PHYSICAL GEOGRAPHY OF AFRICA

1) **Relief**

Africa is a continent which is made up of different relief features these include = plateaus, plains, mountain depressions, basins valley, etc. such relief features were formed as a result of different process which include;

(a) **Tectonism**; This one makes process like faulting, folding warping and vulcanicity occur.

(b) **Denudation**; this one involves weathering erosion, transportation and deposition. The features formed include ;

1) **Plateau surfaces**

A plateau is a table – like piece of land which is flat at the top. In the plateau lands of Africa, there are valleys, depressions, etc, which have formed. Plateau lands are normally shaped by denudation force. They include the following;

i) Bie on the western coast.
ii) FutaJaron in the west,
iii) Jos in Nigeria.
iv) High veld in South Africa, etc.

i) Basins

These are Africa's striking relief features. A basin is a broad, shallow and saucer – like feature that is separated by plateau or mountains. Africa;s banns have been depositional areas for waste ended from the plateaus. Examples of basins in Africa include; Chad, Sudan, Victoria, Congo, Nile, Okavango, Senegal, Zambezi, Orange, etc.

- Africa is also characterized by depressions which include;

- Qattaro
- Donakil
- Bodele
- Derfual.

ii) The Great Rift Valley

A rift valley is a longitudinal depression that forms on the earth's surface. The great rift valley of Africa mainly dominates the Eastern region i.e., the E. African rift valley.

-This was formed as a result of two theories namely; Compression, and
Tensional theory. It begins in North i.e., Jordan and Israel through the N. Western corner of Egypt i.e., Red sea right to Zambezi river and Northern
Uganda.

iii) <u>Mountains and Highlands</u>

Africa is endowed with numerous mountains and highlands which include;
- Ethiopian highlands in Ethiopia.
-Cameroon Mountains in Cameroon.
-Adamewa highlands in Cameroon.
-Atlas mountains in Morocco.
-Drakensburg in South Africa.
-Ahagger highland in Algeria.
-Guinea highlands in Guinea.
-FutaJalon.
-Tibetsi Mountain.

a) <u>VOLCANICITY</u>

Volcanicity is a process by which molten rocks (magma) is extruded onto the earth's surface as a result of very hot temperature.

The hot temperature is caused by Geo – chemical reactions and radioactivity within the interior of the earth.

The molten rocks (magma) are formed and forced out through the lines of weakness known as vents and form larva after eruption have taken place.

Larva starts to cool and solidifies onto the earth's surface then piles up around the vent to form a volcanic mountain.

- Some volcanic mountains have conelets or subsidiary cones along their slopes due to secondary eruptions.

Examples of volcanic mountains of highlands in Africa include;

- Ethiopian highlands.
- Adamawa highlands.
- Drakensburg in South Africa.
- A hagger highland in Algeria.
- Guinea highlands in Guinness, etc.

Qn. Draw a well labeled volcanic mountain

FOLDING

Fold mountains in Africa are found at the edges of the continent i.e., Atlas mountains in the North and cape ranges in the South.

Formation of Fold Mountains

They formed by deposition of rock waste and other materials by agents like moving glaciers and the river system.

This took places on the surface of the ocean floor whereby the deposited material accumulated and deepened the bed at the centre.

This created pressure and pulled the continental plates towards each other due to the weakness of the sedimentary rocks that had been formed.

The cigar of the continent were crumbled up, folded and uplifted out of water into the atmosphere to form mountains ranges which are anticlines and valleys which are synclines.

Fold Mountains

Assignment

1) Explain the importance of mountains of highlands o the economy of Africa.

