, and magnetic compass. *e) Preparation of a work schedule.*

A work schedule is a timetable to be followed on the day of the field study. It gives a step by step plan of activities for the day indicating the specific times when each activity should take place.

Such a schedule is important in the following ways;

(i) It ensures proper time management and reduces the tendency of wasting time.
(ii) It ensures that no important area will be inadequately covered or forgotten.
(iii) It ensures that the one carrying out the study remains on course. i.e does not deviate into irrelevant areas.
(iv) It is a pointer as to how much time will be required for the study.

(e) Briefing (coordination) and dividing in groups.

This specifies the details on how you are going to operate (operational plan). This involves telling students what is expected. It involves the following: -

a) Reviewing the topic to work on.
b) Revising the objectives of the study, specifying how individual objectives are to be achieved.
c) Describing the methods of recording data.
d) Emphasizing how to approach people in a polite way to maintain good relationship.
e) Grouping the students into working teams (team work) and Assigning students different responsibilities to do.

Step 6: Actual fieldwork (collecting relevant data)

This is the stage of collecting data practically, the students go in the field and apply the knowledge and methods, identified and discussed in the pre- fieldwork preparations to collect the geographical data about the area.

Note that:

a). In the field, the first thing to do is to introduce /notify your presence to relevant authorities or management by producing the letter that you used to seek permission during your pilot study.

b) The best way to start fieldwork is identifying a strategic position where you can see all you want to study.

c) Periodically, review the topic and objectives to ensure that data being collected is relevant.

Step7: Follow up activities (analyzing data and presenting results of fieldwork)

The main purpose of follow up exercise is to re-organize and discuss results, concerning the topic and the objectives of fieldwork as spelt out from the beginning.

The following are done as follow-up activities;

a) Students discuss and compare data (is sharing information through discussion).

b) Polish up diagrams and sketches drawn during the study.

c) Organize the data, analyze and interpret the data and show the different relationships.

d) After compiling each group reports their findings (data presentation).

e) Students write a report on the entire fieldwork exercise.

f) Report writing (this is data analysis according to objectives)

Methods of data collection.

1) Observation.

Direct observation is to see and identify patterns and interrelationships. This method gives opportunity to record what is seen directly. The method serves well in a situation where the phenomena being understudied cannot communicate back. E.g. rocks, soil, rivers and vegetation.

Advantages of the observation technique.

i. The data obtained is reliable since it is first-hand information.

ii. One collects only what is relevant to the study. iii. It is time saving because you do not have to look for data in many places.

Disadvantages.

i. It has an element of subjectivity because the data may be the findings of only one person's observations.

ii. The choice of spots to gather data from may be an individual's choice and preference, which may be biased.

iii. Data on past activities may not be available during the study.

iv. Where the required information may have changed with time, one can make wrong conclusions.

v. Visual disabilities may reduce the effectiveness of the technique. vi. It involves a lot of traveling which makes it tiresome or expensive.

2) Interviewing.

Interviewing is when questions are asked to respondents and answers received from them to obtain information about desired geographical aspect. An interview may be conducted face to face or on telephone.

Below are some of the guidelines on how to achieve a conducive atmosphere for an interview;

a) Approach people politely.

b) Create a warm and friendly atmosphere for respondents.

c) Assure the respondents that the information they give remains confidential.

d) Avoid unnecessary interruptions during the interview.

e) Do not suggest answers. Let all the answers come independently from the respondents.

Advantages of the interview technique.

a) It gives first-hand information through direct responses from the resource persons.

b) The interviewer can seek clarification from the respondent in case of ambiguity in answers.

c) The interviewer is free to seek for more information by initiating further discussions or by asking other questions.

d) Information can also be obtained from people who cannot read or write.

e) The interviewer has the opportunity to create a good rapport with the respondent and this would ensure that reliable answers are given.

f) The interviewer can also gauge the accuracy of the responses.

Disadvantages.

a) It is time consuming since the interviewer has to handle one person at a time.

b) It is expensive and tiresome since the interviewer has to move to different places to meet the respondents.

c) It can easily be prone to language barrier where the interviewer and the respondent do not speak the same language. Use of interpreters might distort some information.

d) Where resource persons may have forgotten, information on events in the past may be unreliable.

e) The respondent may sometimes through exaggeration give wrong information or even deliberately mislead.

3) Administering questionnaires.

This is a system of data collection where the researcher gives out a rigid questionnaire to the people in the field. The questions are prepared in relation to the objectives and hypotheses of the study.

