

# CHAPTER 7--CLIMATE AND BIODIVERSITY

Student: \_\_\_\_\_

1. Which of the following is *not* a type of terrestrial ecosystem on Earth?
  - A. ice-covered
  - B. deserts
  - C. forests
  - D. grasslands
  - E. none of these
2. Which of the following climate zones would be described as not extreme, with four seasons?
  - A. polar
  - B. tundra
  - C. temperate
  - D. tropical
  - E. rain forests
3. Which of the following is a local area's short-term temperature, precipitation, and humidity?
  - A. climate
  - B. weather
  - C. biomes
  - D. ecosystems
  - E. currents
4. Where does the largest input of solar energy occur?
  - A. North pole
  - B. South pole
  - C. 30° N
  - D. 30° S
  - E. equator
5. Prevailing winds are the result of what?
  - A. temperature
  - B. direction the sun strikes the earth
  - C. rotation of the earth on its axis
  - D. ocean currents
  - E. sun storms

6. Which of the following statements about oceans is *not* true?
- A. Ocean currents redistribute heat from the sun.
  - B. Most of the heat absorbed by the ocean air is absorbed in tropical waters.
  - C. Irregularly shaped continents cause currents to flow in circular patterns.
  - D. Differences in density of warm and cold seawater set up warm and cold currents.
  - E. Oceans currents flow counter-clockwise in the northern hemisphere.
7. Which of the following is *not* a greenhouse gas?
- A. carbon monoxide
  - B. water vapor
  - C. carbon dioxide
  - D. methane
  - E. nitrous oxide
8. The term *greenhouse effect* describes
- A. occupational diseases of florists
  - B. the trapping of heat energy by molecules in the atmosphere
  - C. the effect climate change has on the economy
  - D. the efforts of the White House to support environmental legislation
  - E. mutations in DNA from UV radiation
9. Scientists expect human-enhanced global warming to do all of the following *except*
- A. alter precipitation patterns
  - B. shift areas where we can grow crops
  - C. raise average sea levels
  - D. lower sea levels
  - E. shift areas where plants and animals can be found
10. The rain shadow effect refers to
- A. more light on the windward side of mountain ranges
  - B. more moisture on the leeward side of mountain ranges
  - C. moister conditions on the windward side of mountain ranges
  - D. drier conditions on the windward side of mountain ranges
  - E. less light available on the leeward side of mountain ranges
11. Large terrestrial regions with similar characteristics are
- A. ecosystems
  - B. communities
  - C. populations
  - D. habitats
  - E. biomes

12. The *most* important factor in determining which biome is found in a particular area is
- A. soil type
  - B. topography
  - C. magnetic fields
  - D. climate
  - E. tidal activity
13. Biomes are characterized by certain types of
- A. light and temperature
  - B. climate and light
  - C. light and climate
  - D. climate and dominant plant life
  - E. dominant plant life and temperature
14. Which of the following is the primary limiting factor that controls the vegetative character of a biome?
- A. light
  - B. precipitation
  - C. nutrients
  - D. soil type
  - E. predation
15. Which of the following is *not* an adaptation of desert plants for their environment?
- A. toxins in their stems to discourage being eaten
  - B. spines to discourage animals from taking their water
  - C. opening their pores only at night to prevent evaporation
  - D. store water in expandable tissues
  - E. reduced or no leaves
16. Which type of desert would have high daytime temperatures in summer, low temperatures in winter, and moderate precipitation?
- A. tropical deserts
  - B. cold deserts
  - C. Gobi desert
  - D. temperate deserts
  - E. Sahara desert
17. Desert soils take hundreds of years to recover from disturbances because of all of the following *except*
- A. slow plant growth
  - B. low species diversity
  - C. high soil bacteria activity
  - D. slow nutrient cycling
  - E. lack of water

18. "Widely scattered clumps of trees, warm temperatures year-round, alternating dry and wet seasons, with herds of herbivores" are the characteristics of which of the following?
- A. tall-grass prairie
  - B. tundra
  - C. short-grass prairie
  - D. temperate grassland
  - E. savanna
19. Which of the following is *not* true of prairies?
- A. Winds blow almost continuously.
  - B. Evaporation is rapid.
  - C. Fires in summer and fall are common.
  - D. Prairies are typical of coastal regions of continents.
  - E. Tree growth is hindered by fires and wind.
20. Treeless, bitterly cold most of the year, winters are long and dark, low-growing plants, and permafrost are the characteristics of which of the following?
- A. tall-grass prairie
  - B. tundra
  - C. short-grass prairie
  - D. temperate grassland
  - E. savanna
21. On a visit to a Natural History museum you are shown a burrow-dwelling small animal with thick fur. You predict the animal came from the
- A. temperate grasslands
  - B. desert
  - C. arctic tundra
  - D. tropical forest
  - E. taiga
22. Thick, spongy mats of low-growing plants, primarily grasses, mosses, and lichens, are typical of the
- A. arctic tundra
  - B. coniferous forest
  - C. tall-grass prairies
  - D. tropical forests
  - E. taiga

23. Which of the following does alpine tundra receive in larger amounts than Arctic tundra?
- A. rain
  - B. snow
  - C. sunlight
  - D. wind
  - E. ice
24. Which of the following is the big disadvantage of living in a chaparral region?
- A. too much rain
  - B. fire hazard
  - C. too little rain
  - D. too many venomous snakes
  - E. bothersome rodent populations
25. Tropical rain forests are not good for clearing to grow crops or animals, primarily because they are low in which of the following?
- A. rainfall
  - B. temperature
  - C. light
  - D. soil nutrients
  - E. wind
26. Trees of the tropical rainforest are characterized by leaves that are
- A. needlelike
  - B. broadleaf and fall seasonally
  - C. needlelike and fall seasonally
  - D. needlelike and evergreen
  - E. broadleaf and evergreen
27. Which of the following would *not* be true of a tropical rain forest?
- A. low net primary productivity
  - B. little ground level vegetation
  - C. low levels of ground level sunlight
  - D. high biodiversity
  - E. high humidity
28. Most of the nutrients in the tropical rain forests are found in the
- A. living organisms
  - B. large rivers
  - C. deep, rich soil
  - D. thick atmosphere
  - E. shallow soil

29. Which of the following about temperate deciduous forests is *false*?
- A. Average temperatures change significantly with the seasons.
  - B. They are predominantly a few broadleaf deciduous tree species.
  - C. Areas cleared of trees can return to forest in 100-200 years
  - D. They have nutrient-poor soil.
  - E. Precipitation often spreads relatively evenly throughout the year.
30. Which of the following *does not* belong with the others?
- A. taiga
  - B. cold forests
  - C. boreal forests
  - D. evergreen coniferous forests
  - E. tropical rain forests
31. Which of the following biomes has been most disturbed by human activities?
- A. tundra
  - B. tropical rain forest
  - C. coniferous forest
  - D. temperate deciduous forest
  - E. taiga
32. Which of the following would be described as having ample rainfall or moisture from fog, with large conifers such as Sitka spruce and Douglas fir?
- A. temperate rain forest
  - B. temperate deciduous forest
  - C. tropical rainforest
  - D. chaparral
  - E. taiga
33. If you are walking through a forest dense with oak and hickory trees and thick with leaf litter underfoot, you would assume you are in a
- A. tropical savanna
  - B. temperate deciduous forest
  - C. tropical rain forest
  - D. temperate rain forest
  - E. coniferous forest
34. Which of the following is *not* true about mountains?
- A. They serve as major storehouses for water.
  - B. They contain habitats for many endemic species.
  - C. They serve as sanctuaries for species driven from lowland areas.
  - D. They help regulate the earth's climate.
  - E. They contain a minority of the world's forests.