PROBLEMS FACING PEOPLE LIVING IN MOUNTAINEOUS /HIGHLAND AREAS IN AFRICA

1) Some active volcanoes can erupt where larva can destroy people's property and plantations.
2) The steep nature of landscape in mountains discourages the construction of communication routes i.e. roads and railway lines which results into remoteness that limits service delivery to the people.
3) There is a problem of mass wasting in form of landslides rock fall, mudslides which are caused by heavy rainfall. Deforestation along the slopes hence loss of property and lives of people.
4) There is occurrence of floods especially in the valleys due to runoff from the mountain slopes hence destruction of property.
5) People settling on the leeward side of the mountains (rain shadow) experience droughts that lead to crop failure and death of live stock which results into famine.
6) Continuous attacks from wild animals, poisonous snakes and insects that live in the cocky and forested areas along the slopes hence loss of lives.
7) There is a lot of insecurity especially in areas near mountains where wrong doers like rebels hide which threatens the tourism sector.
8) The steep slopes also accelerate soil erosion especially during heavy rains which destroys infrastrure, i.e. roads along the slopes and leaves behind infertile soils.
9) There is also shortage of land due to the steep slopes in relation to population hence leading to land fragmentation.
10) The high altitude areas are cold which discourages settlement especially to people

who have respiratory diseases.

11. The steep slopes limit mechanization which leads to low production in the agricultural sector.

SOLUTIONS TO THE ABOVE PROBLEMS

1) There has been continuous terracing and contour ploughing along and across the mountain slopes in order to control soil erosion.
2) Afforestation and re – afforestation programmes has been put in place especially along the mountain slopes where rainfall is heavy on the windward side in order to reduce the occurrence of mass wasting.
3) Irrigation farming has been practiced especially on the leeward side where rainfall is not enough to support crop growth throughout the year.
4) Construction of contouring roads and use of animal transport in the very deep areas to overcome the problem of remoteness.

5) These should be re – settlement of people by the government from areas which are prone to mass wasting.
6) There has be construction of embankments along the river valleys and water harvesting by people who settle along the slopes to control the runoff hence solving the problem of flooding in valleys.
7) Land consolidation in areas where fragmentation has been rampart in order to support mechanization which in turn increases production in the agricultural sector.

IMPORTANCE OF HIGH LANDS / MOUNTAINS TO A'CA'S ECONOMY

1) Volcanic mountains like Mtn. Kilimanjaro, Drakensburg etc, act as tourist attractions hence generating foreign income.
2) Mountains influence the climate of Africa through influencing formation of relief rainfall.
3) The lower slopes of mountains especially volcanic ones have very fertile soils which favor crop farming.
4) Some mountains \/highland are sources of rivers which provide water for domestic and industrial use.
5) Mountains attract tourists who bring in foreign income inform of foreign exchange.

EFFECTS OF MOUNTAINS TO CLIMATE

1) Mountains affect it by determining the pattern of rainfall and temperature.

Rainfall

- Mountains / highlands lead to formation of relief rainfall as shown;

2) When an air mass (wind) picks moisture from the source and find a barrier which is a mountain / highlands, it is forced to rise up to the condensation level where it loses moisture that forms clouds which results into relief rainfall received on the wind ward side. Having lost moisture, wind descends into the lee – ward side when it is dry leading to dry conditions (rain shadow).

3) Mountains / highlands also modify temperature through a process known as lapse rate. This is where temperature lavers with law altitude experience warm – hot temperatures.

LAKES AND RIVERS IN AFRICA

Africa is endowed with a number of lakes and rivers most of the rivers are found in the South of the Sahara desert and that natural lakes are mostly located in E. African or coast of the continent specifically on the rift valley.

There are also man – made lakes which have been formed as a result of damming, these include; Volta on R. Volta in Ghana.

- Kariba on r. Zambezi and Zimbabwe.
- Kainji on R. Niger in Nigeria.
- Nasser on R. Nile in Egypt.

Assignment

Draw a map of Africa and on it mark and name the following; Rivers Zambezi, Nile Orange, Limpopo, Senegal, Congo and Volta. Lakes; Chad, Tana, Bangwuelo, Volta and Malawi.

(a) River valleys are subjected to flooding especially during heavy rains/edge to the destruction of crops, property and loss of lives. The Okavango river with its source in the highlands of Angolo, forms a huge, swampy inland delta as it approaches the Kalahari desert.
- Navigation on the river is restricted by waterfalls and rapids e.g. on Kafue Congo and Zambezi rives.
- In arid areas, river valleys are often congested due to access to water and fertile soils. In Egypt, the valley and Delta of the Nile on the main centers of Habitation.
- Shortage of land for agricultural expansion. The expansion of urban areas into nearby farming areas infringe on the already limited agricultural land in the Nile Delta.
- Pollution of rivers makes the waters unfit for human consumption, Egypt for example gets almost all of its water from the Nile.

