

CONCEPT OF GEOGRAPHY

GEOGRAPHY

Geo – means earth

Grapha/Grapher – means to write, to draw and to describe about the earth

Geography is the study of distribution and interrelationship of phenomena in relation to the earth's surface.

or

Geography is a science that deals with the earth and its life, the description of land sea, air, plants and animal life including human being and their activities.

or

It is the science of distributions and is concerned with spatial variations in any physical or cultural.

BRANCHES OF GEOGRAPHY

There are three main branches of geography namely: -

(a) Physical geography

(b) Human and economic geography

(c) Practical geography

A. PHYSICAL GEOGRAPHY

Is concerned with Land formation processes, weather and climate . Also it is the branch of geography that studies all physical features e.g .Mountain, rift valley

B. HUMAN AND ECONOMIC GEOGRAPHY OR REGIONAL GEOGRAPHY.

It deals with all activities of human on the earth's surface, which includes mining, agriculture, transportation, settlement, tourism etc,

C. PRACTICAL GEOGRAPHY

Is concerned with field study of photograph interpretation, map work , statistics and research.

Exercise 1

1. Why are we studying geography?
 - (i) To gain skills of observing, measuring, recording and interpreting phenomena
 - (ii) To understand interaction between our country and other countries and share ideas of solving problems.
 - (iii) To acquire skills for combating environment problems in order to conserve and manage the environment in a sustainable way.
 - (iv) To develop awareness and knowledge about natural resources (Land forests, mineral deposits, water etc) wild animals climatic regions and other natural resources..
 - (v) It provide base for specialization career for example cartographer, climatology, geologist etc
 - (vi) It helps to learn on how other countries in the world solve different problems like fire outbreak disease, environment problems e.t.c
 - (vii) It help us to understand aspect of weather and climate and how it influence the environment
 - (viii) To gain the knowledge of employment opportunities

Exercise 2

1. What is geography?

Geography is the study of human and environment in relation to the earth

2. How many branches of geography do we have?

There are three branches of geography namely;

- (i) Physical geography
- (ii) Human and economic geography
- (iii) Practical geography

Physical geography concerned with Land formation process, weather and climate.

Human and economic geography deals with all activities of human on the earth's surface.

Practical geography is concerned with field study, photograph interpretation ,map work and research

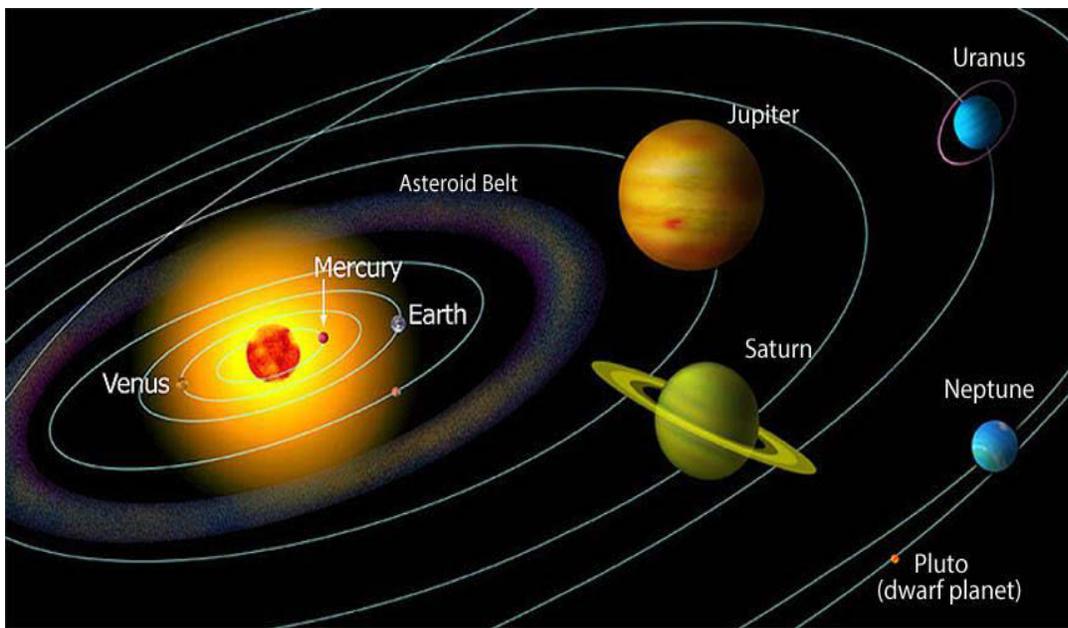
3. Why are we studying geography? (give three strong reasons and examples)

- (i) To develop awareness of our country and heritage.
- (ii) To expand our knowledge of employment opportunities.
- (iii) To gain skills of observing, measuring, recording and interpreting phenomena.

THE SOLAR SYSTEM

Is the arrangement of sun, planets and other solid objects in the space in relation to the position of the sun.

The planets are not arranged in a single line from the sun, they are scattered in the space.



1. Mercury = 57,600,000 km
2. Venus = 107,200,000 km
3. Earth = 148,800,000 km
4. Mars = 227,200,000 km
5. Jupiter = 772,800,000 km
6. Saturn = 1,417,600,000 km
7. Uranus = 2,854,400,000 km
8. Neptune = 4,468,800,000 km

A. SUN

Sun is the star. It is one among the millions of stars that one sees at night except that it looks much bigger because it is closer to the earth than other distant stars.

The sun is much larger than other distant stars from the earth, in fact much larger than all the planets put together. Its diameter is approximately 1.4 million kilometers and its mass is approximately 330,000 times greater than that of the earth. The elements that form the material of the sun are also in different proportion from those of the earth.

The sun is composed of approximately;

- 75% hydrogen
- 23% helium
- 3% of other elements

The earth is relatively cold body but the sun is so hot that nearly all molecules are broken into their separate atoms and all are mixed together into a single hot gas. Its average surface temperature is about 6000°C , it is much hotter in the interior where it is about $14,000,000^{\circ}\text{C}$.

The sun is the main source of all light and heat that the planets receive.

B. SOLAR ENERGY

The sun is the source of all energy in the earth. This is called solar energy. Solar energy is the energy produced by the sun

USES OF SOLAR ENERGY

Solar energy is used in many ways: -

1. In drying clothes, grains, fruits and meat.
2. Growing plants :- when plants grow they use energy from the sun to manufacture their food through the process known as **photosynthesis**
3. Solar energy captured in solar panels and stored in batteries provides electricity used in generating industrial and home appliances like television, refrigerator, Oven, electric iron and cooker.
4. Many everyday items such as calculators and other low power consuming devices can be powered by solar energy effectively
5. Is used as a source of vitamin D for human being
6. It is used for evaporation of water from water bodies which is necessary for rain formation

Coal energy is the solar energy stored in the bodies of plants grew thousands of years ago, which after being buried under the earth for a very long time turned into coal similarly gas and oil formed from died bodies of organic matters which lived thousands of years ago.

HOW THE USE OF SOLAR ENERGY PROMOTES ENVIRONMENTAL CONSERVATION

1. Solar energy is used by plant during manufacturing its food through the photosynthesis. In this process plants take up carbon dioxide from the atmosphere and releasing oxygen. In doing so carbon dioxide is removed from the atmosphere making the ozone layer safe and more oxygen to be used in troposphere by other living organisms
2. More over, Solar energy is clean and safe type of energy suitable for heating and lighting. This is due to the fact that it does not release soot.
3. The use of solar energy in households helps to promote and conserve environment in the sense that it would reduce the need for firewood and charcoal, where by both once extracted pollute and destroy forest.

4. The use of solar energy also reduces the use of fuel like kerosene as a result it helps to reduce environmental pollution caused by smoke from burning fuel

SOLAR ENERGY IN RELATION TO THE EMANCIPATION OF WOMEN (HOW SOLAR ENERGY CONTRIBUTE TO THE EMANCIPATION OF WOMEN)

i) Helps to reduce the time would be consumed/used by the women searching firewood from forest.

ii) The use of solar energy equipments on cooking makes them to have more time to be involved in money making activities such as business or farming.

iii) Through the use of solar energy equipments in cooking and other domestics tasks, young girls get time to go to school and private study as it was to the boys.

C. PLANETS

The planets are bodies that revolve around the sun. They include:-

- | | | |
|------------|------------|------------|
| 1. Mercury | 4. Mars | 7. Uranus |
| 2. Venus | 5. Jupiter | 8. Neptune |
| 3. Earth | | 6. Saturn |

As they revolve around the sun they appear to move around the star. That is why the Greeks called them planets means “Wandering stars”. All planets revolve around the sun in the same orbit that are elliptical and nearly the same plane.

The time taken to complete an orbit round the sun depends on the distance of the planet from the sun. All the light and heat of the planets come from the sun. Hence the temperatures on the planet depend on their relative distances from the sun.

However, Pluto is not a planet because an object to be a planet, it needs to meet these requirements (criteria) defined by the International Astronomical Union (IAU) as follows:

- i) It needs to be in orbit around the sun
- ii) It needs to have enough to pull itself in a spherical shape

iii) It needs to have "Cleared neighborhood of its orbit"

Note: Any object that doesn't meet this 3rd criteria is considered a dwarf planet. And so, Pluto is a dwarf planet is not a planet.

PLANETS POSITION AND CHARACTERISTICS

Planet	Approximate distance from the sun	No. Of moon per planet	Average temperature	Period per orbit
Mercury	58 million km	0	340 °c	88 days
Venus	108 million km	0	40 °c	225 days
Earth	150 million km	1	-	365.5 days
Mars	288 million km	2	100 °c	1 year and 322 days
Jupiter	777 million km	16	138 °c	11 years and 315 days
Saturn	1426 million km	20	247 °c	21 years and 167 days
Uranus	2869 million km	15	200 °c	84 years and 6 days
Neptune	4495 million km	2	265 °c	164 years and 288 days

D. COMETS

Sometimes at night one sees objects with leading heads and right tail at the sky. These are called **comets**. At present many scientists believe that comets are composed of ice crystals and fragment matters. Comets revolve around the sun far beyond the limits of Pluto. They can be seen from the earth only when they come close to the sun.

E. ASTEROIDS

Asteroids are solid heavenly bodies revolving around the sun mostly between the orbits of Mars and Jupiter. There are thousands of these, the largest having diameter of less than 800km. These bodies cannot be seen without a telescope

because they are very far away.

F. METEORS

Meteors are process of hard matter falling from outer space become visible between 110 and 145 km above the earth's surface, where as a result of friction with the atmosphere become hot and usually disintegrate. When they do completely disintegrate as they pass through the atmosphere reach the earth's surface and are known as meteorites.

Meteorites are usually made of nickel, iron or silica fragments of disintegrated comets. There are two known meteorites in Tanzania one is found in Mbozi District and the other fell at Malampaka in Kwimba District in 1930.

Sometimes meteors reach the earth's surface with such force, hence they make large holes or craters. An example of such craters in the world is the great meteor crater in Arizona desert in United states of America which is 150 meters deep and about 1 kilometer width.

G. SATELLITES

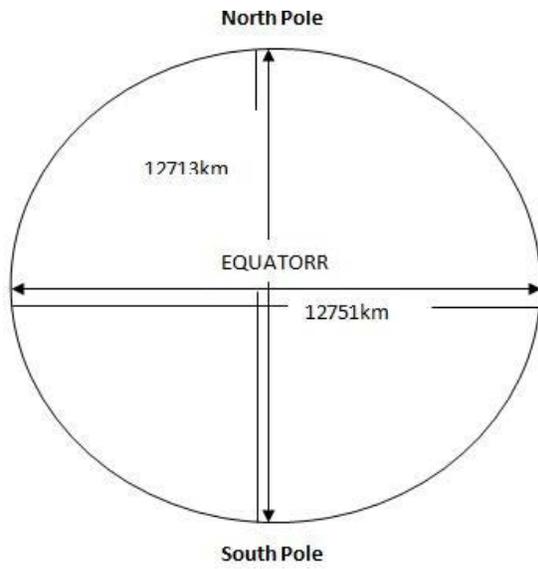
Satellites are moons of the planets. The number of satellites depend on the nature and size of planet up to the moment space researches have proved that only seven planets have satellites.

H. THE EARTH

We live on the planet earth. The Earth is made of the : -

- Atmosphere (air)
- Hydrosphere (water bodies)
- The crust solid
- Molten material
- Biosphere (living things)

About $\frac{3}{4}$ of the earth's surface is covered by water. In fact no other planet in the solar system is known to have water bodies, the shape of the earth is a flattened sphere. This flattening is very slight as indicated by measurements in diameters through poles and at the equator. The diameter through the poles is 12,713 km while at the equator it is 12,757 km.

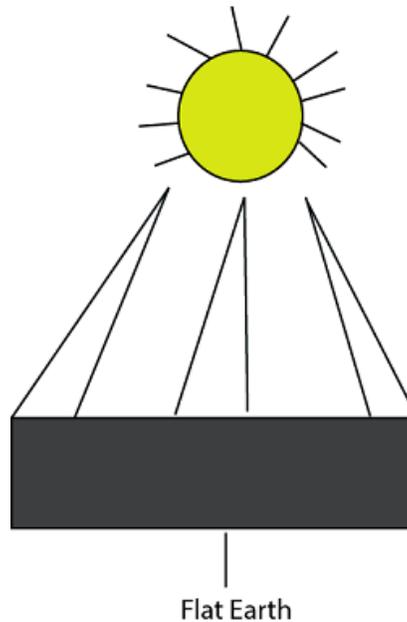
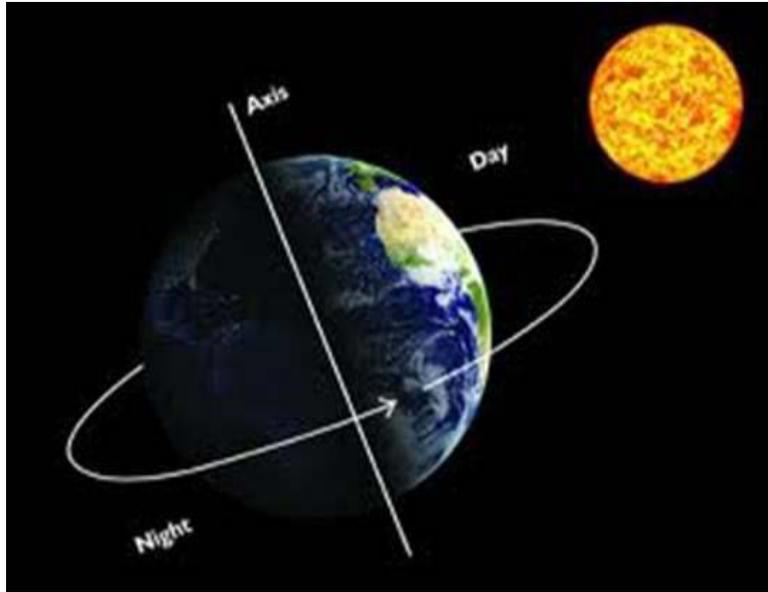


EVIDENCES OF THE EARTH'S SHAPE

There are some several evidences which are used to prove that the earth is sphere like structure, some of them are shown in the following: -

(i) SUNRISE AND SUNSET

The sunrise and sunset at different places of the earth, people in the east see the sun earlier than the people in the west due to earth's rotation from west to east. If the earth was flat the whole world would have sunrise and sunset at the same time.



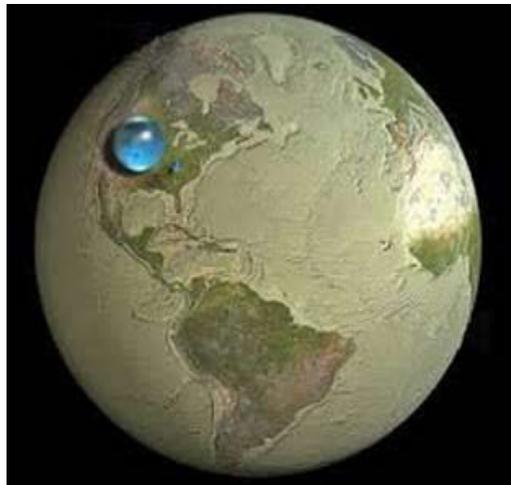
(ii) CIRCUMNAVIGATION OF THE EARTH

If traveling from a certain point of the earth and you go straight around the earth you will come to the point of origin. The first traveler around the world named Magellan in 1519-1522 proved this, image did not encounter abrupt edge over the world in his voyage.



(iii) AERIAL PHOTOGRAPHS

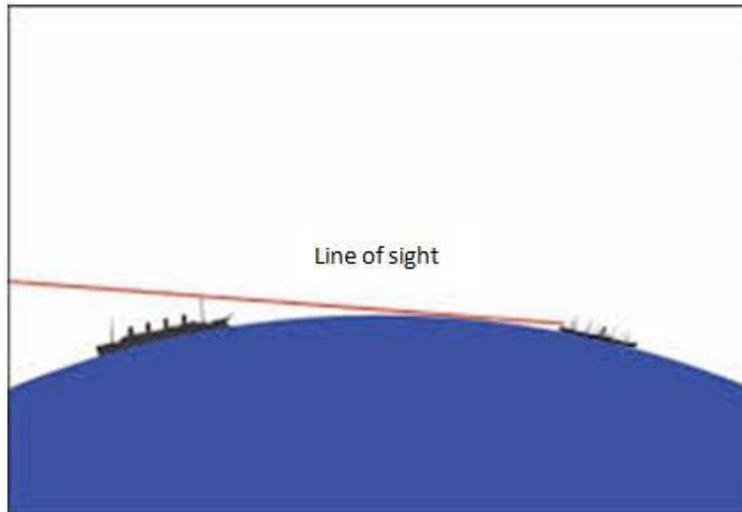
Photographs taken by satellites or aeroplane from the air show that the earth has a curved or round shape.



(iv) SHIP'S VISIBILITY

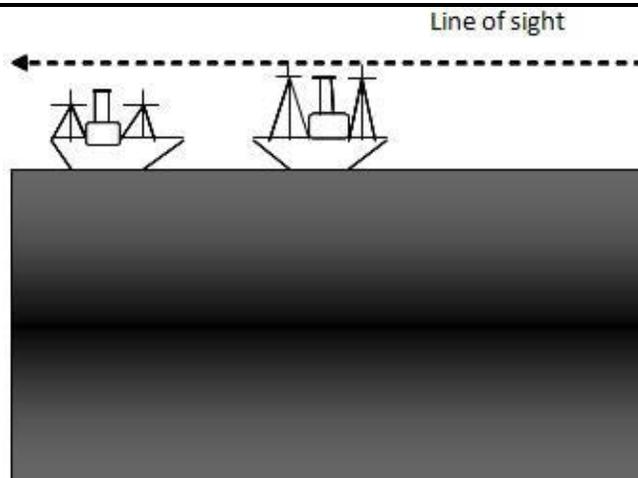
If you are in the coast viewing a ship which is very far you will see the soot, then the pipe and eventually the whole ship gradually appears. If the earth were flat the ship would have been seen all at once

SPHERICAL EARTH



FLAT

EARTH

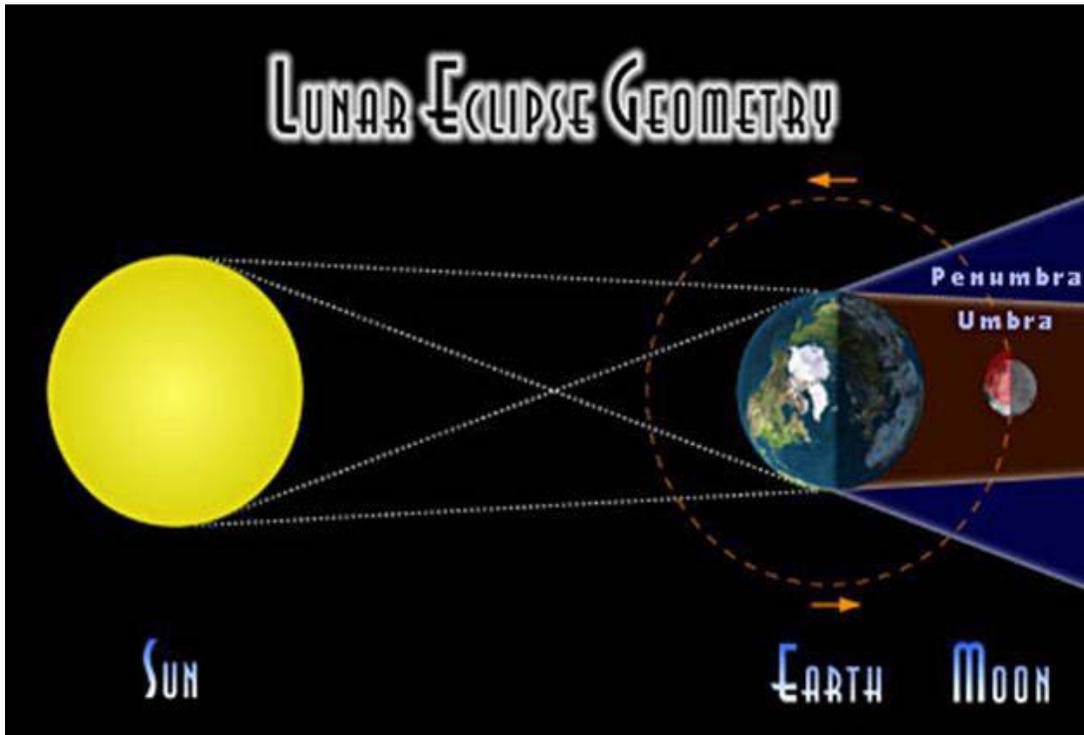


(v) **LUNAR ECLIPSE**

The shadow of the earth thrown to the moon during lunar eclipse is always round. Only a spherical object can give a circular shadow.

Earth's shadow

Earth's orbit



THE MOON

The moon is a natural satellite of the earth. It has a solid spherical body with a diameter of 3456 kilometers. The distance from the earth to the moon is a 384,403 kilometers. The moon takes 129 ½ days to make a complete revolution around the earth .

The moon appears to rise in the east and set in the west because the earth spins from west to east.

Among all planets only the earth sustains life due to its position from the sun. It is not very close or very far from the sun.

Other bodies such as Pluto which is very far from the sun does not sustain life because it is very cold. Likewise Mercury which is very close to the sun does not sustain life because it is very hot.

Exercise 1

1. Define the following terms

- (i) **Solar system** -Is an arrangement of the sun,planets and solid objects in the space in relation to the position of the sun.
- (ii) **The sun** - Sun is a big star.
- (iii) **Solar energy** - Is an energy produced by the sun.
- (iv) **The planets** - Are bodies that revolve around the sun.
- (v) **Comets** - Are the objects with leading heads and bright tail on the sky.
- (vi) **Asteroids** - Are solid heavenly bodies revolving around the sun mostly between the orbits of Mars and Jupiter.
- (vii) **Meteors** - Are process of hard matter falling from outer space.
- (viii) **Meteorites** - Are usually made of nickel, iron or silica fragments of disintegrated comets.
- (ix) **Satellite** - Are moons of the planet.

2. List down four uses of solar energy;

- (i) It is used for domestic purposes. e.g. For cooking, to generate electricity, etc.
- (ii) It is used as a source of vitamin D for human being
- (iii) It is used for manufacturing of food to the plants
- (iv) It is used for evaporation of water from water bodies which is necessary for rain formation

3. Mention five evidences which are used to prove that the earth is sphere like;

- (i) Sunrise and sunset
- (ii) Circumnavigation of the earth
- (iii) Aerial photographs
- (iv) Ship's visibility

(v) Lunar eclipse

EARTH'S MOVEMENT

The earth is in motion all the time. One does not feel this motion because one moves with it, like all other planets, the earth has two motions known as: -

- (a) Rotation
- (b) Revolution

ROTATION

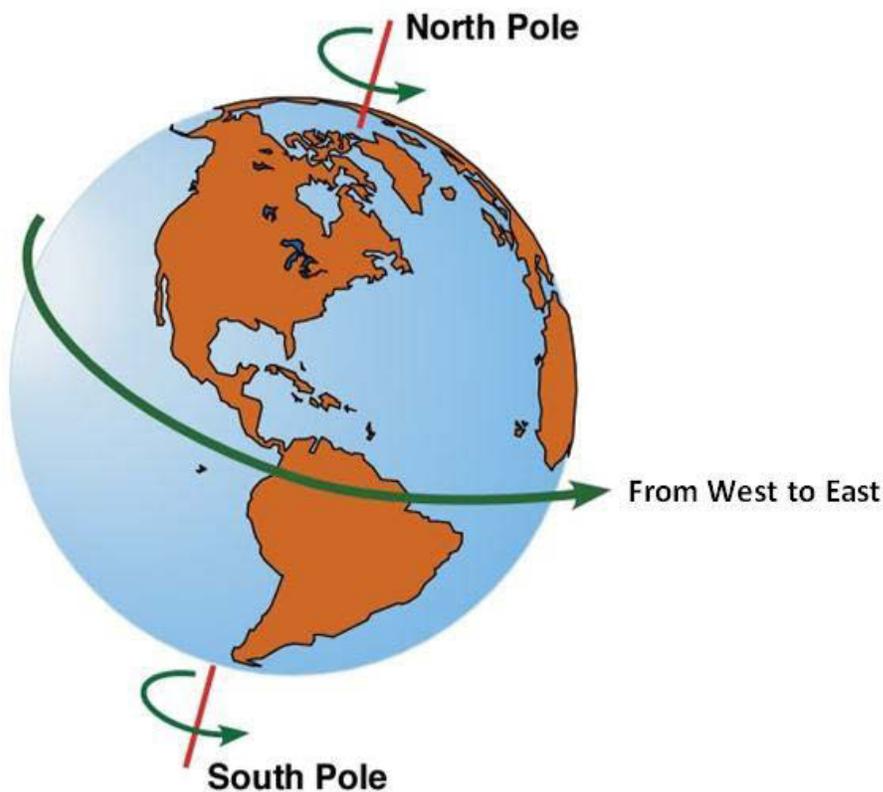
Rotation is the spinning of a body on its axis.

Earth's rotation – is a spinning of the earth on its axis.

Axis – is an imaginary line joining the north and south poles through the center of the earth

The earth's axis makes an angle of 66° from the perpendicular. The earth rotates on its

Axis from west to east.



It makes one complete rotation after every twenty four hours or one day, the following observations illustrates the earth's rotation from west to east;

1. When traveling in a fast moving vehicle we notice trees and other objects on both sides of the road moving in the opposite direction. This observation is similar to the movement of the earth's rotation to the sun.
2. In the morning the sun appears to rise over the eastern horizon but due to the fact that the sun is the center of the solar system we know that it does not move in relation to the solar system. This shows that the earth is moving from west to east.
3. At night most of the stars appear to move across the sky from east to west. This shows that the earth is moving from west to east.

ROTATION OF THE EARTH CAUSES/ EVIDENCE TO PROVE THAT THE EARTH ROTATES;

- Day and night

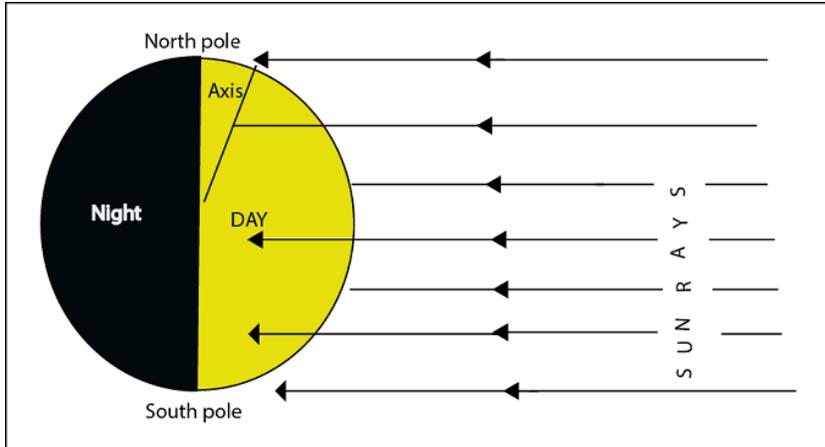
- Different hours

- Deflection of winds and ocean currents

- Daily rising and falling of tides

A: DAY AND NIGHT

When the earth rotates, it causes day and night. The side that faces the sun will be expecting day light while the side that is not facing the sun at that time will be in darkness. Therefore as the earth rotates its parts come alternatively in the light pass out of it again.



Exercise 2

1. What is rotation?

Rotation is the spinning of a body on its axis

2. What is the earth's axis?

The earth's axis is an imaginary line joining the north and south pole through the center of the earth.

3. Mention the degrees of the earth's axis

Earth's axis it makes 66° degrees.

4. What is the direction of the earth rotation? From west to east.

5. What time is used by the earth to make one complete rotation? 24 hours or one day.

6. Mention four causes of the earth's rotation

(i) Day and night

(ii) Different hours

(iii) Deflection of wind and ocean currents.

(iv) Daily rising and falling of tides.

REVOLUTION

Is the movement of one body around another.

Earth's revolution: -

- Is the movement of the earth around the sun
- The earth takes 365 $\frac{1}{4}$ days for a complete revolution
- When the earth takes 366 days to accomplish one revolution is called a Leap year
- The earth revolution revolve around the sun in an elliptical
 - Due to the shape of the earth's orbit, the earth is very closer to the sun at one point of the year than at another.

APHELION AND PERIHELION

Aphelion is the furthest position of the earth's orbit from the sun.

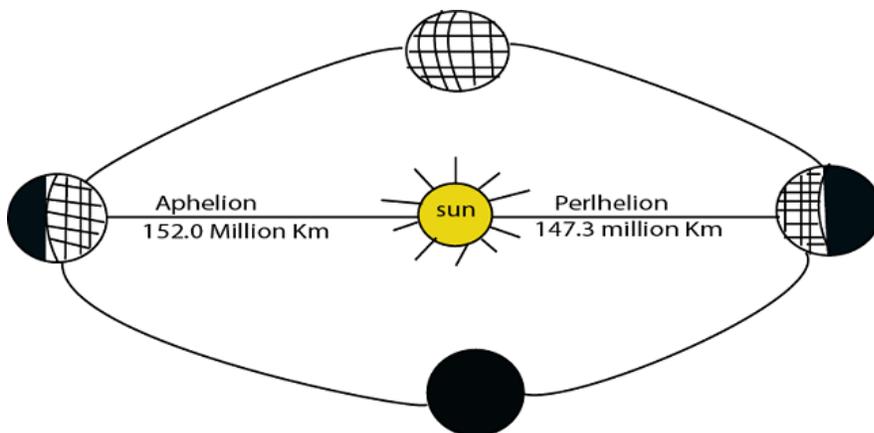
- The earth is at Aphelion each year on **4th July** when it is in 152 million kilometers from the sun.

