Name: _____ Class: _____ Date: _____

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1. The greenhouse effect occurs because of the absorption and re-emission of _____ radiation by the atmosphere.

a. visible light
b. infrared
c. ultraviolet
d. shortwave

ANSWER: b

2. How much did the average temperature of Earth change between 1880 and 2016?

a. 4°C
b. 2°C
c. 1°C
d. –2°C
e. no significant change

ANSWER: c

3. Which of the following is NOT a greenhouse gas?

a. methane
b. ozone
c. carbon monoxide
d. nitrous oxide
e. chlorofluorocarbons

ANSWER: c

4. Which of the following human activities is NOT a significant source of greenhouse gases in the atmosphere?

a. generating electricity
b. using landfills
c. using refrigerants
d. agriculture
e. hunting

ANSWER: e

5. Excluding water vapor, greenhouse gases make up _____ percent of the atmosphere.

a. 7
b. 3
c. 1.5
d. less than 1

ANSWER: d

6. How much solar radiation is reflected by Earth's atmosphere and surface?

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a. 24 percent
b. 33 percent
c. 45 percent
d. 60 percent

ANSWER: b

7. The surface temperature of Mars averages approximately –55°C, with carbon dioxide trapped in ice and permafrost. How could humans begin to make the atmosphere more conducive to life?

ANSWER: Adding artificial greenhouse gas molecules with high absorption potential, such as chlorofluorocarbons, to the atmosphere of Mars would begin to heat the atmosphere via the greenhouse effect. As the atmosphere heated, the carbon dioxide would be released and continue the process without further inputs.

8. The energy of incident solar radiation reaching the surface of Earth declines toward the poles from its maximum in equatorial regions. Which of these is NOT a reason for this?

a. The tilt of Earth increases the reflection of solar radiation.
b. A given amount of solar radiation is spread over a larger area at higher latitudes.
c. Solar radiation travels a longer path through Earth's atmosphere at higher latitudes.
d. The rays of the Sun strike Earth at right angles over the equator as compared to oblique angles at the poles.

ANSWER: a

9. Which of the following has the highest albedo?

a. grass
b. snow
c. water
d. rainforest
e. pavement

ANSWER: b

10. Where is the solar equator?

a. at the Tropic of Cancer
b. between the equator and 23.5° N, depending on the season
c. between 23.5° S and 23.5° N of the equator, depending on the season
d. along the equator
e. between the equator and the Tropic of Capricorn

ANSWER: c

11. During summer equinox in the Northern Hemisphere, the Sun shines most directly

a. at the Tropic of Capricorn.
b. at the Tropic of Cancer.

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c. north of the solar equator.
d. at the equator.

ANSWER: b

12. Urban heat islands are warmer than surrounding areas. How might albedo contribute to urban heat islands?

ANSWER: The albedo of pavement and most roofs is much lower than the albedo of natural surfaces. This lower albedo reduces the reflection of solar radiation and increases the reradiation of infrared, which heats the local air.

13. Explain how an increased angle of Earth's tilt would affect the variation in the heating of Earth.

ANSWER: An increased angle would cause the solar equator to move farther north and south throughout the year. This would make summers warmer and winters colder, since the direct sunlight would be more focused on the hemisphere that is in summer.

14. Imagine Earth as a cylinder with a pole at each end. How would the distribution of heat from the Sun change?

ANSWER: If Earth were cylindrical, there would be no change in atmospheric thickness or the angle at which the Sun hit the surface except for the flat ends, which would receive almost no sunlight and therefore be coldest. The only variable along the sides would be differences in albedo. There would be no significant variation in temperature with latitude.

15. Why do the tropics receive more precipitation than areas at higher latitudes?

a. There is more water in tropical latitudes.
b. Water cycles more rapidly through the tropical atmosphere.
c. More precipitation falls as snow at higher latitudes.
d. The tropics are windier.

ANSWER: b

16. The maximum amount of water vapor air can hold is called the

a. saturation point.
b. latent heat capacity.
c. dew point.
d. absolute humidity.
e. condensate retention.