- The presence of water weed (hyacinth) on rivers limits fishing activities. It blocks off fishing sites as well as disrupting water transport e.g. the sand along the Nile River in Sudan.
- Shortage of water due to increasing demand of urban centre and industries e.g. in the Wit waters in South Africa.

(b) Using of lock gates to bypass rapids and waterfalls i.e., lock gates continues to enable the ocean vessels to bypass Kainji dam.

- Establishing industries away from the river valleys to reduce congestion in Egypt.

LAND FORMS ASSOCIATED WITH RIVERS

CLIMATE OF AFRICA

Climate refers to the average weather condition of a place recorded and studied for a long period of time, i.e., over 30 – 35 years.

It should be noted that weather is expressed in terms of elements which include temperature rainfall, atmospheric pressure, cloud cover, humidity, wind, sunshine etc.

- Climate in Africa varies from place to place basing on these factors;
  1) **Latitude;**
     Africa is the only continent crossed by the Equator, tropic of cancer and Capricorn. This has influenced climate in such a way that these regions that are crossed are near the sun leading to hot temperatures and heavy rainfall at the equator. This normally happens after the equinox (21st March and 23rd September). When the sun overheads the equator.
  2) **Altitude;**
     This is the height of land above sea level. The atmosphere is always headed from the earth's surface thru reflection of solar radiation. This leads to cool temperature at a higher altitude and warm – hot along the lower slopes.

  3) **Temperature;**

Goes on reducing with an increase in altitude (lapse rate such a condition brings about cool temperatures in the high altitude areas e,g Atlas ranges, Drakensburg, Ethiopian highlands, etc.

4) **Ocean currents;**
These affect the temperatures of coastal regions in that they modify temperature of winds blowing over these areas. If wind blows a warm current, its temperature will be lowered. The warm current will lead to rain formation because it raises the evaporation rate and the reverse is true. For example Canary cool currents, guinea warm currents, Mozambique warm currents, Banguela cool current.

5) **Intertropical convergence zone (I.T.C.Z);**
This zone is a place where the North East and South east trade winds converge on each other. The I.T.C.Z. moves throughout the year depending on the apparent seasonal movement of the sun.
When the sun moves southwards; the I.T.C.Z. also moves south wards and vice versa. This leads to formation of rains during those seasons.

6) **Prevailing winds**;
Africa lies in the path of North East trade winds. The effects of winds in determining climate determine on the nature of the source regions. The North East trade winds are largely dry because they originate from a desert continent. Whereas the South East trade winds are largely moist because they originate from Indian Ocean. It is the moist wind that brings about rainfall and dry wind (north east) which brings about dry conditions especially in North Africa.

7) **Presence of large waer bodies (distance from the sea);**
Presence of inland large water bodies leads to high rate of evaporation that result into formation of rainfall in the adjacent areas through the land and sea breeze.

8) **Vegetation cases;**
The climate of Africa is also determined by the nature of vegetation whereby tropical rainforests like in west and Central Africa lead to formation of rainfall through evapo-transpiration while areas with scanty vegetation receives little and un reliable due to rates of evapo – transpiration e.g. Northern Nigeria, Sudan and Egypt, etc.

9) **The influence of man's activities;**
The influence on man's activities has influenced climate in such a way that where man clears forests and reclaim swamps.

- It reduced evaporation and evapo – transpiration rates hence leading to little or no water vapor. This brings about low humidity cludless sky and little rainfall formation. However man can modify climate through planting forests and reserve the natural areas hence modifies temperatures and increases on rainfall forming processes.

CLIMATE ZONES / REGIONS IN AFRICA

- Africa experiences different types of climate which includes the following;
  (i) Equatorial climate.
  (ii) Savanah climate
  (iii) Mediterranean climate.
  (iv) Desert / semi – desert climate.
  (v) Montane.

