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

LESSON 1 Interactions among Earth’s Sphere’s (page 230-233)

1. What is a system? A group of parts that work together as a whole
2. Describe Earth as a system: the Earth involves a constant flow of matter through different parts
3. Describe each of the 5 main spheres of Earth:
   a. Atmosphere= the envelope of gases that form Earth’s outer layer; mixture of gases, mostly nitrogen and oxygen; also contains dust particles, cloud droplets and water vapor; contains the weather (precipitation and winds)
   b. Geosphere= nearly all of Earth’s mass is the solid rocks and metals and other materials; has 3 main parts: metal core, solid mill delayer and a rocky outer layer
   c. Hydrosphere= ¾ of Earth is covered by a relatively thin layer of water; includes oceans, rivers, lakes, groundwater, and water vapor; at surface most of water is oceans
   d. Cryosphere = all of the water in the form of ice on or in Earth
   e. Biosphere= the parts of the Earth that contain living organisms

4. As a major source of energy for Earth’s processes, sun can be considered part of the Earth system as well.

Sc.6.E.7.5 Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.

LESSON 2 Energy in Earth’s Atmosphere (page 234-243)

5. Nearly all Earth’s energy comes from the sun.
6. This energy travels to the Earth as visible light and infrared radiation, plus a small amount of ultraviolet radiation.
7. Waves are classified according to wavelength, or distance between peaks.
8. Most of the energy from the sun travels to Earth in the form of visible light and infrared radiation. A smaller amount arrives as ultraviolet radiation.
9. Visible light = all colors that you see in a rainbow: red, orange, yellow, green, blue, violet.
10. The direct transfer of energy is called radiation.
11. One form of electromagnetic radiation, infrared, has wavelengths that are longer than wavelengths for red light.

My Learning Scale for Climate Interactions is ____ because _______________________________; I still need help with ________________________________. 
12. **Infrared** is not visible by humans, but can be felt as **heat**.

13. The sun also gives off **ultraviolet radiation**, which is an **invisible** form of energy with wavelengths that are **shorter** than wavelengths for **visible** light.

14. **Ultraviolet radiation** can cause sunburns.

15. What happens to the Sun’s energy near Earth? Some sunlight is absorbed or reflected by the atmosphere before it can reach the surface, the rest of the sunlight passes through the atmosphere to Earth’s surface.

16. Different **wavelengths** of radiation are absorbed by different **layers** in the atmosphere.

17. Clouds act as **mirrors**, reflecting sunlight back into space.

18. Dust size particles and gases in the ________________________ disperse light in all directions, in a process called **scattering**.

19. Why does the clear daytime sky look blue? The light you see has been scattered by gas molecules in the atmosphere. Gas molecules scatter short wavelengths of visible light (blue and violet) more than long wavelengths.

20. What happens to about 50% of the energy that reaches Earth’s surface? **It is absorbed by Earth’s surface, heating the land and the water.**

21. What happens to energy that heats the land and water? The absorbed energy is radiated back into the atmosphere.

22. Describe the process known as the greenhouse effect: some of the energy radiated back to the atmosphere is infrared; this ‘heat’ is absorbed by water vapor, carbon dioxide, methane and other gases in the air. These gases in turn hold heat in Earth’s atmosphere.

23. How does the Sun’s energy affect global winds? What are global winds? The sun provides Earth with light and heat. It also influences large scale (global) patterns of movement of air within Earth’s lower atmosphere.

24. How are global winds created? Global winds are created by the unequal heating of Earth’s surface. These winds occur over large areas.

25. What is the Coriolis Effect? The way Earth’s rotation makes winds curve.

26. Doldrums: Calm areas where warm air rises; occur at the equator where the direct sunlight heats the surface strongly.

My Learning Scale for Climate Interactions is ____ because ________________________________; I still need help with _________________________________.

27. Horse Latitudes: two calm areas of sinking air; at about 30° north and south; the air stops moving toward the poles and sinks

28. Trade winds: blow from the horse latitudes toward the equator

29. Prevailing Westerlies: blow from west to east, away from the horse latitudes

30. Polar Easterlies: blow cold air away from the poles

31. Temperature differences between land and water drive the formation of winds.

32. Land heats and cools more rapidly than water. Also, land can heat to higher temperatures than water. Land can also cool to lower temperatures than water.

SC.6.E.7.6 Differentiate between weather and climate

LESSON 3 Climate and Climate Regions (page 244-251)

33. How do scientists differentiate between weather and climate? Weather refers to the conditions of Earth’s atmosphere at a particular time and place. Climate refers to average, year-after-year weather patterns in a given area.

34. Climates are classified according to a system that uses two major factors: precipitation and temperature.

35. Climate areas have distinct vegetation, or plant growth.

36. Tropical rainy climates = rainy days, afternoon thunderstorms are common; tradewinds bring moisture from the oceans to some tropical areas.