35. How much of the world's population depends on mountain systems for all or some of their water?
- A. 10%
  - B. 18%
  - C. 36%
  - D. 58%
  - E. 69%
36. Increasing stress levels on biomes would result in all of the following *except*
- A. massive loss of biodiversity
  - B. increased crop production
  - C. accelerated projected climate change
  - D. higher levels of carbon dioxide in the atmosphere
  - E. replacement of one biome by another
37. Climate determines where humans and other species can live and thrive.
- True False
38. Without wind, the tropics would be unbearably hot and the rest of the world would freeze.
- True False
39. Prevailing winds blowing over the oceans produce the ocean currents.
- True False
40. The El Niño Southern Oscillation changes the weather only along the Pacific coast of South America.
- True False
41. The six giant convection cells that surround the earth lead to a regular distribution of climates and result in the earth's deserts, grasslands and forests.
- True False
42. The greenhouse effect is a completely human-made or artificial feature.
- True False
43. A large body of evidence indicates that human activities are enhancing the earth's natural greenhouse effect and changing the earth's climate.
- True False
44. Climate changes from human activities will last decades.
- True False

45. Heat is trapped and released more slowly by land than water.

True False

46. Cities tend to create distinct microclimates.

True False

47. Deserts are primarily located in the hot, tropical regions.

True False

48. Deserts are routinely chilly at night because the desert soils have little vegetation or moisture to help store the heat.

True False

49. Desert ecosystem soils take decades to hundreds of years to recover from off-road vehicle use.

True False

50. Succulent plants are normally found in temperate forests.

True False

51. Desert ecosystems are fragile.

True False

52. Grasslands exist because few grass seeds sprout in the growing season, leaving little for the grazing herds to eat.

True False

53. Most tundra soils formed about 17,000 years ago.

True False

54. Tropical rain forests cover only 2% of earth's land surface but may contain at least half of the earth's known terrestrial plant and animal species.

True False

55. Less than 500 million people worldwide live in the mountains or at their edge.

True False

56. Deciduous forests are typically located at higher altitudes than coniferous forests.

True False



57. Ice and snow on mountains absorb sunlight, helping to maintain the earth's warmth.

True False

58. Mountains, forests, deserts, and grasslands are all negatively affected by off-road vehicles.

True False

59. Many mountains are islands of biodiversity surrounded by a sea of lower-elevation landscapes transformed by human activities.

True False

60. The level of environmental degradation and destruction of terrestrial systems has leveled off.

True False

61. \_\_\_\_\_ is the average atmospheric or weather conditions in a given region during a time frame of several decades to thousands of years.

\_\_\_\_\_

62. Wind is an indirect form of \_\_\_\_\_ energy.

\_\_\_\_\_

63. The El Niño Southern Oscillation affects the weather over at least \_\_\_\_\_ of the earth for 1 or 2 years.

\_\_\_\_\_

64. The highest solar energy input is at \_\_\_\_\_.

\_\_\_\_\_

65. The earth's air circulation patterns, prevailing winds, and configuration of continents and oceans result in \_\_\_\_\_ giant convection cells.

\_\_\_\_\_

66. \_\_\_\_\_ help redistribute heat from the sun, thereby influencing climate and vegetation, especially near coastal areas.

\_\_\_\_\_

67. \_\_\_\_\_ global warming can cause climate changes that last for centuries or thousands of years.

\_\_\_\_\_

68. The rain shadow effect means deserts are likely to form on the \_\_\_\_\_ side of mountains.  
\_\_\_\_\_
69. A desert is an area where \_\_\_\_\_ exceeds \_\_\_\_\_.  
\_\_\_\_\_
70. \_\_\_\_\_ occur in the interiors of continents in areas too moist for deserts and too dry for forests.  
\_\_\_\_\_
71. Global warming has caused the melting of \_\_\_\_\_ in the tundra, with the release of methane and carbon dioxide, both greenhouse gases.  
\_\_\_\_\_
72. Tropical savannas in East Africa have herds of \_\_\_\_\_ and \_\_\_\_\_.  
\_\_\_\_\_
73. Temperate shrubland, or chaparral, is found along the coastal regions of \_\_\_\_\_ in the United States, the Mediterranean Sea, central Chile, southern Australia, and southwestern South Africa.  
\_\_\_\_\_
74. Soil nutrients are remarkably sparse in the \_\_\_\_\_, considering the overall high levels of biomass.  
\_\_\_\_\_
75. Vegetation layers in the tropical rain forests are structured mostly according to plants' need for \_\_\_\_\_.  
\_\_\_\_\_
76. Because of a slow rate of \_\_\_\_\_, temperate deciduous forests have nutrient rich soils.  
\_\_\_\_\_
77. Boreal forests are composed of a few species of coniferous evergreen trees with small, needle-shaped leaves. These trees can withstand the intense cold and \_\_\_\_\_ of winter.  
\_\_\_\_\_

78. Climate and vegetation vary with both latitude and \_\_\_\_\_.

\_\_\_\_\_

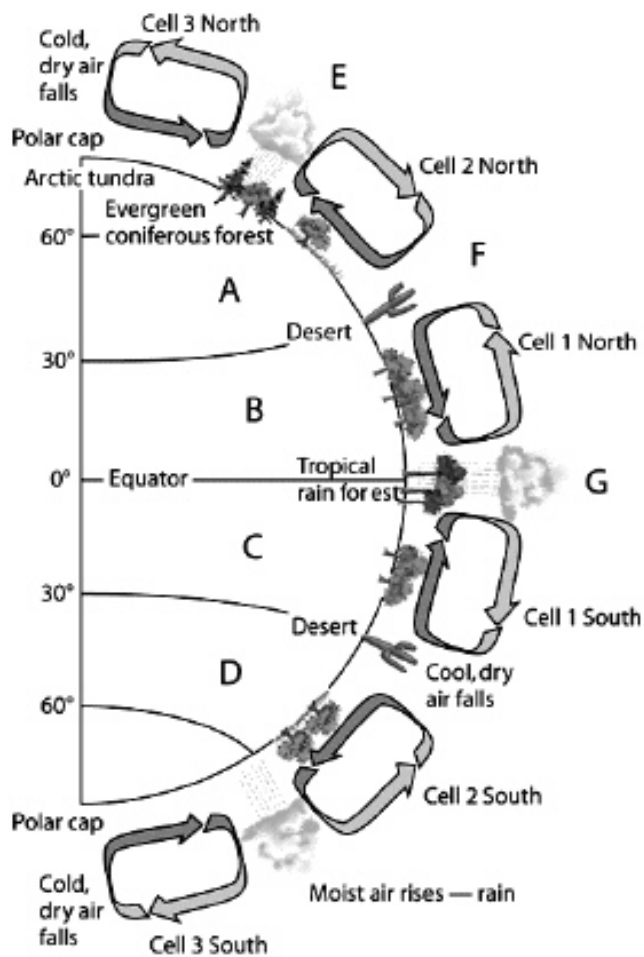
79. About \_\_\_\_\_ percent of the world's major terrestrial ecosystems are either being used unsustainably or are being degraded.