Draw :A MAP OF AFRICA SHOWING CLIMATE ZONE TYPES

A MAP OF AFRICA SHOWING OCEAN CURRENTS AND PREVAILING WINDS

- **Equatorial Climate**
  This is widely experienced within latitudes 5ºN and 10ºS of the equator. These are areas astride the equator where there is a lot of warm rising air which is called Doldrums. Its experience in countries like Gabon, Southern part of Nigeria, Liberia, DRC, Equatorial Guinea, Ivory coast, Ghana, Togo, Sierra Leone , Central African Republic, Cameroon and part of East Africa.

  Characteristics of Equatorial Climate
  1. The zone experiences low atmospheric pressure due to hot temperature of that heat the air above the earth's surface for it to rise. (Doldrums).
  2. Rainfall received is a convectional type due to high rate of evaporation and evapo – transpiration (2000mm and above)
  3. It experiences heavy rainfall which is distributed throughout the year, i.e. double, maxima.
  4. There is high humidity experienced throughout the year due to high rate of evaporation and evapo – transpiration that avail a lot of moistures.
  5. There is thick cloud cover experienced due to a lot of moisture in the atmosphere that condenses.

6. The region also experiences a small daily temperature range between three degrees Celsius.
7. Temps are hot through out the year ie over 25c
8. Rainfall is usually accompanied by lightening and thunder.

Factors which have favored the equatorial climate

1) The existence of the large water bodies like the Atlantic Ocean and Congo basin in the central ports which are sources of water vapor.
2) The region is found of low altitude which has maintained the hot and warm temperatures.
3) Existence of ocean currents e.g. warm Guinea current that raises the evaporation and evapo – transpiration rate leading to heavy rainfall and hot temperature.
4) Existence of dense vegetation cover like the tropical rain forests in countries i.e. DRC and Central Africa republic which favor high evapo transpiration rate leading to heavy rainfall.
5) The region is a stride the equator (latitudinal location) which experiences hot temperature due to high solar radiation.
6) Influence of human activities eg. Establishment of forests, man made lakes which increases rainfall totals.
7) The apparent movement of the overhead sun leading to double maxima of rainfall in march and September.
8) Low altitude of less than 500m above the sea level leading to heavy rainfall .

Activities carried out

1. Growth of perennial crops e.g., rubber due to heavy rainfall and hot temperatures experienced throughout the year.
2. There is industrialization due to presence of agricultural production that avail raw materials.
3. Tourism is carried out due to warm temperature experienced that people from countries which experience extreme winters.
4. There is fishing due warm experienced that favors the metabolism of fish and growth of planktons on which fish feed.
5. There is lumbering due to the dense tropical, rainforests favored by heavy rainfall distributed evenly throughout the year.

Problems faced by people living in the equatorial region

1. Occurrence of the pests and diseases due to the warm temperatures that favors breeding of the vectors.
2. Heavy rainfall received leads to flooding that destroys people's property and crops.
3. There is also under developed of the infrastructure like roads normally get slippery due to heavy rain which limits transportation.
4. Occurrence of soil erosion in some areas that leaves behind infertile soil and destroys the infrastructure.
5. It also affects the aviation activities due to heavy storms and that clouds hence limiting air transport.

1. **Tropical / Savannah climate**
   This covers the largest region of the continent and its known as a transitional zone from the equatorial region. It is associated with savannah vegetation inform of wood and grass land basing on the distance from the equator. It is experienced in countries like Zambia, Zimbabwe and South Africa, the central part of Nigeria, Malawi and part of the C.A.R. etc.

Characteristics of Tropical Climate

1. It is under the doldrums i.e. experiences low atmospheric pressure especially during summer.
2. The moderate rainfall is usually experienced after the overhead of the sun which causes hot temperatures that bring about evaporation.
3. There is high humidity especially in summer due to evaporation.
4. The region also receives single maxima which range between 7120 – 1000mm per annum basing on the location to equator.
5. The region experiences two reasons i.e. dry and wet season.
6. Region has a big annual range of temperature ranging between 18 - 25ºC
7. It experiences hot summer of about 25ºC and winter.