ANSWER: a

17. The intertropical convergence zone is

a. the dry region at the edge of the Hadley cells.
b. at the solar equator.
c. the area between polar and Hadley cells.
d. the cause of westerlies.

ANSWER: b

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18. The Coriolis effect causes what in surface winds?
    a. wind deflection to the east near the equator
    b. wind deflection to the right in the Northern Hemisphere
    c. wind deflection to the west in the Southern Hemisphere
    d. polar wind deflection to the left

ANSWER: b

19. In the area between convection cells the prevailing wind direction is primarily
    a. north to south.
    b. east to west.
    c. west to east.
    d. nonexistent.

ANSWER: c

20. Explain how the Coriolis effect would change if Earth were egg-shaped, with a narrower equatorial region.

ANSWER: A narrower equatorial region would result in a less significant difference in rotation speed between the equator and poles. This would decrease the Coriolis effect, resulting in the prevailing winds going more north-south and less east-west.

21. Additional water vapor in the atmosphere has both positive and negative feedback. Why is this?

ANSWER: Because water vapor is a greenhouse gas, it traps additional heat, which increases the temperature and allows more water vapor to be held in the atmosphere. However, additional water vapor can also increase cloud cover, which reflects more sunlight, decreasing the temperature and thus reducing the amount of water vapor in the atmosphere.

22. Explain how a decrease in atmospheric temperature can cause rain.

ANSWER: Since the capacity of air to hold water depends on temperature, as temperature decreases, the saturation point decreases. Water in the atmosphere that exceeds the new saturation point will fall as precipitation.

23. What kind of oceanic circulation would you predict for the western coasts of continents?
    a. cold currents moving poleward from the equator
    b. warm currents moving poleward from the equator
    c. cold currents moving from the poles toward the equator
    d. warm currents moving from the poles toward the equator

ANSWER: c

24. Which of the following phenomena triggers an El Niño–Southern Oscillation event?
    a. development of an unusually cold high-pressure air mass in the Antarctic region
    b. increased freshwater added to the surface currents, resulting in low salinity
    c. reversal of high- and low-pressure areas in the equatorial central Pacific Ocean

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d. cold water upwelling in the eastern Indian Ocean

ANSWER: c

25. Upwelling causes
    a. increased surface water temperature.
    b. nutrient-rich zones.
    c. low productivity in the deep ocean.
    d. increased evaporation and precipitation.

ANSWER: b

26. Gyres in the Southern Hemisphere rotate _____ and in the Northern Hemisphere rotate _____.
    a. clockwise; counterclockwise
    b. clockwise; clockwise
    c. counterclockwise; clockwise
    d. counterclockwise; counterclockwise

ANSWER: c

27. Which of the following does NOT drive ocean currents?
    a. the Coriolis effect
    b. topography of the ocean basins
    c. temperature differences
    d. continental water sources
    e. differences in salinity

ANSWER: d

28. Thermohaline circulation is driven by
    a. upwelling along the coast.
    b. high precipitation from the intertropical convergence zone.
    c. sinking polar water with high salinity.
    d. increased temperatures at the solar equator.

ANSWER: c

29. Which of the following is an effect of an El Niño–Southern Oscillation?
    a. increased precipitation and productivity in Australia and Africa
    b. disruption of fisheries off the coast of California
    c. increased upwelling along the western coast of South America
    d. drought in the southern United States and Mexico

ANSWER: b

30. Water near the equator is at a higher elevation than water near the midlatitudes because of

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a. gravity.
b. salinity.
c. temperature.
d. precipitation.

ANSWER: c

31. One potential effect of climate change is that it could disrupt thermohaline circulation. What might cause this disruption?

ANSWER: Thermohaline circulation is driven by the sinking of cold, high-salinity water near the poles. If the polar temperature continues to warm, there will be less ice formation, which concentrates the salt in polar waters. Increased melting of existing ice will also decrease the salinity of polar water. This decreased salinity would make the water less dense and thus slow its effect on the current.

32. Explain how the effects of El Niño–Southern Oscillation illustrate the importance of air and water currents in the global distribution of heat.