\_\_\_\_\_

80. All four of the major biomes<sup>3/4</sup>deserts, grasslands, forests, mountains<sup>3/4</sup>are being degraded by human use of \_\_\_\_\_.

\_\_\_\_\_

81.

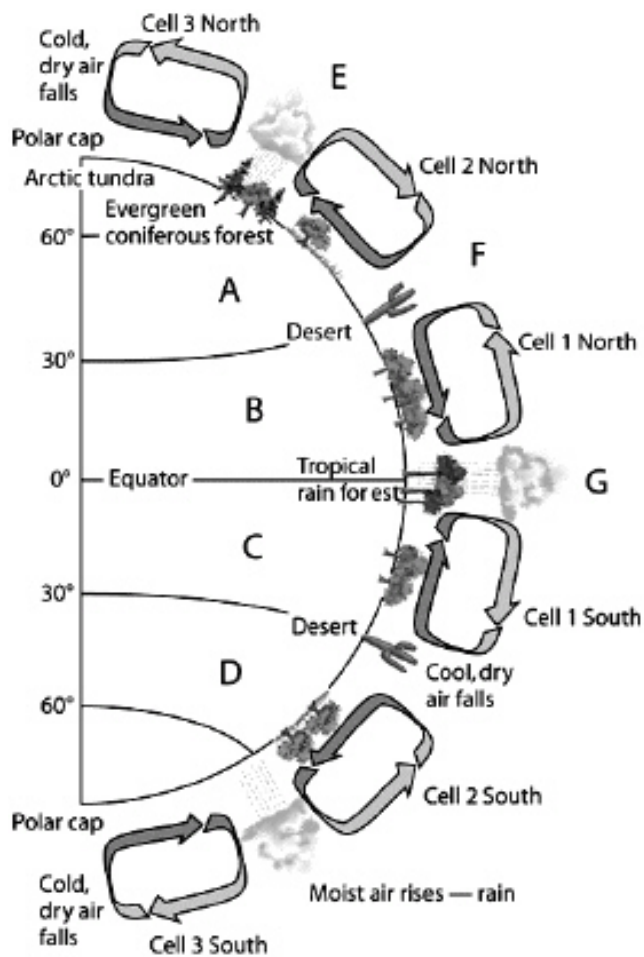


### Global Air Circulation

Use the Figure above to answer the following question(s).

Choose the letter(s) that represent(s) tropical deciduous forest and grasslands.

82.

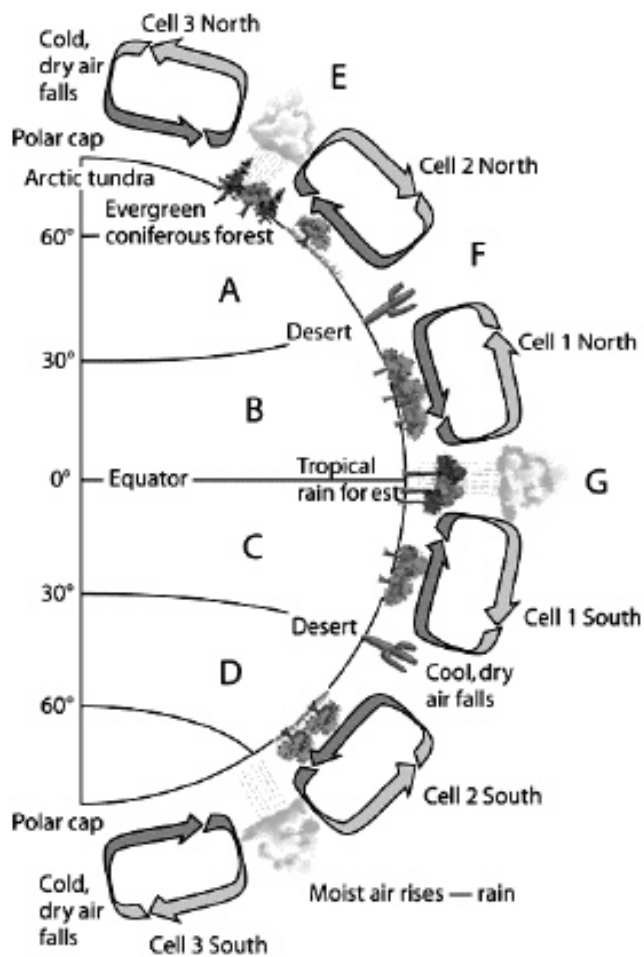


### Global Air Circulation

Use the Figure above to answer the following question(s).

Choose the letter(s) that represent(s) moist air rising, cooling, and forming precipitation.

83.

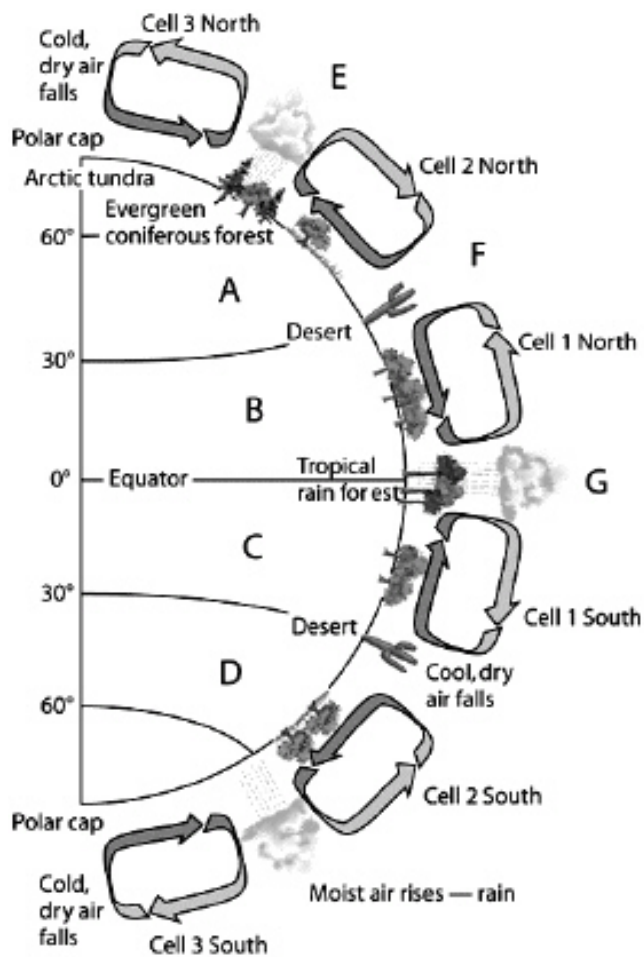


### Global Air Circulation

Use the Figure above to answer the following question(s).