There are two types of questionnaires;

a) ***The open-ended questionnaire.***

This questionnaire has questions which are not limiting. The questions act as a guide to a person carrying out the field work. He/ she can go even beyond the question requirement when answering the questions. Such a questionnaire is also called a personal interview questionnaire.

b) ***The rigid questionnaire.***

This has a series of questions which are administered to a respondent in the field. In this questionnaire, possible answers may also be given within the questions. The responds only ticks the correct answer.

MINERALS AND ROCKS

Minerals

Minerals are inorganic substances which occur naturally at or beneath the surface of the earth.

Most Minerals are formed from more than one element and majorly from oxygen, potassium, magnesium, iron, aluminum, sodium, calcium and silicon.

Others like diamond, gold and silver are formed from only one element..

Minerals like sulphur have no crystals.

Characteristics of minerals.

1) They have different degrees of hardness. talc is the softest while industrial diamond is the hardest.
2) Some minerals aggregate into distinct shapes.
3) Some minerals like gold, silver, copper and diamond have only one element while others like bauxite have more than one.
4) Minerals can be opaque, translucent or transparent.
5) Minerals have different textures (feel).
6) Minerals have specific colours, for example, gold is yellow and copper is brown.
7) Minerals have luster. This refers to the surface appearance of a mineral as it reflects light.
8) Minerals have different degrees of tenacity. they can be described as brittle, elastic, ductile or flexible.
9) Minerals differ in streak. This is the Colour that a mineral leaves when it is rubbed against a hard surface.

Rocks.

A rock is a substance that is an aggregate of mineral particles. It may be made of particles of one mineral only or a combination of two or more minerals.

Classification of rocks

Rocks are classified according to their mode of formation and appearance. Three rock types exist;

1) Igneous rocks
2) Sedimentary rocks
3) Metamorphic rocks

Igneous rocks are produced when molten magma cools and solidifies.

The magma may solidify within the earth's crust forming **intrusive igneous rocks** or on reaching the earth's surface forming **extrusive igneous rocks**.

Some igneous rocks like granite cool slowly forming large crystals. Others like basalt cool rapidly and thus contain small crystals.

INTRUSIVE ROCK TYPES

Intrusive rocks crystallize from magmas that have been intruded into the earth's crust at depths far below the surface. Intrusive rocks that were formed deep in the earth's crust are called **plutonic rocks**. They are generally coarse grained (mineral grains greater than 1 millimeter in diameter).

Those formed near the surface are called **hypabyssal** rocks. They can be found in features like dykes and sills. Examples are dolerite, Porphyrite, porphyry, Diabase, lamprophyre and Granophyre.

***Intrusive rocks examples*;**

a. **Gabbro**. It is a *basic rock* that contains a high %-age of ferromagnesian minerals like pyroxene, olivine, plagioclase feldspar and about 25 to 50% silica.
b. **Diorite** is an *intermediate rock* containing plagioclase feldspar, hornblende or pyroxene.
c. **Granite** is an *acidic rock*, containing at least 65% silica with dominant minerals being potash feldspar, quartz, hornblende, biotite *(black mica)*.
d. **Peridotite.** It is an *Ultrabasic rocks* almost completely composed of olivine and pyroxene**.**

EXTRUSIVE/VOLCANIC ROCKS

These rocks are formed on the surface of the earth when lava solidifies. The kind of rock is largely dependent on the type of lava. Since the lava solidifies quickly, on falling onto the surface, the crystals formed are very small. The rocks are fine textured.

They are of two types;

Volcanic ejecta

The materials thrown out from the ground during volcanic eruptions include solid ash and semi-liquid materials. The most common rock formed from cooling of these materials is **pumic**e which is spongy and can easily float on water. When volcanic ash and dust settles on the ground, it may be compressed to form a rock known as **tuff,** which is a mechanically formed sedimentary rock but whose forming materials are of volcanic origin.

Lava flows.

These are formed from the magma that has reached the surface and flown for a considerable distance before solidifying, depending on its degree of fluidity.

Basalt is the commonest type of rock formed from this lava. It is a dense black rock that is similar to Gabbro.

Another rock is obsidian which is also black and has a glassy appearance and is known as volcanic glass. It does not have crystals due to rapid cooling and solidification.

SEDIMENTARY ROCKS

These are layered or stratified rocks formed from weathering, erosion, transportation and final deposition of sediments or particles of other rocks either on land or in water.

The process whereby sediments or rock particles are deposited by water, wind or moving ice is known as sedimentation.

Sedimentary rocks are non-crystalline and contain fossils. They are also known as stratified rocks. There are three classes of sedimentary rocks.

1) Mechanically formed.
2) Organically formed.
3) Chemically formed.