ANSWER: El Niño–Southern Oscillation is driven by the change in prevailing wind direction over the Pacific, a regional event. However, this change has global effects, including increased precipitation in North America, drought in Africa, and dry conditions in both South America and Australasia. Only Europe would not be subject to significant effects.

33. Compared to coastal regions, the interior of a continent usually has _____ precipitation and _____ variation in climate.

a. less; less
b. more; more
c. less; more
d. more; less

ANSWER: c

34. Rain shadows occur

a. on the downwind side of mountains.
b. in areas without significant convection currents.
c. along coasts with cold air.
d. between deserts and coastal areas.

ANSWER: a

35. What is the cause of the higher climatic variability in the Northern Hemisphere?

a. Significant mountain ranges interrupt convection currents.
b. More human activities affect the climate.
c. Water surface area is less.
d. More oceanic currents carry cold water from the poles.

ANSWER: c

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36. Zoologists from Peru and Chile have been examining climate records from the coastal deserts of their countries. These deserts are the driest on Earth, yet they lie within the southward reach of the intertropical convergence during the Southern Hemisphere summer. Explain this curious phenomenon.

ANSWER: Two factors contribute to extreme dryness along the Pacific coasts of Peru and Chile. Both lie in the rain shadow of the Andes. Running northward along the shore is the cold Peru Current of the eastern Pacific Ocean. Moist air masses moving eastward from the Pacific will lose much of their moisture as they are cooled by passage over the cold waters of the Peru Current. These coastal deserts are thus effectively blocked from receiving any precipitation either from the east or the west.

37. Explain why dry climates are commonly found around 30° S and 30° N latitudes.

ANSWER: This is where the cool, dry air from Hadley cells sinks to Earth's surface. Since the air has already lost most of its water vapor while rising, very little precipitation falls in these areas. Rain shadows also contribute to dryness in some areas.

38. Explain why western Europe is much warmer than the same latitudes in eastern Europe.

ANSWER: Western Europe has generally warmer temperatures because the ocean moderates the temperature along the coasts. The warm current along the western coast of Europe magnifies this coastal warming effect, making the Atlantic coast warmer than the areas around the Black Sea and Caspian Sea.

39. Which of the following changes will increase climate warming?

a. melting of glaciers and ice caps
b. increased intensity of storms and hurricanes
c. changes in oceanic circulation
d. increased precipitation

ANSWER: a

40. Why is it difficult to predict how climate will change as a response to global warming?

a. The future levels of greenhouse gases are difficult to predict.
b. It is difficult to predict how human technology might change the climate.
c. The global climate is complex.
d. Variability resulting from the Sun's effects is unknown.

ANSWER: c

41. A regression equation for algae biomass (micrograms per liter) depending on the amount of phosphorus (micrograms per liter) is determined to be $y = 1.5x - 2$. What is the biomass if there is 14 µg/L of phosphorus?

a. 18 µg/L
b. 19 µg/L
c. 23 µg/L
d. 11 µg/L

ANSWER: b

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42. A statistical tool used to help one see how one variable changes in response to another variable is called_____ analysis.

a. mean
b. regression
c. standard deviation
d. median

ANSWER: b

43. The greenhouse effect is so named because

a. Earth's oceans act as a greenhouse for phytoplankton.
b. Earth's landmasses provide the substrate for all terrestrial producers.
c. Earth's atmosphere acts like the glass of a greenhouse.
d. Earth's land mass is a heat sink much like a greenhouse.

ANSWER: c

44. Some have proposed that humans might, individually, attempt to combat climate change by replacing their roof shingles with light or white-colored shingles rather than dark or black-colored shingles when replacing the roof of their homes. The notion behind this idea is

a. decreasing the albedo of Earth's surface.
b. increasing the albedo of Earth's surface.
c. decreasing the reflectivity of Earth's surface.
d. increasing the absorption of Earth's surface.

ANSWER: b

45. At what time of year does the Northern Hemisphere receive the most direct sunlight?

a. December solstice
b. June solstice
c. September equinox
d. March equinox

ANSWER: b

46. As the temperature of the air increases, what happens to the saturation point of water vapor in the air?

a. The saturation point increases.
b. The saturation point decreases.
c. The saturation point remains the same.
d. The saturation point increases then decreases.

