

LESSON NOTE FOR WEEK TWO (FAMVAR INTERNATIONAL SECONDARY SCHOOL)

SUBJECT: GEOGRAPHY

CLASS: SS1

TOPIC: WEATHER AND CLIMATE

DEFINITION OF WEATHER AND CLIMATE

Weather is the atmospheric condition of a place over a short period of time. The weather could be rainy, sunny or cloudy. Climate, on the other hand, is the average weather condition of a place over a long period of time, usually between 30 to 35 years.

ELEMENTS OF WEATHER ELEMENTS

- 1. Temperature:** This refers to the degree of hotness or coldness of a place . It influences the amount of water vapor present in the air. It also determines the rate of evaporation and condensation in the lower atmosphere (troposphere).
- 2. Atmospheric Pressure:** This refers to the weight of the volume of air which extends to the outermost layers of the atmosphere . Atmospheric pressure decreases as one goes higher (i.e. increases in height or ascent).
- 3. Cloud:** This is a visible accumulation of tiny water droplets or ice crystals in the earth’s atmosphere. Clouds form when air becomes saturated or filled with water vapor. Clouds reduce visibility and deplete solar insulation.
- 4. Sunshine:** This is the visible part of the solar energy. It aids the formation of clouds and rainfall. The amount of sunshine in a place depends on the season,a factor determined by latitude and by the position of the earth as it revolves around the sun.
- 5. Rainfall:** This refers to water droplets which fall from the atmosphere as a form of precipitation. There are three(3)types of rainfall which are convectional, orographic and frontal rainfall.
 - i. Orographic or relief rainfall:** This occurs when moist laden air is forced to ascend a mountain barrier. It is also referred to as **relief rainfall** because it is caused by a mountain barrier(relief).
 - ii. Convectional rainfall:** Convectional rainfall occurs when the heated air from the earth's surface rises upwards along with the water vapour and gets condensed when it reaches a higher altitude.It is common in areas with extremely high temperature. It is torrential and normally accompanied by thunder and lightning.
 - iii. Frontal/cyclonic rainfall:** This is a kind of rainfall which is caused by the convergence of two characteristically different air masses with temperature differences.
- 6. Humidity:** This refers to the dampness of the atmosphere due to the pressure of water vapour. Humidity is, in general, a measure of water vapor in the air.

| S/N | ELEMENTS | MEASURING INSTRUMENT |
|-----|-------------------|--|
| 1. | Temperature | Thermometer |
| 2. | Rainfall | Rain gauge (millimeter or centimeter) |
| 3. | Wind direction | Wind vane |
| 4. | Wind speed | Anemometer |
| 5. | Pressure | Barometer |
| 6. | Relative humidity | Hygrometer |
| 8. | Sunshine | Campbell Stokes recorder |
| 9. | Solar radiation | Pyranometer |

AFFECTING WEATHER AND CLIMATE

- i. Latitude
- ii. Altitude
- iii. Cloud cover
- iv. Continentality/distance from the ocean
- v. Vegetation
- vi. Ocean current
- vii. Planetary wind and pressure belt
- viii. Natural vegetation
- ix. Slope of the area

NOTE: Latitude: Latitude refers to the location of a place on the earth's surface in relation to the equator. Tropical latitudes receive more solar radiation than the mid-latitudes and polar latitudes and therefore have hotter temperature.

Altitude: Altitude refers to the height of a place above the sea level. Temperature decreases by 6.5°C for every 1000 meters ascent or 0.65°C for 100m ascent. This phenomenon is called **normal lapse rate or environmental lapse rate**.

WEATHER RECORDS

In a meteorological station, there is a device called the **Stevenson's screen** which shelters weather instruments and protects against precipitation and direct heat radiation from the sun. It is a wooden box with an opening allowing air to circulate freely around them. It is raised to the ground with a height of 4feet (1.2m) . Weather instruments kept in the Stevenson's screen are:

- a) Wet and dry bulb thermometer(hygrometer)
- b) Minimum and maximum thermometers

Temperature: Temperature is the degree of hotness and coldness of a place. In a meteorological station, temperature is measured using a thermometer (or minimum and maximum thermometer). The unit of temperature is Fahrenheit (°F) or Celsius (°C) .We must note that temperature can be converted from one scale to another. We can convert from Fahrenheit to Celsius/centigrade and vice versa.

To convert from Fahrenheit to Celsius/centigrade, we use the formula; $\frac{^{\circ}\text{F}-32}{1.8}$

To convert from Celsius to Fahrenheit , we use the formula: $(1.8\times^{\circ}\text{C})+32^{\circ}\text{C}$

A Stevenson's screen is a shelter that shields meteorological instruments against precipitation and direct heat radiation. It is raised above the ground at a height of 4ft or 1.2m

CALCULATION OF TEMPERATURE

- I. Mean daily temperature: $\frac{\text{max temp} + \text{min. temp for a day}}{2}$
- II. Diurnal or daily range of temperature = max temp- min temp for a day
- III. Monthly range of temp = difference between the hottest and the coldest temperature for the month.
- IV. Annual Range of temperature = Difference between the hottest and coldest temperature for the year
- V. Annual Temperature = Total temperature for the year
- VI. Mean annual temperature = $\frac{\text{Total temperature of the year}}{12}$

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Example: Use the statistics in the table below to answer the questions that follow;

| Month | J | F | M | A | M | J | J | A | S | O | N | D |
|-----------|----|----|----|----|----|----|----|----|----|----|----|----|
| Temp.(°C) | 40 | 30 | 21 | 25 | 10 | 40 | 48 | 30 | 25 | 30 | 20 | 15 |

Calculate:

1. The month with the highest temperature
2. The month with the lowest temperature
3. Annual range of temperature
4. Annual temperature
5. Use the table above to draw a line graph
6. Mean annual temperature

Solution

1. July=48°C
2. May=10°C
3. Highest monthly temp - lowest monthly temp: $48-10=38$
4. Sum of monthly temperatures: $40+30+21+25+10+40+48+30+25+30+20+15=333$ °C
5. Annual temp/12 i.e. $333/12=27.83$ °C

Homework

1. Define weather and climate
 - a. List and briefly explain four elements of weather
2. List out the instruments used to measure the following elements of weather
 - A. Atmospheric Pressure
 - B. Humidity
 - C. Rainfall
 - D. Wind speed

| Month | J | F | M | A | M | J | J | A | S | O | N | D |
|-----------|----|----|----|----|----|----|----|----|----|----|----|----|
| Temp.(°C) | 35 | 25 | 24 | 30 | 28 | 45 | 40 | 33 | 28 | 30 | 20 | 10 |

3. Using the statistics in the table above, Calculate the following:
 - I. Annual temperature
 - II. Annual range of temperature
 - III. Mean annual temperature