Perihelion is the nearest position of the earth from the sun.

- The earth is at perihelion each year on **3rd January** when it is 147.3 million kilometers from the sun.

Therefore the speed of revolution is about 29.66 km per second.

REVOLUTION



THE EFFECTS OF EARTH'S REVOLUTION

When the earth revolves around the sun it causes: -

- (a) Seasons of the year
- (b) Eclipse
- (c) Difference in the length of day and night
- (d) Change of midday sun in the latitudes.

Exercise 3

1. To define the following terms

(a) **Rotation**

Is the spinning of a body on its axis.

(b) **Earth rotation**

Is the spinning of the earth on its axis.

(c) **Axis**

Is an imaginary line spinning the north and south poles through the center of the earth.

(d) **Revolution**

Is the movement of one body around another.

(e) **Earth revolution**

Is the movement of the earth around the sun.

(f) **Aphelion**

Is the furthest position of the earth's orbit from the sun.

(g) **Perihelion**

Is the nearest position of the earth from the sun

2. Mention 4 effects of earth's rotation

- (i) Day and night
- (ii) different hours
- (iii) Deflection of wind ocean currents
- (iv) Daily rising and falling of tides

3. List down 4 effects of earth's revolution

- (i) Seasons of the year
- (ii) Eclipse
- (iii) difference in the length of day and night
- (iv) change of midday sun in the latitude

4. What causes of day and night?

The day and night; the side that faces the sun will be experiencing day light while the side that is not facing the sun at that time will be in darkness.

5. To mention three observations illustrate the earth rotation from west to east

- (i) it makes one complete rotation every twenty four hours or one day
- (ii) At night most of stars appear to move across the sky from west to east
- (iii) In the morning the sun appear to rise over the eastern horizon due to the fact that the sun is the center of solar system.

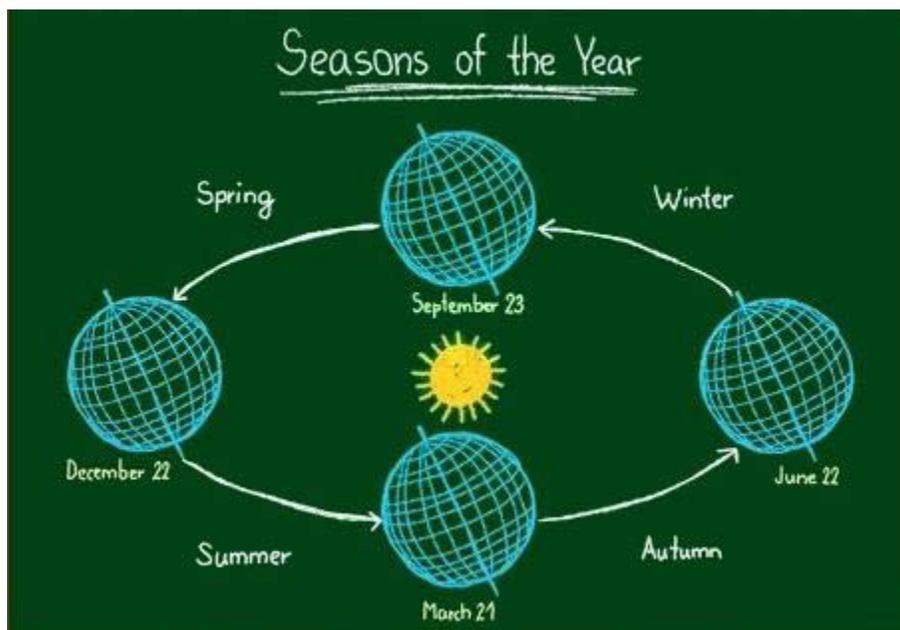
SEASONS

Season is one of the four periods of the year separated from each other by different temperature conditions. The seasons are summer, autumn, winter and spring. They are more pronounced between 23°c and 66°c of latitudes. At the equator the year is divided between hot and wet seasons while at the poles is very cold all the year around and the season cannot be identified easily.

The Northern hemisphere summer months are May, June and July. Autumn months are August, September and October, Winter Months are November, December and January while spring months are February, March and April. In the Southern Hemisphere summer months are November, December and January, Autumn months are February, March and April Winter has May, June and July while spring months are August , September and October.

CAUSE OF SEASONS

Seasons are caused by inclination of the earth's axis and the earth's revolution around the sun. The earth's axis is tilted at an angle of 66° to the earth's orbital plane and it is always pointing to the same direction in space. In its revolution around the sun one of the hemispheres is inclined towards the sun to one period of the year and away from it at another period of the year.



ECLIPSE

This is the movement of one heavily body between the two others, such that it casts shadow over the other.

The eclipse involves three heavily bodies namely; the Sun, the Earth and the Moon. So long as the sun is the central body of the solar system, it never moves, only the earth and the moon are in the motion all the time.

An eclipse is said to be total eclipse when the whole body is obscured i.e completely blocked from the sun light and it is described as a partial eclipse when the only part of the body becomes obscured. At any place an eclipse will last short time, hardly seven minutes because both the earth and the moon are in motion.

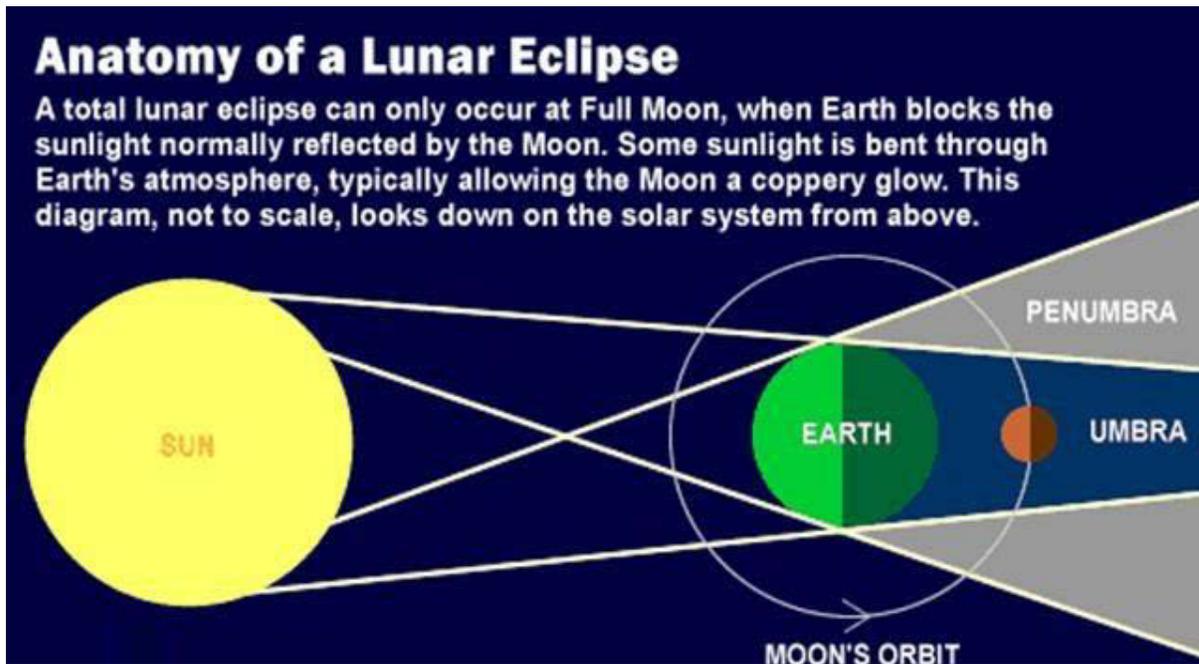
TYPES OF ECLIPSE

There are two types of eclipse i.e Lunar eclipse and solar eclipse

LUNAR ECLIPSE (ECLIPSE OF THE MOON)

This occurs when the earth moves between the sun and the moon, this casting its shadow over the moon.

ECLIPSE OF THE MOON

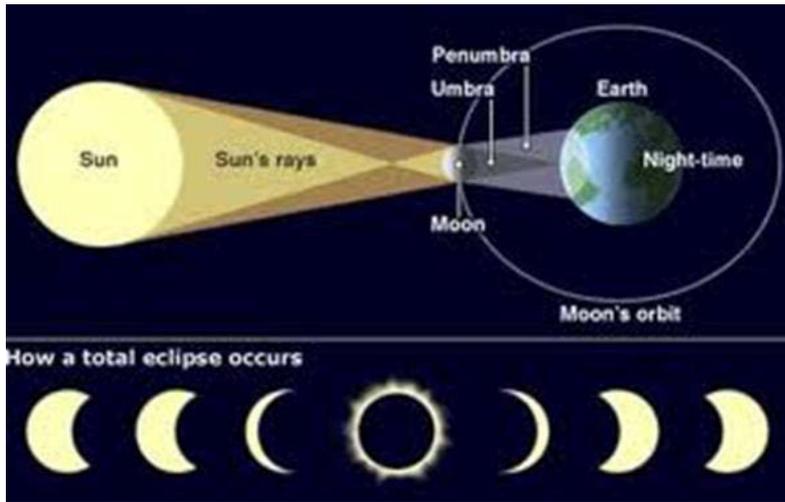


THE SOLAR ECLIPSE

The solar eclipse is also known as the *eclipse of the sun*.

This occurs when the moon passes between the earth and the sun casting its shadow over the earth.

THE SOLAR ECLIPSE



Umbra or total eclipse is when the whole body is obscured i.e completely blocked from the sun's light.

Penumbra or partial eclipse is when only part of the body becomes obscured.

Exercise 4

1. Define the following terms.

Eclipse

Is the movement of one heavenly body between two others such that it casts shadow over the other.

Lunar eclipse

This occurs when the earth moves between the sun and the moon thus casting its shadow over the moon.

Solar eclipse

Is also known as the eclipse of the sun. This occurs when the moon passes between the earth and the sun, thus casting its shadow over the earth.

Penumbra

Is when only part of the body becomes obscured.

Umbra

Is when the whole body is obscured i.e completely blocked from the sun's light.

Seasons

Is one of the four periods of the year separated from the other by different temperature conditions.

2. Mention 4 seasons of the year

(I) Summer

(II) Autumn

(III) Winter

(IV) Spring

At any place an eclipse will last for *short time* or *hardly seven* minutes

THE APPARENT MOVEMENT OF THE OVERHEAD SUN

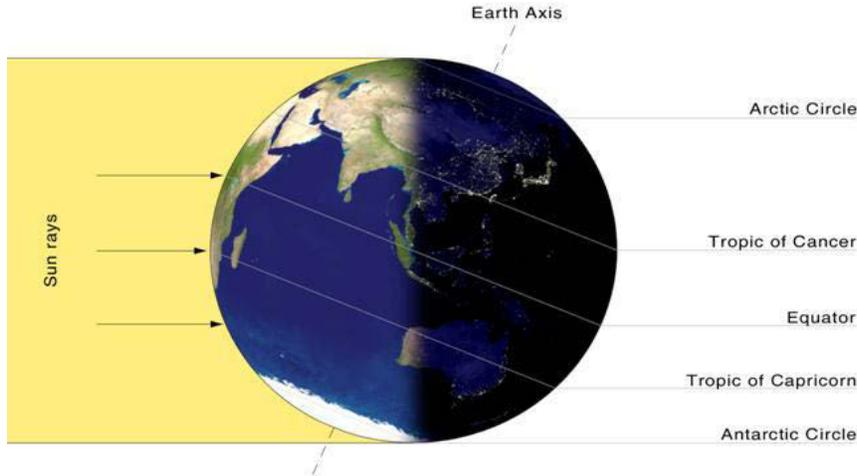
The apparent movement of the overhead sun is related to the different positions of the earth on its movement as it revolves around the sun. The overhead sun appears to move northwards and southwards in an oscillating (swinging) manner.

However the overhead sun's northward limit is latitude 23°N . People beyond this latitude never see the sun vertically above their head. The latitude 23°N is known as ***Tropical of cancer***. Similarly the overhead sun ends 23°S in its apparent Southward movement. This latitude is known as the ***Tropic of Capricorn*** on 21st June the sun is vertically overhead on the Tropic of cancer. This is known as the summer solstice in the Northern hemisphere.

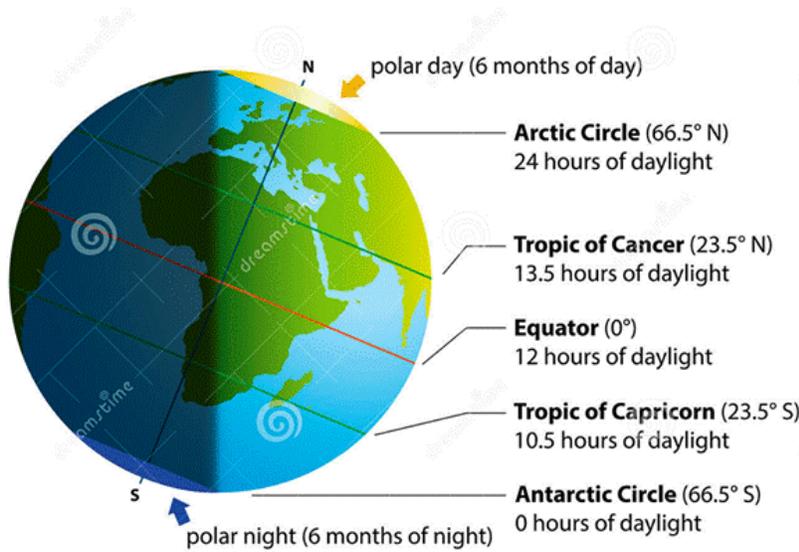
On 22nd December the sun is vertically overhead on the ***Tropic of Capricorn*** this is the winter solstice in the Northern Hemisphere.

Solstice means equal night or is when the sun on these days appears to stand still between its northward and southward journeys.

WINTER SOLSTICE



summer solstice (June 21)



THE SOLSTICES

The sun is overhead twice a year at the equators 21st March and 23rd September. 21st March is known as the Spring equinox and 23rd September is known as the autumn equinox in the Northern Hemisphere.

Equinox means equal nights, at equinox the length of day and night is equal over all places on the earth's surface. Viewed from the Southern Hemisphere the solstices and the equinoxes

are

reversed.

LENGTH OF DAY AND NIGHT

Places along the equator experience equal day and night all the year, but north wards or south wards towards the poles, the length of day and night vary with latitudes. For instance in Northern Summer when the Northern Hemisphere is inclined towards the sun, days are longer than nights. However at latitude 66°N known as the Arctic. Cycle and beyond the sun appears around the sky without setting. in the North pole day light is experienced for six months before the sunset.

Then this region remains in darkness for the next six months, Latitude 66° south is known as the Antarctic cycle.

The polar regions south of the Antarctic cycle experience the long six months night from March to September and the six months day light from October to February.

PARALLELS AND MERIDIANS.

Parallels are more commonly known as Latitudes

Latitude/Parallel

The arc or angular distances(measured in degree minutes and seconds) of a point on the surface north or south of the earth from the equator.

Meridians: Are commonly known as Longitude.

Longitude/Meridian: Is angular distance measured in degrees East or west of the prime meridian, they run from north to south.

THE IMPORTANCE OF PARALLEL AND MERIDIANS

- Longitudes (meridian) enable us to calculate local and International times of different places on the earth/s surface.
- Latitudes (parallel) help us to to explain and understand the variation in climate on the surface of the earth.
- Parallel and meridians are used by pilots and sailors to guide their path.

d) They enable us to locate places on maps, for example Tanzania is found at Latitude $6^{\circ}00'S$ of the equator and Longitude $35^{\circ}00' E$ of Greenwich meridian.

LATITUDE AND LONGITUDE

Latitude:

Is the angular distance north or south of the equator measured in degrees, minutes and seconds.

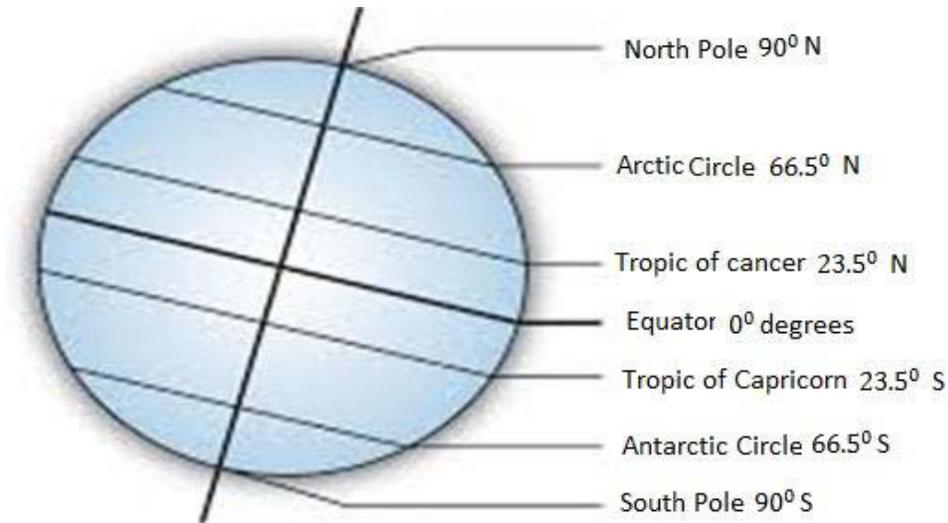
OR

Are the lines drawn on a map from east to west.

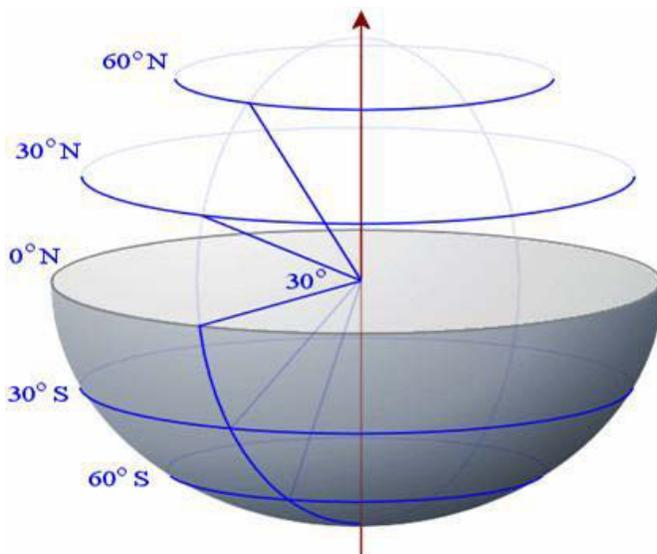
- The equator is latitude of 0°
- The equator divides the earth into two equal parts (Hemisphere)
- The hemisphere north of the equator is northern hemisphere
- The hemisphere south of the equator is known as Southern hemisphere
- Latitude are also known as a parallel lines of equator because they never meet.
- The lines of latitude are measured from 0° (the equator) to 90° north and south.

LINES OF LATITUDE ARE

- The equator 0°
- The tropical of cancer $23 \frac{1}{2}^{\circ}N$
- The Tropical of Capricorn $23 \frac{1}{2}^{\circ}S$
- Arctic cycle $66 \frac{1}{2}^{\circ}N$
- Antarctic cycle $66 \frac{1}{2}^{\circ}S$



PARALLEL OF LATITUDE 30° N



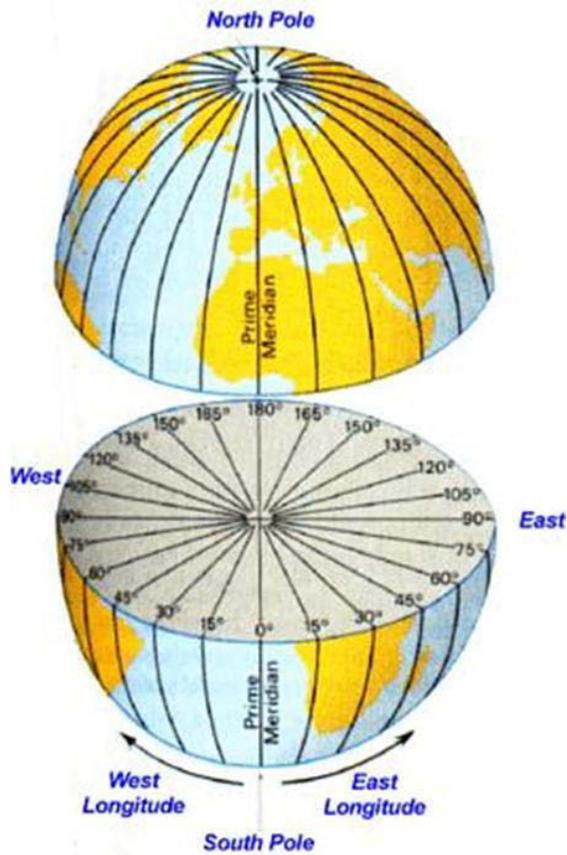
Longitude

Is an angular distance measured in degrees east or west of the prime meridian, they run from north to south.

Greenwich is a longitude 0° . It is also known as prime meridian.

The prime meridian is the line running through the poles (North and South) and is known as greenwich 0°

Longitudes are measured from 0° to 180° East or West of greenwich, all meridians are passing through the North and south poles.



LONGITUDE AND TIME

The earth rotates on its own axis from west to east once every twenty four hours (one day). This means that the earth turns through 360° in twenty four hours.

All places along a given meridian will experience midday along the same meridian, it is known as Local Mean, on the Greenwich meridian is known as Local Mean Time (LMT).

When it is 12:00 noon, on the greenwich meridian it will be 1:00 pm at a place of 15°E or 11:00 at a place of 15°W .

To find time for example for Musoma in Tanzania (34°) when it is 12:00 in Kinshasa Zaire

1. Note the longitude position of Kinshasa $15^{\circ} 30^{\circ}\text{E}$ and Musoma 34°
2. Find the difference in degree of longitude between Kinshasa and Zaire

$$34^{\circ} - 15^{\circ}30' = 18^{\circ} \frac{1}{2}$$

3. Find the difference in time between Kinshasa and Zaire

$$18^{\circ} \frac{1}{2} \times 4 = 1^{\circ} \frac{7}{30} \text{ or 1 hour and 14 minutes}$$

60

OR,

$$\begin{array}{rcl} 1^{\circ} & = & 4 \text{ minutes} \\ 18 & \times & \frac{1}{2} = x \end{array}$$

$$x = \frac{4 \times 18 \times \frac{1}{2}}{1} = 1 \text{ hour and 14 minutes.}$$

4. Since Musoma is to the east of Kinshasa, Musoma time will be ahead of that of Kinshasa by 1 hour and 14 minutes therefore time for Musoma will be 12:00 + 1:14 = 13:14 pm Or 1:14 pm.

In the other hand, given the time difference between two places and the longitude of one of them, one can calculate the longitude position of the second places Kinshasa $15^{\circ} 30'$ and 1 hour and 14 minutes. behind the time of Musoma.

Find the longitude position of Musoma

Difference in time between Musoma and Kinshasa 1 hour and 14 minutes.

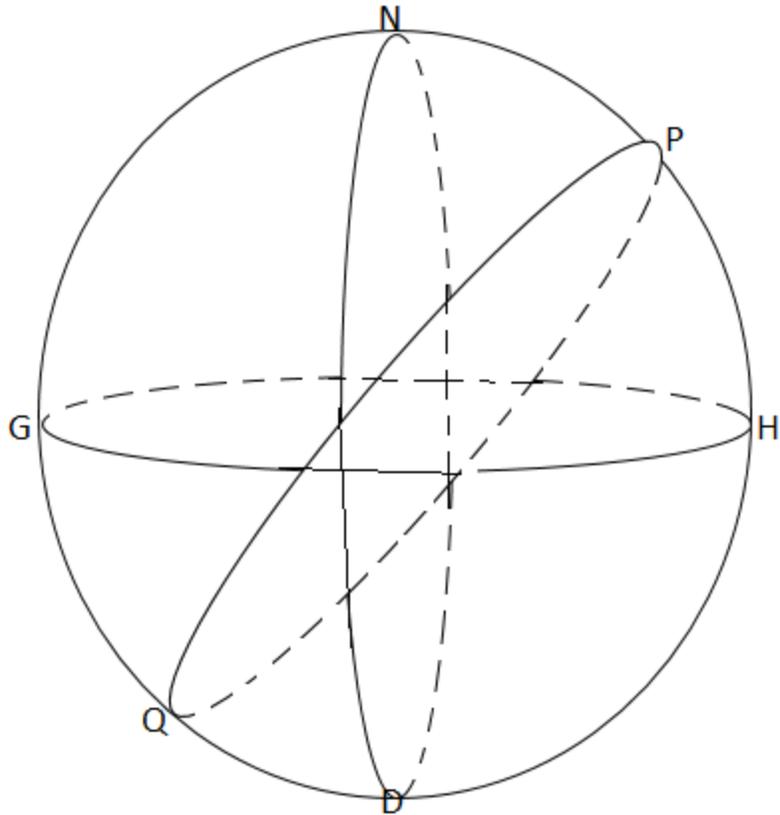
Difference in degrees of longitude between Musoma and Kinshasa is 1hr and 14 minutes
= $74/4$ or $18^{\circ} 30'$

Since the time of Kinshasa is behind that of Musoma, Musoma must be east of Kinshasa. Therefore the longitudinal position of Musoma will be $15^{\circ} 30' + 18^{\circ} 30' = 34^{\circ}E$.

GREAT

CIRCLE

The intersection of the surface of a sphere and a plane through its centers for example meridians of longitude and equator are great circle in the earth's surface. Therefore there is no limit to the number of great circle that can be drawn.



Great circle also is a circle drawn on a globe (or other sphere) with a center that includes the center of the globe. Thus a great circle divides the globe into two equal halves.

IMPORTANCE OF GREAT CIRCLE

- i) The great circles are important for aeroplanes which use them as route ways to guide their path
- ii) Great circles are important for ship to follow routes along great circles

TIME.

Refers to a period that is used for a event or activity. It is measured in seconds, minutes, hours, days, months or years.

TIME ZONES

Is the region having the same standard time. Standard time is common on time for all countries

belonging to the same time zone for example, Tanzania, Kenya, Uganda, Ethiopia, Djibouti and Somalia use the same standard time. This is commonly referred to as the East African Standard time.

There would be problems of telling time if every place had its own time set according to local mean time. For example, there would be

great confusion in railway and airway time table or in radio programs if they had to show different times each one place within a small area. To avoid this problem, different stretches of land take their time from great Meridian. The time adopted is known as **STANDARD TIME**.

In East Africa, standard time is taken from meridian of 45°E when a whole stretch of land keeps to the same standard time that stretches from a time zone. Therefore time zone refers to a stretch of land where standard time is accepted through out a longitudinal zone 15° width.

Countries with large stretches of land have several standard time zones. There are 24 time zones in the world. The Greenwich Meridian is the starting point for dividing the globe into 24 time zones, the standard time for Greenwich is known as the Greenwich Mean Time (GMT).

Essence of Time Zone

- In a certain place there could be a place on the surface using its' own local time. This would brought a lot of confusion example every radio station would have to announce different times for every region within the same country: Local time of Bukoba would be different from that of Dodoma.
- The above confusion was avoid when it was internationally agreed to split the world into 24 time zone according to Longitudes
- The longitudinal division across the earth with an approximates with of 15° of longitude which is regular across the oceans.
- Each time zone has a standard time which is the time of the longitude(meridian near the center of time zone. In the same way, all countries belonging to the same time zone have common time.

Note: Large countries like Canada, USA and Russia have different standard times for different regions within them because they are crossed by many time zone

Exercise 5

1. If it is 9:30 am at kasse $33^{\circ} 15^{\circ}\text{E}$ what time is in Zanzibar $45^{\circ} 15^{\circ}\text{E}$?

$$\begin{array}{r} 45^{\circ} .15^{\circ} \\ -33^{\circ} .15^{\circ} \\ \hline 12 . 00 \end{array}$$

$$\begin{array}{r} 1\text{hr} = 15^{\circ} \\ ? \times 12^{\circ} \end{array}$$

$$1 \times 12 = 48 \text{ minutes}$$

15

9.30 am

0.48

10.18 = 10.18 minutes

2. Find the time for the yuncle 30°w if it is 12.00 noon London

$$30^{\circ} - 0^{\circ} = 30^{\circ}$$

$$\begin{array}{r} 15^{\circ} = 1\text{hr} \\ 30^{\circ} = ? \end{array}$$

$$15 = \frac{300}{15} \times \frac{1\text{hr}}{15} = 2\text{hr}$$

15 15

12.00

-2.00

10.00

= 10.00 a.m

3. When it is 3.30pm at Nairobi (25°E) what is the time for Comoro 120°E ?

$$\begin{array}{r} 1\text{hr} = 15^{\circ} \\ \quad \times \\ ? \quad 95^{\circ} \end{array}$$

$$\underline{1\text{hr} \times 95^{\circ}} = \underline{95^{\circ}} = 6 \frac{1}{3} \times 60$$

$$15 \quad 15$$

= 6hrs and 20 minutes

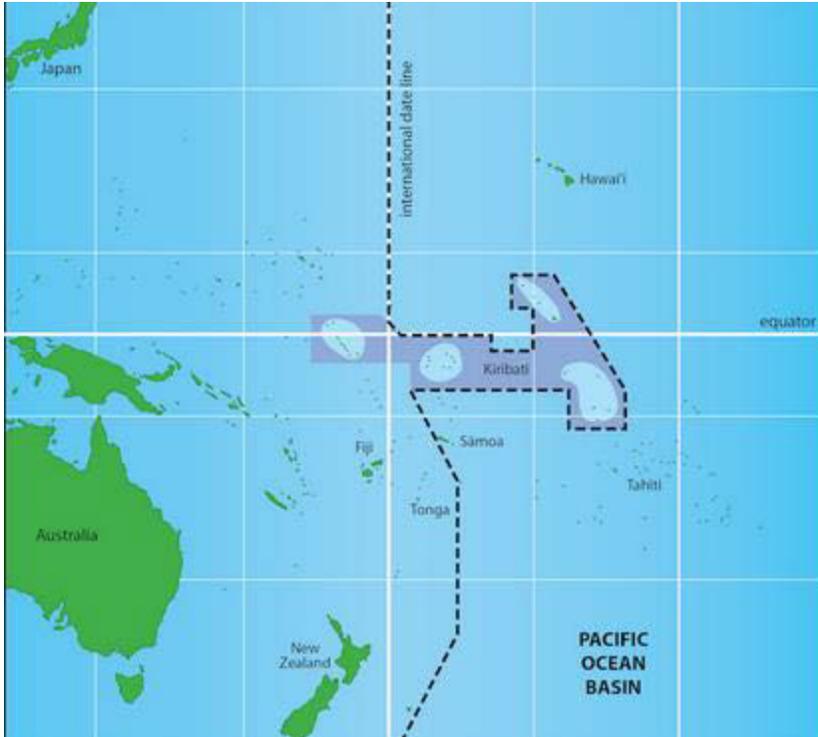
3.30

+ 6.20

9.50 p.m

INTERNATIONAL DATE LINE.