ANSWER: a

47. Dry climates may be the result of

a. Hadley cell circulation and the rain shadow effect.
b. the Coriolis effect and the rain shadow effect.

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c. Hadley cell circulation and the Coriolis effect.
d. thermohaline circulation and the rain shadow effect.

ANSWER: a

48. The plant hardiness map developed by the U.S. Department of Agriculture shows that the ordering of the zones of plant hardiness is generally related to

a. annual rainfall.
b. time of first frost.
c. longitude.
d. latitude.

ANSWER: d

49. Describe the path that incoming solar radiation takes and how it is transformed in the greenhouse effect.

ANSWER: Solar radiation (made up of visible light and ultraviolet (UV) light reaches Earth. Approximately one-third of incoming solar radiation is reflected back into space by clouds, the atmosphere, and Earth's surface. Clouds and Earth's surface absorb the remaining incident solar radiation. The absorbed solar radiation is transformed into infrared radiation (IR). The IR is then reradiated back out from Earth's surface. Some of the reradiated IR passes out into space, but much of the reradiated IR is absorbed by greenhouse gases (both natural and anthropogenic) in the atmosphere and returns to Earth.

50. Which of the following pairs is an example of convergent evolution?

a. dogs and cats
b. wolves and deer
c. birds and bats
d. giraffes and trees

ANSWER: c

51. Biomes are geographic regions

a. with the same key species.
b. with species that have not evolved convergently.
c. with the same range of temperatures.
d. whose plant communities have similar adaptations.

ANSWER: d

52. Which of the following species does NOT easily fit with the expectations of biome classification?

a. organ pipe cactus
b. eucalyptus trees
c. feral dogs
d. cattails

ANSWER: b

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53. On a climate diagram the growing season of a biome occurs when the
    a. temperature line is above the precipitation line.
    b. precipitation line is above the temperature line.
    c. temperature is above 0°C.
    d. temperature is above 5°C

ANSWER: c

54. Which of the following does NOT have an influence on plant communities in biomes?
    a. topography
    b. soils
    c. herbivory
    d. fire
    e. genetic makeup

ANSWER: e

55. How much additional precipitation is required to meet water needs for every 10°C increase in temperature?
    a. 2 cm
    b. 5 cm
    c. 6 cm
    d. 10 cm
    e. 20 cm

ANSWER: a

56. Which of the following is used to distinguish aquatic biomes?
I. salinity
II. depth
III. flow
    a. I and II
    b. I and III
    c. II and III
    d. I, II, and III

ANSWER: d

57. Why is the biome concept difficult to apply to aquatic systems?
    a. Temperature is similar over the majority of aquatic biomes, unlike terrestrial systems.
    b. Aquatic communities vary little from place to place because of the ability of fish to travel between oceans.
    c. Nutrients from terrestrial biomes limit most aquatic systems, so terrestrial systems must be considered when determining the aquatic biomes.
    d. Producers in many aquatic systems are algae, which have little characteristic large-scale structure.

ANSWER: d

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58. At what average temperatures do we see the greatest variation in precipitation among biomes?
    a. warm temperatures (approximately 20°C to 30°C)
    b. moderate temperatures (approximately 5°C to 20°C)
    c. cold temperatures (approximately –5°C to 5°C)
    d. very cold temperatures (less than –5°C)

ANSWER: a

59. Few biomes have cold temperature combined with high precipitation. Why is this?

ANSWER: The combination of cold temperature and high precipitation is globally rare because in cold biomes little energy is available to evaporate moisture from Earth's surface, which is a necessary precursor to precipitation. Cold air also has little capacity to hold moisture and thus yields relatively little precipitation.

60. Why are animals NOT used as the distinguishing features for biomes?

ANSWER: Animals are generally less variable in their forms than plants as climate changes. This is partially due to the inability of plants to move; they must adapt to the stresses of each environment. Animals are mobile and can seek shelter or specific microclimates in ways that plants cannot, which means that they often live in multiple biomes.