Choose the letter(s) that represent(s) temperate deciduous forest.

84.

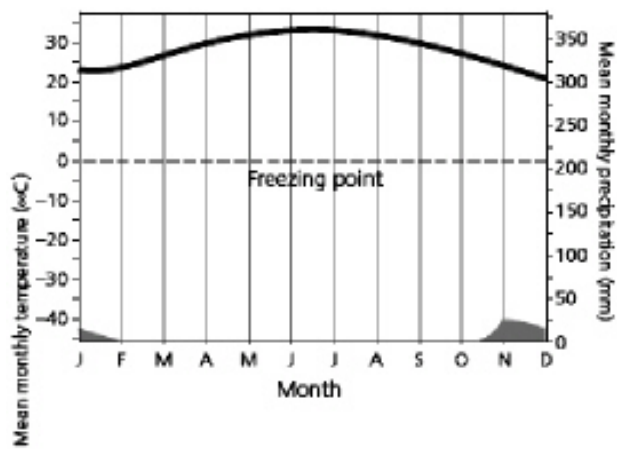


### Global Air Circulation

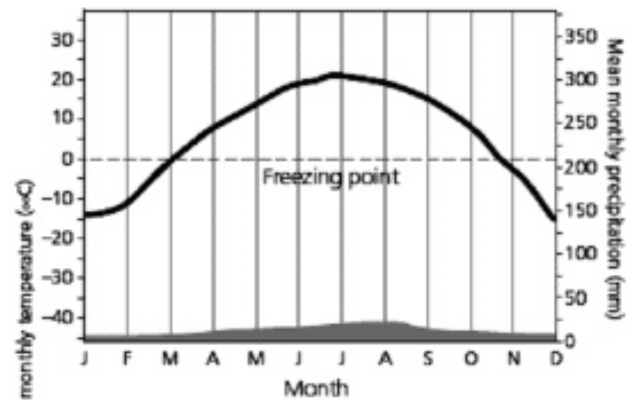
Use the Figure above to answer the following question(s).

Choose the letter(s) that represent(s) cool, dry air falling.

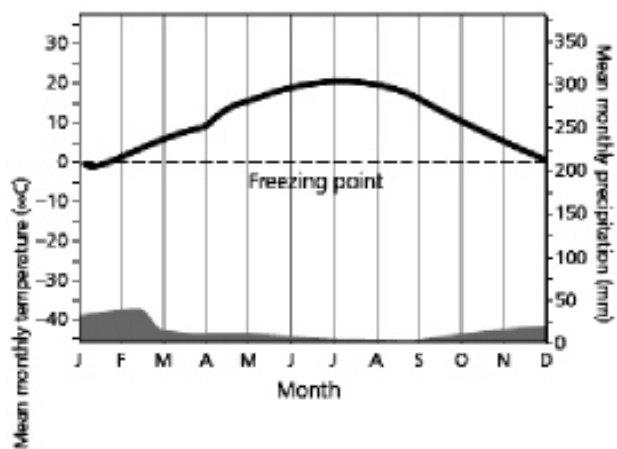
85. Tropical desert



Cold desert



Temperate desert

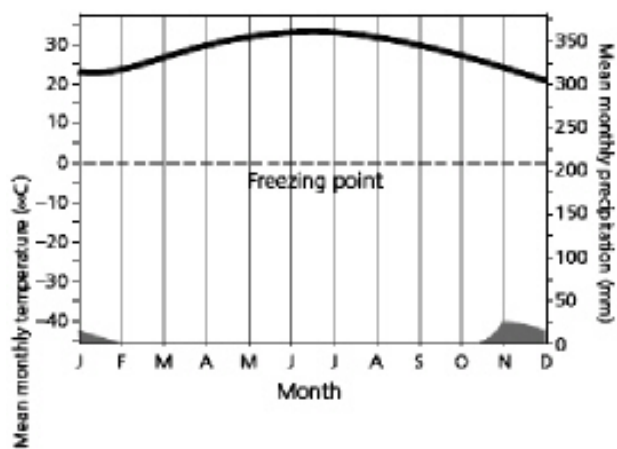


Use the Figure above to answer the following question(s).

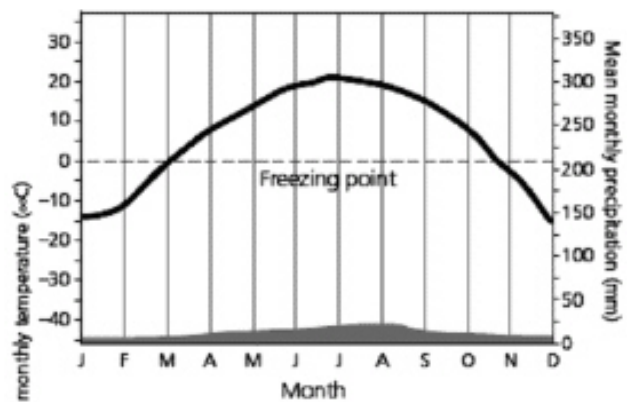
What does the dark line represent?