The line where date is changed or where the calendar day begins.



One travels eastwards and cross the date line, one will gain a day, if one travels westwards and cross the date line, one will lose a day, if Greenwich it is noon on Tuesday a place 90°w would be 10am on Tuesday, at a place 180°w it would be midnight Monday . On the other hand a place 90°E would be 6.00pm on Tuesday and at a place 180°E would be midnight on Tuesday.

MAJOR FEATURES OF THE EARTH'S SURFACE

Earth is the fifth largest planet in the solar system. Its surface is approximately 510 millions square kilometers. This means that earth is very large. The surface of the earth is made up of two main features LAND and WATER BODIES The land's surface area is estimated at 29.2% of the total area of the earth's surface, while water covers the remaining 70.8%. Most of the land exists in large blocks called Continents.

Likewise, most of the water is contained in large water bodies called seas and oceans.

CONTINENT

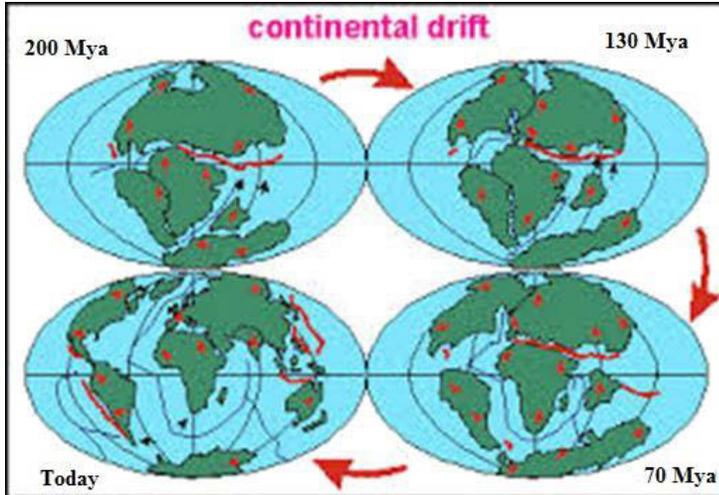
Continent is a major landmass rising from the ocean floor. Formerly the continents were big landmass known as Pangaea. Due to the forces operating continuously, the landmass was separated into two parts namely Laurasia to the northern hemisphere and Gondwanaland to the Southern hemisphere. Further separation or drifting led to the formation of the present continents which include Africa, Antarctica, Asia, Australia, Europe,,North America and Southern

America. The boundaries of the continents with the exception of Asia and Europe were filled with water. Ural Mountains separated Europe and Asia. While other continents are separated by water bodies called seas and oceans. For instance African continent and Asia to the north are separated by mediterranean sea and Red sea. Africa and South America are separated by Atlantic ocean, etc.

LOCATION AND SIZE OF CONTINENTS

S/N.	CONTINENT	LOCATION	SIZE (Km ²)
1.	Asia	Is located to the east of the Ural mountain and Suez canal and South of Caspian sea	43,608,000
2.	Africa	Located in the Southern hemisphere bordered by Red sea and Suez canal to the north east, mediterranean sea to the north Atlantic ocean to the west and Indian ocean to the South East	30,335,000
3.	North America	Located in the Northern hemisphere surrounded by oceans, to the north Atlantic ocean, to the east Arctic ocean to the west Pacific ocean	25,349,000
4.	South America	Located to the Southern hemisphere and small part of the continent is located in the northern hemisphere. It is separated with Atlantic ocean to the north and North east, to the west Pacific ocean to the south southern sea	17,611,000
5.	Antarctica	Located in the Antarctic region in the Southern hemisphere. Antarctica is surrounded by the Southern ocean. Almost 98% is covered by ice.	13,340,000
6.	Europe	Located in the northern hemisphere. The continent is surrounded by: <ul style="list-style-type: none"> • Black sea (South east) • Arctic ocean (North) • Atlantic ocean (West) • Mediterranean sea (South) 	10,498,000
7.	Australia	Located in the Southern hemisphere near New zealand. The continent of Australia along with zealand constitutes a region called oceania or Australasia	7,682,000

FORMATION OF CONTINENTS



Land surface of the earth

The land surface occupies 29% of the surface of the earth, it forms seven continents. It includes Islands adjacent to the continents. The seven continents are Asia, Africa, South America, North America, Australia, Europe and Antarctica. Oceans surround these continents. There is more land surfaces in the Northern Hemisphere than in the southern hemisphere.

Southern hemisphere

This is the southern most continent, it is situated in the South Pole and almost all of it lies within latitude 66°S , it is surrounded by the southern Ocean. It is uninhabited.

Exercise 1

1. The name of the continents of the earth's surface are: -
 - (i) Africa.
 - (ii) Europe.
 - (iii) North America.
 - (iv) South America.
 - (v) Asia.
 - (vi) Antarctica.
 - (vii) Australia.

2. List the name of planets in the solar system

- (i) Mercury
- (ii) Venus
- (iii) Earth
- (iv) Mars
- (v) Jupiter
- (vi) Saturn
- (vii) Uranus
- (viii) Neptune

3. To mention four uses of solar energy

- (i) It is used for domestic purpose
- (ii) It is used for solar cookers
- (iii) It is used to provide vitamin D for human being
- (iv) It is used for manufacturing food through Photosynthesis process

4. What is the meridian time in Mombasa $39^{\circ} 35' E$ when it is noon meridian time at Kampala $32^{\circ} 35' E$

Solution. $39^{\circ} 35' e$ $1 \text{ hr} = 15^{\circ} = \frac{1 \times 7^{\circ}}{15^{\circ}} = \frac{7^{\circ}}{15^{\circ}} = \underline{28 \text{ minutes}}$

$-32^{\circ} 35' e$ $? = 7^{\circ} \quad 15^{\circ} \quad 15^{\circ}$

7.00

.12. 00
+ 28
12: 28 pm

5. What is the approximate different in meridian time between Mwanza (33°c) and Colombo (80°c)?

$$\text{Soln } 80^{\circ}\text{c} - 33^{\circ}\text{c} = 47^{\circ} \quad 1\text{hr} = 15^{\circ} \quad = \frac{1\text{ hr} \times 47^{\circ}}{15^{\circ}} = 03:02 \text{ hrs}$$

6. Define the following terms:

- (a) Lunar eclipse- It occurs when the earth moves between the sun and moon, this casting its shadow over the moon.
- (b) Solar eclipse – It occurs when the moon passes between the earth and the sun, this casting its shadow over the earth.
- (c) Solar energy – Is the energy produced by the sun.
- (d) Continent - Is a major landmass rising from the ocean floor.
- (e) The international date line- Is the line where date is changed.
- (f) Longitude – Are the imaginary lines drawn on a map from north to south.
- (g) Latitude- Are the imaginary lines drawn on a map from east to west.

7. To mention four evidences of the earth’s shape.

- I] Sunrise and Sunset
- Ii] Circumnavigation
- Iii] Aerial photograph
- Iv] Ship’s visibility

REVIEW QUESTIONS

1. What is Geography?

Geography is the science that study distribution and Interactions of phenomena in reaction to the earth’s surface.

2. Mention three branches of geography.

- (i) Physical geography
- (ii) Human and economic geography
- (iii) Practical geography

3. What is earth's rotation? Mention four effects of earth rotation.

Earth rotation – Is the spinning of the earth on its axis

4. List four effects of earth rotation;

- (a) Day and night
- (b) Different hour.
- (c) The deflection of the wind
- (d) Ocean tides.

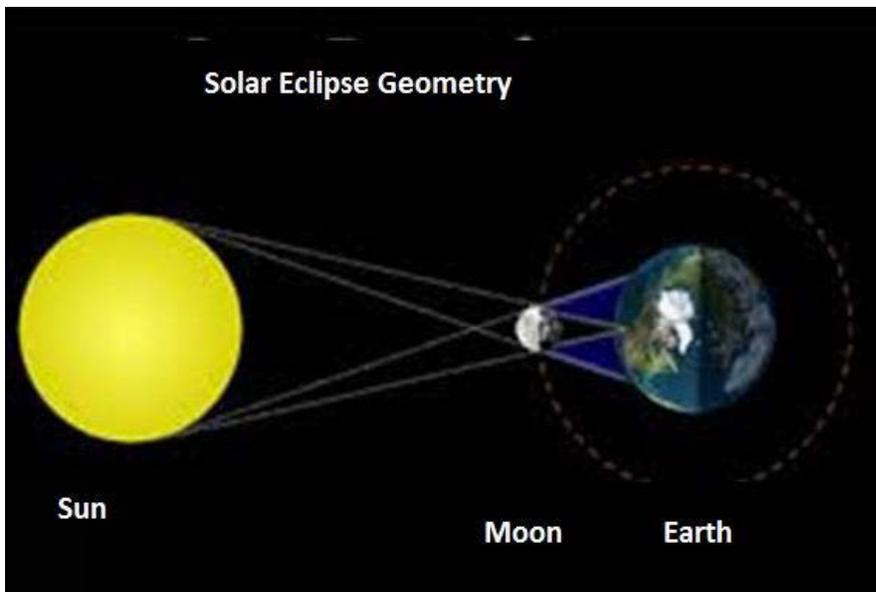
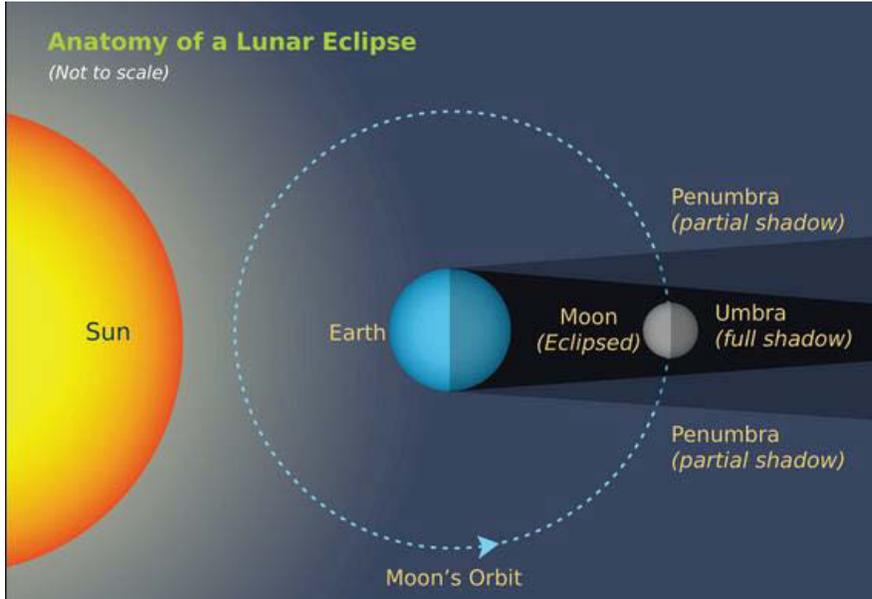
5. What is earth revolution?
Earth revolution- Is the movement of the earth around the sun.

Define:

- (i) Eclipses – Is the movement of the one heavily body between two others such that it casts shadow over the other.
- (ii) Lunar eclipse – The earth becomes at the center between the sun and moon
- (iii) Solar eclipse – The moon becomes at the center between the sun and earth

6. Draws the well labelled diagrams of Lunar and solar eclipses

Solutions



MAJOR RELIEF FEATURES OF CONTINENTS

The surface of any continent is not smooth. It has mountains, hills, plain and plateaus, river valleys, lakes, basins and rift valleys. Altitude and slope give rise to the different relief features. Plain, plateaus and mountains form the major relief features of continent.

1. PLAINS

A great part of any continent is plain. Plains are continuous stretches of comparatively flat land and not rising much above the sea level. Many extensive plains are a result of down warping of the earth's crust for example, Siberia in Asia, North European plains, Indo- getic plain and the Great central plains of North America.

PLATEAUS

Extensive high altitude areas with more or less uniform summit levels are known as plateaus. They are formed when forces formed within the earth uplift a plain region. Major plateaus regions include the central plateau of Africa, the Brazilian Highlands and the Arabian plateau. The African plateau is higher in the South and East of the continent than it is in the north and west. In some areas, the outflow and spread of lava have formed plateaus over an extensive area, for instance the Deccan plateau in the India sub-continent and Colombia plateaus in the United states.

MOUNTAIN

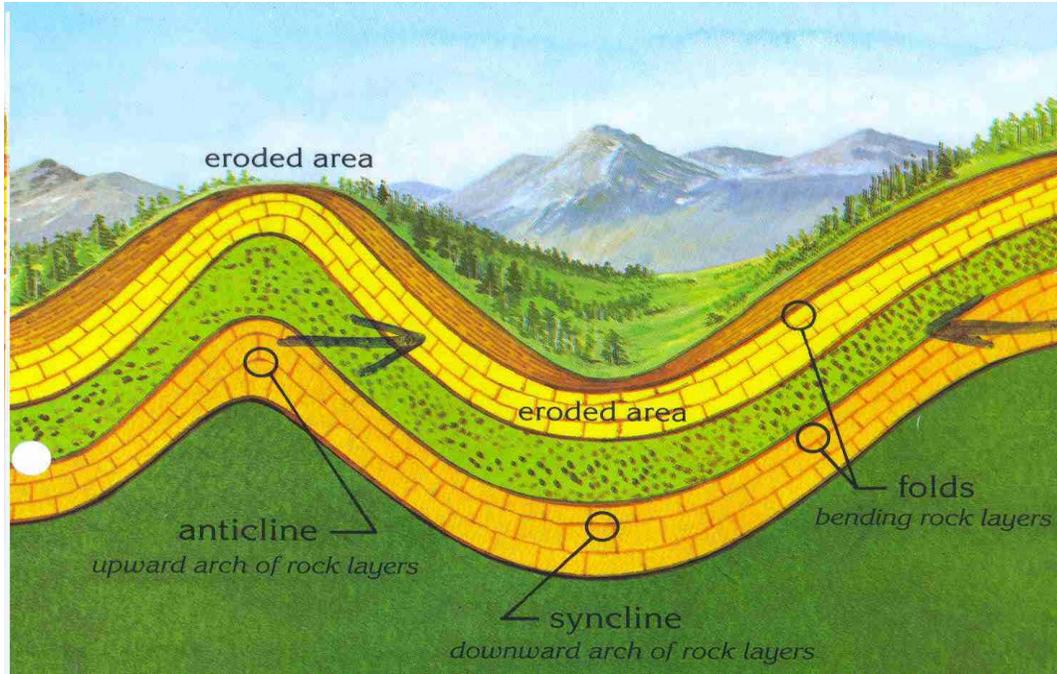
There are three major types of Mountains: These are;

- a] Fold mountains
- b] Block mountain
- c] Volcanic mountain

a] FOLD MOUNTAIN

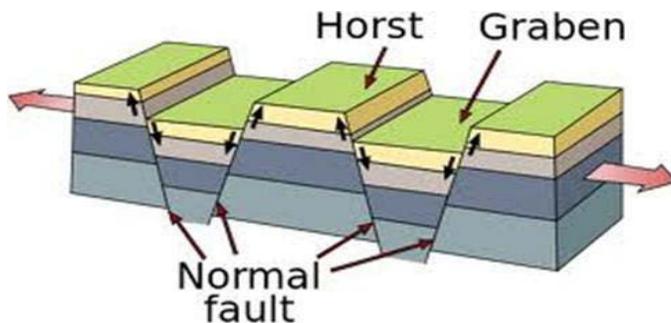
The wrinkling of the earth's crust forms fold mountains, folding once occurs where rocks are laid in layers, fold mountains usually consist of high ranges that extend for hundreds of kilometers across the continent. Thus fold mountains form the most extensive ranges in the world. For example the Rock mountains in North America vary in width from 640 to 1,600 kilometers and are about 5,000 kilometers in length.

These types of mountains have some of the highest peaks of the world. Mountain Everest is 8,848 meters above sea level and the Andes is 7,003m above sea level. Apart from the Himalayas in Asia and the andes in South America, this group of mountains includes the Andes- in South America, the Alps in Europe, the Atlas in North Africa, the Cap Rangers in South Africa, the Appalachians in U.S.A and the Great Divide Range in Australia.



b) BLOCK MOUNTAINS

Block Mountains are formed when a movement in the earth's crust forces the rocks to break. As a result, enormous cracks or faults are formed when sets of faults run parallel to each other and the ground between is forced up, a block mountain (horst) is formed.



Usually Block Mountains do not extend over wide areas as Fold Mountains do. Example of block mountains are the Sambara, Uruguru and Ruwenzori mountains in East Africa, the Vosges and Black forest mountains in Europe and mount Sinai in Asia.

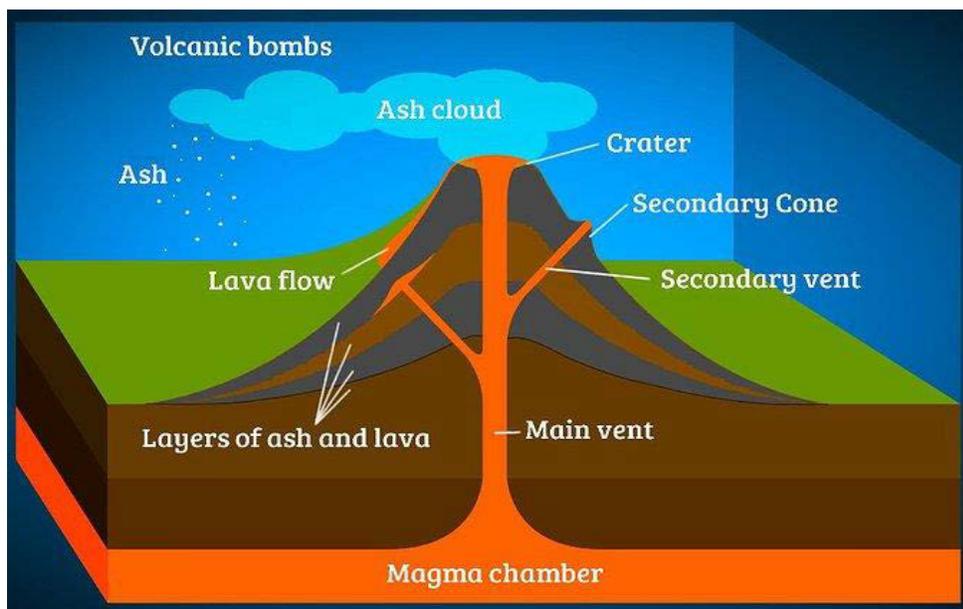
Other features associated with faulting and Block Mountains are rift valleys or grabens. Rift valleys are formed when the land is between two sets of faults sink down. The Great East African Rift valley is the longest in the world. It stretches from the Baka's valley east of the Lebanon mountains, through the Red sea, Ethiopia, East Africa to the lower Zambezi Area. A

branch of the valley runs along Lake Tanganyika in Tanzania to Lake Albert in Uganda. Another less extensive rift valley is the middle Rhine Rift valley between the Vosges and black forest mountains. The walls of a rift valley form fault lines or escarpments. Trenches formed by rift valley are sometimes filled with water to form Lakes like Lake Nyasa, Lake Albert, Lake Eyas, and Lake Turkana all of which are in East Africa and the Dead Sea in Jordan.

c) VOLCANIC MOUNTAIN

Volcanic mountains are formed from the pouring up and cooling of hot molten lava and ashes that are thrown out from the earth's interior after a volcanic eruption. Among the existing volcanic mountains some still experience a periodic eruptions for example the mountain Italy, the Krakatoa in Indonesia, the Mufumbiro in Uganda, the Oldonyo Lengai in Tanzania and the Cameroons in Equatorial Africa. These are said to be active volcanic.

The volcanic mountains, which erupted only once in historical time and are no longer active, are said to be dormant. Good examples are the Kilimanjaro and Meru mountains both of which are in Tanzania. That volcanic mountain which have not erupted for a very long time and have not shown any signs of erupting again are said to be extinct (dead). Good examples are the Kenya, Elgon and Rungwe Mountains, all of which are in East Africa.



TYPES OF VOLCANIC MOUNTAIN

- i) Active volcanic mountain
- ii) Dormant volcanic mountain

iii) Extinct (dead) volcanic mountain

Volcanic Mountains are usually conical in shape and mostly contain craters at their summits, for example, Fujiama and Kilimanjaro Mountains. Sometimes craters are filled with water to form crater lake for example, Lake Duluti and Ngorongoro both of which are in Arusha Region in Tanzania. Also Lake Ngozi found at Rungwe district in Mbeya.

RESIDUAL

MOUNTAINS

Apart from the three types of mountains, there are Residual Mountains which are formed by a prolonged denudation. Denudation involves removing weaker rocks from the land the result of which landforms are lowered leaving behind resistant rock. The remaining resistant rock is known as residual mountains. Examples of residual mountains include the Haggard Mountains of central Sahara, the Sekenke hills of Singida in Tanzania, the Adamawa mountains of Eastern Niger, the Highlands of Scotland. The sierras of central Spain, and the Mess and Butlers of the western plateau of the United States.

BASINS AND DRAINAGE OF THE CONTINENT

A basin : Is a form of natural or artificial depression (hollow) varying in size in the earth's surface

Drainage: Is the removal of water from the land.

The over land flow : Is the flow of rain water on the ground surface.

Underground flow: Is when rain water sinks into the ground and finds its way to the surface.

Run- off: Is the flow of rain water over and under the ground.

RIVERS

When rain falls or snows melt, water flows in small channels which finally join together and form large streams or RIVERS. OR
Is the natural out floor of water from different sources can be from Lakes, Spring, melted ice etc. to the mouth which an be ocean, lake or sea.

TRIBUTARIES:

These are the streams that join together to form main streams or parent.

DISTRIBUTARIES: These are the small streams which are formed when the main river branches off before it enters the sea or lake.

- Ø The area from which the river system collect its rain water known as RIVER BASIN or DRAINAGE BASIN or CATCHMENT AREA.

The boundary between one drainage basin to the next is known as WATER DIVIDE or WATER SHED or BASIN PERIMETER.

RIVER SYSTEM (THE WATER) DIVIDE ENCLOSING A DRAINAGE BASIN



Water flows down a slope by the help of force of gravity, While flowing it carries minerals in solution, rock fragments and organic matters from high land area to low land area.

The end of running water (run-off) is to the SEA/OCEAN.

THE MAIN RIVERS IN AFRICA

These are : The Congo River, The Niger river, The Orange river, The Nile river, The Zambezi river and the Limpopo river.

- Ø The Congo, Niger and Orange rivers flows and pour their water into Atlantic Ocean.
- Ø Zambezi and Limpopo flows into Indian Ocean.
- Ø River Nile flows into Mediterranean Sea.

THE VOLUME OF WATER IN THE RIVERS

- . The volume of water in the river varies seasonally.
- . During the rainy season or when ice melts, streams channels carry more water than in dry season.
- . When it rains heavily the stream channel fail to hold all of it so the water- over flows the river banks and floods the river valley.

Flood causes destruction to crops, building, animals and human.

LAKES:

Is a hollow in the earth's surface in which water collects.

Lakes are formed when some run-offs (running and being holded by depressions or hollows on the continent) have their outlets to the sea. Example of Lakes is Nyasa, Victoria and Kyoga in Africa.

OCEANS

Ocean is a large body of salt water. that occupies about 75 percent of the earth's surface. There is more water surface in the Southern hemisphere than in the North Hemisphere. Ocean include the Indian, the pacific, the Atlantic, the Arctic and the Southern Ocean.

The pacific Ocean is the largest. It is about 165. 3 million square kilometers. The second largest Ocean is the Atlantic which is about 82.2 million square kilometers. The Indian Ocean which is about 3.4 million kilometers is the third largest followed by Atlantic Ocean which is about 14.0 million square kilometers.

Ocean water contains a number of dissolved mineral salts. They include sodium Chloride (common salts) which makes up about 78 percent of all salt in the ocean water. Ocean water also contain compounds of magnesium, potassium, and calcium, Most of these minerals are in the ocean as a result of constant accumulation. Since the formation of the oceans Most minerals come from the land have been dissolved by water and brought into the ocean by rivers, wind and ice. Another source has been volcanic activity that takes place in the oceans.

Saltiness of the ocean water is not the same everywhere in the ocean. Saltiness of ocean water depends mainly on temperature which affects capacity of water to dissolve salt, the amount of fresh water brought into the ocean by rivers and rainfall and the amount of evaporation taking place from surface.

Generally temperature of ocean water decreases from the equator where surface temperature is about 25⁰c, to the Polar Regions where water is very cold temperature drops to 2.2⁰C. However, in polar regions where the ocean surface is permanently covered with ice temperature increases with depth up to 1.1⁰C.

Ocean water is constantly in motion. There are two types of movement .One is horizontal movement, which is in the form of current and the other is a vertical movement which is the rising of sub- surface water and the sinking of surface water.

Ocean Current

An ocean current is the movement of surface water in the ocean. These are warm and cold currents. Currents of the oceans are set in motion by prevailing winds, differences of density and temperature of the ocean water, the rotation of the earth and the shape of continent influence the flow of the major ocean current of the world.

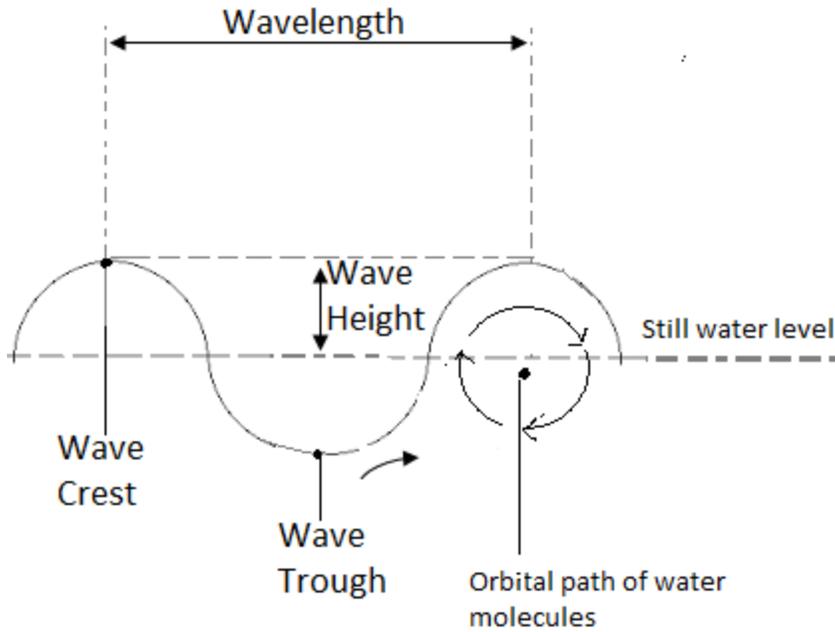


Tides

Tides are the rising and falling in the level of water in the ocean. The tides occur twice in 24 hours. The level of which tides rise and fall varies slightly. On the days when it rises to its highest level it also falls to its lowest level. This rising and falling is caused by the pull of gravity of the moon and the sun.

Waves.

Waves are the up and down movement of the surface of water. The highest part of the waves is called the crest and the lowest is called the trough. The distance from one crest to the next or from trough to trough called the wave length. Upper waves travel in a definite direction, while the lower waves are the up and down movement . For example a cork thrown into the water does not travel with the waves. It moves up and down but not forward. Waves are driven to the shore by wind. The higher of the wave and the force with which it is driven are determined by the strength of the wind and the distance of open water which it has blown.

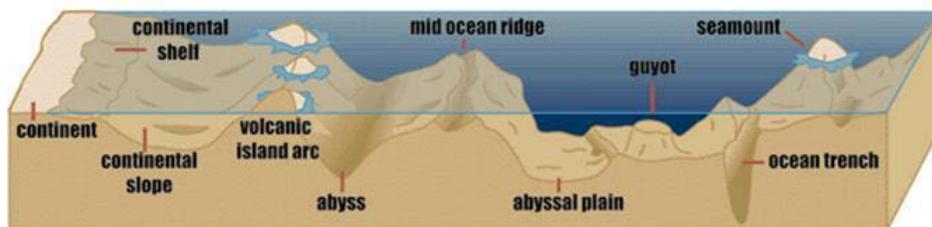


The ocean floor

Is the bottom of the surface of the ocean.

The floor of the ocean is irregular. The major relief features of the ocean floor are;

Features of the Ocean Floor



The continental shelf

The continental shelf is a gently sloping margin of a continent. Continental shelf are occupied by shallow water that extends from the coast to the depth of about 200 meters towards the ocean basin.

The continental Slope

The continental slope is found at the point where the continental shelf forms a steep slope towards the ocean floor.

Oceanic Deep or Trenches

Ocean Deep or trenches are long narrow depressions or trough found on the ocean floor.

Deep sea plains

Deep sea planes are the most extensive area of the ocean floor. They are monotonous undulating areas. Large parts of these plains are covered with time mode.

Exercise 2

1. 1. The name of the continents of the earth surface are
 - A)Asia
 - B) Africa
 - C) North America
 - D) South America
 - E) Europe
 - F) Australia
 - G) Antarctica

2. 2. There are three types of mountains. These are
 - a) Fold mountain
 - b) Block mountain
 - c) Volcanic mountain

3. 3. Ocean currents are set in motion by
 - a) Prevailing winds
 - b) Differences of density
 - c) Temperature of the ocean water
 - d) The rotation of the earth and the shape of continents

4. 4. Saltiness in ocean water has accumulated over long period of time from:
 - A. Volcanic activity in oceans
 - B. Salt rocks lying at the bottom of the sea
 - C. Land materials blown by wind into the sea
 - D. Rivers that pours their water into the sea
 - E. Land materials brought into the sea by moving ice

5. 5. Why Saltiness of the ocean water is not the same in all over the oceans?. The saltiness of ocean depend mainly on

- a) Amount of evaporation taking place
- b) Amount of fresh water brought into the sea by rivers and rainfall
- c) Amount of temperature which effects capacity of water to dissolve minerals
- d) Ocean current

6. 6. **Define**

- a) **Ocean current:** Is the movement of surface water in the ocean
- b) **Tides:** Are the rising and falling in the level of water in the ocean
- c) **Waves:** Are the up and down movement of the surface of water.