37. List 2 examples of tropical rainy climate: rainforests = forests with large amounts of year round rainfall. Savannas are tropical grasslands.

38. Dry Climates = amount of precipitation that falls is less than the amount of water that could potentially evaporate.

39. List 2 examples of dry climates: deserts = very dry regions with extreme temperatures. Steppes are large, semi-arid regions on the edges of deserts (contain short grasses and low bushes).

40. Temperate continental climates = climates that are not influenced much by oceans; commonly have extremes of temperature; forests and grasslands can grow; subarctic climates lie north of some continental climates; furs and spruce forest grow here.

41. List examples of this climate in the US = Northeast and the Midwest; Alaska
42. Temperate marine climate = found along coastlines; due to the moderating influence of oceans, these climates are humid and have mild winters

43. List 3 examples of the temperate marine climate in the US: a. Florida is wet and warm but not as hot as the tropics (humid subtropical); may include cypress trees, marshes, and sabal palm. Oregon and Washington are distinguished by mild, wet winters; thick forest. Southern California has mild, warm, dry summers and cool, rainy winters.

44. Polar climate = coldest climates; short, cool summers follow bitterly cold winters. Most are dry, because the cold air contains little moisture. Grasses, wild flowers and shrubs can grow in soil that thaws in summer. Alaska's polar climate has vast regions of tundra or treeless plains beneath which is permafrost (permanently frozen ground)

45. List 2 examples of polar climates Alaska and Greenland

46. Highlands = higher slopes of mountains have temperatures that are lower and precipitation is increased

47. Given an example of highlands in the US: Rocky Mountain slopes

48. What natural factors can cause climate changes?
   a. movement of continents
   b. changes in position of Earth in relation to the Sun
   c. major volcanic eruptions
   d. changes in the Sun's energy output

SC.6.E.7.7 Investigate how natural disasters have affected human life in Florida

LESSON 4 Natural Disasters in Florida (page 252-253)

49. Natural disaster = natural event that causes severe or widespread destruction

50. Natural disasters such as hurricanes and tornadoes and wildfires have repeatedly damaged many areas of Florida, causing loss of __life__ and damage to __property__

51. What are the damaging effects of hurricanes? Wind, rain and storm surge
52. What is the greatest threat to life and property during a hurricane? _storm surge_

53. When do tornadoes most often occur in Florida? _During summer months they form from tropical cyclones; more powerful tornadoes form from Feb. through April when the jet stream moves south into Florida_

54. What is a wildfire? _Large fire that spreads quickly over a natural area._

55. When is the dry season in Florida? _Nov/Dec. through April/May_

56. When do most wildfires occur? _Dry season / droughts_

57. Florida’s natural landscape is shaped by _wildfires._

58. What causes floods? _Floods occur when the volume of water in a river increases so much that the river overflows its channels._

59. What is a drought? _A long period of scarce rainfall._

**SC.6.E.7.9 Describe how the composition and structure of the atmosphere protects life and insulates the planet**

LESSON 5 Composition and Structure of the Atmosphere (page 260-267)

60. Earth’s atmosphere consists of _nitrogen, oxygen, carbon, other gases_ as well as particles of liquids and solids.

61. Earth’s atmosphere is divided into _4_ main layers according to changes in temperature.

62. The 4 main layers of the atmosphere are: _describe each_

a. _troposphere:_ layer where Earth’s weather occurs

b. _stratosphere:_ second layer, contains the ozone layer which protects living things from ultraviolet radiation from the sun

c. _mesosphere:_ layers that protects Earth’s surface from being hit by most meteoroids

d. _thermosphere:_ outermost layer of Earth’s atmosphere

65. What are the two layers in the thermosphere? _ionosphere and exosphere_

LESSON 6 Human Activities and Climate Change (page 268-274)

My Learning Scale for Climate Interactions is ___ because _____________________________________; I still need help with ________________________________________________________________.
63. What does ozone in the atmosphere do? It absorbs some of the harmful radiation from the sun.

64. What is the ozone layer? It is a layer of upper atmosphere that contains a very small amount of ozone which is enough to absorb some of the sun’s harmful ultraviolet radiation.

65. What causes a hole in the ozone layer? It is caused by a group of gases called CFCs (chlorofluorocarbons) used in air conditioners, aerosol spray cans, etc.

66. How does the atmosphere help to insulate Earth? It keeps Earth’s surface warm through a process called the greenhouse effect (greenhouse gases = water vapor, carbon dioxide, methane).

67. How can humans be help to reduce harmful greenhouse gas emissions? (page 274)

- Efficient energy use
- Clean energy sources
- Carbon capture

My Learning Scale for Climate Interactions is ____ because ____________________________; I still need help with ____________________________.