1) **Mechanically formed sedimentary rocks.**

They are Form from the compaction and cementation of sediments which have been laid down in water or on land. The sediments are mainly derived from the weathering and breakdown of rocks. The rock types are sometimes reffered to as **Clastic sedimentary rocks**

They are classified according to the grain size and the kinds of rock fragments that make up the sediment into arenaceous, argillaceous and rudaceous rocks.

a) ***Rudaceous /Coarse-grained rocks***. Breccia, Conglomerate and boulder clay.

b) *Ar**gillaceous/ fine-grained rocks.*** Shale, Siltstone, Mudstone, loess and claystone.

c) ***Arenaceous mainly sand particles.*** Weathered quartz or sandstone, grit

2) **Chemically formed sedimentary rocks.**

They result from chemical processes, generally under water. Examples;

a) ***Carbonates.*** These are sedimentary rocks made up of carbonate compounds. They are formed by the precipitation of calcite from seawater and also in caves as *travertin*e in form of stalactites and stalagmites and Trona which is hydrated sodium carbonate.

b) **Sulphates and chlorides**. They are Also termed *evaporates*. Sulphates are formed from the evaporation or desiccation of sulphate compounds. The rocks form mainly in shallow desert lakes. E.g *gypsum* which is a hydrated calcium sulphate

MINING

Mining is the extraction of valuable minerals or other geological materials from the earth from an ore body, lode, vein, seam, or reef.

Mining techniques can be divided into two common excavation types: surface mining and sub-surface (underground) mining.

Occurrence of minerals.

Minerals and mineral ores may occur in four main formations;

1. *Veins and lodes.*

A vein is a crack or a crevice in a mass of rock containing minerals deposited in crystalline form. If the deposit is large, it is known as a ***lode***. If the veins and lodes are exposed to the surface, they are known as ***reefs***. They are associated with igneous and metamorphic rocks. Veins and lodes are common in metamorphic aureoles of igneous rocks. They are formed when minerals in molten form are intruded into cracks and as they cool, they solidify. Metals that occur in veins include copper, tin, lead and zinc. Unwanted material after extraction of metals is known as ***gangue***.

2. ***Beds and seams.***

Coal and other minerals may occur in beds or layers as a result of deposition, accumulation and concentration in horizontal strata of the earth's crust, of plant remains. Also potash salts, common salt, and gypsum after formation by evaporation of water from lakes and ponds may be covered by other materials so that they occur as underground seams.

3. ***Alluvial deposits.***

Minerals resistant to weathering may be eroded in small particles from veins of rocks. They then are carried by streams and rivers to the valleys or plains where they are deposited. The alluvial deposits of minerals occur within the sand, clay and gravels. Examples are Gold, tin and platinum.

4. ***Weathering products.***

Some minerals may be formed through deep weathering of a variety of rocks under tropical conditions of alternating wet and dry conditions. For example, Bauxite is formed by concentration of aluminium minerals as a result of leaching by ground water.

FACTORS AFFECTING EXPLOITATION OF MINERALS

The occurrence of minerals does not guarantee their exploitation. Many factors must be considered before actual mining begins, some of them are listed below:

1) ***Value of the mineral***: a mineral is not worth mining unless it has a high commercial market value. Minerals like gold, diamond, copper and uranium are often mined at very high cost, but their value and profitability are just as high.

2) ***Size and grade of the deposits*:** unless the deposits are of reasonable size and high grade, it might not be worthwhile investing in expensive equipment and basic infrastructure to undertake the mining.

3) ***Mode of occurrence*:** if the deposits occur too deep in the earth's crust or in many remote places such as in the ocean, the cost of extraction may be too high.

4) ***Transport costs**:* minerals occurring in remote, sparsely populated regions, away from the urban and industrial markets, may not be worth mining as the cost of constructing transport networks might outweigh the profit derived.

5) ***Labor supply**:* workers must be available if any mining is to be undertaken, if amine is located in a distant place, it will be very difficult to secure a reasonable supply of workers and site engineers.

6) ***Level of technology.*** This is important in prospecting for, mining and processing of minerals. In developing countries, mineral exploitation has been affected by low levels of technology.

7) ***Availability of capital***. A large capital outlay is required in mining. Countries with inadequate capital rely on foreign investors who always have an upper hand in mining over the local people.