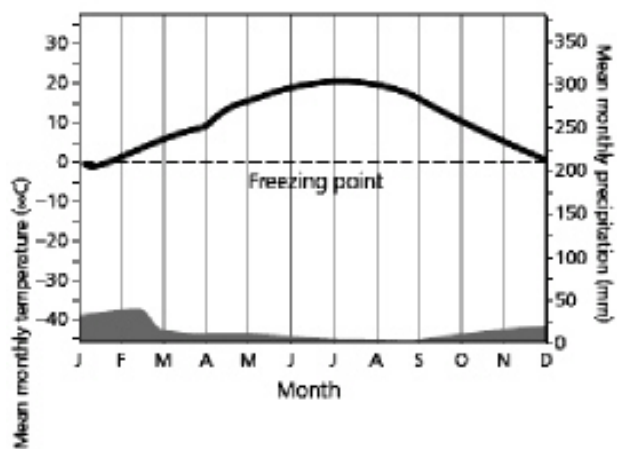
86. Tropical desert



Cold desert



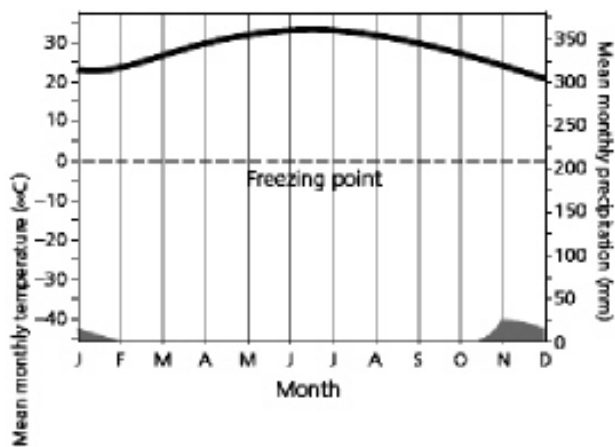
Temperate desert



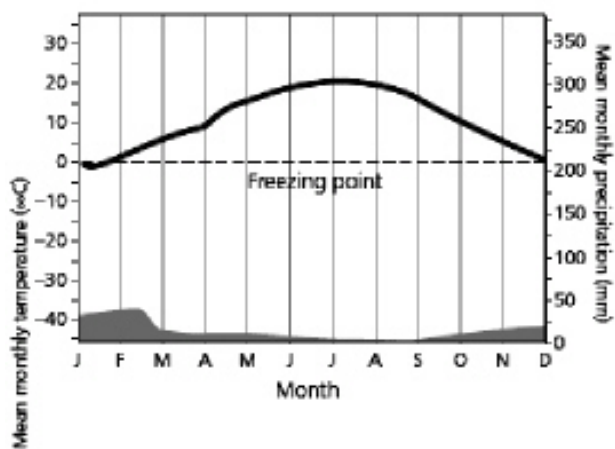
Use the Figure above to answer the following question(s).

What does the gray coloration at the bottom represent?

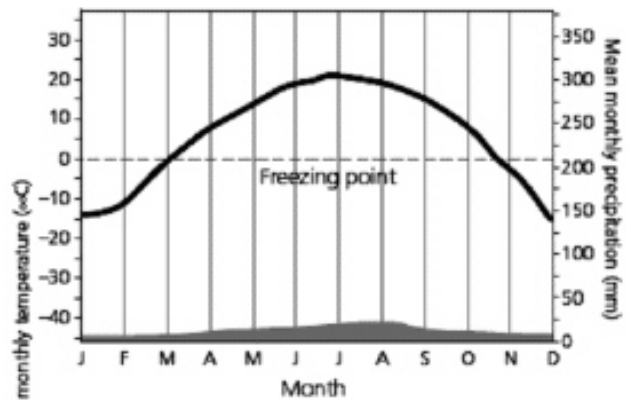
87. Tropical desert



Temperate desert



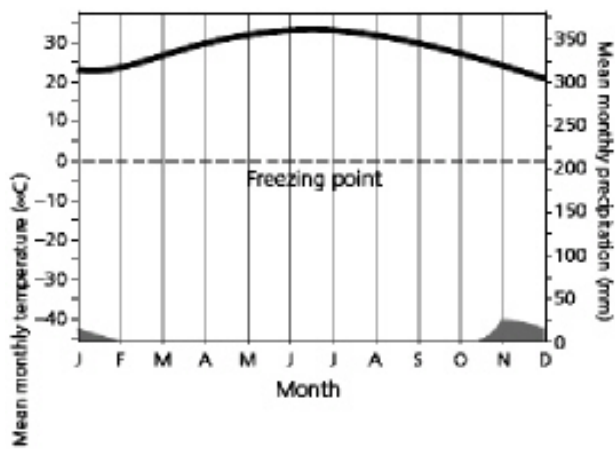
Cold desert



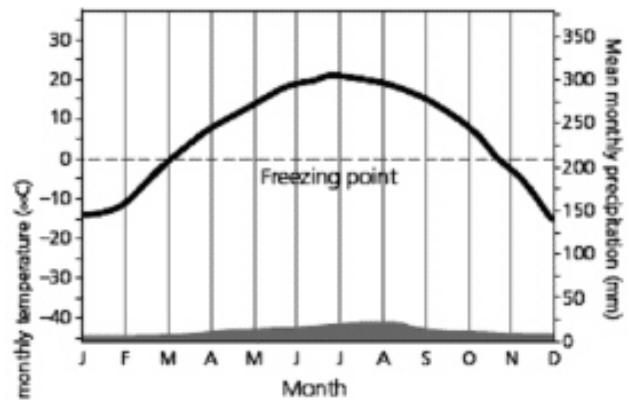
Use the Figure above to answer the following question(s).

Do any of the three deserts types receive a majority of their precipitation during the summer months (warmest period)?

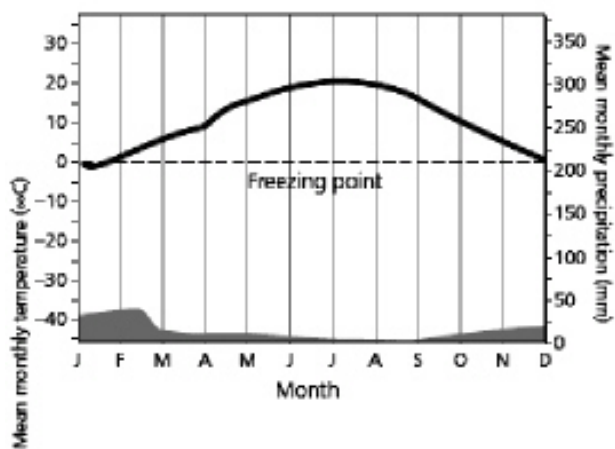
88. Tropical desert



Cold desert



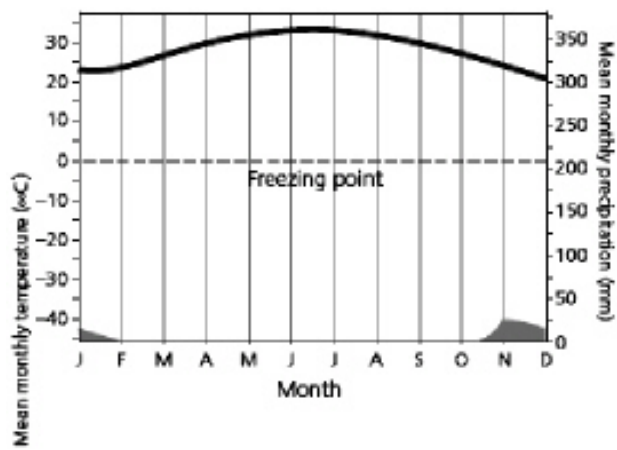
Temperate desert



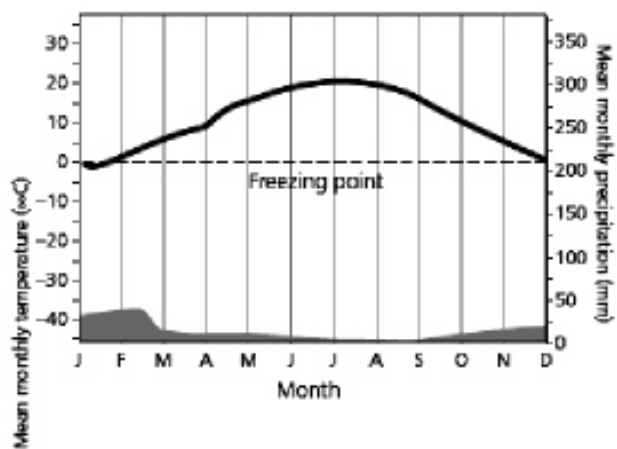
Use the Figure above to answer the following question(s).