61. In climate diagrams the location of the temperature and precipitation lines are used to determine which of the two limits plant growth in the biome. Explain why higher temperatures also require increased precipitation.

ANSWER: As the temperature increases, plants transpire more, thus increasing their water use.

62. Where could you NOT find an example of a temperate seasonal forest biome?
    a. United States and southeastern Canada
    b. Europe
    c. South America
    d. eastern Asia

ANSWER: c

63. Warmer and drier parts of the temperate seasonal forest biome are dominated by
    a. rain forests.
    b. deciduous forests.
    c. needle-leaved forests.
    d. grasslands.
    e. woodlands.

ANSWER: c

64. Which biome occurs at the highest elevation?
    a. boreal forest
    b. temperate rainforest

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c. woodland/shrubland
d. tundra

ANSWER: d

65. Which biome is home to the coast redwood (*Sequoia sempervirens*)?
a. temperate seasonal forest
b. temperate rainforest
c. boreal forest
d. tropical rainforest
e. tropical seasonal forest

ANSWER: b

66. Which biome has the highest biodiversity?
a. temperate rainforest
b. temperate seasonal forest
c. tropical rainforest
d. tropical seasonal forest

ANSWER: c

67. Overgrazing has caused significant changes in vegetation in
a. boreal forest.
b. temperate grasslands.
c. tropical seasonal forest/savannah.
d. woodlands/shrublands.

ANSWER: b

68. Which biome has distinct wet and dry seasons?
a. tropical seasonal forest/savannah
b. boreal forest
c. temperate grasslands
d. tropical rainforest
e. tundra

ANSWER: a

69. Which of the following helps to prevent tree growth in tallgrass prairies?
a. low precipitation
b. high temperatures
c. frequent fires
d. human land use
e. acidic soils

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ANSWER: c

70. Which of the following is another name for boreal forest?
a. matorral
b. pampas
c. steppes
d. taiga

ANSWER: d

71. In which biome is plant growth primarily constrained by precipitation in the summer?
a. boreal forest
b. temperate seasonal forest
c. temperate grassland
d. tundra

ANSWER: c

72. Which biome has soil that degrades quickly once cut for logging purposes and/or converted to agricultural use?
a. temperate seasonal forest
b. tropical rainforest
c. tropical seasonal forest/savannah
d. woodland/shrubland

ANSWER: b

73. Succulent plants are a defining feature of a
a. temperate seasonal forest.
b. temperate rainforest.
c. subtropical desert.
d. woodland/shrubland.

ANSWER: c

74. Savannah gradually changes to tropical seasonal forest as
a. temperature increases.
b. temperature decreases.
c. precipitation increases.
d. precipitation decreases.

ANSWER: c

75. Which combination of factors causes the fastest nutrient cycling in a biome?
a. high precipitation and high temperatures
b. high precipitation and low temperatures

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c. low precipitation and high temperatures
d. low precipitation and low temperatures

ANSWER: a

76. Which is a characteristic agricultural use of the woodland/shrubland biome?
a. grapes
b. wheat
c. cattle
d. coffee

ANSWER: a

77. Although precipitation is fairly low in boreal forests, soils are often saturated because of
a. groundwater recharge.
b. frequent flooding.
c. prevalence of succulent plants.
d. reduced evaporation rates.

ANSWER: d

78. Which of the following global factors accounts for the difference between temperate seasonal forests and temperate rainforests?
a. decreased precipitation in the seasonal forests due to the edge of Hadley cells
b. increased temperatures in the rainforest due to ocean currents
c. decreased precipitation in the seasonal forests due to rain shadows
d. increased temperatures in the rainforest due to lower latitudes

ANSWER: b

79. Biomes occupying the extremes of the precipitation spectrum (very moist or very dry) burn infrequently, while biomes with moderate precipitation and seasonal drought burn readily and regularly. Explain this phenomenon.

ANSWER: Fire is uncommon in very moist forests because fuels are rarely dry enough to sustain fire. Because of their low productivity, dry biomes like deserts rarely accumulate sufficient fuel to burn. Seasonally dry but still productive grasslands and shrublands have both abundant fuels and the appropriate conditions for fire.