7. 7. With examples mention two types of ocean current

I. Cold current- Banguela, Labrador, Canaries

II. Warm current- Mozambique, Brazil current, East Greenland current

8. The major relief feature of the ocean floor are.

- a) Ocean deep
- b) Ocean ridge
- c) Oceanic Island
- d) Continental slope
- e) Continental shelf
- f) Ocean plain
- g) Basin

9. The name given to the first land mass was PANGAEA

10. Explain how each type of mountain is formed with diagram

Each type of mountain if formed with diagram due to the mode of its formation and the nature of materials evolved (especially to the volcanic mountains).

WEATHER

Weather: The conditions of the atmosphere which occur at a place at specific time period (from hour to hour or day to day) are known as weather.

Importance of weather:

- a) Good weather improves people's lives
- b) Weather determines the kind of clothing to be worn by people in an area.
- c) Knowledge of the weather of a place enables people to carry out economic activities which can be sustained by the weather in that place. e.g. dairy cattle do well in a cool and wet place.
- d) By studying the weather of a place over a long time, we can establish its climate.

Weather and Human activities
Most human activities affected by weather that is experienced at a place. For example, When the rains are heavy, flooding occurs and causes damage to crops, animals and infrastructure like roads. This means that few economic activities can take place. When there is no rain, plants and animals die, rivers and streams dry up, and irrigation and other economic activities like fishing cannot be carried out. Therefore weather affects the social economic activities of a place.

Elements of Weather
Are the basic atmospheric condition of a place at a given time.
There are 7 element of weather

- i) Sunshine
- ii) Temperature
- iii) Humidity
- iv) Cloud cover
- v) Precipitation
- vi) Wind
- vii) Atmospheric pressure

IMPORTANCE OF EACH ELEMENT OF WEATHER

i. Sunshine

Sunshine refers to the sun's rays that reach the surface of the earth.

Importance of Sunshine:

- The sun's energy enables plants to manufacture food through the process of photosynthesis
- People need sunshine to dry their crops, food like cassava, millet, maize and fish
- They also use sunshine to warm themselves

Dries clothes after washing them

ii. Temperature

Refers to how hot or cold an object or place is.

The heat in the atmosphere is supplied by the sun

Importance of Temperature:

Warm is essential for plant and animal survival

Plants need warm in order to manufacture their food

Facilitates formation of clouds

iii. Humidity

Is the amount of water vapor (moisture) in the atmosphere

There are two types of humidity:

a) Absolute humidity and

b) Relative humidity

a) Absolute humidity:

Is the actual amount of water vapor or moisture in a given volume of air at a particular temperature.

b) Relative humidity:

Is the ratio of the actual amount of water vapor or moisture in a given volume of air (i.e. absolute humidity) to the maximum amount of water vapor that the same volume of air can hold at the same temperature.

iv. Cloud cover

Clouds are masses of tiny droplets of water or ice particles or both which are suspended in the atmosphere.

They are formed when water vapor or moisture in the atmosphere cools and condenses.

Importance of cloud cover:

Are important because they condense to form rain and other forms of precipitation.

v. Precipitation

This refers as the fall or deposition of moisture water vapor or frozen water from the atmosphere onto the earths surface.

Importance of Precipitation:

- All life on the earth is purely dependent on moisture provided through precipitation
- The importance of rain is that, rain provides water for plants to grow (i.e. water for irrigation, growth of grass and pasture depend on rain)
- Also animals too need water to drink and human needs for domestic and industrial uses.

Note:

Excess rain and rainstorms result in disasters due to flooding

vi. Wind

Wind is air in motion. It is made up of variety of gases, such as oxygen and carbon dioxide. Wind move horizontally from areas of high pressure to areas of low pressure.

Importance of wind:

- They are important in many aspects of weather for instance they cause flow of heat and moisture and their transfer from one point to another and are also responsible for the movement of clouds.
- Wind direction and wind speed or velocity are two important aspects in geography. Wind direction is important because it help us to understand characteristics of the particular winds in terms of temperature and moisture content.
- Wind speed or velocity determines wind strength or force and therefore determines weather conditions of a place. Example, When strong winds blow over a place, little or no rainfall will be experienced.

vii. Atmospheric Pressure

This is the force at a point on the earth's surface due to the weight of air above that point. The atmosphere is the air surrounding earth's surface and it has weight, which is force with which it presses down on a unit area. The weight of atmosphere on the earth's surface and at sea level at 1033.3g/cm²

-Areas of very low pressure cause feeling of weightlessness and that is the feeling one gets when he or she is on top of a very high mountain like Mt Kilimanjaro.

-Areas under very low pressure may experience very strong winds periodically as air flows into such areas from high pressure regions.

WEATHER STATION

Is a place where the elements of weather are measured and recorded. Examples of the elements are temperature, humidity, pressure, rainfall, wind direction and speed, cloud cover, and sunshine.



STEVENSON SCREEN

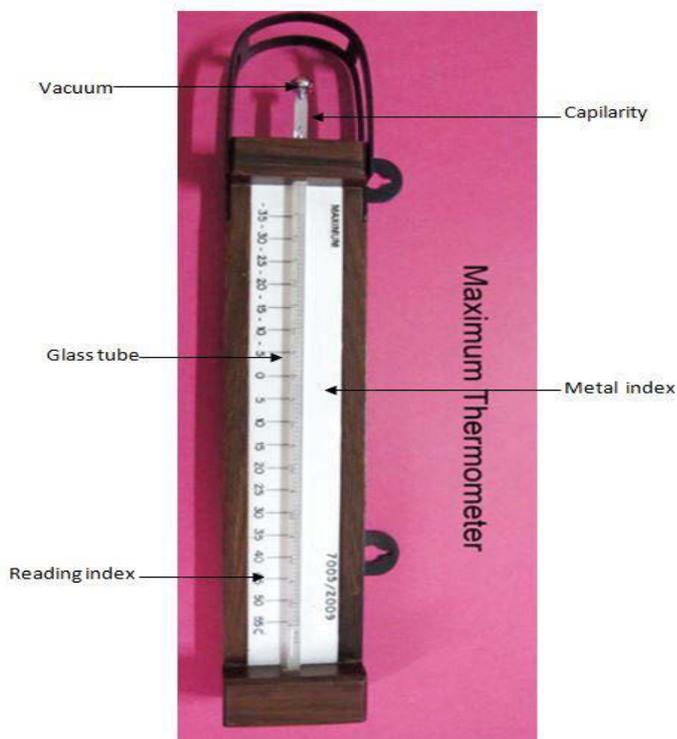
A Stevenson screen is made to allow air temperature to be measured. It consists of a wooden box with louver sides in order to allow free air to enter inside. In order to prevent sun's heat to reach inside, the roof is double bodied. The screen is painted white to improve insulation. The screen is then placed on a stand which is about 121 centimeters above the ground. Other instruments include rain gauge, wind vane, anemometer, barometer, hygrometer, and the camp-bell stokes sunshine recorder. Weather and climate affect the physical environments as well as human activities.



1. Temperature:

Temperature is the degree of heat of a body, measured by a thermometer and expressed in degrees of a centigrade or Fahrenheit scales. There are several types of thermometer which shows the highest temperature reached during a day and the minimum thermometer which shows the lowest temperature reached.

Maximum thermometer



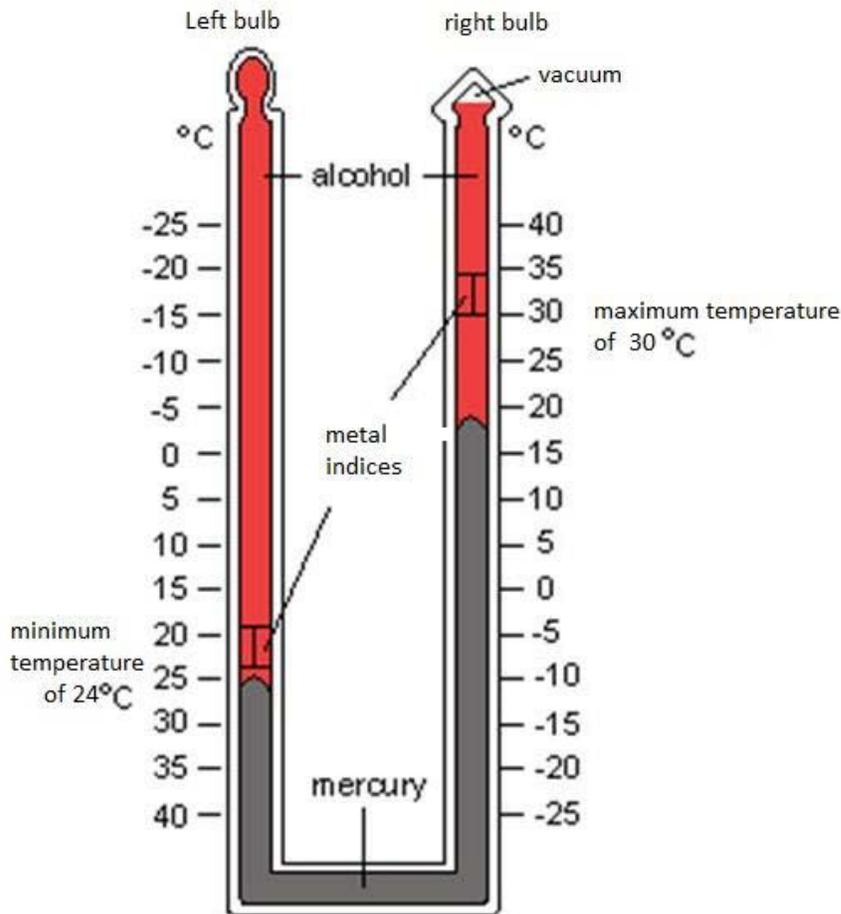
The figure above shows the maximum thermometer with a metal index. Thermometer is made of glass and it contains mercury in a bulb. A mercury column extends from a bulb at one end of the thermometer along a fine glass tube. The length of the mercury column shows changes in temperature when temperature rises, the mercury expands and the length of the column increases, pushing along the metal index.

The maximum temperature is read from the side of the metal index nearest to the mercury. When the temperature falls the mercury falls, leaving behind the metal index still indicating the maximum temperature reached. A magnet is used to bring back the metal index into contact with the mercury.

Minimum thermometer

The minimum thermometer contains alcohol instead of mercury. Alcohol is used because it has lower freezing point than mercury. Any fall in temperature will cause the alcohol column to contract and the meniscus (the curved upper surface of the alcohol column) will pull the index back along the tube whenever temperature rises, the alcohol will expand and flow freely past the metal index without pushing it up. Therefore the metal index is always left as a record of the lowest temperature reached between the readings. The part of the metal index away from the bulb will indicate the lowest temperature reached.

Six's thermometer



The six's thermometer can also be used for measuring maximum and minimum temperature

The thermometer consists of a "U" shaped glass tube. The metal index nearest to the bulb indicates the minimum temperature and the other metal records the maximum temperature. When the mercury in the tube maximum temperature falls, the alcohol in the bulb contracts. This causes the mercury to push index B towards the bulb. The minimum temperature is read from the part of index B from the mercury.

Reading and Recording Temperature

Temperature reading is taken every day either at regular and fixed intervals (for example, after every four or six hours) or once in twenty four hours – In some meteorological stations temperature are recorded continuously by a self recording instrument called a thermograph. The maximum and minimum temperature which are recorded for a specific period of time are used to calculate;

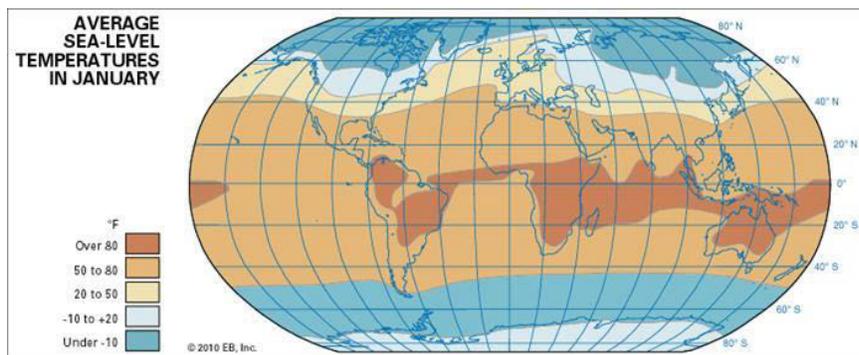
Daily range of temperature, which is the different between the maximum and the minimum temperatures.

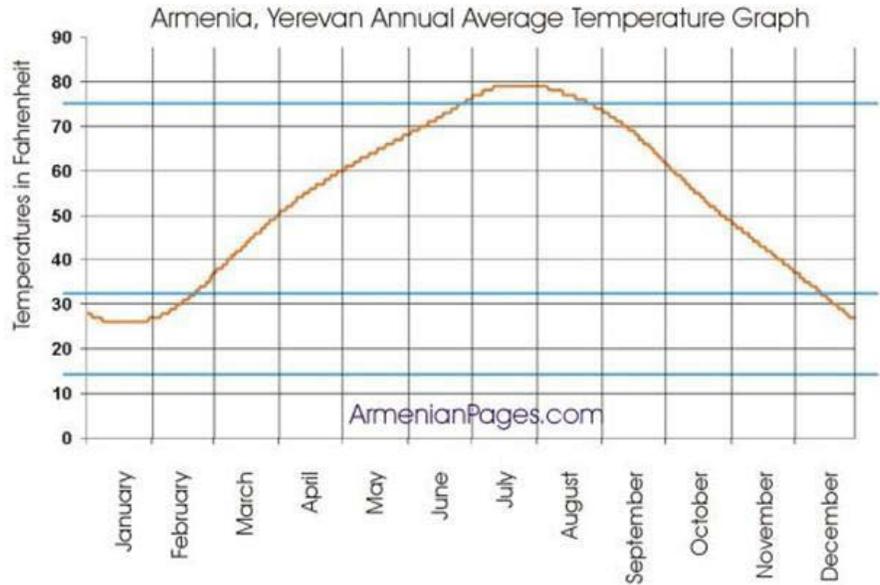
The mean daily temperature which is the average of the maximum and minimum temperature. The monthly range of temperature which is the difference between the highest mean daily temperature and the lowest mean daily temperature in a month. The annual range of temperature in a year which is the difference between the highest mean monthly temperature and the lowest mean monthly temperature.

To get a mean temperature daily for a month of a particular year add the mean daily temperature and divide the total by the number of days in that month. The average monthly temperature of a place such as Dar es Salaam for January is obtained by adding all the mean January temperature for thirty years or more and dividing the sum by the same number of years. This mean monthly temperature is used to show the temperature condition of the place for January.

When mean monthly temperature for a given month are obtained for many places, they can be shown on a map. Lines are drawn to connect places with the same mean monthly temperature. These lines are known as isotherms.

Mean January temperature in °f.





The way of presenting temperature data for a town is by using a graph. Mean monthly temperature figures for a year are plotted on the graph and points are joined by a smooth line.

Factors affecting temperature

Factors that affect temperature include: altitude, ocean currents, distance from the sea, latitude and prevailing winds.

Altitude

Temperature decreases with an increase in altitude at the rate of 0.6°C for every 100 meters. That is why the summit of Mount Kilimanjaro with 5895 meters above sea level permanently covered with ice.

Ocean currents

Ocean currents are either warm or cold. Warm currents raise the temperature of wind blowing across them while cold currents lower temperature of such winds. Some winds blowing on shore will influence the temperature of such winds in some of coastal areas with the temperature of the ocean currents.

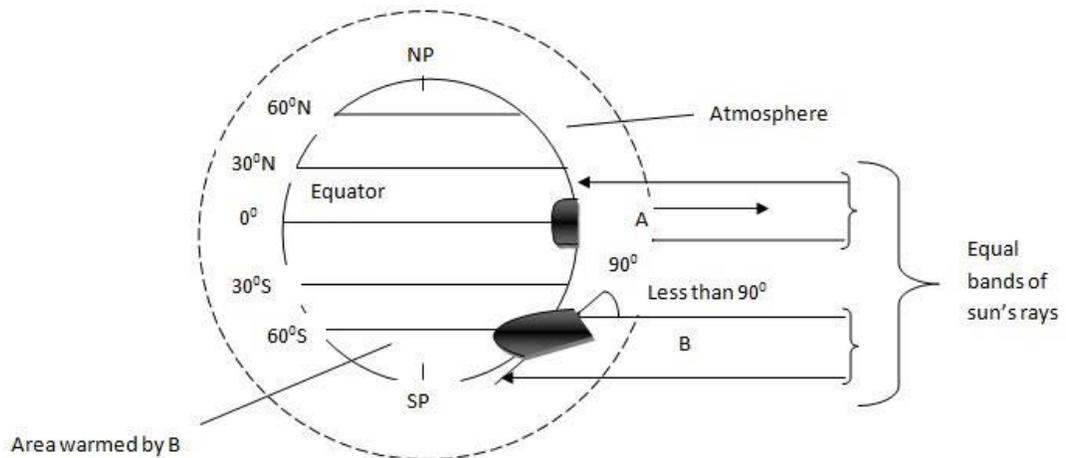
Distance from the sea

Distance from the sea affects temperature. This is because large areas of land masses lying at great distance from the sea do not get the moderating influence of the oceans. Lack of this moderating effects makes the land masses experience very low temperature in winter and very high temperature in summer. This extremely results in high annual range of temperature. The interior of the continent of Asia is a typical example.

Latitude

The amount of heat received at any place depends on the angle at which the sun's rays strike the surface of the earth and the duration of sunshine. At the equator the sun's rays reached the earth's surface at almost right angles. Throughout the year but the angle decreases as one move towards the poles (fig 3.8) Therefore temperature decreases with increase in latitude because the sun rays spread over a larger area and its heating effect decreases.

EFFECTS OF LATITUDE ON TEMPERATURE



2. Humidity

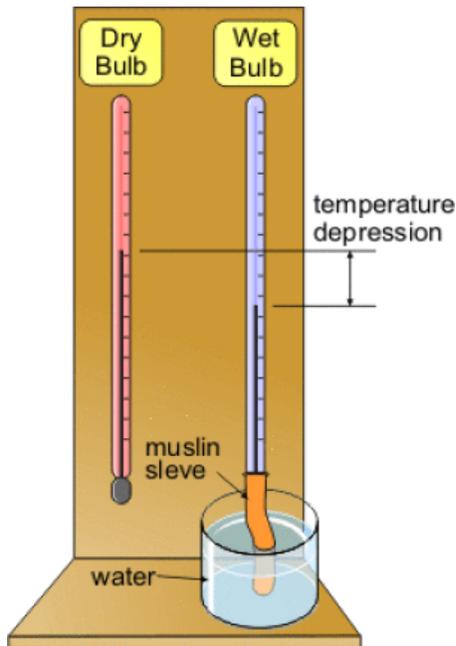
The sun's heat causes water to evaporate from the surface of the ocean and other water bodies. to form water vapor in the atmosphere.

Humidity is the amount of water vapor in air. Or

Humidity is the state of the atmosphere in relation to the amount of water vapour it contains. Humidity indicates the degree of dampness of the air and it is one of the main influences on weather. It is expressed in either absolute or relative terms.

Absolute humidity, expressed in grams per cubic meter, is the actual amount of water vapour present in a certain volume of air at a given temperature. Relative humidity is the amount of water vapour present in a mass of air expressed as a percentage of the total amount of water vapour that would be present when that air is saturated at the temperature. Air is saturated when the atmosphere cannot hold any more water vapour. This condition depends on the temperature and pressure of the air.

Humidity is measured by a hygrometer which consists of wet and dry bulb thermometers. The wet bulb thermometer is kept moist (wet) by wrapping it in a Muslin which is then dipped in a container of distilled water.



When the air is not saturated water evaporates from the muslin and cools the wet bulb. The cooling effect causes the mercury to contract. The dry bulb is not affected in the same way as wet bulb because it does not have a Muslin wrapping. It is affected by the surrounding air. So when the air is not saturated the two thermometers show different readings, when the air is saturated the two thermometers show the same readings.

Therefore when there is a big difference in reading between the two thermometers humidity is low and when there is small difference humidity is high.

Exercise

1. Define the following terms:

- a) **Climate** : Is the average weather condition of an area recorded over a long period of time (over 30 year)
- b) **Weather station**: Is an established area where daily records of weather are done accurately.
- c) **Temperature**: Is the degree of heat of a body.

- d) **Maximum thermometer:** Is used to show the highest temperature
- e) **Minimum thermometer:** Used to show the lowest temperature
- f) **Humidity:** Is the state of the atmosphere in relation to the amount of water vapour it contains.
 - (i) **Absolute humidity:** Is the actual amount of water vapour present in a certain volume of air at a given temperature
 - (ii) **Relative humidity:** Is the amount of water vapour present in a mass of air.
 - (iii) **Weather:** Is the condition of the atmosphere which occurs at place at a specific period of time (FROM HOUR TO HOUR OR DAY TO DAY).

2. Mention seven elements of weather and their instruments

- i) Temperature- Thermometer
- ii) Humidity- Hygrometer
- iii) Precipitation- Rain gauge
- iv) Clouds- Human eyes
- v) Winds- Wind vane, anemometer
- vi) Sunshine- Camp bel, Stokes sunshine recorder
- vii) Pressure- Barometer

3. The records of maximum and minimum thermometers are used for;

- i) Daily range temperature which is the difference of maximum and minimum thermometer.
- ii) Daily temperature which is the average between maximum and minimum temperature.

4. How can you obtain the following;

- a) Daily range temperature : Difference between maximum and minimum temperature.
- b) Mean daily temperature : The average between maximum and minimum temperature.

5. Lines drawn on a map to connect places with the same mean monthly temperature are known as **Isotherms**
6. Temperature data are presented by using **Graph**
7. **List down five factors affecting temperature**
 - i) Altitude
 - ii) Ocean currents
 - iii) Distance from the sea
 - iv) Latitude
 - v) Prevailing winds

3.

Precipitation:

Precipitation refers to the deposition of moisture from the atmosphere on the earth's surface. It includes dew, frost, snow, mist and hail, sleet and rain.

Dew:

Is the water vapor that condense on solid objects when the dew is reached. The droplets formed after condensation of water vapour which is then deposited on the cool surface such as building, leaves, grass and stones.

Frost:

Frost is a tiny ice crystals deposited on objects on the ground, frost is formed when temperature falls below freezing point.

Snow:

snow is the frozen droplets of water, snow formed when water vapour in the atmosphere turns into crystals of ice and reach the ground before melting.

Mist:

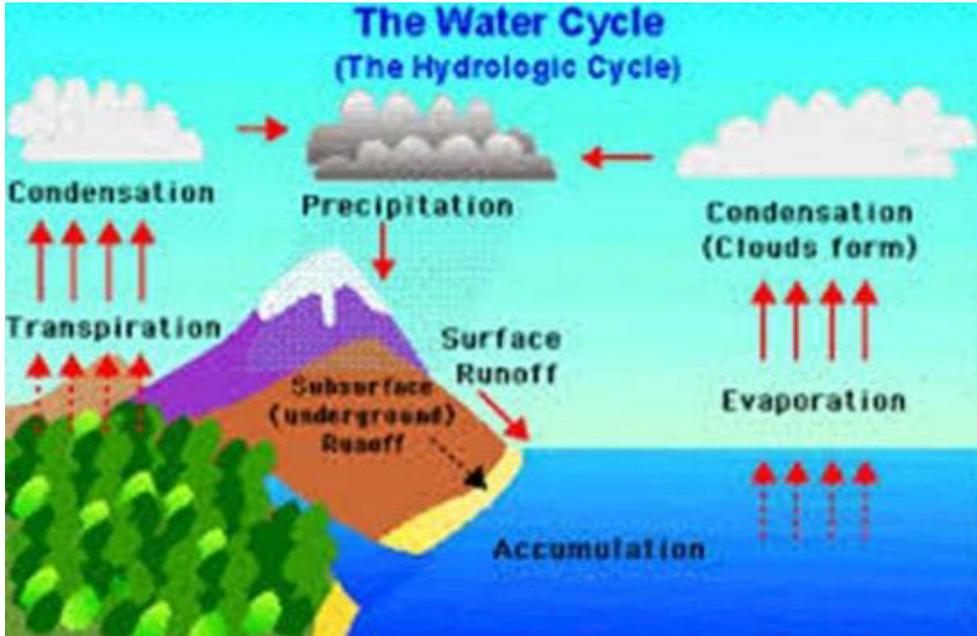
mist refers to tiny water droplets suspended immediately above the ground. Frost is similar to mist but it is denser with less visibility.

Hail:

Hail is the form of precipitation falling with small ice blocks, sleet is a mixture of snow and rain. It forms when the temperature of the ground is lower than the temperature above.

Rain:

Rain are the droplets of water falling from the atmosphere after condensation. When water vapour rises, It cools at high altitude until dew point is reached. Dew point is the temperature rate at which the atmosphere is saturated with water vapour. Condensation takes place after dew point has been reached to form water droplets. These droplets combine to form larger drops which fall as rain.



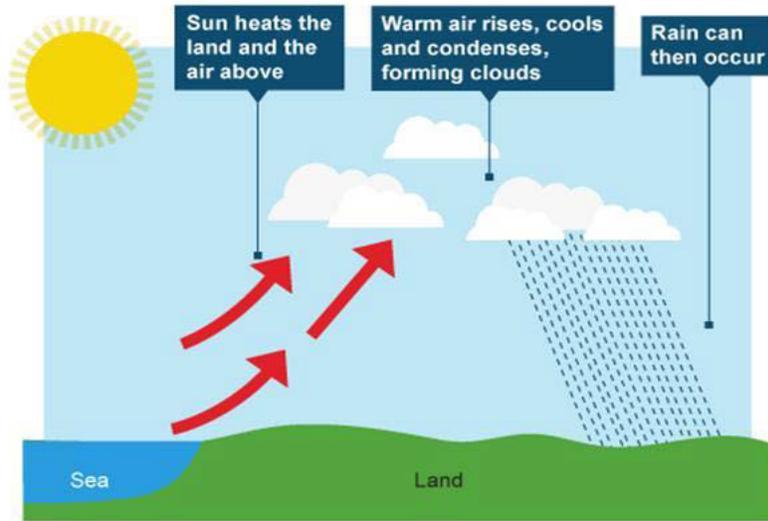
TYPES

OF

RAINFAL

a) Convectonal rainfall

When rain is formed through vertical rising of moist air currents it is called convectonal rain

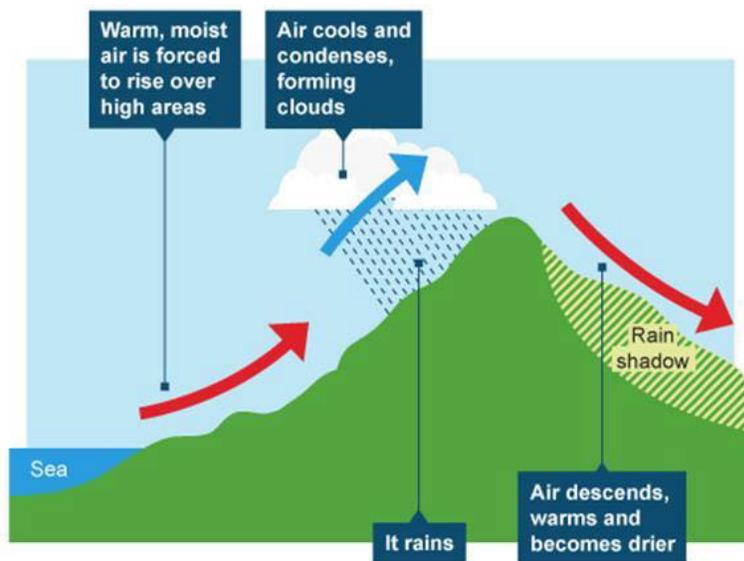


Convectional currents arise due to differential heating of the earth's surface. Convectional rains are common in the tropical areas.

b) Relief rain

Sometimes moist winds are forced by a high mountain to rise and when they reach high altitude the moisture in them condenses to form droplets, which fall as rain.

Rain formed in this way is called relief or orographical rain.



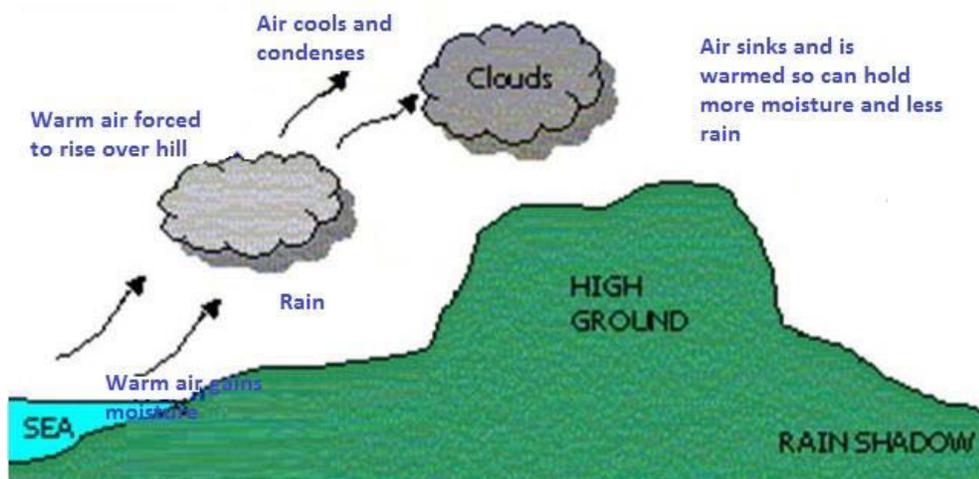
The sides of the mountain facing the direction of the winds is known as the wind ward side while that which faces away from the direction of the wind is known as the lee wards side or the rain shadow, the

lee ward side gets very little rain . A typical example of rain shadow in Tanzania is found in the western side of mountain Kilimanjaro, winds blow from the Indian Ocean in the east and are forced by this mountain to rise and drop most of their moisture on the eastern and south eastern slopes. When these winds blow to the western side of the mountain they already relatively dry.