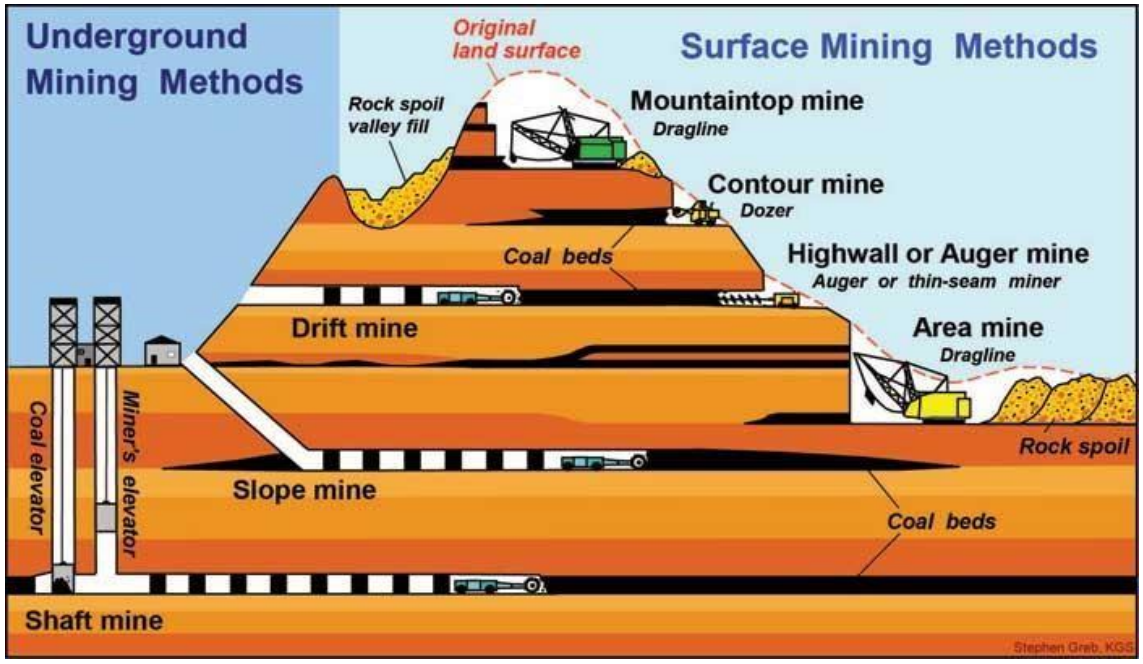
8) ***Availability of market.*** Unstable world market prices may affect mining . for example, Zambia where copper has been a major foreign exchange earner was heavily affected by falling of the copper prices in the 1970s. some mines were closed down and the country resorted to other economic practices to avoid effect on balance of payment.

Methods of Mining

There are basically two main types of mining:

- Open-cast or surface mining
- Underground mining

Methods of Mining



1. **Open-cast or Surface mining**.

In this type of mining the minerals or rocks that are to be mined are exposed at the surface or very close to the surface. To extract the materials, giant earthmovers remove the top soil and the rocks and the material is extracted.
The following are types of surface mining processes:

a) *Strip mining process*

As the name suggests the surface of the earth is stripped. In this process the soil and rocks that lie above is removed generally by heavy machinery and then the mineral ore is extracted. This type is possible only when the targeted materials are relatively near the surface. The mineral generally extracted is coal or some kinds of sedimentary rocks. In Kenya Athi River and Bamburi Limestone mining is done by stripping

b) *Alluvial/Placer mining process*

In this process alluvial deposits in sand or gravel are extracted. This process does not involve the usage of any sort of heavy materials and can be considered relatively easy when compared to others. Generally gold and other gemstones are mined in this process.

c) *Hydraulic mining process*

In this process high pressure water jets are used to dislodge rocks and minerals. During earlier times gold was found in an easier way by this method. However, this process has been discontinued due to environmental concerns.

d) *Dredging process*

It is the process of underwater excavation by deepening a water body. In this method sediments and other substances are removed from harbors, rivers and other water bodies and minerals are extracted.

e) *Panning*.

This process involves digging out of the sand or gravel from the bed of the river and whirling it with water in a shallow pan. The pan is tilted in such a way that the lighter sand/gravel is washed on the side leaving the heavier mineral. For example, mining of gold at Rongo in Migori and on river Morun beds in west Pokot.

f) *Open pit process*

The easiest and the cheapest way to mine materials that are close to the surface, large open holes are dug in the ground. Sometimes, explosives are used to get large blocks of rocks out of the way.

2. underground mining

There are five processes. They are:

a) *hill Slope boring*

A type of underground mining, slopes are made into the ground and the desired material is accessed. This is done when the minerals are located far enough and surface mining cannot be employed to reach it. Generally, coal is mined in this way.

b) *Drift/Adit mining process*

This process is carried out when the material is situated sideways of a mountain. The materials are easier to access and the mouth is made slightly lower than the resource area so as to allow gravity to pull down the materials easily. Generally, coal or iron ore is mined through this process.

c) *Shaft process*

The deepest form of underground mining, this is done by excavating a vertical passageway deep down. The materials to be extracted are situated deep inside and elevators are used to take the miners up and down. It is kept in mind that the tunnels are made airy for miners to work without any problems.
Generally, coal is mined in this process.

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