**Unit 7 Formative Assessment: Severe Weather & Climate**

1. Climate
   1. The four factors that determine an area’s climate are:

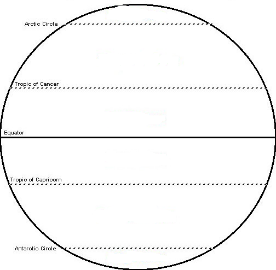
1. (Most Important)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Explain why #1 is the most important factor in determining climate.

1. Match each Koppen climate zone to its description:
   1. Humid Tropical
   2. Dry
   3. Humid Mid-Latitude
   4. Continental
   5. Polar
   6. Severe winters; mild summers; north of the equator; Quebec, Canada
   7. High temperatures year-round; no seasons; high humidity; near equator; Puerto Rico
   8. Mild winters; hot, humid summers; consistently moderate precipitation; North Carolina
   9. Coldest; little precipitation; times of continuous light and continuous darkness; Antarctica
   10. Hot summers; cool winters; little precipitation; arid; New Mexico
2. Label the latitude zones as they pertain to climate.
3. Which of the following are used to categorize an area’s climate in the Koppen Climate Classification System? (You may choose more than one.)
   1. Temperature
   2. Elevation
   3. Latitude
   4. Precipitation
   5. Pressure
   6. Vegetation
4. Circle the words that make each statement below true:
   1. Places at higher elevations tend to be ***(warmer/colder)*** than places at lower elevation.
   2. Places near water have more ***(extreme/moderate)*** climates than places further from water.
   3. As latitude increases, the intensity (strength) of the solar radiation ***(increases/decreases)***.
   4. Arid climates are ***(wet/dry)***.
   5. Humid climates are ***(wet/dry)***.
   6. The amount of carbon dioxide in Earth’s atmosphere is currently ***(increasing/decreasing)*** at a very ***(rapid/slow)*** rate.
   7. Historically, the global temperature has ***(increased/decreased/gone up & down)***.
   8. In the last 100 years, Earth’s temperature has ***(increased/decreased)***.
   9. The concern over the recent change in Earth’s temperature is because the speed of change is much ***(faster/slower)*** than in the past.
5. Identify 3 impacts of global warming.
6. Greenhouse gases:
   1. Identify the two most important heat-absorbing (greenhouse) gases in the lower atmosphere.
   2. List 3 natural sources for each of the gases named above.
   3. List 3 man-made sources for each of the greenhouse gases named.
7. The trapping of heat in lower layer of the atmosphere by certain gases is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   1. Complete the statement below to describe how the above process works:

\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_, and methane from [**non-human/man-made**] sources rise into the atmosphere and [**absorb/reflect**] heat back to [**Earth/space**] during the [**day/night**].

* 1. Complete the statement below to describe how the ENHANCED GREENHOUSE EFFECT works.

\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_, and methane from [**non-human/man-made**] sources rise into the atmosphere, [**increasing/decreasing**] the total amount of greenhouse gases, and [**absorb/reflect**] even [**more/less**] heat back to [**Earth/space**] during the [**day/night**], causing an overall [**decrease/increase**] in global temperatures.

* 1. What is the main source of carbon dioxide entering Earth’s atmosphere today?
  2. Explain how burning fossil fuels contributes to the enhanced greenhouse effect.

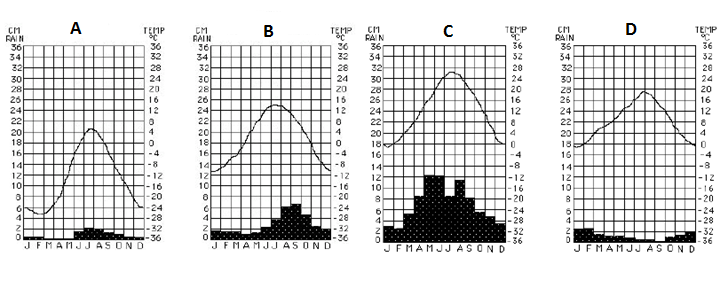
1. Complete the following chart comparing El Nino and La Nina:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Event | Tradewind Strength | Amount of Upwelling | Pacific Ocean Surface Temperature | Weather Patterns |
| El Nino |  |  |  |  |
| La Nina |  |  |  |  |

1. Complete the chart below concerning the 8 natural causes of climate change:

|  |  |  |
| --- | --- | --- |
| Short-term OR Long-term | Event | Effect on Climate |
|  | Numerous volcanic eruptions releasing small ash particles |  |
|  | Numerous forest fires |  |
|  | Hemisphere tilted toward the sun |  |
|  | La Nina |  |
|  | Higher than average solar flares |  |
|  | Increased water area |  |
|  | Lesser degree of tilt |  |
|  | More circular orbit |  |