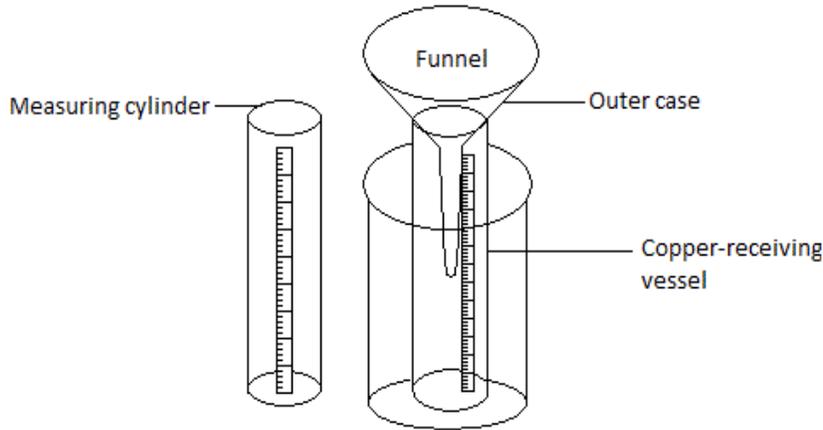
c) Cyclonic rain

When large masses of air with different characteristics of temperature and moisture, cyclonic rain may occur. As the warm and moist air is forced up over the cool and dry air, it expands. At higher altitude the warm air cools and water vapour condenses to form clouds and rain.

On the other hand tropical cyclones are formed over oceans is the tropical between latitude 8°N and 8°S. They usually bring very heavy rainfall and are associated with thunderstorms and very fast moving wind, which often causes destruction along coastal settlements . In the Caribbean and U.S.A tropical cyclones are called hurricanes in Africa they are known as cyclones and in China and Japan they are called typhoons.

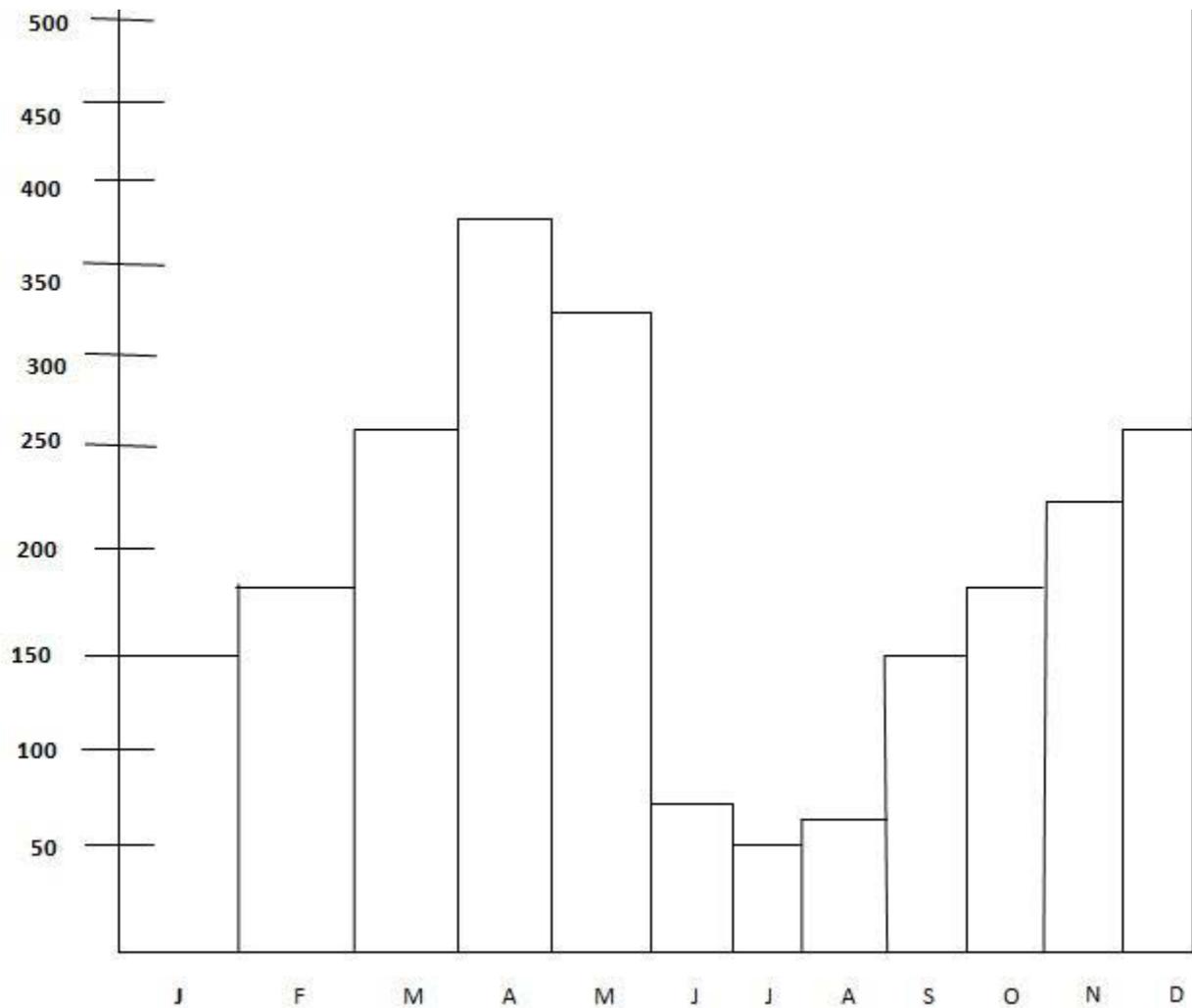


Rainfall is measured by using a rain gauge. The rain gauge consist of an outer case , a copper-receiving vessel, a funnel whose diameter is normally 13 centimeters, a clear glass jar or bottle and a graduated measuring cylinder.

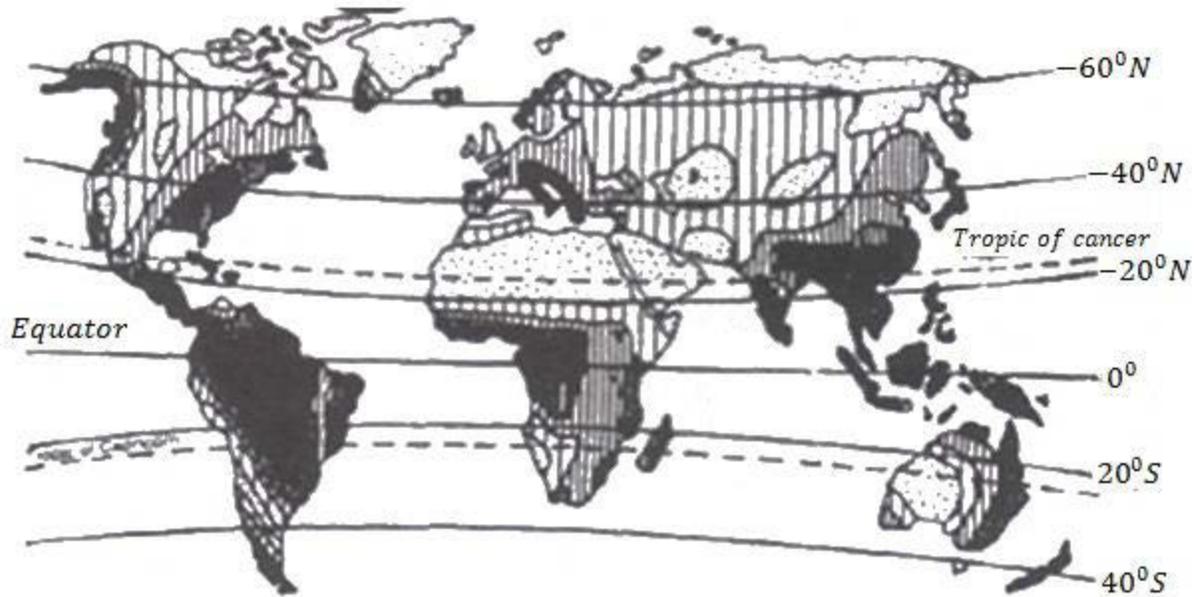


Normally reading is done once every 24 hours. If necessary comments on the nature, time and duration of rainfall should be added to the record. Mean monthly rainfall for a station is usually obtained by adding up rainfall records of a particular month (say January) for a number of years (say 30 years) and dividing the total by the same number of years.

The figures so obtained can be presented in the form of graphs known as histogram. Figures for different places are plotted on a map and places with the same amount of rainfall are joined by smooth line. The line joined places with the same amount of rainfall are known as Isohyets



Mean Rainfall In Bukoba



WORLD MEAN ANNUAL RAINFALL

Rainfall Variation.

Rainfall variation is a normal phenomenon on the earth which is caused by a number of factors. Some of them include Ocean currents, distance from the equator, prevailing winds, water bodies, nature and shape of the coast, distance from the sea, altitude and human activities.

Ocean Currents.

There are two types of Ocean Currents. The warm and the cold currents. The warm Ocean Currents yield rainfall over the adjacent land. This is because the winds cross over them do carry large amounts of moisture for example Mozambique current. Much rainfall is experienced along the East Coast of Africa.

Cold ocean currents are crossed by wind which have no moisture, hence brings very little or no rain in the adjacent land. For example Benguela currents in south-west Africa coast and the canary current in the north-west coast of Africa.

Distance from the equator

Areas along the equator receive more rain than areas away from it. This is because of high amount of solar radiation, which result into evaporation and raising of air moisture hence condensation takes place resulting into convectional rainfall. Congo basin and Brazil are few examples which receive much rainfall due to their position.

Prevailing winds.

Winds blowing from the land towards the sea (off-shore) are carrying moist air from the land and yield no rainfall except in the sea. These winds usually lead to dryness of the land with very low rains in the coast. Effects of these winds are development of deserts. Eg, the Sahara Dessert in the North of Africa.

Lack of water bodies.

Areas with large water bodies such as areas around lake Victoria receive much rain than areas without water bodies like central Tanzania and North Eastern Kenya. Water bodies increase much rain to adjacent areas.

Nature and shape of the coast.

The coastal areas, which align parallel to the prevailing wind such as the N.E trade winds move parallel with the North Eastern Coast of Kenya, yield no rainfall. As result a dry climate is experienced along the coast.

Distance from the sea.

The areas near the sea or ocean experience high rainfall due to winds blowing moisture from the sea which would cause rainfall to the coastal areas. Areas that are very far from the sea receive very little or no rainfall for example, Dar es Salaam in Tanzania and Mombasa in Kenya receive heavier rains than Dodoma, Singida and Tabora, which have long distance from the Indian Ocean.

Altitude.

Altitude is also a factor for uneven distribution of rainfall, highlands force the warm air to rise over them. When they condense, they cause rain to fall on the wind ward side. The other side of the highland (leeward) may receive very little or no rainfall at all. People of such areas includes the eastern part of South Africa receives heavy rain (orographic) while the Western part experiences prolonged droughts due to effects of Drankensburg mountains. The eastern part of East Africa also receives heavier rainfall than the western side due to warm moist winds blowing from the Indian Ocean.

Human activity.

Besides other environmental benefit plants or trees intercept precipitation and return moisture to the air through transpiration and evaporation. This process becomes balanced when there is no destruction of the vegetation. Human activity such as settlement, animal rearing, farming and transportation however can cause rainfall variations on the earth's surface through land degradation. When people cut trees or clear the bushes, land is naturally destroyed.

The destruction of vegetation disturbs evaporation, condensation and precipitation process, which are necessary elements of rainfall. In turn the amount of precipitation in the air is interrupted either by causing floods or droughts. The California desert in U.S.A and the Sahel in Africa are the results of droughts caused by human activities, which have led to the expansion of the deserts in the 1980s.

RAINFALL EFFECTS

Too much rainfall for example, the case of Elnino (1998) results into negative impacts on life and properties. Heavy rainfall may cause destruction of houses, roads and bridges, crop and loss of life for both human and animals. In addition to the loss of life and property, floods, which are the results of heavy rainfall results into eruption of diseases such as malaria, cholera, and dysentery.

On the other hand, too little rainfall leads to little yield of food and cash crops. Famine and hunger in the parts of the world is a result of lack of rainfall.

Prolonged dry seasons in some parts of the world have resulted into the loss of lives of both animals and the people. North Eastern Kenya, Somalia, Sudan, and Ethiopia are some of the areas where people and animals have lost their lives because of long droughts.

Rainfall reliability leads to continuous crops production and animal keeping hence improves standard of living and the industrial development of a nation may be realized. Sustainable agriculture is made possible and people are assured of enough food and cash crops.

Pressure.

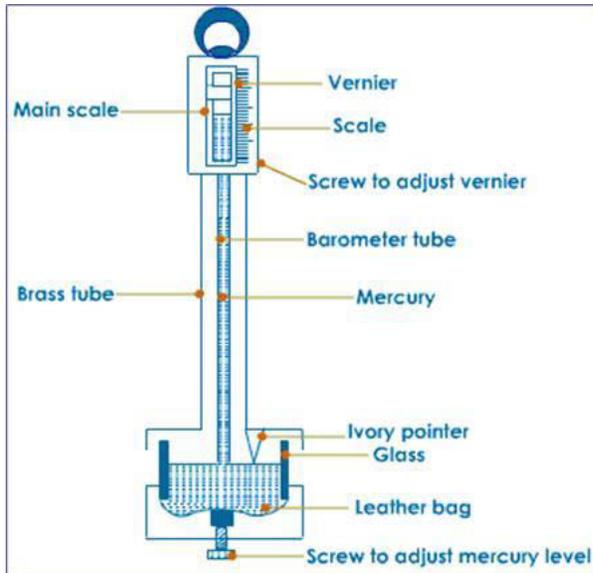
The air surrounding the earth's surface from the atmosphere. The atmosphere has weight. The force with which it presses down on a unit area is called atmospheric pressure. The pressure is exerted equally in all directions. To demonstrate that atmospheric pressure is exerted equally in all directions one can do the following experiment.

- Take a glass with full of water.
- Cover the top of the glass with a piece of thin paper
- Hold the glass upside down.

Atmospheric pressure is measured by an instrument called a barometer. There are two types of barometer, mercury barometer and aneroid barometer. A mercury barometer is a simple apparatus consisting of a glass of about 9.2 centimeters long and bowl filled with mercury.

The glass tube is filled with mercury and being put upside down in the bowl of mercury. At sea level the mercury will fall until the column is about 76 centimeters above the surface of the mercury in the bowl. A vacuum is left at the top of the tube. To read the pressure centimeter rule is placed besides the glass tube and the change in height of the mercury column gives the reading of the atmospheric pressure. Mercury barometers are not portable.

Barometer



Another instrument commonly used is the aneroid barometer. It consists of an air tight box of thin metal containing very little air. The top of this box moves inwards and outwards with changes in atmospheric pressure. This movement is transmitted by a system of levers to a circular seal with a pointer which shows the reading of atmospheric pressure.

Pressure is expressed in millimeters with reference to the height of mercury column or in millibars. A bar is the standard unit of pressure measurement. It is divided into one thousand units called millibars. At sea level pressure is one thousand millimeters of mercury or 1.5 kilograms of force per square centimeters. This is equivalent to 1013.2 millibars approximately one bar.

Lines joining places with the same pressure are called isobars and the pressure is greater at sea level where the whole thickness of the atmosphere exert its weight. Pressure decreases at the rate of 10 millibars for every 100 meters increase in height because the thickness of the atmosphere decreases.

Pressure

1. What is pressure?

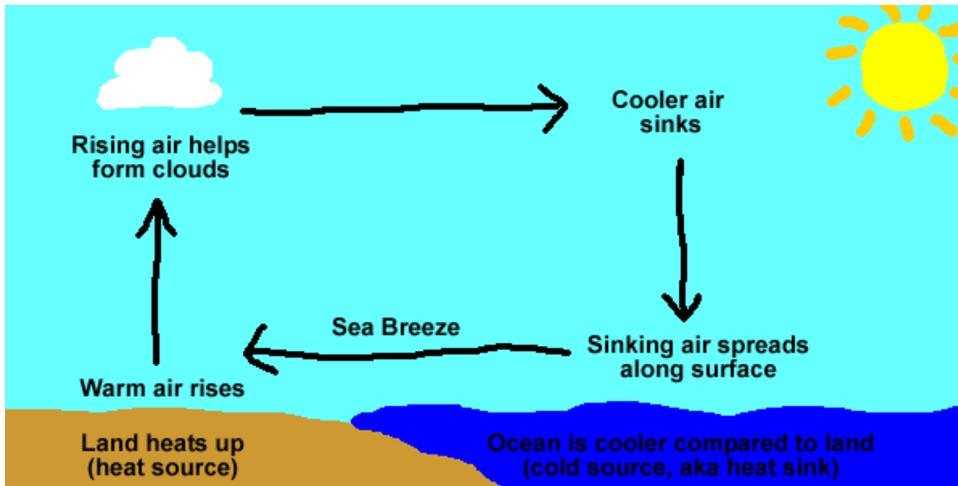
Pressure is the air surrounding the earth's surface forms the atmosphere.

2. Define atmospheric pressure – Is the force with which atmosphere presses down on a unit area
3. Atmospheric pressure is measured by a barometer
4. Two types of barometers are;
 - a) A mercury barometer.
 - b) Aneroid barometer.
5. Pressure is expressed in millimeter.
6. A bar is the standard unit of pressure measurement
7. It is divided into one thousand units called millibars.
8. Lines joining places with the same pressure is called isobars.
9. Mention three roles of pressure in human life.
 - a) Partial filling of tires hinders proper movement of the vehicle.
 - b) Pressure is also helpful to the patients whose parts of body fail and pump blood to other parts of the body.
 - c) Other pressured things include the decoration balloons and playing...
10. Pressure decreases at the rate of 10 millibars for every **100 meters**

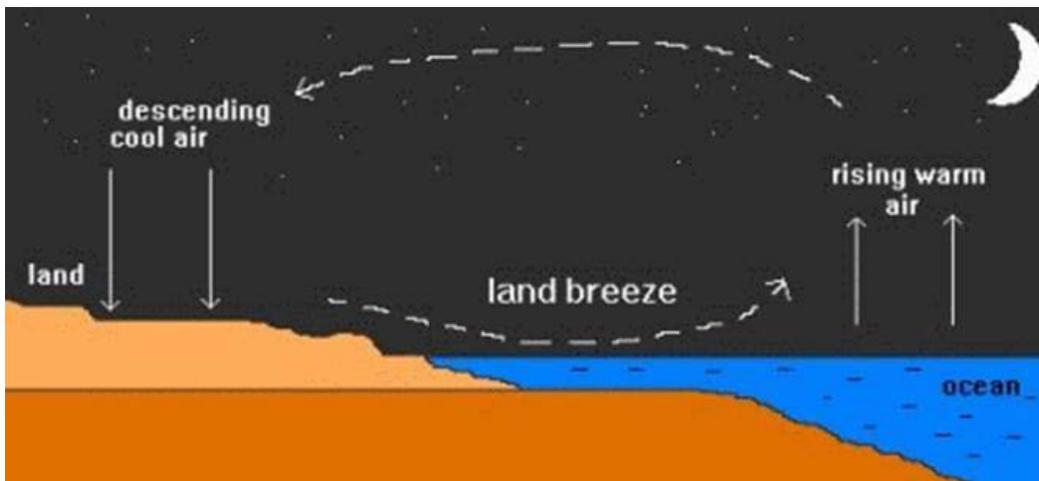
WINDS

Wind is air in motion from high pressure to low pressure area.

SEA BREEZE(DAY)



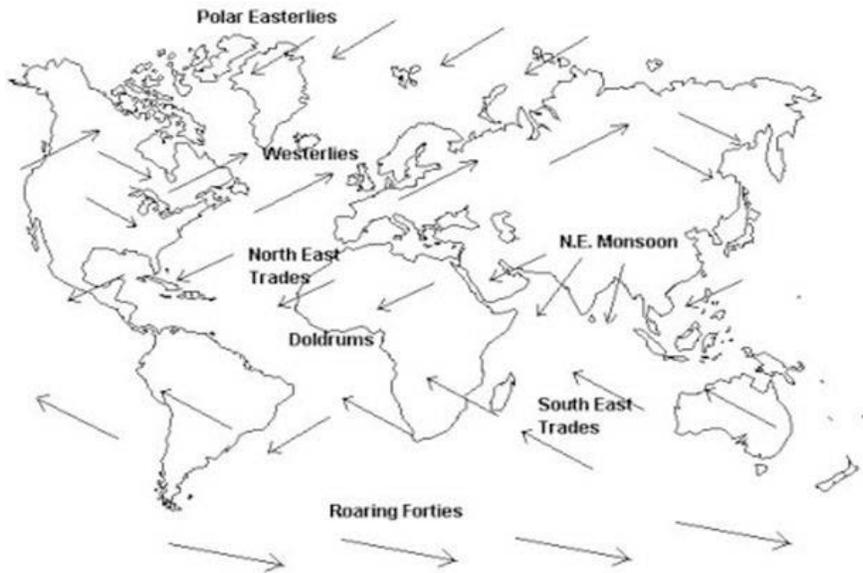
LAND BREEZE(NIGHT)



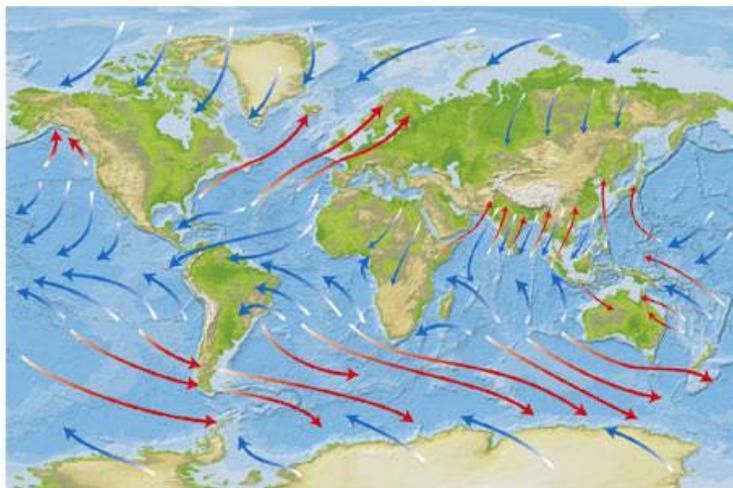
During the day the land is usually warmer than the sea, and the air pressure on the land is lower than that over the sea. Therefore winds blow from sea to land. These winds are known as sea breezes. During the night the land is cooler than the sea and there is low pressure on the sea. Therefore winds blow from land to sea, these are called land breezes.

There are great variations in the general patterns of wind systems in areas of the earth's surface where there are large land masses adjacent to large water bodies. During summer, intense low pressure develops in central Asia in the Northern hemisphere and winds blow in form of high pressure over the Indian and pacific oceans.

July wind pattern



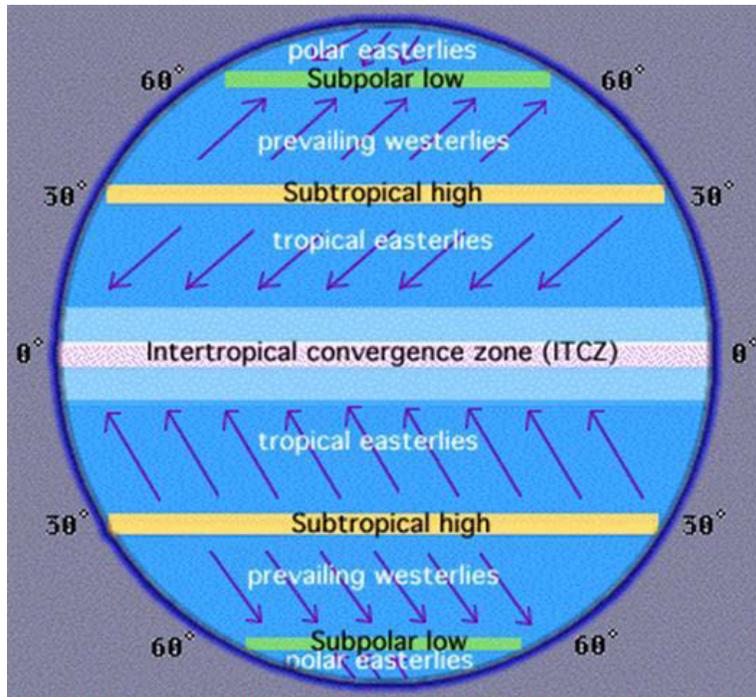
During winter, intense high pressure develops in central Asia while intense low pressure develops over the Indian Ocean causing winds to blow from the land to the ocean. Such winds that reverse their direction with changes in seasons are called monsoon winds. The word monsoon is derived from an Arabic word “mausin” which means season.



January breeze

In the equatorial belt of low pressure between 5°N and 5°S, intense solar heating causes the moist air to rise in great convection currents. This belt is called the doldrums or low pressure belt. The rising air spreads out and moves towards the poles. In so doing it cools and sinks from a high pressure belt. This take place around latitude 30°N and, these latitudes are called horse latitudes or subtropical high pressure belts.

In latitudes 30°N and 30°S some of the high pressure air moves the surface towards the equator as the north-east and south-east trade winds, and some of it moves over the surface towards the poles as the western. Cold air blowing from the poles southwards and northwards expand and its pressure falls. These low pressure belts become noticeable around latitude 60°N and 60°S . As air moves away from the poles most of it moves in from higher levels to take its place. Thus in each hemisphere there are three winds systems; One operates between north poles and latitude 60°N and between the south poles and latitude 60°S (polar winds) and a second one operates between latitude 30°N and 60°N and between latitude 30°S and 60°S (the westerly winds).



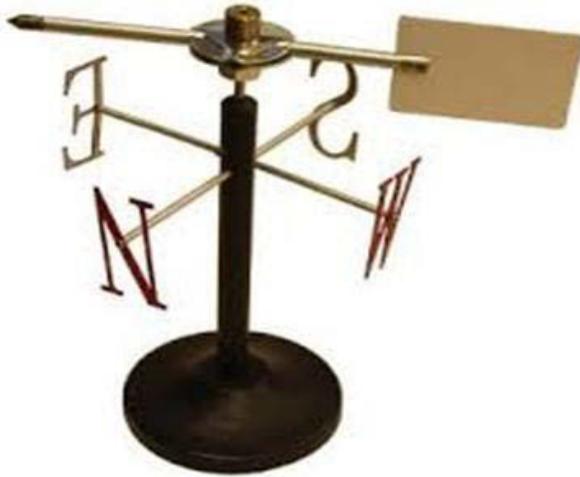
Wind belts of the world

Occasionally in the westerly wind system depressions and anticyclones develop. A depression is an area of low pressure in which winds blow a circular motion. This motion is anti-clockwise in the Northern hemisphere but clockwise in the southern hemisphere. A depression develops when cold heavy air comes into contact with warm moisture. A depression is usually associated with cyclonic rains. Anticyclones are areas of high pressure in which winds blow in a clockwise circular motion in the Northern hemisphere. They normally follow a depression and are associated with cool fine weather with no rain.

Wind direction is measured by a wind-vane. A wind-vane consists of a freely rotating arrow fitted to a central rod. The arrow of the wind-vane always points to the direction from

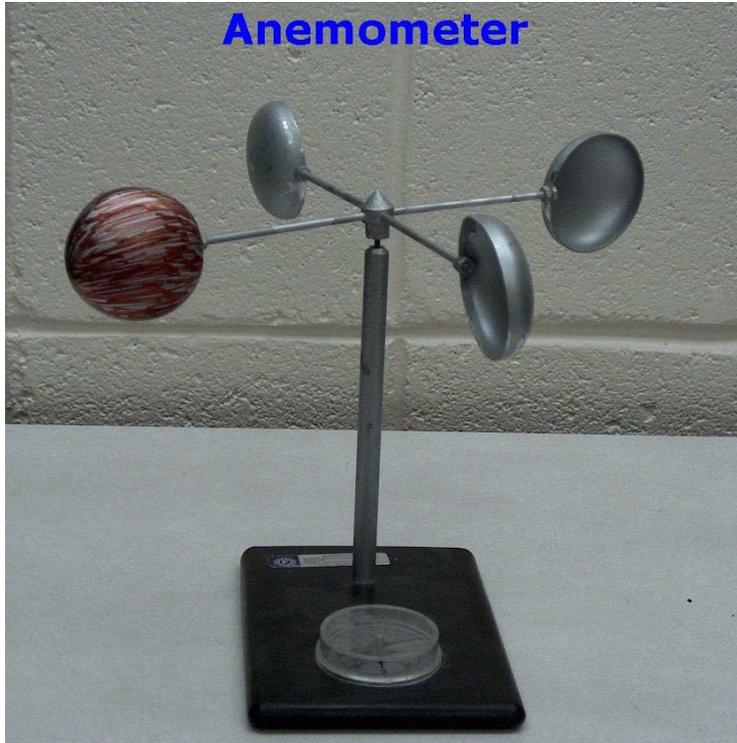
which winds blows, and the wind is named after this direction. Four arms marking the directions of the cardinal points are fixed to the stationary central rod.

Wind- vane



Wind speed is measured by an instrument called an anemometer. This instrument consists of three or four horizontal arms that when there is wind the arms rotate. This movement operates a meter which records the speed of the wind in kilometers per hour.

Anemometer



Weather forecasting

Weather forecasting is defined as a prediction of weather condition of a place at a given time approximately 24 + 48hrs. Weather forecasting is obtained through two methods namely, traditional and modern methods.

The traditional method predicts weather through observation of types of birds voices, croaking of frogs, rainbow, migration of birds, changes of wind direction, position of the moon and general body feeling. The method is still widely used in predicting weather by the indigenous communities.

Modern method involves the use of modern equipment such as satellites, electronic computers, radar, and aircraft, balloons, ships, submarines, rockets and daily records from weather stations. This method of predicting weather is more reliable and accurate.

METHODS AND INSTRUMENTS USED FOR WEATHER FORECASTING (MODERN METHODS)

1. Radiosonde
This is an instrument used to register pressure and temperature from the ground to roughly 12km above the ground. The instruments are fixed to balloons filled with helium gas and are released into the atmosphere everyday at a particular time from different weather stations. The radiosonde transmits radio signals to computers on the ground station where they are analyzed. The signal transmitted give pressure, temperature and humidity readings at different altitude. These balloons are made in such a

way that they burst when they reach a certain altitude.