80. Compare and contrast arctic and alpine tundra.

ANSWER: Arctic and alpine tundra are superficially similar in their vegetation and even species composition: They are characterized by low-growing plants adapted to harsh conditions, including extreme winter weather. However, alpine tundra is characterized by warmer and longer growing seasons, less severe winters, greater productivity, better-drained soils, and higher species diversity.

81. The ocean zone with the highest productivity is the
a. neritic zone.

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b. photic zone.
c. aphotic zone.
d. benthic zone.

ANSWER: a

82. Which of the following is NOT an effect of dams on streams and rivers?
a. increased water temperature upstream of the dam
b. increased sediment settling
c. increased levels of dissolved oxygen downstream of the dam
d. habitat fragmentation

ANSWER: c

83. The open ocean is most similar to
a. subtropical desert.
b. temperate seasonal forest.
c. tropical rainforest.
d. woodland/scrubland.

ANSWER: a

84. A symbiotic relationship with algae is central to
a. mangrove swamps.
b. intertidal zones.
c. coral reefs.
d. ponds and lakes.

ANSWER: c

85. As a river flows downstream, it generally
a. moves faster.
b. has more nutrients.
c. is more shaded.
d. narrows.

ANSWER: b

86. An important characteristic of freshwater wetlands is
a. basic soils.
b. anoxic soil conditions.
c. sections of open water.
d. acidic water.

ANSWER: b

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87. Coral reefs are most similar to
    a. subtropical deserts.
    b. woodlands/shrublands.
    c. temperate seasonal forests.
    d. tropical rainforests.

ANSWER: d

88. An important characteristic of streams is
    a. high allochthonous inputs.
    b. high autochthonous inputs.
    c. lack of interaction with the riparian zone.
    d. many photosynthetic organisms.

ANSWER: a

89. Which is the surface water of thermally stratified lake?
    a. the epilimnion
    b. the hypolimnion
    c. the littoral zone
    d. the thermocline

ANSWER: a

90. The aphotic zone is a feature in
    a. coral reefs.
    b. freshwater wetlands.
    c. mangrove swamps.
    d. open ocean.
    e. intertidal zones.

ANSWER: d

91. Lakes are generally divided into zones, each of which has unique physical and biological attributes. In which zone would you expect to find rooted vegetation?
    a. littoral
    b. limnetic
    c. pelagic
    d. benthic
    e. neritic

ANSWER: a

92. Which is a unique characteristic of estuaries?
    a. the prevalence of aquatic woody vegetation

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b. the seasonal overturn of water stratification
c. the mixing of fresh and salt water
d. the large variety of benthic organisms

ANSWER: c

93. Why is water at the bottom of a temperate lake likely to be close to 4°C year-round?
a. Cooling water below 4°C requires enormous amounts of energy.
b. Soil temperatures are close to 4°C for most of the year in temperate regions.
c. Air temperatures in the temperate zone rarely fall below 4°C.
d. Water is densest at 4°C.

ANSWER: d

94. During which seasons does overturn occur in a lake?
a. winter and spring
b. winter and summer
c. fall and spring
d. fall and summer
e. winter and fall

ANSWER: c

95. In which aquatic environment are organisms most likely to produce bioluminescence?
a. aphotic zones
b. coral colonies
c. intertidal zones
d. mangrove swamps

ANSWER: a

96. What important role do mangrove swamps play in maintaining their environment?
a. They transfer sediment from terrestrial to aquatic biomes.
b. They filter water, which refreshes groundwater reservoirs.
c. They prevent coastal erosion.
d. They increase the sedimentation of coral reefs.

ANSWER: c

97. Explain how the riparian zone might affect an adjacent terrestrial biome.

ANSWER: The flooding in a riparian zone will bring additional water to an adjacent terrestrial biome, much like increased precipitation. The most noticeable changes will occur in desert biomes. This is what causes a significant increase in vegetation along rivers like the Nile, where the floodplains are much more fertile than the surrounding subtropical desert.