For the temperate desert, what is the approximate temperature when the biome receives the largest amount of precipitation?

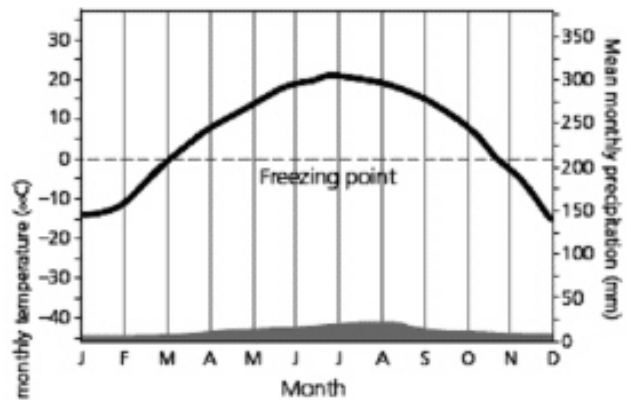
89. Tropical desert



Temperate desert



Cold desert

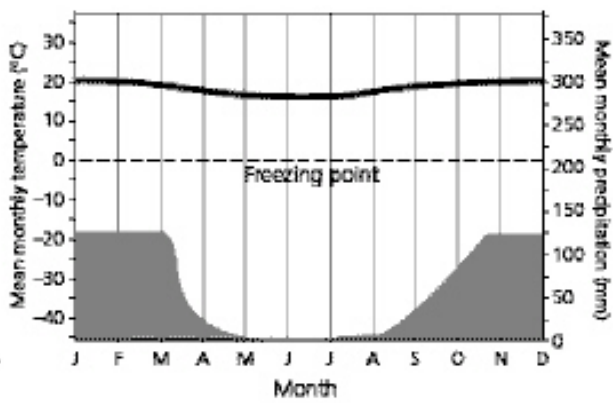


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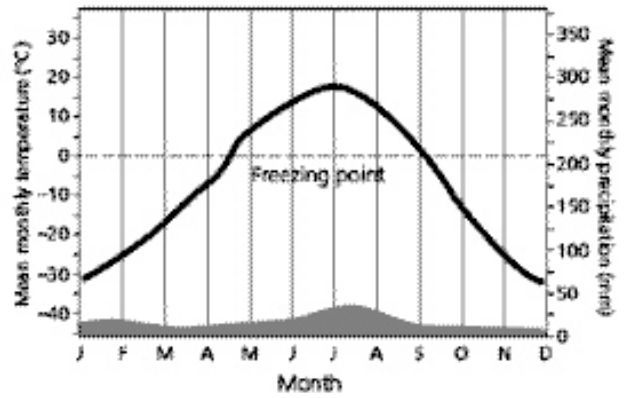
How much of the year is the cold desert below freezing?

90.

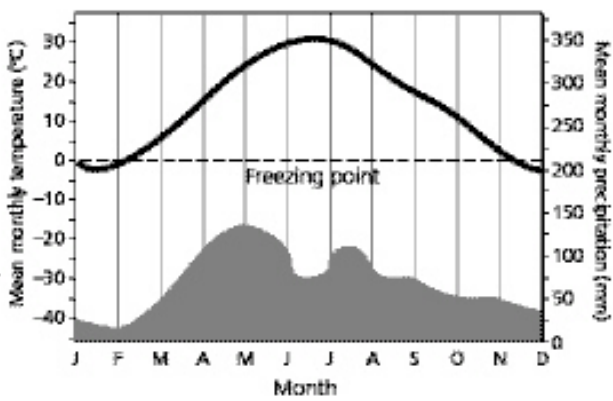
### Tropical grassland (savanna)



### Cold grassland (arctic tundra)



### Temperate grassland

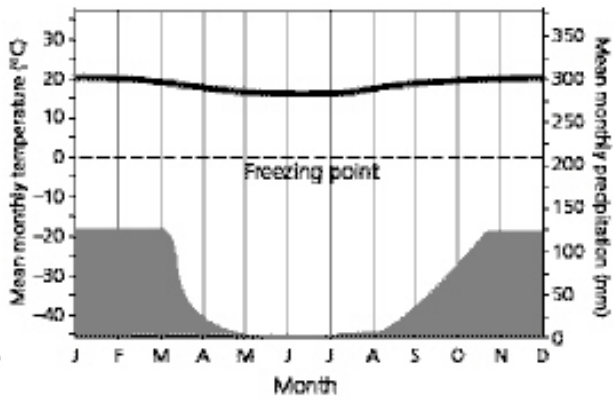


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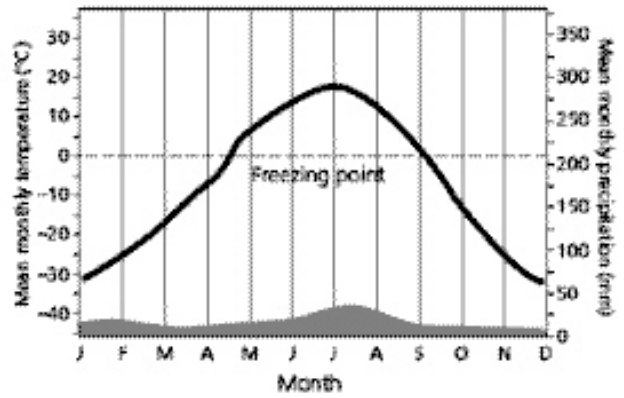
How much of the year is the tropical grassland below the freezing point?

91.