2. Satellite

The satellite used for predicting weather are human made space. They move around the earth so that they can provide various types of information. They are also used in radio, television and telephone communication. Satellite transmits photographs on weather conditions on a daily basis. The movement of clouds can be predicted from an analysis of the movement of winds force period of 24hours.

3. Persistence method

This is simpler way of making a weather forecast. It assumes that the atmosphere conditions of a place at the time of forecast will not change. For example, if it is 28°C in Dodoma today the persistence method predicts that it will still be 28°C in Dodoma tomorrow. If two inches of rain fell in Arusha yesterday, this method predicts that two inches of rain will fall in Arusha today.

4. Statistical forecasting

In this method, meteorologists ask themselves how is the weather usually like at this time of the year?. They then collect records of average temperatures and rainfall over the last five years. This give forecasters an idea of what the weather is "supposed to be like" at the certain time of year.

Weather forecasting is useful to people in the following ways;

a) Farmers planning their work for a year. This is because weather broad casting helps farmers to adjust their farming activities to suit the expected weather conditions.

b) Weather broadcasting greatly influence transport since it helps sailors and air travelers to know condition of the winds.

c) Helps in planning sport activities.

d) Helps in selecting suitable clothes.

e) Helps fishermen to plan their fishing activities.

f) Helps contractors to plan for a suitable houses.

g) Helps in geographical expeditions like tours and military.

h) Military personnel benefit from weather broadcasting as they can plan their military activities depending on weather conditions

Exercise

1. If the temperature at Dar- es-salaam, which is at sea level, is 32°C , the temperature at a place where altitude is 1,500 meters will be

a) 0.6°C

b) 23°C (C)

c) 8°C

d) 17°C

2. Circle the letter of the correct response for the following statements.

To obtain the mean monthly temperature of a place for a month in a particular year, take

a) The sum of mean daily temperature for the month.

Number of days in the month.

b) The sum of the monthly temperature $\times 12$

Numbers of days in the month.

c) The sum of the monthly temperature for the year

12 months

d) The daily maximum + the daily minimum

2.

3) Study the Temperature graph for Delhi below and answer the following;

a) Which is the coldest month?

b) Which is the hottest month?

c) Calculate the annual range of Temperature.

CLIMATE

Is the average weather condition of an area recorded over a long period of time (over 30 years). The weather elements listed above are measured and recorded at a weather station. A weather station is an established area where daily records of weather are done accurately. Each weather station should have the following instruments; Thermometers which are kept in Stevenson screen that is maximum thermometers, minimum thermometers (six's thermometer), dry bulb thermometer and wet bulb thermometers

THE MAIN DIFFERENCES OF WEATHER AND CLIMATE

WEATHER

1. Is the condition of the atmosphere of a place at a particular time over a short period of time
2. Weather varies from one place to another within a region
3. Weather changes abruptly within a short period
4. There are weather instruments for measuring most of the elements of weather

CLIMATE

- Is the average weather conditions of a region which have been observed over a long time
- Climate remains uniform over a large region
- Climate change is slow, gradual and occurs over many years
- Climate elements are not measured but calculated from the weather measurements

Major Natural Regions of the World

Temperature on the earth's surface varies from place to place. Places near the Equator usually have high temperatures throughout the year, while places near poles are cold throughout the year, similarly different areas on the earth's surface receive different amounts of rainfall.

A place in South America, which gets the same amount of rainfall as a place in West Africa and has similar temperatures, will have the similar natural vegetation.

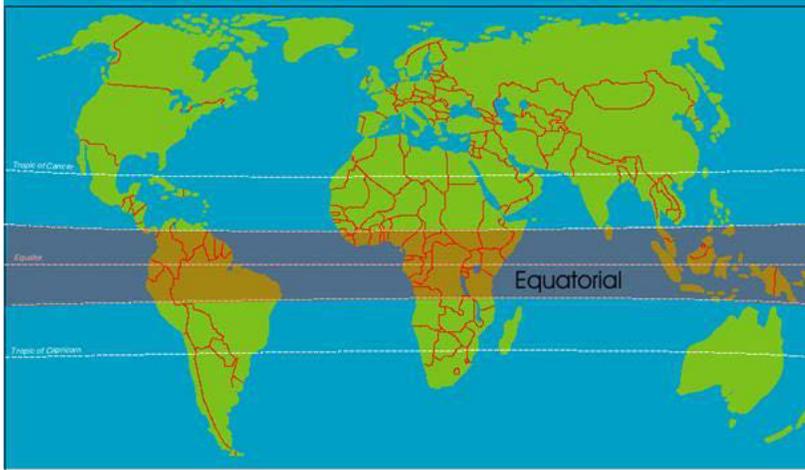
Likewise, people who live in the two areas under the same natural conditions carry out similar economic activities, for example, farming.

A region with the same geographical background to human activity such as temperature, rainfall and natural vegetation, is called a natural region, on this basis the earth's surface may be divided into the following natural regions;

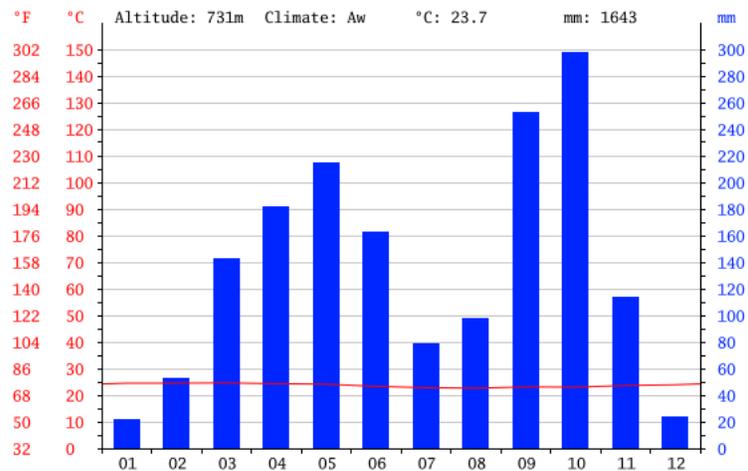
1. 1. Equatorial Region.
2. 2. Tropical Grasslands (Savanna).
3. 3. Monsoon Region.
4. 4. Hot Deserts.
5. 5. Mediterranean.
6. 6. Warm Temperature Eastern Margin (China type).
7. 7. Warm Temperature Interior Region (Steppe type.)
8. 8. Cool Temperature West Coast Margin (British type).
9. 9. Cool Temperature Continental Regional (Siberian).
10. 10. Cold Temperature Eastern Margin (Laurentian)
11. 11. Tundra and Polar Regions.
- 12.. Mountain Regions.

The Equatorial Region

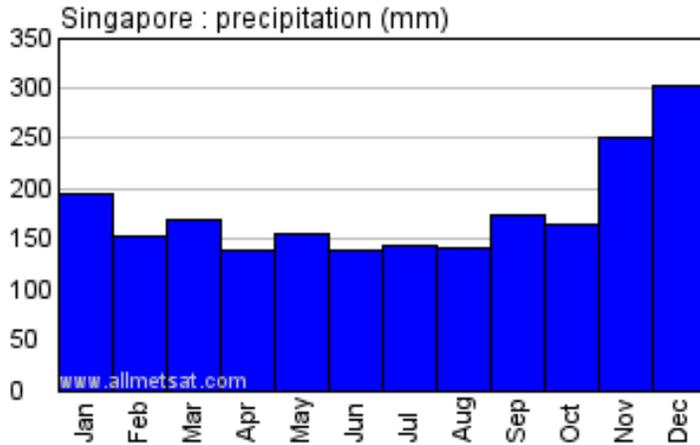
The equatorial region is found approximately between latitude 0° and 5° North and South of the equator. Areas which belong to this type of natural region are the Amazon and Congo basins, the West Africa Coast, the East Indians and the Coastal plain Colombia.



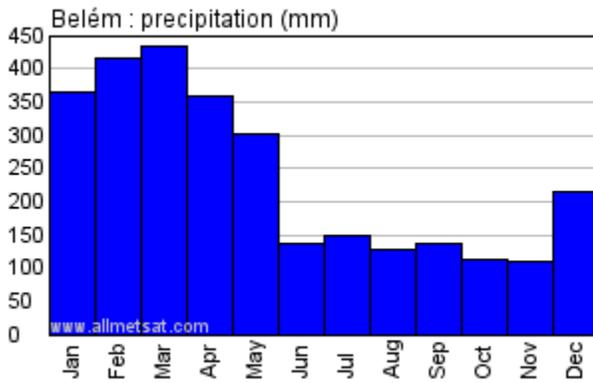
High temperature and very heavy rainfall characterize the region. The temperature varies little from 27⁰c throughout the year. The annual range of temperature is generally small about 2⁰c throughout the year. The total rainfall in these regions is around 2,000 millimeters with no distinct dry season. The annual distribution of rainfall usually shows two peaks (maximal) after the equinoxes fig 4.3, 4.4 and 4.5 and table 2(a) ,(b) and (c) demonstrates the climate of this region.



YAOUNDE



Singapore



Belem

Table 2: Typical climate figures for the equatorial Region.

a) Yaounde (Cameroon)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	25	25	24.6	24.5	24.2	24	24	24	24	24	24.4	24.5	24.3
Rainfall mm	40.6	68.6	150	230	206	114	64	84	194	226	150	50.8	1579

b) Singapore

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	25.5	25.5	26.1	26.7	27.2	26.7	26.7	26.1	26.7	26.7	26.1	25.6	26.1
Rainfall mm	246	180	185	198	65	178	170	198	175	201	256.5	264	2415.5

c) Belem (Brazil)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temperature °C	25.5	25	25	25.5	25.5	25.5	25.5	25.5	26.1	26.1	26.7	26.1	25.5
Rainfall mm	198	337.8	431.8	352.1	279.7	231.1	58.4	71.1	15.2	12.7	15.2	66	2275.8

Rainfall in this region is of the convectional type and is usually accompanied by thunder and lightning. Heavy rainfall, high humidity and high temperatures throughout the year result in continuous growth of vegetation's. The natural vegetation in this region is thick forest called selva. The forest is always green, because the trees do not shed their leaves at the same time. The most common trees are mahogany, rosewood, ironwood, green heart balsa, palms and tree ferns.

The trees can grow to a height of 45 meters and their umbrella-like tops form an almost continuous cover of tree crowns (canopy). The trees are often intertwined with creepers (Lianas) and

have many parasite plants. Because little light reaches the ground hence there is little undergrowth, where man has cleared the forest and practiced shifting cultivation, deserted areas develop secondary forests with mainly small trees and thick undergrowth.

There are three types of animals found in the equatorial rain forests. The first type consists of tree dwellers such as the gorilla, the chimpanzee and the monkey. These animals have long arms, which enable them to swing from branch to branch. In addition to these animals there are many varieties of birds, reptiles and insects. The second type consists of those animals which live in the rivers, such as the hippopotamus and the crocodile. The third type comprises animals that dwell in the open parts of the forest, especially where the forest merges into the Savanna.

People living in the equatorial regions usually engage in shifting cultivation or “slash and burn” agriculture. In this type of cultivation the people clear the forest by cutting down and burning the vegetation, then they tilt the soil and grow crops such as yams, cassava, groundnuts, maize, millet, sweet potatoes, sorghum, beans, water melon and banana. The major type of people in Amazon and Congo basin and East Indians are engaged in this kind of agriculture. They also do some hunting and fishing.

Another agriculture activity found in the equatorial region is plantation agriculture. A plantation is a large scale farm in which cash crops such as natural rubber, cocoa and oil palms are grown. Most rubber plantations are found in Malaysia, Indonesia, Thailand and Sri-Lanka. Natural rubber are of great importance to the economy of Malaysia and Thailand. It was equally important in the economy of Indonesia before oil was discovered. Rubber is used in making tires and in the manufacture of many industrial products.

Oil palm is another important crop grown in equatorial regions. It is grown in Nigeria, Malaysia and Indonesia. Palm oil is produced from the flesh of the fruit and from the nut. Palm oil is used for the manufacture of margarine, cooking fat and soap.

In Nigeria oil palm cultivation is widely spread in the South. The palm belt yields more palm produce than all the other parts of West Africa put together. The palm belt has ideal condition for growing palm. It has heavy annual rainfall about 1500mm, enough sunshine for opening the palm fruits, and well drained soils. Over 90% of the produce is obtained from small hold farmers, while the rest is obtained from plantations. Oil is extracted from the nuts by manual method or in oil mills.

Cocoa was introduced to the West Africa mainland from Fernando Po Islands in the last part of the 19th century. It has been developed by peasant farmers. At the beginning, the quality of cocoa was very poor as a result of lack of new technology in the preparation of the beans for export. Great improvements have been achieved following the grading of the cocoa beans and the payment attached to each grade. Ghana is the leading cocoa producing country in the world, with an annual output of about 250,000 tons.

A piece of land can be kept under cocoa cultivation for as long as 40 years. Preparation of the farms is done between January and March. Food crops are also grown on the cocoa farms during the first 4 years when the cocoa trees have not started to bear fruits.

Cocoa seedlings are easily damaged by directly sun rays and heavy rain. That is why a few trees are left when clearing the bush so that they may provide shades. More shades are provided by planting bananas.

Flowering begins in December and the main cocoa harvest takes place between October and February and the “light crop” is gathered from April to August. During the main harvest, owners of large cocoa farms are usually forced to hire labours to gather and tend upon the beans during fermentation. The quality of the crop depends largely on proper fermentation.

At home, men use sticks to split open cocoa pods. Inside each pod there are about forty beans lying in a bed for sticky white pulp. Women separate the beans from the pulp. Children help to carry them to the markets that are close to railway stations. From the markets the cocoa beans are transported by rail to Accra for export.

(Ghana Main cocoa producing area)



Lumbering in Ghana.

Ghana is among the west African countries that fall under equatorial type of climate. One of the economic activities carried in Ghana is lumbering. The forest and woodland used to cover about 33.1% of the total land use in Ghana. Up to date the forest land remaining is only a quarter of the former land. This is due to high exploitation of forests without replacement, which encourage expansion of deserts and soil degradation. Forest management is under government control, which involves both natural forest and timber plantations.

The government encourages timber production for export which employs about 70,000 people in the timber industry. A national Forestry Administration Program (NFAP) was established, supported by international bodies like USAID, the FAO and the countries such as Canada and the United Kingdom. Such programs do not realize the government's irresponsibility in conserving the forests but to people who clear forests for new areas of farms land.

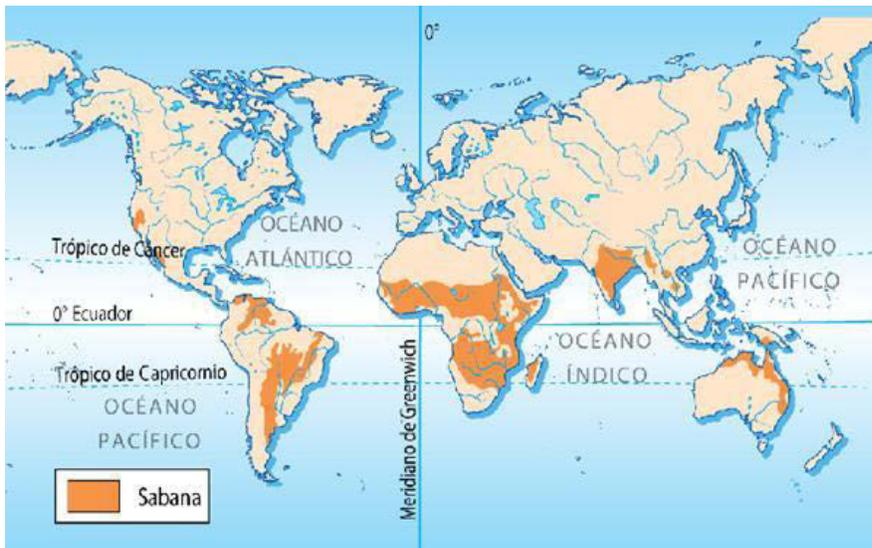
The falling of trees is through both man labour and use of machines. The trees are cut into logs and packed on the trucks then transported to the ports for export, and other to the home industries for

processing. A part from lumbering people obtain traditional medicines, firewood, fruits and meet through hunting. These benefits are not realized by the government.

Tropical Grassland (Savanna or Sudan).

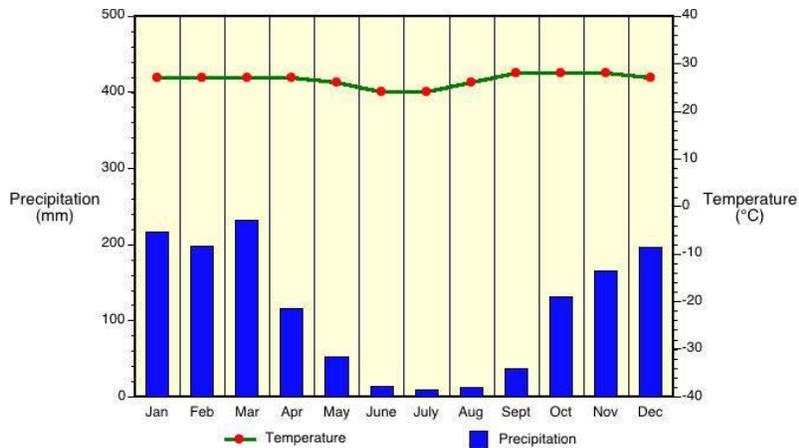
These regions are found between 5°c and 20°c north and south of the equator. They include West Africa, Sudan, East and Central Africa, the Brazilian plateau, Venezuela and North Australia.

Tropical Grassland or Sudan type

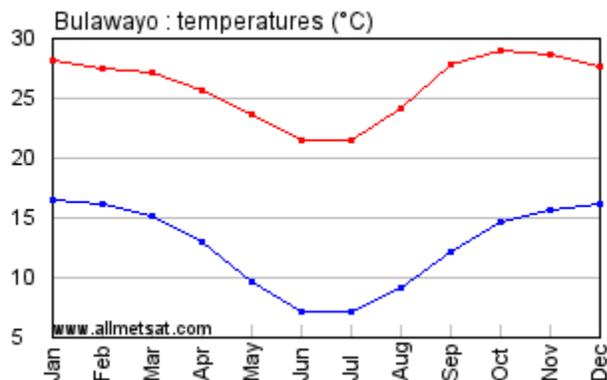


Temperatures are always high, but with a greater range than in the equatorial region. They range from 20°C during the cool season and 32°C in the hot season. This region has an annual range of temperature of about 8°C. Total rainfall mainly during the hot season of the year (Tables 3 (a) and (b) and figure 4.9 and 4.10)

Cuiba climograph



Bulawayo climograph



The vegetation varies considerably from the areas near the equatorial forest to the desert margin. The grass are tall and trees are more numerous in regions near the equatorial forests, but towards the desert margins the grass is short and poor and there are scattered thorn bushes. The grass grows well and becomes green during the rainy season but it turns yellow during the dry season. The grassland is known as the Campos while those in Venezuela are called the llanos. The African and Australian grasslands are known as the Savanna. The Savannas are the most extensive grasslands.

Table 3: Typical climate figures for the Tropical Grassland (Sudan type) Region.

a) Cuiba (Brazil)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly

Temp °C	27.2	27.2	27.2	26.7	25	23.9	24.4	25.5	27.8	27.8	27.8	27.2	26.7
Rainfall mm	248	211	211	101.6	53	7.6	5	28	50.8	114	149.9	205.7	1386.6

(b) Bulawayo (Zimbabwe)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	21.7	21	20.6	18.9	16.0	13.9	13.9	16	20	22.2	22.2	22.2	19.2
Rainfall mm	149.7	101.6	78.7	17.8	7.6	0	0	0	2.5	22.9	83.8	132	599.4

Typical trees of the Savanna grasslands are baobabs, miambo, acacias and gum trees. Two main groups of animals found in the Savanna include the grass and leaf eating animals such as giraffe, elephant, buffalo, hippopotamus, zebra, antelope and rhino. Animals which feed entirely on plants are known as herbivorous animals.

The second group consists of the fresh eating or carnivorous animals such as the lion, leopard and hyena. In addition, there are many species of birds, Reptiles and insects.

People in the tropical grassland engage mainly in livestock keeping and cultivation. In the Campus of Brazil, cattle are grazed on large farms called ranches. Cattle rearing is also important in the llanos of Venezuela and Savannas of Africa.

The main crops grown in the tropical grasslands are maize, millet, groundnuts, rice, beans, onions, cotton, tobacco, sugarcane, sisal and coffee. Maize and millet are the two most important food crops. Maize grows well in the wet areas while millet thrives in the drier parts. Groundnuts are important crops

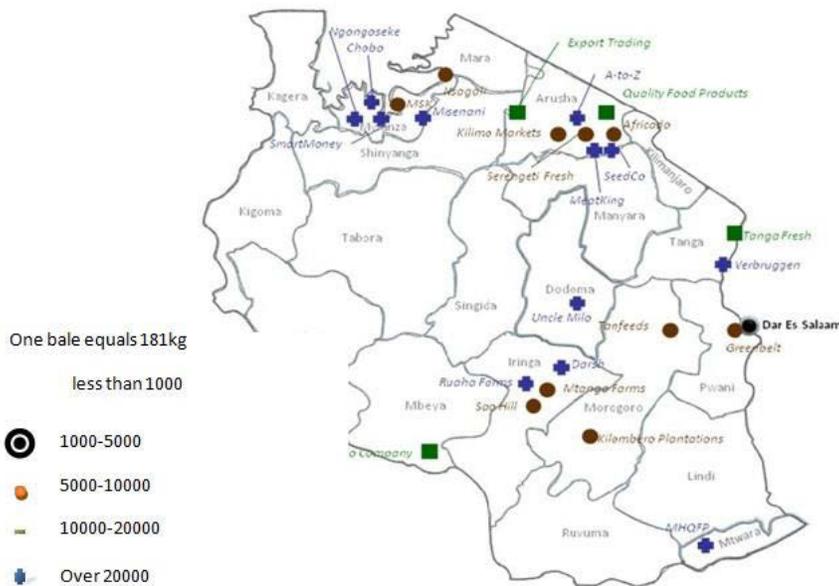
in West Africa. In Brazil and other tropical high land, coffee is grown mainly on plantations. Cotton is widely grown throughout the tropical grassland on small peasant plots.

Most of Tanzania lies in the tropical grassland. In this part of the country livestock keeping is one of the major occupations of the Sukuma and the beans are growing mainly for food by the majority of Tanzanians. Coffee, Cotton, Tobacco are grown in various parts of the country as cash crops.

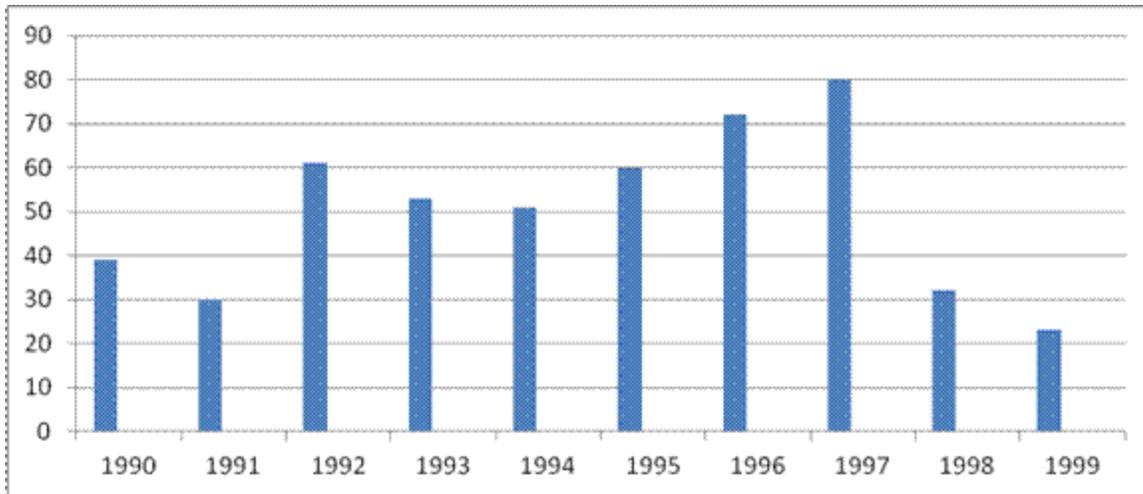
Cotton Growing in Sukuma land

Cotton is one of the important cash crops in Tanzania. Over 90% of the outputs comes from areas around Lake Victoria, specifically Mwanza and Shinyanga regions. These are usually referred to as Sukumaland and it is inhabited by Sukuma tribe. Other areas together produce about 10% of the

country's total output.



Cotton production 1990-1999



Cotton growing in sukuma land started in Mwanza and Kwimba districts, and later spread into the surrounding areas of shinyanga, Maswa and Geita. These new areas had a small population but a lot of flat land. This made large scale cotton farming possible. People also grow cassava, maize and rice mainly for subsistence.

In sukuma land rainfall is seasonal and has great influence in cotton growing. Both the total annual rainfall, which is between 508 millimeters and 884 millimeters, and the monthly distribution are of great importance to the quality and quantity of cotton produced.

Table 4. Rainfall Data: Average Monthly totals

Month	Station		
	Geita (Boma station) mm	Maswa Banagi Hill station mm	Maswa (Gulu Station)
October	85.80	30.75	8.64
November	136.91	75.18	43.94
December	122.43	88.14	99.82
January	101.6	75.95	100.84
February	884.58	78.23	98.55
March	121.16	116.59	119.63

April	156.21	119.63	85.34
May	87.63	61.72	37.59
June	11.18	30.99	0.00
Jully	1.02	24.38	0.00
August	12.45	42.93	0.00
September	32.00	35.56	0.64
Total	1752.97	780.05	594.99

GRAPHS

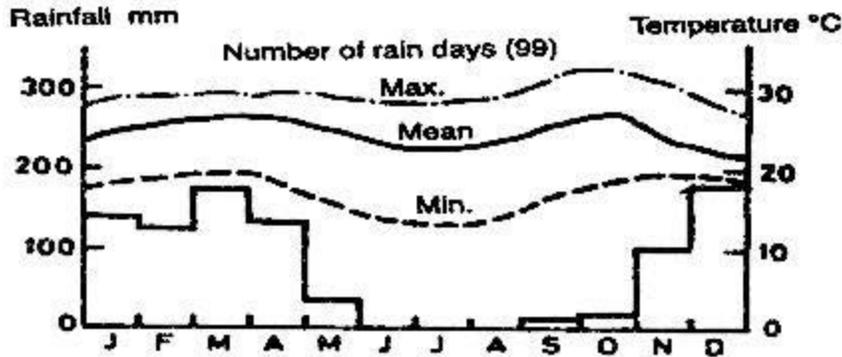


Fig. 4.13: Tabora.

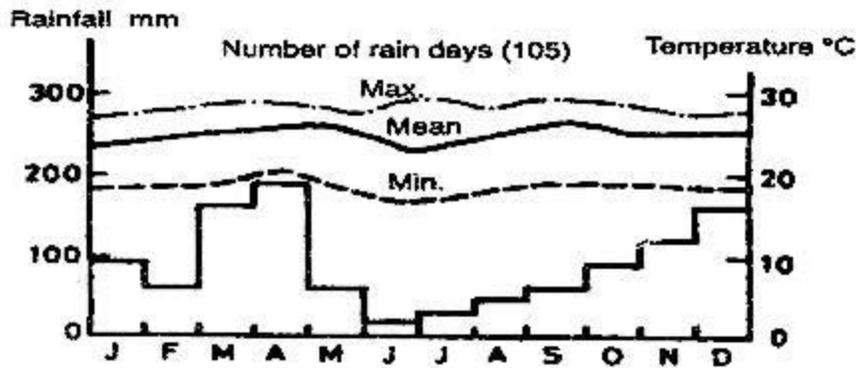


Fig. 4.14: Mwanza.

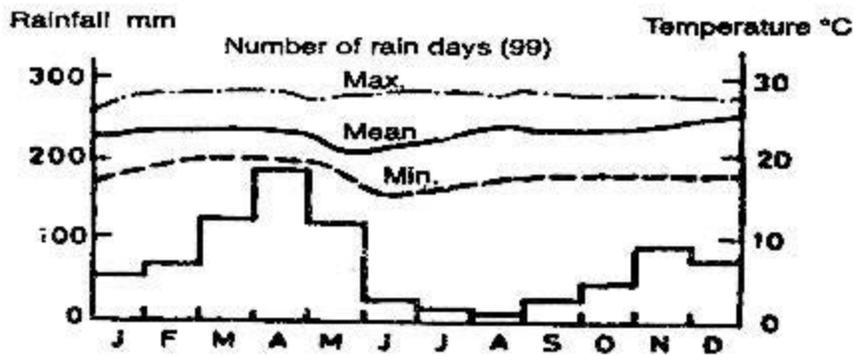


Fig. 4.15: Musoma.

Generally Mwanza Region has an altitude varying from 1,128 meters to 1,280 meters. Suitable land for growing cotton in Mwanza area occurs in patches in the up lands partly because there is a lot of rocky land in this area and partly because the bottom lands are more suitable for grazing. In Mwanza region cotton fields are usually cultivated by family members. They cultivate the farm in strips down the slopes around the hills.

Shinyanga region has been more recently settled than Mwanza region. Cotton farms in this area are quite extensive because the land is flat and the farmers use tractors or plough and hire labour during

weeding and harvesting peaks. Geita district is the only district in Mwanza region which engages in extensive farming similar to that found in Shinyanga region.

Labour patterns in both Mwanza and Shinyanga regions follow a similar sequence. For example, a generalized working pattern in Geita district in Mwanza and that of Maswa district in Shinyanga is as follows;

Activity	Geita- (Mwanza)	Masura (Shinyanga)
1. First significance cultivation	Early October	Late November
2. Cultivation peak	Late November	Late December
3. Weeding peak	Early January	Early February
4. Harvesting peak	Mid June	Early July

- In Maswa farmers generally begin to cultivate soon after the first rains. Their working calendar on the cotton farms is as follows;

November- Mid December

- Clearing the fields.
- Ploughing and spreading manure or fertilizer.
- Collecting seeds from primary societies (about two and a half tons per hectare).
- Planting.

Mid December- March

- Thinning the seedlings.
- Weeding (done three to four times).
- Spraying (done three to four times).