98. Explain why the communities in intertidal zones must be adapted to survive a wide range of conditions.

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ANSWER: Organisms living in intertidal zones must be able to survive in both high tide and low tide conditions. High tide brings water and lower temperatures, while low tide conditions can be dry and hot because of sun exposure. There can also be variations in salinity as well as harsh conditions from waves.

99. Biological activity is severely limited in a thermally stratified temperate lake in midsummer. Explain this phenomenon with reference to both surface and deeper waters.

ANSWER: Thermal stratification prevents water from circulating between the surface and the depths. Without this circulation, biological processes stagnate. Surface waters are enriched with oxygen and are illuminated by the Sun, but nutrient depletion severely limits the productivity of plants and the activities of animals that ultimately depend on plants for their food. In contrast, the nutrient-rich deeper waters lack sunlight and are oxygen-depleted, which limits biological activity. When the lake turns over in the fall, oxygen levels increase in deeper waters and the surface waters become more nutrient-rich, which stimulates biological activity throughout the lake.

100. Explain the similarities and differences among bogs, marshes, and swamps.

ANSWER: All three are types of freshwater wetlands with plants that have adapted to soil saturated with water. Bogs are characterized by acidic water and are prevalent in the high latitudes of the Northern Hemisphere. Swamps contain emergent trees, while marshes have primarily nonwoody vegetation such as cattails.

101. Which of the following is NOT a barrier to shifting biomes?

a. mountains
b. rivers
c. large highways
d. oceans

ANSWER: b

102. How might global climate change affect current agricultural regions?

ANSWER: One negative effect could be the increase in transition from grassland and savannah biomes to desert biomes as temperatures get too high to support more water-dependent plants.

103. Describe some of the similarities and differences between tropical rainforests and tropical seasonal forests.

ANSWER: Tropical rainforests are found within 20° N and 20° S of the equator. Tropical rainforests are always warm and receive at least 2,000 mm of precipitation throughout the year with rarely fewer than 100 mm in any given month. Tropical season forests are generally found beyond 10° N and 10° S of the equator. Tropical seasonal forests are warm but have a definite wet and dry season during the course of the year.

104. In general terms what is the difference between a stream and a river?

ANSWER: Streams are narrow channels of fast-flowing fresh water. Rivers are wide channels of slow-flowing fresh water. Streams typically join with other streams to become larger channels that are then large enough to be considered a river.

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105. Explain the differences between autochthonous and allochthonous inputs in a stream or river.

ANSWER: Autochthonous inputs are organic matter produced from within the stream or river ecosystem by producers (algae and plants). Allochthonous inputs are organic matter that enters the stream or river from outside of the stream/river ecosystem (examples: leaves and other plant parts that fall into a stream/river). Organic matter in streams tends to be more allochthonous, and organic matter in rivers tends to be more autochthonous.

106. In which lake zone would photosynthesis not occur?

a. profundal zones
b. littoral colonies
c. pelagic zones
d. limnetic swamps

ANSWER: a

107. The shortest growing season is found in which biome?

a. taiga
b. tundra
c. boreal forest
d. temperate rainforest

ANSWER: b

108. Manure from a farming operation that enters into a stream would be considered?

a. allochthonous
b. autochthonous
c. both allochthonous and autochthonous
d. neither allochthonous nor autochthonous as the input is not natural

ANSWER: a

109. What are the epilimnion and hypolimnion labels used to identify layers of a lake based on?

a. proximity to the shore
b. presence of rooted vegetation
c. temperature differences
d. amount of light penetration

ANSWER: c

110. A major driver of the spring and fall turnover in lakes is what?

a. the formation of ice
b. the receding/melting of ice
c. the water dropping to 4°C
d. the wind

ANSWER: d

Chapter 2

111. Which areas have the fewest number of biomes present?

a. North America and South America
b. Africa and Australia
c. Africa and South America
d. Australia and Asia

ANSWER: b

112. Why might Earth's temperature continue to increase for a time even if all emission of greenhouse gases ceased?

ANSWER: Because of the long lifetime of many greenhouse gases, even if emissions ceased, the gases already emitted will remain in the atmosphere for many years. Since it takes time for Earth to heat, the temperature will continue to rise until it stabilizes at the temperature dictated by the current levels of greenhouse gases.