Activities carried out

1. There is farming i.e. growth of annual crops like beans, maize, and rearing of animals due to the grass lands.

2. There is tourism due to abundance of wild life in the wood and grassland regions.
3. There is hunting and fruit gathering in the wood lands.
4. Charcoal burning especially at Acacia trees in the woodlands.
5. There is also minimal lumbering especially in areas that are close to the equator.
6.

Problems faced

1. Occurrence of drought which limits agricultural activities leading to famine.
2. Attacks from tropical diseases and pests like tsetse flies.
3. Soil erosion especially in the dry season due to wind.
4. Occurrence of floods in the wet season.

2. **Mediterranean climate**

This is experienced at the extremes of the continent i.e. in the countries like Morocco, Algeria and Tunisia then the South in South African Cape Town.

Characteristics

1) The region experience cool temperature due to the influence of wind originating from the North and South.
2) Summer temperature goes upto 21ºC and in winter it drops to 10ºC and below.
3) Annual rainfall ranges between 300 – 700mm.
4) Humidity of this climatic region is low and the sky is almost cloudless.
5) The region experienced dry off shore winds in the summer leading to dry conditions and onshore winds in winter leading to light showers.

Economic activities carried out

1) Forestry due to growth of the oak and cork trees along the slopes of Atlas Mountains.
2) There is sheep rearing due to the cool temperature hence growth of esparto grass.
3) There is fruit growing e.g. grapes, apples due to cool temperatures experienced in winter and the warm summer temperatures which increase the sugar content.
4) Tourism is also carried out especially when the temperature is warm that attracts people from European countries.
5) There is also industrialization due to presence of raw materials like fruits.

Problems faced by the Mediterranean region

1) The dry conditions in summer limit the agricultural activities.
2) Occurrence of pests and diseases during the warm summer because they multiply a lot.
3) Soil erosion also occurs especially by wind which destroys the infrastructure.
4) In appropriate methods of farming i.e., monoculture especially in the fruit growing areas.

3. **Semi – Desert and Desert Climate**
   These conditions are found in regions which do have semi – deserts i.e., in South Africa, Botswana, Ethiopia, Northern Nigeria, Mali, Niger, Senegal, etc.

   Most of the world's deserts are found on the Western sides of the continent. Africa's deserts are two categories namely;

- Marine deserts
- Continental deserts.

MARINE DESERTS

The major marine desert in Africa is called Namib Desert which is found in the South western Direction of the continent along the coast of Atlantic Ocean.

This was caused by the cool Benguella Ocean current which reduces the evaporation rate along the west of Namibia leading to very little or no rainfall received.

CONTINENTAL DESERTS

In these areas, there is very little rainfall received and almost no rainfall is received in particular places e.g. the deeper regions of Sahara desert take a very long period of time without receiving rainfall.

There is also Kalahari semi – desert in South Africa. This is caused by the proximity to the desert conditions e.g. Namib and obstruction of the Drakensburg Mountains and Cape ranges.

Rainfall received is 380mm and below but in semi – desert it can go up to 500mm (one short rainfall season).

OCEAN CURRENTS

The continent of Africa is washed by two categories of ocean currents i.e. the cold and the warm ocean currents.

1) **Cold ocean currents**
   These include the Benguella and Canary ocean currents.

   Characteristics
- They are cold in nature which lowers the temperature of the area where they wash.
- They usually carry less moisture which reduced the rainfall formulating.
- They usually advance towards the tropical region i.e., in areas of cool temperature.

2) **Effects of cold ocean currents**
- They are less effective in rainfall formation.
- They lead to arid conditions e.g. the cold Benguella ocean current is responsible for the occurrence of Namib and Kalahari.
- They hinder aviation activities due to mist and fog conditions in the atmosphere that limit the visibility.
- They discourage human settlement due to limited forming activities.

Warm Ocean currents
- These include Mozambique (Agulhas). The Somali currents, etc.

Characteristics
- They originate from areas of hotter temperatures to raise the temperatures of their density.
- They usually flow from the tropics towards the polar region apart from the Guinea currents.

- They are always carrying moisture.
- They originate from areas of high pressure to the low pressure zones.
- They usually decline in Africa as they flow to their destinations.

Effects of warm ocean currents.

