SC.6.E.7.4: Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.

1. Interactions of Earth’s Spheres and Earth Systems
   - **Hydrosphere**: Liquid Water (Ex. Lakes, Rivers, Oceans)
   - **Cryosphere**: Frozen Water (Ex. Glaciers, Icebergs, Ice caps, Snow)
   - **Biosphere**: Life (Ex. Animals, Plants, Trees)
   - **Atmosphere**: Air (Ex. Stratosphere (Ozone Layer), Troposphere)
   - **Geosphere**: Land (Ex. Rocks, Sand, Mountains, Volcanoes, Soil)

2. Weather and Climate

<table>
<thead>
<tr>
<th>Weather</th>
<th>Climate</th>
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<tbody>
<tr>
<td>Definition: Describes the atmospheric conditions at a specific place at a specific point in time. Weather generally refers to day-to-day temperature and precipitation activity.</td>
<td>Describes the average conditions expected at a specific place at a given time. A region’s climate is generated by the climate system, which has five components: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.</td>
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<tr>
<td>Time Period: Measured for short term</td>
<td>Measured over a long period</td>
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3. Global Weather Patterns

4. Atmosphere Protects Life
   - Contains Oxygen and Weather
   - Ozone layer protects us from harmful UV rays from the sun
   - Acts as a blanket to moderate the temperature on Earth
   - Protects us from meteors (burns them up)
Read each of the following statements. Mark “W” for weather and “C” for climate.

1. _____ The high temperature today was 93 degrees Fahrenheit.
2. _____ The month of December is generally very cold and snowy.
3. _____ Houston has very humid conditions during the summer month.
4. _____ It is supposed to rain for the next 3 days.
5. _____ It was extremely windy outside today at the game.
6. _____ Part of the Sahara Desert receive less than 2 cm of rain per year.

What is this? ______________________________
How does it affect climate? ___________________
_________________________________________
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How does it affect climate? ___________________
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What are 3 ways life on Earth would change if the atmosphere was thinner?
1. _______________________________________
2. _______________________________________
3. _______________________________________

1. Why is the water temperature warmer in the black can?
   a. The black can absorbs light energy better than the metallic can.
   b. The black can reflects light energy better than the metallic can.

2. Which of the areas listed below are most like the metallic can?
   a. Forests
   b. Oceans
   c. Deserts
   d. Ice (poles, snow, glaciers, etc.)

3. If solar radiation is transmitted through the atmosphere, what will happen when it contacts the geosphere?
   a. Most of the energy will be absorbed by the geosphere and changed into heat.
   b. All of the energy will be absorbed by the geosphere and changed into heat.
   c. Most of the energy will be reflected back into space.
   d. All of the energy will be reflected back into space.

4. Where are most (99%) of the Sun's most harmful ultraviolet radiation frequencies absorbed and reflected?
   a. The greenhouse gases in the troposphere
   b. The greenhouse gases in the stratosphere
   c. The ozone layer in the stratosphere
   d. The ozone layer in the mesosphere

5. Why are clouds able to keep Earth’s surface cooler in the day and warmer at night?
   a. Clouds reflect incoming solar radiation and transmit outgoing heat.
   b. Clouds reflect incoming solar radiation and absorb outgoing heat.
   c. Clouds absorb incoming solar radiation and transmit outgoing heat.
   d. Clouds absorb incoming solar radiation and absorb outgoing heat.

6. The Gulf Stream flows along the equator before turning north along Florida’s east coast. How does the Gulf Stream impact Florida’s climate?
   a. The Gulf Stream makes Florida hot and dry.
   b. The Gulf Stream makes Florida cool and dry.
   c. The Gulf Stream makes Florida hot and moist.
   d. The Gulf Stream makes Florida cool and moist.

7. Two cities are located at the same latitude but on the east and west coasts of the United States. Which will have warmer ocean water?
   a. The city on the east coast will have warmer water.
   b. The city on the west coast will have warmer water.
   c. The water temperatures will be about the same for both cities.
8. On average, the height of hurricane season is Labor Day weekend. Can we expect a hurricane on Labor Day weekend this year?
   a. Yes, because the past is a great predictor of the future.
   b. No, because hurricane occurrence varies from year to year.
   c. Maybe. Based on climate there is a high likelihood of a hurricane, but actual weather events may differ from climate.

9. On some small islands in the Pacific Ocean, the average sea level is rising on the beaches little by little each year. Residents of the islands are worried that their island, and their homes, may become flooded in a few years. What is the most likely cause for the water level increases?
   a. They are getting more rain in their area.
   b. The tides are more dramatic because of the number of full moons they have experienced.
   c. Ice from the North and South poles is melting and adding to the water in the ocean.
   d. The waves are bigger because of increased winds.

10. Hurricanes are large storms that form over warm waters out in the ocean. Hurricanes are associated with low-pressure regions in the atmosphere. How does the low pressure associated with a hurricane help them to grow big and powerful?
    a. Air in the atmosphere tends to move toward low-pressure regions, which would increase the winds surrounding a hurricane.
    b. Low-pressure regions push away other air in the atmosphere, which would make the hurricane bigger.
    c. Low-pressure air heats up the water and therefore makes the hurricane stronger.
    d. Low-pressure conditions means slow winds, which makes the hurricane stronger.

11. Based on the northern location of England on the map, it appears that it would have a cold, harsh climate. In reality, England has a mild climate because of the warm Gulf Stream current in the Atlantic Ocean. How does the Gulf Stream current help keep England's climate mild?
    a. The warm water of the Gulf Stream warms the land of England where they meet.
    b. The warm Gulf Stream waters heat the air over the ocean, which then moves over England.
    c. The warm Gulf Stream waters make the air very humid, which results in a milder climate in England.
    d. The warm Gulf Stream waters attract the cold air from England, thus keeping England mild.

12. The atmosphere surrounding Earth helps to maintain the various climates found around the world and keeps Earth from becoming extremely cold all over. How does the atmosphere help to keep Earth insulated and warm?
    a. The atmosphere creates heat as Earth moves through space, helping to insulate Earth.
    b. The atmosphere traps the heat generated by Earth's core and helps maintain Earth's climate.
    c. The atmosphere helps spread the warmth from the water near the equator to other parts of Earth.
    d. The atmosphere helps trap heat energy from the Sun and energy radiated from Earth to maintain the climate.

13. Convection currents in the atmosphere influence many weather patterns. What property of the air has the most influence on convection currents?
    a. the direction of the wind
    b. the velocity of the wind
    c. the temperature of the air
    d. the mass of the air

14. When nitrogen is returned to the soil when dead plants decompose, the interaction is between which two spheres?
    a. Hydrosphere and geosphere
    b. Cryosphere and geosphere
    c. Biosphere and Geosphere
    d. Biosphere and atmosphere

15. Which of the following statements refers to weather?
    a. “It rains a lot in the Spring in my city.”
    b. “It’s very hot and sunny today. Let’s go to the beach.”
    c. “There are many people who don’t believe there is a hole in the ozone layer.”
    d. “We are going south to Florida in January because it will be warmer.”

16. The water cycle is the continuous movement of water on, in and above the Earth. Which of the following describes evaporation in the water cycle?
    a. Water vapor meets cold air and changes back into a liquid
    b. Plants take in water from the soil
    c. Water gets heated and changes from liquid water to water vapor
    d. Water freezes

17. Hurricanes form in tropical water between 8 and 20 degrees north and south of the equator. Hurricanes rarely form a higher latitudes because the water is too
    a. warm.
    b. deep.
    c. shallow.
    d. cold.