May - July

- Harvesting
- Sorting and grading

June - August

- Selling.

August – September

- Uprooting and burning the cotton plants. Most farmers do the ploughing and planting at the same time at the beginning of the rainy season.

Weeding is done at least three times. The first weeding is done when the cotton seedlings are seven to ten centimeters tall. This helps the seedling grow healthy and strong because they get enough supply of food and in clean fields. The second weeding is done before the cotton balls open and spraying is done after each weeding to clear off any cotton disease.

The harvesting period is the busiest time for the whole family, usually harvesting is done between May and July. The beginning and the end of harvesting will depend on when each individual farmer planted his cotton. But harvesting peaks occur between the last week of June and the first week of July. After harvesting peaks occur between the last week of June and the first week of July. After harvesting, Farmers immediately uproot the cotton plants and burn them. Burning help to kill the cotton pests that might have attacked the cotton plants. The farms are left clear of any cotton plants ready for the next ploughing period.

Livestock Raising in Tanzania.

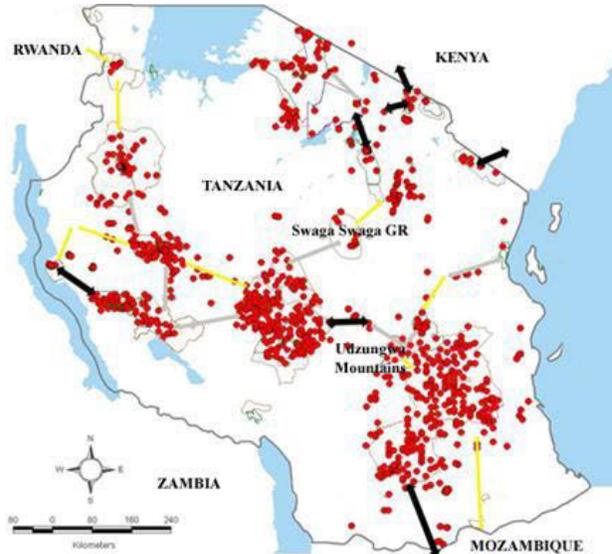
Livestock raising in Tanzania include pastoralism, mixed farming and ranching. Pastoralism is an activity of keeping animals such as cattle, goats and sheep's. The pastoralists in Tanzania include the Masai and Barbaigs who move from one place to another searching for pastures and water for their animals. Normally they don't have permanent settlements. These are pure pastoralists with large herds of animals.

Ranching is a commercial way of keeping animals. The animals are kept in an enclosed big area with necessary facilities. Ranches in Tanzania involve beef cattle, piggery and large poultry projects. Some of these ranches can be found in Kongwa District in Dodoma, Kikombo in Mpwapwa District. Ruvu in Kibaha District and west Kilimanjaro in hai District. The government or companies today run most of these ranches.

Mixed farming is a kind of farming whereby people with permanent settlement keep animal and involve in crop cultivation. Good examples are the Sukuma, Nyamwezi and Gogo. Few cattle herders in Tanzania practice transhumance that is seasonal movement with cattle up to the highlands and down the valleys especially during dry seasons. The good examples of such movements are the pare who move with herds to the uplands during a day time and back to their homes in the evening.

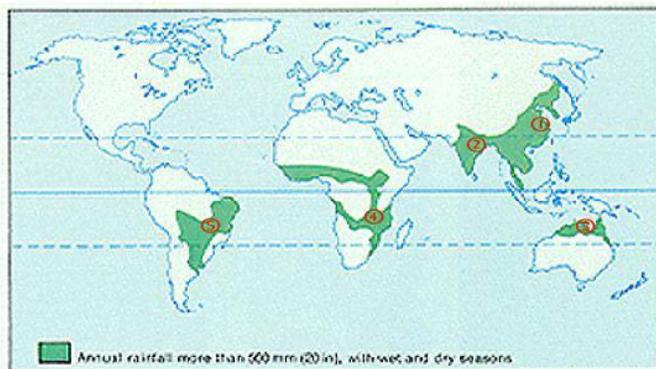
Exercise.

Draw a map of Tanzania and show the areas with large number of animals keepers



Monsoon Region

It was pointed out that the word monsoon comes from an Arabic word “Mausin” which means season. The monsoon region is an area in the climate mainly influenced by the wind blowing alternatively from one direction in one season and the other direction in another season. The areas which have monsoon type of climate are South East (India, Pakistan, Burma, Thailand and China) and Northern Austria. This type of climate is mostly marked in India.



In winter, the interior of Asia is extremely cold. The air over this area is cold and heavy, forming a region of high pressure without blowing winds. But the sea is comparatively warm, for it has been gradually gaining at during summer and warm air over it rises, forming a region of pressure. Wind blows from the high pressure area in the interior towards the low pressure area over the sea. Since the winds which blow from land are dry, the monsoon lands receive little rain during winter except for it in coastal areas and island such as sri-lanka which are reached the winds after passing over the ocean. In summer the opposite happen. Except for very high areas, the interior of Asia becomes extremely cold. The air over the land becomes intensively heated, expand, rises and form a region of low pressure. Since the sea takes longer to heat than land does, the sea becomes comparatively cool, and forms an area of high pressure. Winds blow from the sea to the land and bring rain to South East Asia. Over most India Rain bearing winds blow from the south west. In china South East winds blow from the Pacific ocean.

The amount of rainfall the monsoon region receives varies from place to place. For instance, charrapunji, on the wind ward side of the khusi hill in Assam (India), gets around Delhi (India) receives only 620 millimeters of rainfall (Table5 (a), (b) and (c) and fig. 4.17, 4.18 and 4.12.

Table 5: Typical climate figures for the Tropical Monsoon Region;

a) Bombay (India)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	23.8	23.8	25.5	26.8	29.2	22.4	26.4	26.3	26.3	27	26.1	26.3	26.1
Rainfall mm	2.5	0.0	2.5	0.0	17.8	523	693	406	299	60	10	0.0	2016.7

b) Darwin (Australia)

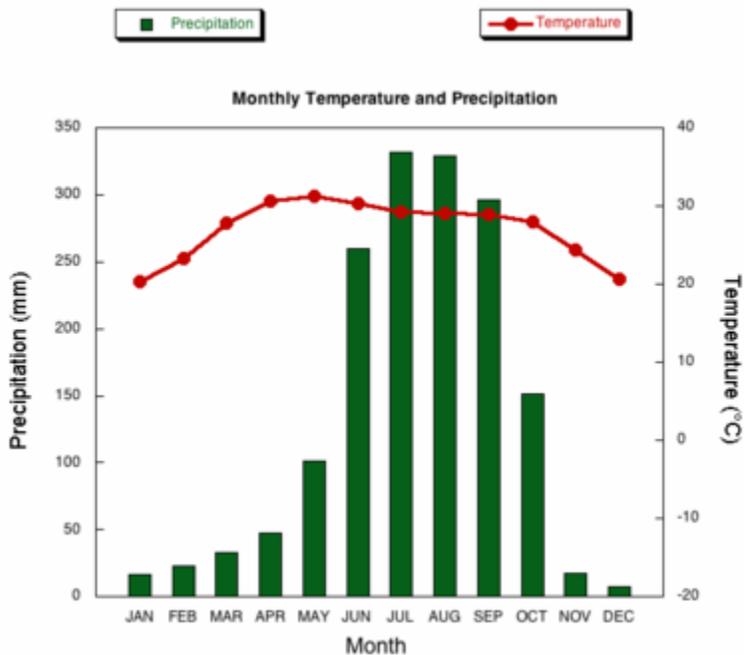
Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	28.9	27.8	28.9	29	26.	2	25.	26.	28.	29.	29.	29.	28.1
Rainfal l mm	388.	330.	246.	11	17.	5	2.5	2.5	12.	53.	132	261	1554.
	6	2	4	4	8				7	3			5

c) Hong Kong

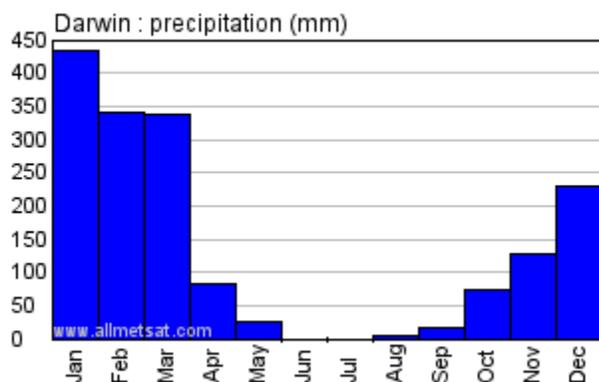
Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	15.4	14.3	17.2	21.1	25	26.1	26.7	26.7	26.1	24.4	20.6	17.2	22.2
Rainfall mm	35.6	27.9	66	139.7	259	383.5	289.6	355.6	292.1	114.3	40.6	33	2169.5

The monsoon region has three marked Season. The hot dry season starts from March to June and has temperatures rising to over 32°C, hot wet season which starts from October to March. Fig 4.17, 4.18 and 4.19 Show rainfall and temperature conditions for three stations in the monsoon region;

Bombay



Darwin



Hongkong

There is very little of the natural vegetation left in the monsoon areas. However, the main natural vegetation types still existing vary with the amount of rainfall. Where there is very heavy rainfall (over 2000mm) vegetation consists of forests with trees such as teak and tropical cedar, .the trees grow to a height of about 30 to 35 meters. Where rainfall is relatively heavy (1000-2000mm) less dense forests are found. The trees include iron, wood and sandal wood. Mangrove trees grow in swampy coasts and many reaching a height of nine meters. Deciduous any trees such as tamarack and acacias are another type of vegetation found in this region. This vegetation is found in their desert of India. Because of population pressure in India, a lot of land which is reserved for wild animals have been used for human settlement. As a result of lack of natural habitats many wild animals have disappeared. Among the animals that have survived are the tigers, the hyenas, and the elephants

About 70 percent of the population in Asia are farmers. Because of the high density of population in many parts of Asia most farms are small in size and are intensive. Rice is the most common food crop and is the staple food for most people in the wetter parts of India, Bangladesh, Burma and indo- china. Wheat, millet, maize and sorghum are grown in the drier areas where rice cannot be grown, and are important crops in the northern India and Pakistan. Sugarcane, cotton and jute are important in lower land crops in India, Pakistan and Bangladesh. Tea is grown in highland areas as a plantation crop particularly in Sri-lank, Bangladesh and India.

Pigs, cows, buffaloes, sheep, goats and poultry birds are raised in this region. India has a large number of cows but a cow is regarded as a sacred animal by the Indians and it is therefore not kept for meat. Cattle is kept for milk and for ploughing. Large urban centers in the region have developed as major industrial centers.

Paddy growing in India.

Rice is the staple food to the people of India. It is grown in the tropical lowland where rainfall exceeds 1780mm per year. it is the most characteristic crop of the monsoon lands and the total coverage

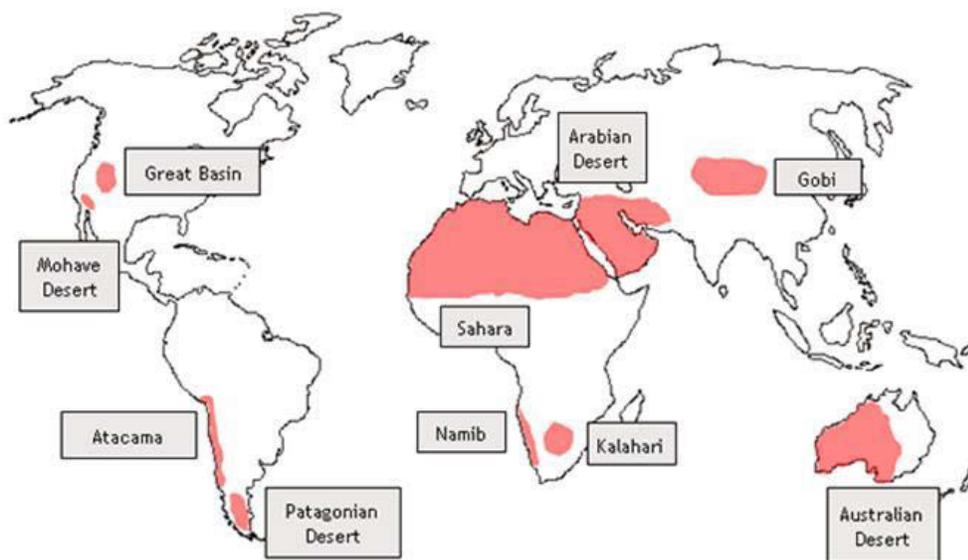
exceeds that of any other crop. Paddy is cultivated in very few areas outside the influence of the monsoon.

The factors for paddy growing include heavy rains which exceed 1780mm per year. The alluvial type of soil brought by rivers and ice melt from the Himalayas increase fertility to the soil. Water logging in the flooded areas is also another factor for paddy growing, the additional water through irrigation from the Punjab irrigation schemes, wells and canals increase yielding of paddy in India. In areas with less amount of rainfall below 1780mm allow growing of paddy where as the wet paddy is grown in the heavier amount of rainfall.

The land holding is for subsistence and plantation. The subsistence is mainly for family consumption where excess is sold to the rural cooperatives. The farmers use oxen borrowed from the land owners or cooperatives to plough the paddy field and harvest by hand using seasonal cheap labourers. In the plantations, they use tractors and often oxen to plough the paddy fields. The tractors are owned by the government and foreign companies. They apply fertilizers and insecticides to improve high yields of the crop. In harvesting they use seasonal or migrant labourers and combined harvesters. A large part of the harvest is for selling.

The Hot Deserts

Hot deserts are found on the western margins of land masses between latitude 20° and 30° north and south of the equator (fig.4.20). hot deserts occupy about one third of the earth's surface. The major hot deserts of the world are, the Sahara, the Kalahari and the Namibian deserts in Africa, the California deserts(north AMERICA), the Atacama desert(south America), the Arabian, thar and Gobi deserts in Asia and the great Australia desert.



The desert surface varies from desert to desert and from place to place within the same desert. On the basis of types of surfaces deserts are classified as:

1. Sand deserts these have sand surfaces and are sometimes known as ergs.
2. Stony deserts where stones prevail. Such deserts are also called series or regs.
3. Rocky deserts (Hamada) which have rocky surfaces. Hot deserts have high temperatures and very low rain fall (fig. 4.21, 4.22, and tables a,b, c.)

Table 6. typical climatic figures for hot desert regions.

a) Insalah (Algeria)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	13.3	6.1	20.0	25	28.9	35	36.7	35.8	32.8	26.7	19.1	14.4	23
Rainfall mm	2.5	2.5	0	0	0	0	2.5	0	0	5.0	2.5	15.0	50

B) Lima (Chile)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	21.7	22.8	22.8	21	18.9	16.7	16	16	16	16.7	18.9	21	18.9
Rainfall mm	0	0	0	0	0	5	7.6	12.7	12.7	2.5	0	0	45.7

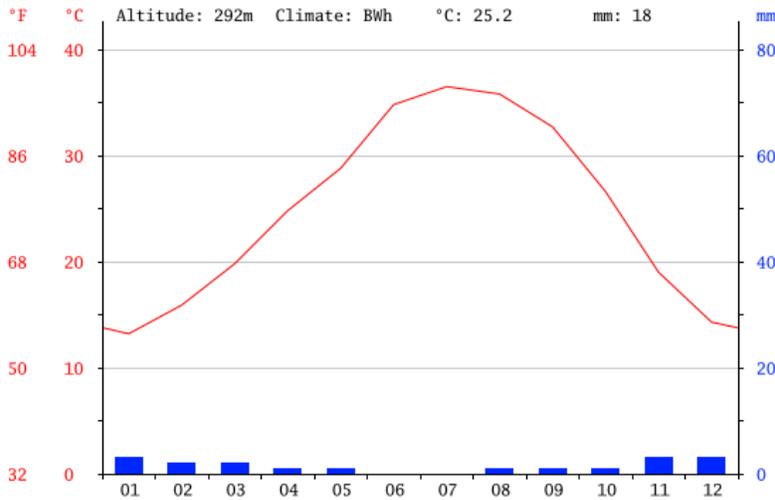
b) Windhoek (Namibia)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	23.3	22.8	21.1	18.9	15.6	13.3	12.8	15.6	18.9	20.6	22.2	23.3	19

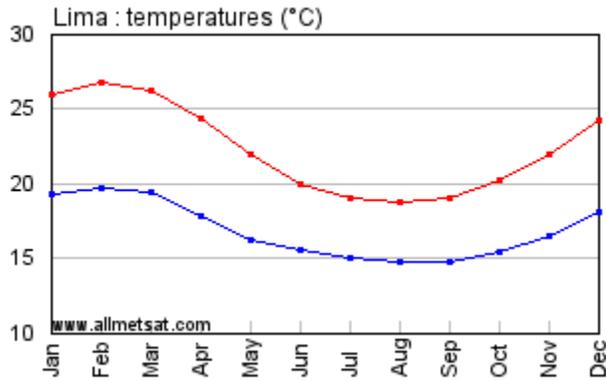
Rainfall mm	68.6	68.6	81.3	43.2	10.1	0.0	0.0	0.0	2.5	10.1	25	45.7	256.5
----------------	------	------	------	------	------	-----	-----	-----	-----	------	----	------	-------

In most deserts, day time temperatures are very high around 40°C. Nights are cold with temperatures as low as 16°C. In winters the night temperatures may fall to 50°C. The daily range of temperatures is large (16°C) for example in Egypt the mean monthly temperature in summer is 32°C in winter months the temperature may be as low as 16°C. (table 6 figure 4.21,4.22 and 4.23)

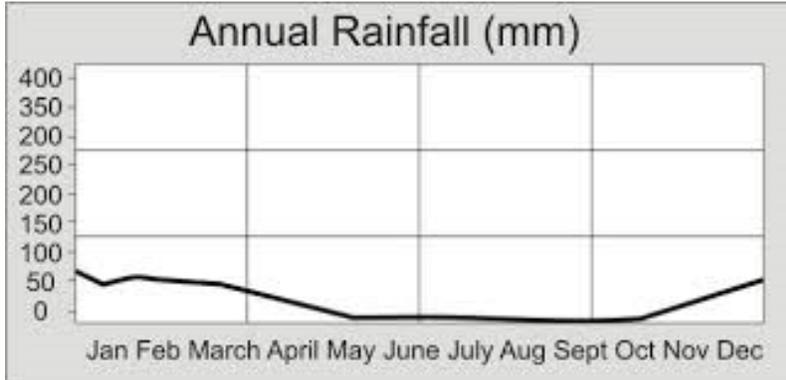
Insalah



Lima



Windhoek



Deserts get very little rain usual less than 250mm. in some deserts rain may fall only once in five or six years. This type of rainfall is heavy and collects into stream of running water which may form channels. When sub channels are dry they are called wadis.

In some cases for example in the Sahara strong winds such as harmattan blow across the desert. These winds carry a lot of sand and dust. Such sandstones are usually called simoom.

Natural vegetation is very scanty in hot deserts and it consists mostly thorny scrub bushes and cactus. Wherever agriculture is practiced the crops that are grown include date palm, cotton, rice, sugarcane, vines, millet, tomatoes, tobacco and fruit trees. Apart from people who live in these Oases there are nomads who move from place to place to search for pastures. They keep camels, donkeys, and sheep. Other desert people get their food from hunting and collection of nuts and fruits. Other occupations include weaving mats, making tents and ropes and also trading.

Meaning of desert:

Desert refers to an area which receive low amount of rainfall approximately 250mm per year.

Life in the oasis.

In the deserts wherever there are oases some forms of settlements is bound to follow. These are depressions of varying size when underground water reaches the surface for example tufted oasis in morocco covers 13000 square kilometers which supports many settlements, including big towns. Other oasis include ghadermes oasis in Libya which is only 2.6 Square kilometers in size and supports a very low population.

Life in an oasis is very secured and well organized. A wall usually constructed around the oasis to keep out the violent storm dusts called simooms. In the oasis people live in mud bricks houses with flat roofs closely packed together. The streets are narrow and winding (run around the oasis). The heart of the settlement is dominated by the suas May (normal market place), mosques, schools and shopping blocks. Suas may also be set up several kilometers from anywhere and people come from a number of surround settlement on special days to trade.

Around the settlement is the agricultural land. Most of the crops produced are through irrigation channels or drawn water from wells by camels or mules. The important crops include date palm, others are maize, barley, wheat, cotton and sugarcane, fruits and vegetations.

Importance of deserts to the economy.

Desserts are important for the production of date palms, cotton, sugarcane and wheat which are raw materials to the world's industries. Useful animals are also reared in the deserts and they walk long distances without eating and drinking. They serve people in transport all over the world as they are the cheapest means of transport. These animals include camels and mules. Valuable minerals deposits (Mining) are found in the deserts for example gold, caliche (cemented groves), copper, sodium nitrate, silver, diamond and uranium which are very important raw materials in the world's industries for different purposes.

Apart from the above mentioned minerals, oil production and the desert. Most of the petroleum used in the world is obtained from deserts. Petroleum serves as lubricant as fuel for road construction and domestic uses and as raw materials in oil refined industries.

Desert formation expansion and control.

Desserts are formed by both man's activities and natural forces, that influence desert formation which include drought which is a result of long experiences of low amount of rainfall or caused by man's activity which is made more acute by population increase.

Population increase encourages deforestation for various reasons. Over grazing, use of unskilled labour, irrigation and over occupation. Desert expansion can be checked through changing people's attitude by planting trees after cutting one, use of proper methods of irrigation, reducing the number of animals in one area avoid mono cropping by crop rotation and control population that exceeds resources available.

Revision.

Answer all questions in this section.

Read the following statements carefully and then write the letter of the most correct answer below in the space provided against the question.

1. One of the following groups are features of the ocean floor.

a) Continental shelf, continental slope, trench.

b) Trench, ridge, basin, dune.

c) Horst, plain, volcano, basin.

d) Ridge, basin, plateau and water fall

2. One of the effects of rapid population growth on small scale agriculture is?

a) Low technology.

b) Land degradation.

c) Decline in soil fertility

d) Population pressure.

3. What will be the temperature of musindi at 1800 meters above sea level, if the temperature of tanga at sea level is 34⁰c?

a) 2-82⁰c

b) 49-8⁰c

c) 28-2⁰c

d) 10.8⁰c

4. Eclipse of the moon(lunar eclipse) takes place

a) When the earth is in between the sun and the moon

- b) When the meteors fall on the moon.
- c) When the moon is above the sun.
- d) All the above answers are correct.

5. Which of the following mathematical statement given is the right answer in minutes of the time taken by earth to turn one degree of longitude?

a) $360^0 \times 24$ hours

60

b) 24 hours \times 60 minutes

360

c) 3600

60minutes

If the time of maputo 50^0e is 3:00pm, when the time at Lagos is 12:16 pm, what is the longitudinal position of Lagos?

- a) 61^0e
- b) 90^0e
- c) 44^0e
- d) 90^0e

Pick out the statement that is not true.

- a) All altitude is a great circle
- b) All longitudes are great circles
- c) All longitudes and equators are great circles.
- d) Greenwich meridian is a meridian 180^0

The structure of the earth is composed of:

- a) Sima and sial.
- b) Carbon and sodium
- c) Silicon and alumina
- d) Crust, mantle and core

Which of the following statements is not true for an equatorial region?

- a) It is found in between 0° and 5° north and south of equator
- b) It has two rainfall maximum
- c) It has small temperature range
- d) It has temperature of above 40°C

Match the items in column A with corresponding items in column B by writing the letter of the correct item in column B against its corresponding number in column.

- i. Meteors (I)
- ii. Water pollution (E)
- iii. Isotherms (N)
- iv. Aneroid barometer (K)
- v. The period when earth becomes nearest to the sun (O)
- vi. Scale (F)
- vii. The cause of day and night (C)
- viii. Mozambique ocean current (H)
- ix. Volcanic mountains (G)

Column B

- a) Has not erupted recently
- b) Mbozi in Mbeya region and Tandara in Ruvuma region
- c) Rotation of the earth
- d) Cold ocean current
- e) Unwanted substances mixed with water
- f) Distance on the map to the actual distance
- g) Rungwa in Mbeya and Kilimanjaro
- h) Warm ocean current
- i) Piece of hard matter falling from the outer space

- j) Aplolion
- k) An instrument used to measure air pressure
- l) Restoration of wasteland in productive land
- m) Chemical added to water to purify it
- n) Lines joining places with the same temperature
- o) Perihelion
- p) Revolution of the earth
- q) Lines joining places with the same air pressure
- r) Is the result of earth's wrapping.

Calculate the total annual rainfall

100

80

70

60

40

16

20

60

10

90

$546+70=606$ total annual rainfall is 606mm

To suggest the type of climatic region for station x give the reasons;

This is the tropical region

Because it has more rainfall 500mm-1500mm

It has above two degrees centigrade

In which hemisphere is the station located?

Southern hemisphere

Suggest two types of crops grown in this area.

- a) Banana
- b) Coffee

List down four elements of weather

- a) Clouds
- b) Winds
- c) Humidity
- d) Pressure

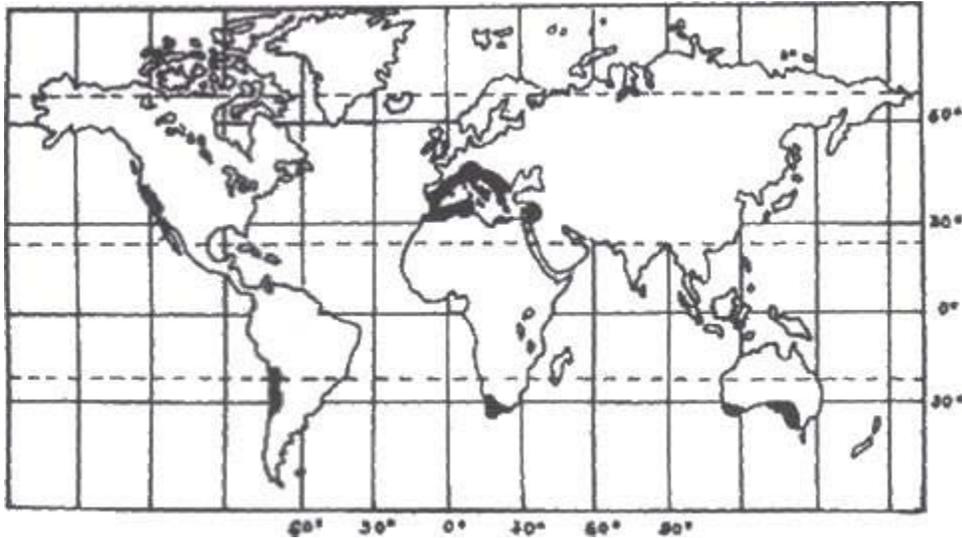
Write true or false against statements given below.

- i. The small stream joining together to form a main river is called a distributary false
- ii. Pastoralism is the seasonal movement of live stock to the mountains and to the valleys. True
- iii. A forest is a renewable source. True
- iv. Contour terracing is an agriculture aim to prevent loss of soil fertility. False
- v. In shifting cultivation permanent crops like coffee, cocoa and banana are grown. False
- vi. All longitudes are great circles. True
- vii. Mining activities can destroy the environment. True
- viii. Lake nyasa is an example of a lake created by aman. False
- ix. Kagera river basin is one of the major sources of the Nile contributing 30% of its water. False

Mediterranean regions.

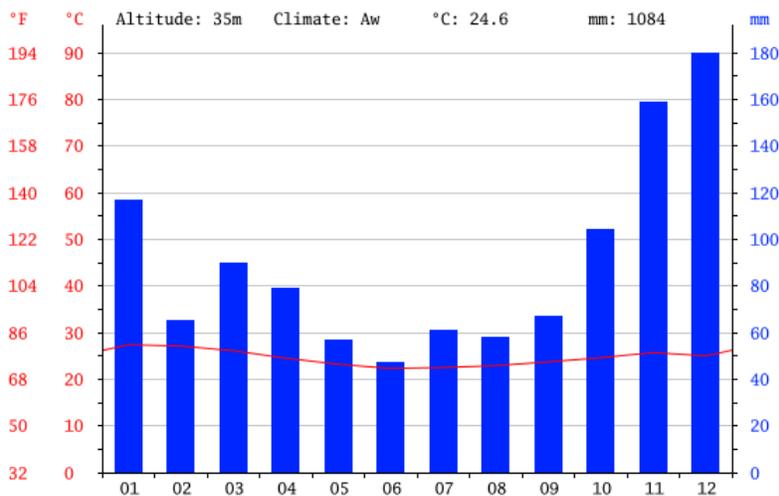
The mediteranean type of climate is found in areas between 30⁰ and 45⁰ in the northern hermisphere and between 30⁰ and 40⁰ in the southern hermisphere.Places with the Mediteranean climate are the coastal lands around the mediteranean sea (the maghreb, spain, italy, greece, egypt, and israel), the

western sides of north and south america (central califonia and central china), Australia (south and western) and south africa (cap province)

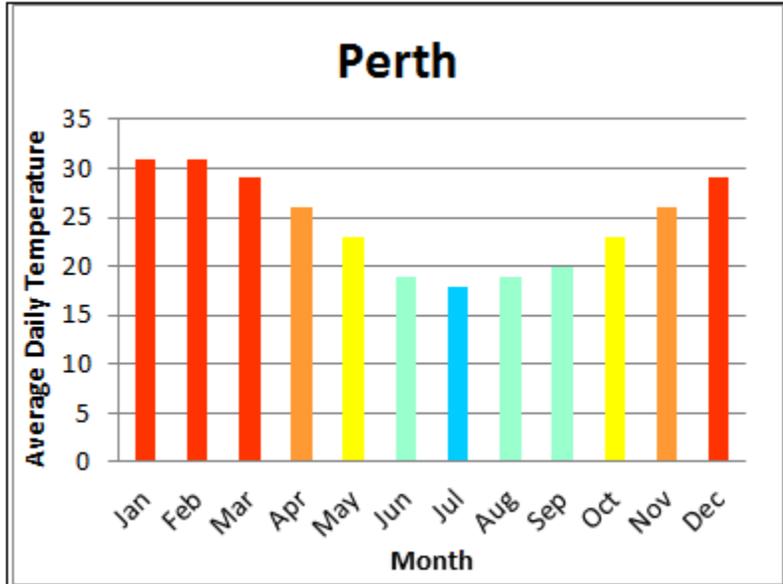


In the summer these areas are hot and dry because they are under the influence of trade winds. In the winter, westerlies from the ocean bring rainfall to these areas. Rainfall is relatively light and the annual total varies from 500mm to 760mm. temperatures range from 21°C in summer to about 10°C in winter.