- They lead to formation of heavy rainfall which sometimes brings about floods.
- They increase the temperature of the area where they wash, leads to a high evaporation and evapo – transpiration rate.
- They lead to growth of dense natural vegetation due to heavy rain in warm temperatures.

Effects of desert and semi – desert climate on human activities

The dry conditions lead to nomadic pastoralism due to limited pasture and water bodies.

Limited rainfall and hot temperature leads to growth of animal's crops like beans, maize, etc and the drought resistant crops like millet.

Limited rainfall leads to irrigation farming along R. Nile in Egypt, R. Senegal in Senegal, etc.

Limited rainfall activities which encourage oil drilling in North Africa.

There is occurrence of soil erosion especially by wind which limits the forming activities.

Growth of dry short grass lands and thickets e.g., in the Kalahari desert which has encouraged wildlife conservation /tourism.

Formation of sand dunes limits leading to remoteness.

Factors which lead to desert type of climate

Location on the western side of the continent where the winds are offshore leading to arid conditions.

Absence of large water bodies within the interior of the continent e.g. the Sahara desert which reduces the amount of water vapor.

The rain shadow effects due to existence of highlands like Ethiopian highlands where dry wind deserts leading to very little rainfall.

Existence of scanty vegetation limits the evapo - transpiration process that would attract rainfall formation.

Existence of the cold ocean currents e.g. Benguella ocean currents that lower the temperature of over crossing wind which reduced evaporation that would result into rainfall formation.

Latitudinal location whereby the high pressure belt force wind to blow away leading to acidity.

Human activities i.e., overgrazing, bush burning, deforestation and swamp reclamation reduce the sources of moisture that would form rainfall.

Problems faced by people living in desert margins.

- Limited supply of water for domestic and human consumption.
- There is always shortage of pasture for livestock leading to nomadic life.
- Infertile soil because of limited moisture (sandy soil) which limits crop growing.
- They receive unreliable rainfall that limits the growth of perennial crops and dense vegetation.
- Excessively hot temperature during day leads to dehydration and limited sight.
- Occurrence of soil erosion by wind.
- There is remoteness due to accumulation of sand that leads /limits the construction of transport routes.
- Occurrence of sand storms leads to limited vision and loss of lives.

Solutions to the above problems

Adoption of irrigation farming e.g. in Egypt, Sudan, Senegal etc., to support crop growth.

Use of animal transport i.e. camels in areas where there is a lot of sand deposition to improve on transport.

Construction of valley dams and boreholes to avail water for the nomadic tribes.

Adoption of water harvesting in the rain season that would be used in the period of scarcity.

Afforestation programmes should be carried out to improve on the water catchment areas.

Diversification of the economy thru emphasizing oil to reduce over reliance on the very few activities.

3**. Montane climate**

This is experienced in mountainous or highland areas for example Ethiopian highlands in Ethiopia, Cameroon Mountains in Cameroon, and Drakensburg in South Africa.

Characteristics of Montane climate

- Heavy rainfall is received on wind – ward side due to moist winds which are forced to rise.
- The lee - ward side receives dry conditions due to the dry descending winds.
- There is always low temperature on higher altitude.
- Dense cloud cover on the windward and cloudless sky on the lee wards side.
- Occurrence of temperature inversion in the valleys i.e. cold air replaces warm air in the valley.

Activities carried out

- Growth of fruits i.e. apple and grapes due to the cool temperatures.
- The cool temperature favors dairy farming because the exotic cattle always survive in such conditions.
- Heavy rainfall on the windward side leads to growth of national forests i.e. Bamboo used for several purposes.
- Tourism is carried out along the slopes with mountain forests and other attractions i.e. waterfalls.
- There is also irrigation farming on the leeward side due to the dry conditions.

Problems out

- Occurrence of soil erosion and landslides due to heavy rainfall which leads to loss of lives.
- There are cold temps that discourage settlement especially to people with breathing problems and high blood pressure.
- The conditions on the lee ward side discourage farming activities which leads to shortage in the area.

Flooding occurs in the valleys especially when the rivers that flow from the mountains increase in volume due to heavy rainfall.