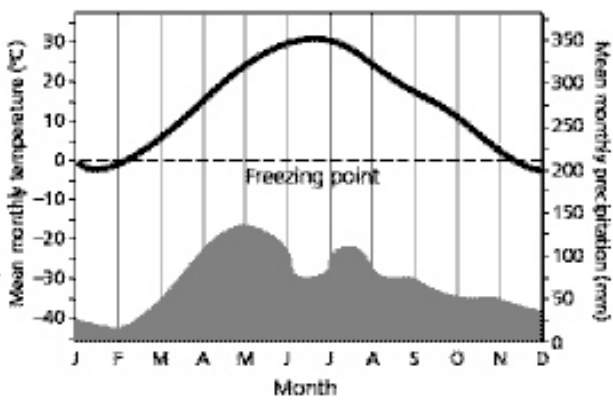
### Tropical grassland (savanna)



### Cold grassland (arctic tundra)



### Temperate grassland

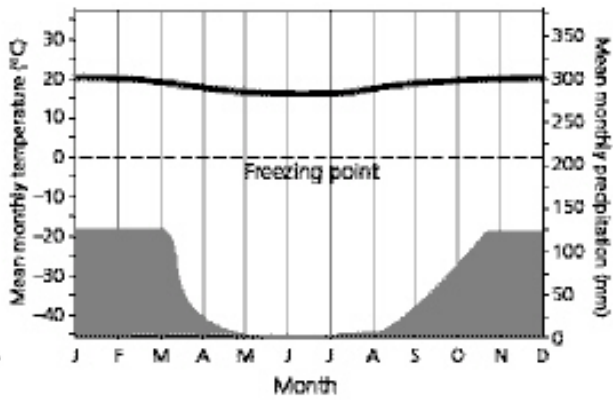


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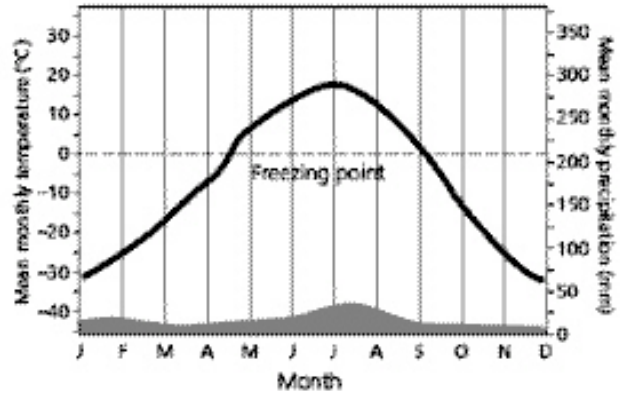
How much of the year is the Arctic tundra below the freezing point?

92.

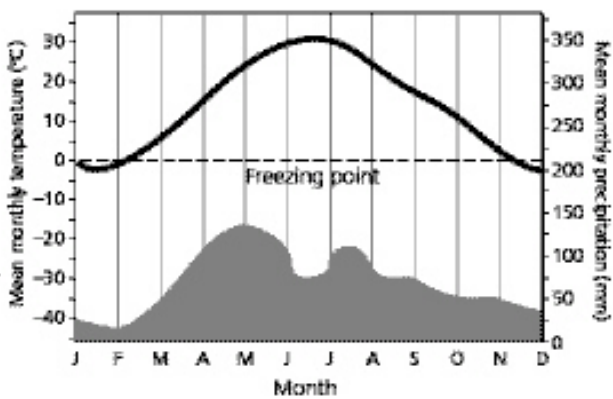
### Tropical grassland (savanna)



### Cold grassland (arctic tundra)



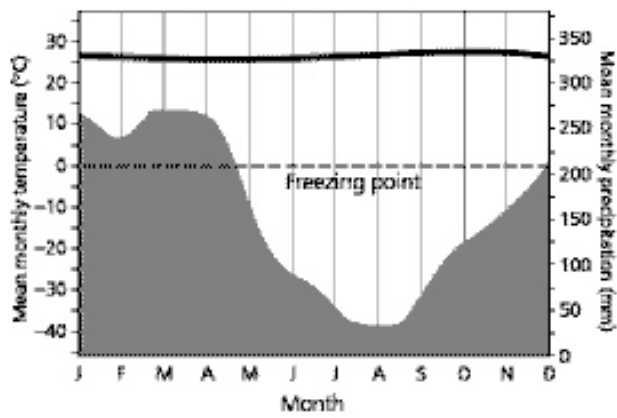
### Temperate grassland



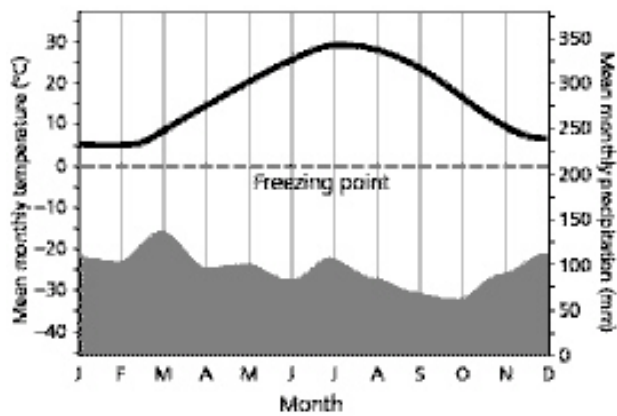
Use the Figure above to answer the following question(s).

What is the mean monthly precipitation, in millimeters, of the tropical grassland in the month of December?

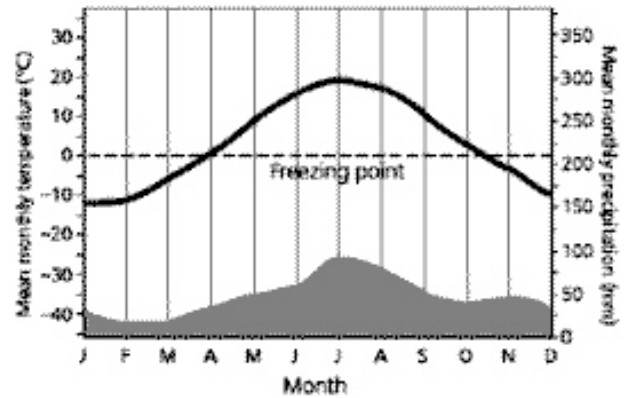
93. Tropical rain forest



Temperate deciduous forest



Northern evergreen coniferous forest (boreal forest, taiga)

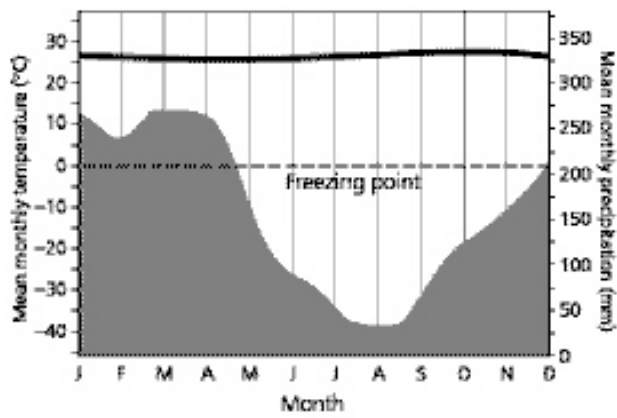


Use the Figure above to answer the following question(s).

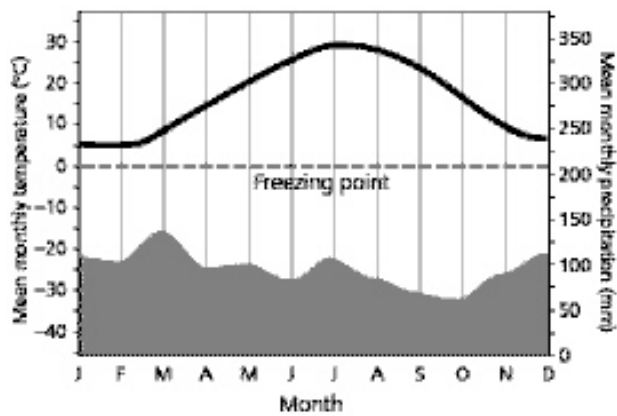
When is the rainy season in the tropical rain forest?