1. What is the pH range of acid rain?
2. Circle the chemical(s) are responsible for acid rain formation.
   1. Sulfur dioxide
   2. Carbon dioxide
   3. Nitrogen oxides
3. What is the main cause of acid deposition in the northeast United States?
4. Ground-level ozone
5. Nitrogen from volcanic eruptions
6. Methane from thawing Siberian lakes
7. Sulfur dioxide from burning coal
8. What 3 pieces of information are included in the Air Quality Index?
9. Use the climatograms provided to answer each of the following questions:



1. What is the temperature **range** for B? \_\_\_\_\_\_\_\_\_\_
2. How much rain does A get in August? \_\_\_\_\_\_\_\_\_\_
3. Which of the four locations has the greatest **average** amount of rainfall? \_\_\_\_\_\_\_\_\_\_
4. What is the average temperature of D in January? \_\_\_\_\_\_\_\_\_\_
5. Which location is in the Polar climate zone? \_\_\_\_\_\_\_\_\_\_
6. Which location is in the Dry climate zone? \_\_\_\_\_\_\_\_\_\_
7. Describe the climate for C. When are the warm/cold and wet/dry seasons?
8. Identify if each of the following describes tornadoes (T), thunderstorms (Th), and/or hurricanes (h).
9. Very low pressure \_\_\_\_\_
10. Is the most violent \_\_\_\_\_
11. Draws in cold downdrafts \_\_\_\_\_
12. Has updrafts of warm, moist air \_\_\_\_\_
13. Has high pressure system above \_\_\_\_\_
14. Require heat, moisture, and differences in air pressure \_\_\_\_\_
15. Thunderstorms:
16. List the three stages in order:
17. Identify the correct stage for the formation and break up events below AND put them in order:
    * 1. Precipitation begins \_\_\_\_\_/\_\_\_\_\_
      2. Updrafts decrease \_\_\_\_\_/\_\_\_\_\_
      3. Most intense stage \_\_\_\_\_/\_\_\_\_\_
      4. Cloud formation \_\_\_\_\_/\_\_\_\_\_
      5. Updrafts & downdrafts form convection cell \_\_\_\_\_/\_\_\_\_\_
      6. Warm air runs out \_\_\_\_\_/\_\_\_\_\_
18. Put the 4 steps of tornado formation in order:
    1. \_\_\_\_\_\_ Spinning hot air stretches/funnels back down to the ground
    2. \_\_\_\_\_\_ Plume of hot air pushes up through cold air
    3. \_\_\_\_\_\_ Hot air trapped below cold air
    4. \_\_\_\_\_\_ Horizontal wind (3 miles above Earth) hits & spins the hot air plume very fast
19. Hurricanes:
20. Where do most develop?
21. Why do most develop in the area identified above?
22. What two systems must form and where in relation to each other in order for thunderstorms to develop into a hurricane?
23. Identify the stage of hurricane formation (Tropical Depression, Tropical Storm, or Hurricane) AND put them in order:
    1. \_\_\_\_\_/\_\_\_\_\_\_ 20-40 mph wind
    2. \_\_\_\_\_/\_\_\_\_\_\_ winds >75 mph
    3. \_\_\_\_\_/\_\_\_\_\_\_ winds 40-75 mph
    4. \_\_\_\_\_/\_\_\_\_\_\_ thunderstorms combine
    5. \_\_\_\_\_/\_\_\_\_\_\_ low pressure over tropical waters cause thunderstorms
    6. \_\_\_\_\_/\_\_\_\_\_\_ anticyclone (high pressure) above cyclone
    7. \_\_\_\_\_/\_\_\_\_\_\_ anticyclone pushes rising air & clouds out/away, preventing downdrafts
24. Differentiate between the weather associated with the eye and eyewall of a hurricane.

Eye:

Eyewall:

1. Explain what happens to a hurricane after it makes landfall.
2. Match each weather instrument/tool to its description:
3. Anemometer
4. Barometer
5. Hygrometer
6. Psychrometer
7. Rain Gauge
8. Satellite
9. Thermometer
10. Weather Balloon
11. Wind Vane/Sock
12. Measures temperature in Fahrenheit or Celsius
13. Measure air pressure in mm or in of mercury
14. Measures cloud cover, precipitation, & tracks air mass movement
15. Measures wind speed in mph or knots
16. Measures actual humidity in mL/cm3
17. Measures relative humidity as a percentage
18. Measures amount of rain fall in cm or in
19. Measures wind direction on a compass (N, E, etc.)
20. Is used to position other instruments higher in Earth’s atmosphere
21. Identify if each of the following describes tropospheric (ground-level) ozone, stratospheric ozone, or both:
22. Increases respiratory diseases \_\_\_\_\_
23. Slows photosynthesis \_\_\_\_\_
24. Absorbs UV energy \_\_\_\_\_
25. Causes damage to cells \_\_\_\_\_
26. Affected by CFCs \_\_\_\_\_
27. Composed of O3 (3 oxygens) \_\_\_\_\_
28. Ozone layer \_\_\_\_\_
29. Causes cancer \_\_\_\_\_