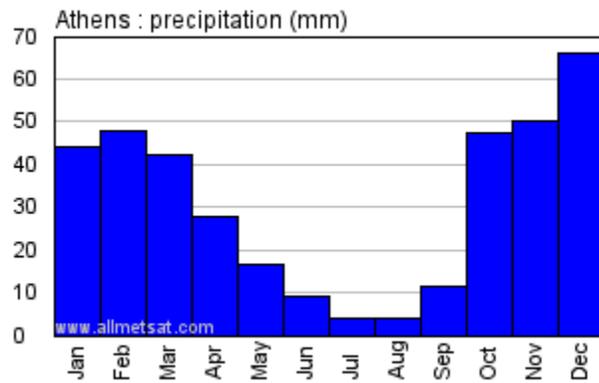
Valporaiso



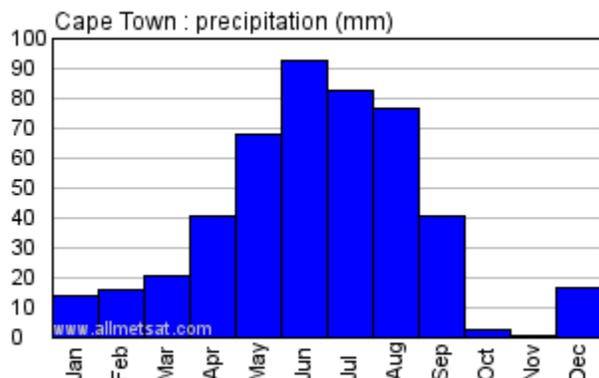
Perth



Anthens



Cape Town



There is little natural vegetation left in the Mediterranean region because much of it has been cleared for cultivation of commercial crops such as citrus fruits.

Since little rainfalls during the growing season, plant life in these areas is adopted to summer drought by storing in thick barks and leaves moisture derived from winter precipitation. The plants also have small waxy, spiny leaves which prevent excessive transpiration. Some of the common trees found around the shores of the Mediterranean sea are cork-oaks, cypress and cedar. where forests have been cleared for cultivation and no trees are spared. In areas that have been mostly developed for cultivation scrub land of ever green shrubs such as cleander, lavender, rose marry and thyme are found in California. The douglasfir, is the most common tree, where as in Australia eucalyptus is the most common tree.

Table 7; typical climatic figures for the Mediterranean region.

a) Valparaiso (Chile)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	17.8	17.2	16.1	14.4	13.3	11.1	11.1	11.7	12.2	13.9	15.6	16.7	14.4
Rainfall mm	0.0	0.0	22.9	2.5	68.6	152.4	134.6	86.4	10.2	12.7	7.6	0.0	497.8

b) Perth (W.Australia)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
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Temp °C	22.8	23.3	21.7	18.9	15.6	13.3	12.8	14.4	14.4	16.1	8.3	21.7	17.8
Rainfall mm	7.6	7.6	17.8	43.2	124.5	167.6	162.6	142.2	83.3	53.3	20.3	15.3	845.8

c) Anthems (Greece)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	9.1	9.7	11.2	14.8	19	23.5	26.6	26.4	23	18.9	14	11.2	17.3
Rainfall mm	50.8	38.1	33.0	20.3	20.3	17.8	7.6	10.2	15.2	43.2	73.7	61	391.2

d) Algiers (Algeria)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	9.4	10.0	11.1	1.3	16.1	20	22.8	23.9	21.1	17.8	13.9	11.1	16.1
Rainfall mm	101.6	66	83.8	50.8	43.2	17.8	2.5	2.5	30.5	86.4	104.1	101.6	696.0

e) Cape Town

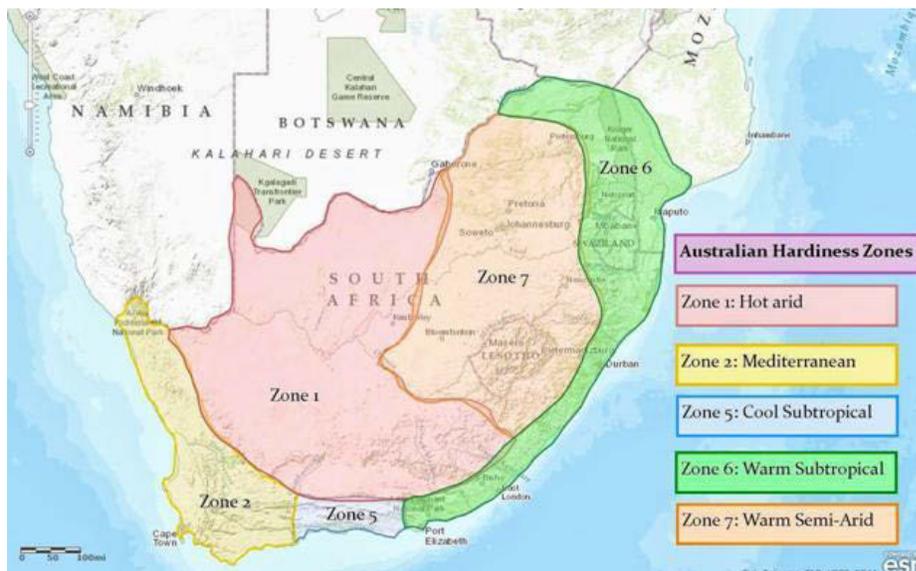
Month	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
Temp °C	21.1	21.1	20	17.2	15	13.3	12.8	13.3	14.4	16.1	17.8	20	16.7
Rainfall mm	17.8	15.2	22.9	48.3	96.5	114.3	94	86.4	58.4	40.6	27.9	20.3	642.6

The climate permits a wide range of crops to be grown these include fruits and cereals. The most common cereals are wheat, barley, maize, and citrus fruits (oranges, lemons, limes.), olives and grapes. Other fruits are peaches, apricots, plums, cherries and pears. Farmers use both ploughs and hoes. Fields are terraced in order to conserve soil and rain water to sink into the ground. In hot districts such as south Spain and Sicily, rice, sugarcane, oranges and lemons are grown in irrigated areas. Agricultural based industries that have developed these areas include wine making, flour milling and fruit.

Fruit growing in south Africa.

The cultivation of fruits seems to be the oldest agricultural activity in South Africa which started as a source of supplying citrus to the passing ships of Dutch east India company to prevent scurvy among the crews. However interests soon shifted to grapes which were converted into wine which stood too long in sea journeys.

Citrus fruits were mainly grown for local markets. When the Boer farmers trekked from Cape Town to the Transvaal they took with them citrus fruit seeds to increase production of the fruits. The opening of gold mine industry increased the demand for the fruits in the 14th century to Cape Town. The establishment of regular sailing of refrigerated vessels increased export of fruits from cape town to western Europe. Due to high demand, new planning was carried out and led to the present huge output . fruit production is an important occupation practiced by the white farmers in the south western cape province in south Africa.



Much fruit growing is practiced in the valley to the east of the Cape Town. The size of farms in these areas varies from 20 to 120 hectares. Grapes for wine are dominant fruit crops, with small areas of

citrus especially along the breed river valley. On the cooler higher plateau of the interior other fruits dominate. These are deciduous fruits which include peaches, plums, pears, table grapes, apricots, prune and apples.

The importance of fruits to South Africa economy can be judged from the fact that citrus fruits contribute 10% of the total export. Citrus fruits with deciduous fruits and wine exports contribute about 20% of all its exports.

The republic of South Africa has nearly 10 million citrus trees cared for by 4200 growers. Many of these growers are members of citrus fruit co-operatives. There are 45 such co-operatives in the country. These growers have their farms in Cape province.

There are large plantations in northern and eastern Transvaal and in natal owned by whites. There are variations in production between the provinces. The Cape Province produces between 20-25 percent while the Transvaal produces about 65% of the total production. Much of the remainder comes from natal.

South Africa trades with a number of partners who are interested in her fruits and fruit products including hard and soft drinks, and jam among others. Britain is one of the partners who import about 30% of the republic's fruits. Others include scandnavia, Germany, Netherlands, and Belgium. These take smaller amounts.

MAP WORK

A map is a scale representing the earth's surface on a flat material. For example a piece of paper, wall, clothes and a piece of wood.

Map interpretation is the ability to translate the symbols and signs on the map ordinary language by industries the features that they represent.

COMPONENTS /QUALITIES/ESSENTIALS OF A GOOD MAP

A map is good if it contains all the essentials of maps, therefore the essentials are good qualities of maps.

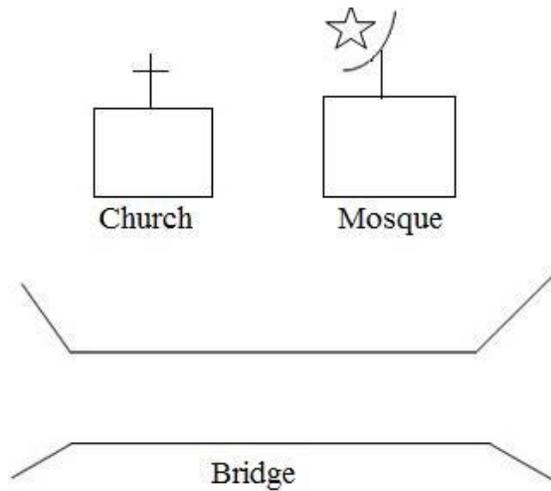
The essentials of a good map are:

1) Key.

Used to interpret symbols and signs found on a map.

For

example.

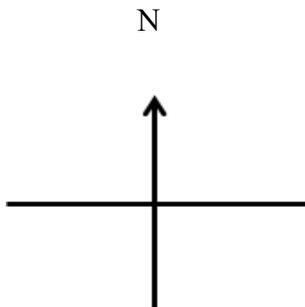


2) *Title*

Used to show what's map is all about. This is the heading of the map. It can appear on top of the map or any where else

3) *North direction*

This is an indication of the north direction. It shows where north is and by knowing north one can know the direction and bearing of the place.



4) *Margin*

This is a boundary or limit around the map. It gives or shows the reader and interpreter the end of the map.

5) This shows when the map was produced and a publisher.

Publisher *and* *date* *publication*

6) *A* *scale*
 It shows the relationship between map distance and the actual ground distance for example 1cm to 10km means one centimeter on the map represents ten kilometers on the ground

7) *Latitude and Longitude / Grid reference .*

It used to locate the place on the map. Foreexample the map of Tanzania is located at latitude 6°00' south of the equator and longitude 35°00' east of Greenwich meridian.

TYPES OF MAPS

The classification of maps are based on the purpose for which each map is drawn. Therefore map.can be categorized into three types as follows:

- i) Sketch map
- ii) Atlas map/ wall maps
- iii) Topographical maps

i) Sketch maps

A map drawn from observation (rather than from exact measurements) and representing the main features of an area.

ii) Atlas map/ wall maps

A collection of different maps that have been bound together in one volume to form a book. These maps are usually drawn to scales example shows town and cities, hills, mountains, valleys, forests, countries, etc.

iii) Topographical maps.

Shows selected physical and human features in an area and their positions on the ground for example hills, village, mountains, lakes, ponds, rivers

MAP SCALE

Is the relationship or ratio between map distance and actual ground distance.

$$\text{Scale} = \frac{\text{map distance}}{\text{Ground (actual) distance.}}$$

TYPES OF SCALE.

We can classify the scale according to the size in our criteria. There are three types of scales;

a) Large scale.

They are used to present information on small areas for example a map of village buildings and farms. The map size involves all numbers less than 1:25000

I.e. 1:10000 and 1:5000

Characteristics of large scale.

- i) It has smaller numbers in the denominator.
- ii) It shows features clearly
- iii) It contains geographical details.

b) Medium scale.

They are used to represent medium details shown on the map.

Map size involves numbers between 1:25000 to 1:250000 i.e. 1:50,000 and 1:100,000. Example of a map that can be drawn using medium scale is a map of a district, region, city etc.

c) Small scale.

They are used to present information that is long.

This type of scale covers a big area with less detail. For example a map of a country, continent or world. May involve numbers between 1 : 500,000 to 1 : 1000,000

Characteristics of small scale.

- i) It has the largest denominator.
- ii) Contains a lot of geographical information.
- iii) It does not show geographical features clearly.

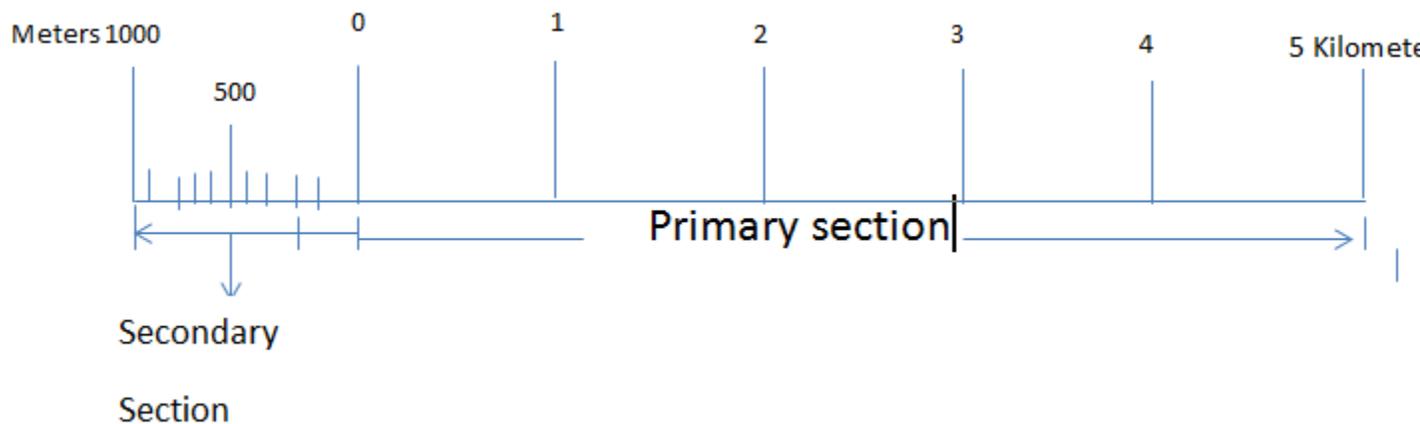
WAYS USED TO EXPRESS MAP SCALE.

i) As a statement.

Refers to the scale which is expressed in terms of words or explanation. For example one centimeter on a map is equivalent to 10 centimeters on the ground.

ii) Linear scale

Is called plain or graphic scale. This is a line which is divided into two parts. The primary division and secondary division. The secondary are expressed in meters and placed on the left side from zero and primaries are expressed in kilometers and placed on the right side from zero.



iii) Representative fraction (RF) scale

Is written as $\frac{1}{50,000}$ or ratio 1 : 50,000

The distance on a map is expressed as fraction of the actual distance on the ground.

Therefore, RF scale = $\frac{\text{map distance}}{\text{Ground distance}}$

- That is- the top number (numerator) represents the map distance on the ground and is usually more than 1.

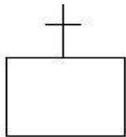
IMPORTANCE OF SCALE ON THE MAP

- a) Scale help to calculate area of a map
- b) It enable us to calculate distance on a map
- c) Scale shows the relationship between map distance and the actual ground distance
- d) Scale help us to enlarge and reduce the area on a map or the whole map
- e) Scale can be used to calculate the vertical exaggeration on a map
- f) Scale is used to calculate the gradient on a map

Distinguish and explain signs from symbols

SYMBOLS

1. Symbols normally look like the features they represent.
e.g. church



SIGNS

Signs do not look like the features they represent. e.g. height in meters •1121
-Coffee, Sisal, tea plantations



2. Most symbols used in map are pictorial

While signs are not pictorial

2) QUANTITATIVE INFORMATION ON MAPS

A) MEASURING DISTANCE ON THE MAP

Distance is the length of an elongated features on the earth's surface such as road, railway, river etc.

How to measure distance.

In order to obtain distance of any feature on the map, consideration should be made on whether the distance to be measured is straight or curved.

Straight distance

For all straight distances a ruler is used to obtain the distance directly from the topographical map given.

Curved distance.

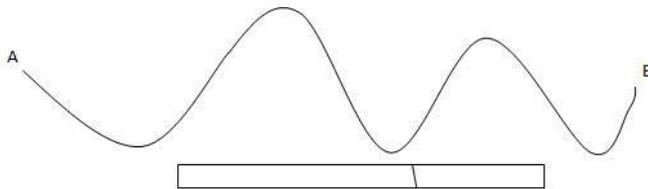
It becomes difficult to obtain curved distance of the features by the use of a ruler directly from the topographical map when the area is inclined. In this case the following devices can be used:-

I. A pair of divider.

A pair of divider is commonly used to measure the distance. You should start by breaking the length by using a pair of dividers then transfer some of the already drawn straight lines. Then transfer the measured line to the linear scale or ruler for calculation to get the actual distance.

II. A piece of a string.

Slowly measure the distance by a piece of string along a given length then transfer it to a linear scale or ruler for actual calculation of the distance.



20cm map distance

Scale distance= map distance

Actual distance

$$\frac{1}{2} \text{ km} \times 2 = 240 \text{ km}$$

$$1:50000$$

$$1/50000 = 20 \text{ cm}$$

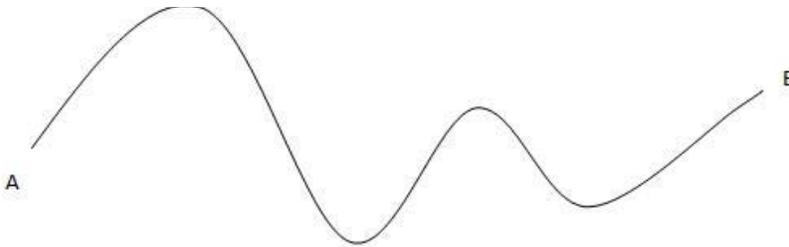
$$100000 = 20 \text{ cm}$$

$$50000 \quad \times$$

$$= 10 \text{ km.}$$

1. A piece of strip paper

Slowly lay a piece of paper along a given length then break your lengths into short segments then transfer to the linear scale for measuring and calculation.



MEASURING AREAS ON A MAP/CALCULATE AREA OF REGULAR IRREGULAR

Area size refers to the bigness or smallness of an area on the earth's surface i.e. the bigness or smallness of earth's surface from topographical map consideration should be made whether the area is regular or not.

Exercise

1) To state the following.

- a) **map** is a scale representing the earth's surface on a flat material
- b) **map** reading refers to a scale reading which is obtained from recognizing or identifying signs and symbols that are used on a map.
- c) **Scale** is the relationship or ratio between map distance and actual ground.

d) **Contour** is a line drawing on a map which shows the area at the same point.

2) Why do we study maps?

- i) People use them to reach their directions.
- ii) Builders use maps to build new roads.
- iii) Maps are used in conducting various geographical researches.
- iv) Maps are useful in military activities.
- v) Maps are useful in describing the features on the earth's surface.

3) To state the way of expressing scale.

- i) Statement scale; Refers to the scale which is used or expressed in terms of words for example 1cm on the map is equivalent to 10 km on the ground.
- ii) Linear scale; Is called plain, it has the primary division and secondary division.

4) What is the importance of a scale?

- It helps to calculate area of a map
- It enable us to calculate distance on a map
- Scale help us to enlarge and reduce the area on a map

5) List at least 3 methods of calculating the linear distance of an object.

- i) A Pair of dividers
- ii) A piece of paper
- iii) A piece of string.

6)The distance of the road is 36cm from Lindi to Nachingwea, convert the distance in kilometers if the scale used is 1:100000

Solution

Distance = 36cm

Scale = 1:100,000

1km = 100,000cm

1 Km = x
Hence, 1 cm = 1 km
(after cross multiplication):

Therefore 1 cm = 1 km
36cm = x
(cross multiplication)

1x = 36km

X=36 the distance is 36km.

Therefore, the distance on the ground from Lindi to Nachingwea is 36km.

b) From the above convert the same distance in km if the scale is changed to 1:50000

Solution

Distance = 36cm

Scale = 1:50000 1km = 100,000cm
x = 50,000cm

(cross multiplication)

= 0.5km

Therefore the distance in Kilometers is 0.5km

REGULAR SHAPE

These are areas with definite shapes such as squares, triangles etc. Their total perimeters or areas are obtained by mathematical formula i.e. length x width, side x side etc.

IRREGULAR SHAPE

These are areas with indefinite shapes such as lakes, farms, ponds etc where these areas can be obtained by any of the following three methods;

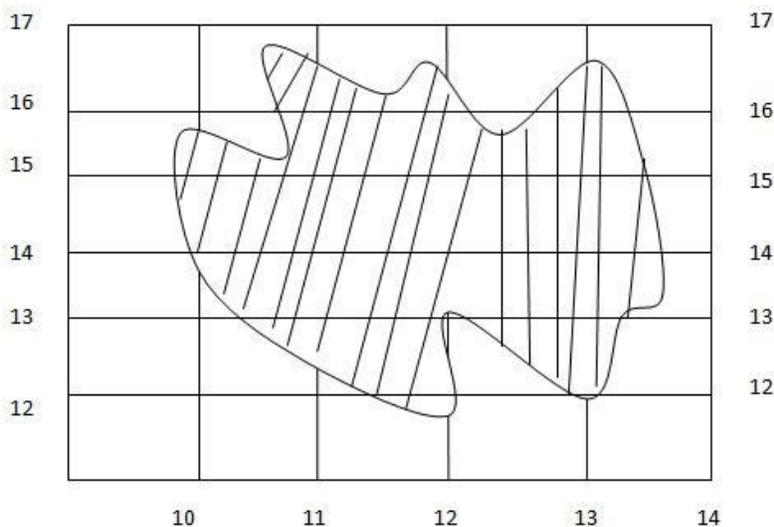
- a) Square method
- b) Strip method
- c) Geometrical method

SQUARE METHOD

This is the most accurate and most widely method used.

Square methods are normally used as follows;

- a) Count all full squares that are complete
- b) Count incomplete squares and divide them by 2
- c) Add them with the full squares to obtain the total area in km^2



METHODS USED TO SHOW OR LOCATE POSITIONS OF A PLACE ON A MAP.

The following are major methods used to show positions of a place on a map.

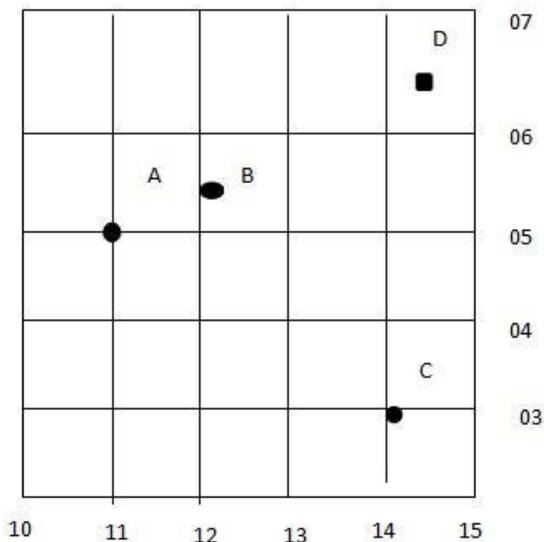
- i) Grid reference.
- ii) Place name
- iii) Bearing and compass direction.
- iv) Latitude and longitude.

Place name.

You can locate the position of a place by where the features are found i.e. Mbeya, Dodoma, Mtwara.

Grid reference.

Grid reference is a network of vertical lines and horizontal lines on a map. Vertical lines whose numbers increase towards the east are called **eastings**. Horizontal lines whose numbers increase towards the north is known as **Northings**. Where horizontal lines and vertical lines meet or cross each other they form a square known as grid square. (G.S). A grid reference point is written in form of six digits starting with three digits of Eastings then three digits of 'nothings'



To write down the grid reference of point A, B, C, D.

A=12006

B =130065

C =140067

D=14003.

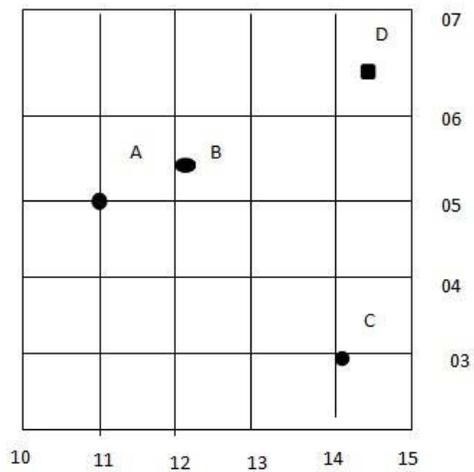
LOCATION AND POSITION:

COMPASS BEARING AND DIRECTION.

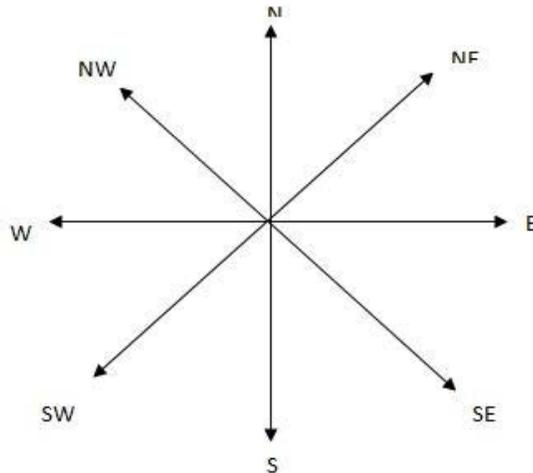
Compass direction is divided into

- a) 4 cardinal points
- b) 8 cardinal points
- c) 16 cardinal points

4 cardinal points



8 cardinal points.



16 cardinal points



HOW TO FIND DIRECTION OF A PLACE ON A MAP.

- 1) Identify them due to points on the given map. Points may be given by using grid reference points, place name or letter.
- 2) Draw a straight line connecting the two points
- 3) Mark the major four cardinal points at the starting point with the word from.
- 4) Now look at the question asked then provide your answer.

What is the direction of point A from B. the direction of point A is NW.

COMPASS BEARING.

Bearing are directions which measure degrees clockwise from north. They are written in three figures i.e. 090° , 045°

HOW TO FIND BEARING ON THE MAP.

- 1) Identify the grid reference points given on the maps.
- 2) Draw a straight line connecting the two points
- 3) Draw the major four cardinal lines at the starting
- 4) Now look at the question asked use a protector to measure degree clockwise from north up to the line joining the two points.

Provide your answer in degrees i.e. what is the bearing of point A from B

BEARING.

- a) Forward bearing
- b) Backward bearing

a) FORWARD BEARING

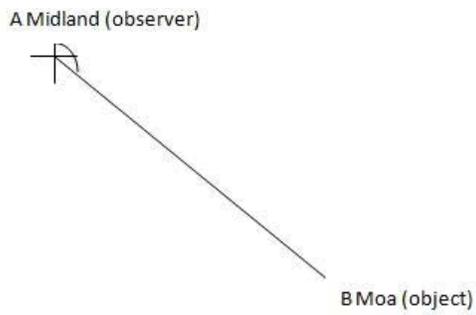
Is a bearing into a subject.

Procedures to calculate forward bearing

- 1) i. Identify the two points.
- ii. Join them with a straight lines
- iii. Draw north direction on a second point.
- iv. Measure the angle by using a protector.
- v. State the bearing in terms of degrees of the direction.

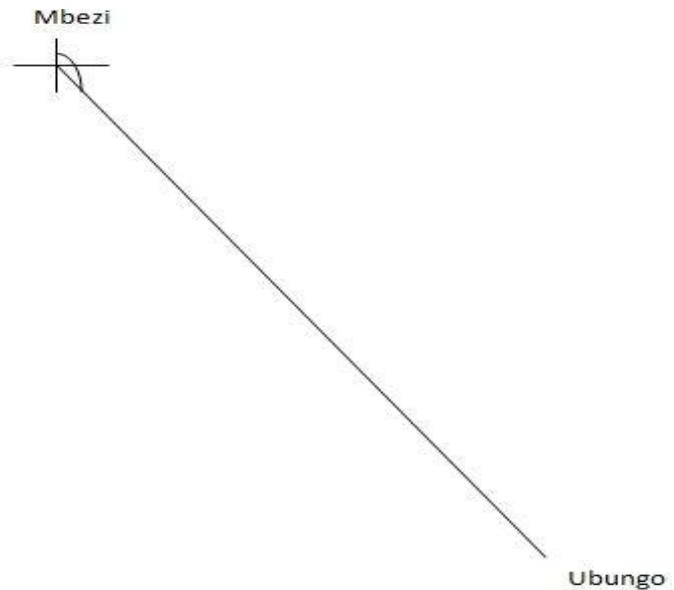
i.e. Find the formed bearing of Moa from

Midland.



B=135° SE

Find the bearing of Mbezi to Ubungo.



The bearing of Mbezi to Ubungo is 135° SE

b) Backward bearing.

Is the opposite of forward bearing, it's taken from the object to the observer while forward bearing is taken from observer to the object.

How to determine the back bearing.

- i) Find forward bearing.
- ii) Mark the cardinal point north direction of the opposite point
- iii) Find the bearing of the observer along the straight line principally to determine the back bearing = FB + OR - 180° BB = FB + 180° IF $FB < 180^{\circ}$ BB = FB - 180° IF $FB > 180^{\circ}$

EXERCISE

Scale conversion

a) To change statement to R.F scale 1cm represents 60km

Soln

$$1\text{km} = 100000\text{cm}$$

$$60\text{km} = x$$

$$1:6000000$$

$$\text{R.F scale} = 1:6000000$$

b) One centimeter represents 0.75km

Soln. $1\text{km} = 100000\text{ cm}$

$$100000 \times 0.75$$

$$= 75000$$

$$\text{1:75000 R.F scale} = 1:75000$$

c) One centimeter representing two kilo meters

Soln

$$1\text{km} = 100000$$

$$100000 \times 2 = 200000$$

$$\frac{1:200000}{\text{R.F}} = \frac{\text{scale}}{=1:200000}$$

IMPORTANCE OF THE USE OF MAPS

- a) People use them to reach their directions
 - b) Maps are used to describe the features of the earth
 - c) Builders are maps to plan the best use of the land
 - d) Road constructors use maps to construct new roads
 - e) Maps are useful in military activities
 - f) Maps are used in conducting various
 - g) Maps are used in conducting various geographical researches
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