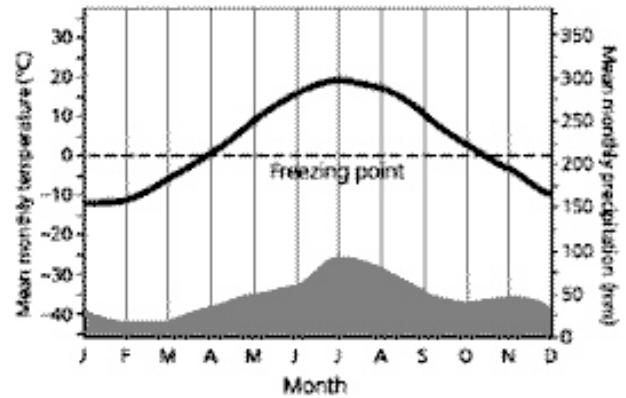
94. Tropical rain forest



Temperate deciduous forest



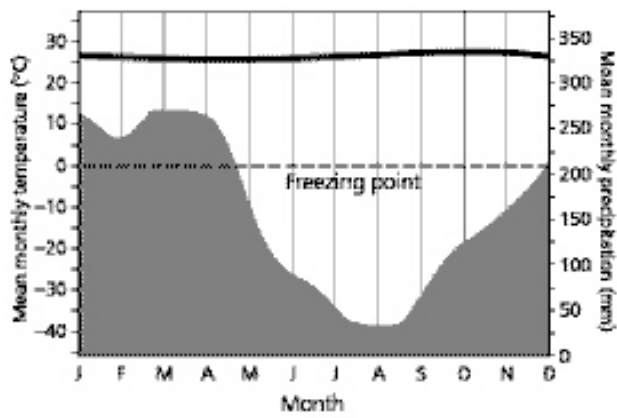
Northern evergreen coniferous forest (boreal forest, taiga)



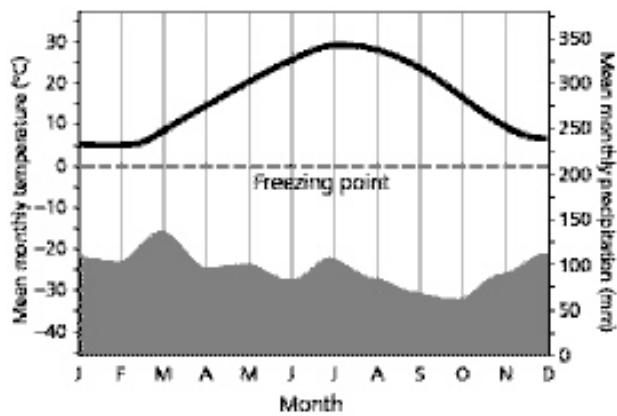
Use the Figure above to answer the following question(s).

When is the dry season in the tropical rain forest?

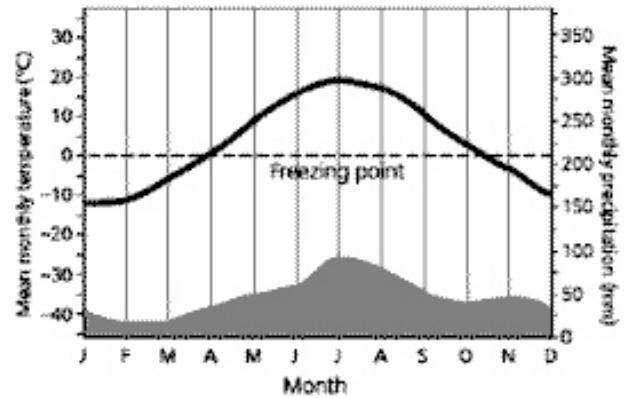
95. Tropical rain forest



Temperate deciduous forest



Northern evergreen coniferous forest (boreal forest, taiga)



Use the Figure above to answer the following question(s).

What is the mean monthly temperature in the tropical rain forest?

96. Briefly summarize the component parts (e.g., heat from the tropics, dense salt water, melting ice, etc.) of the ocean currents as they travel from the North Atlantic to the Pacific and back.
97. What would be the result if the ocean's currents did not function?
98. Briefly summarize the El Niño Southern Oscillation.

99. Using the environmental factors of moisture and temperature, describe the relationship between the three types of biomes (e.g., grasslands or forests).
100. The author indicates that attempting to strike a balance between exploitation of terrestrial natural capital and conservation of that capital is controversial. What might you say to a person whose livelihood comes from the timber industry (or mining, or agriculture making heavy use of irrigation) to encourage consideration of the ongoing degradation of the natural capital and its eventual impact on him/her?

## CHAPTER 7--CLIMATE AND BIODIVERSITY **Key**

1. A
2. C
3. B
4. E
5. C
6. E
7. A
8. B
9. D
10. C
11. E
12. D
13. D
14. B
15. A
16. D
17. C
18. E
19. D
20. B
21. C
22. A
23. C
24. B
25. D
26. E
27. A
28. A
29. D
30. E

- 31. D
- 32. A
- 33. B
- 34. E
- 35. D
- 36. B
- 37. TRUE
- 38. TRUE
- 39. TRUE
- 40. FALSE
- 41. FALSE
- 42. FALSE
- 43. TRUE
- 44. FALSE
- 45. FALSE
- 46. TRUE
- 47. FALSE
- 48. TRUE
- 49. TRUE
- 50. FALSE
- 51. TRUE
- 52. FALSE
- 53. TRUE
- 54. TRUE
- 55. FALSE
- 56. FALSE
- 57. FALSE
- 58. TRUE
- 59. TRUE
- 60. FALSE
- 61. climate
- 62. solar
- 63. two-thirds *or*  $\frac{2}{3}$
- 64. the equator

65. 6 *or* six
66. Ocean currents
67. Human-enhanced
68. leeward
69. evaporation; precipitation
70. Grasslands
71. permafrost
72. grazing; browsing *or* browsing; grazing
73. southern California
74. tropical rainforest
75. sunlight
76. decomposition
77. drought
78. elevation
79. 62
80. off-road vehicles
81. B, C
82. E, G
83. A, D
84. F
85. temperature throughout the year, and the temperature in any one month (by going from the label on the X-axis)
86. distribution of precipitation during the year measured in millimeters; gives an indication of the amount and trends
87. yes, the cold desert (right)
88. approximately 3-5 degrees C° (middle February)
89. 25% of the year, 3 months (January, February, December)
90. none (0%)
91. 6.5 months
92. approximately 125 mm
93. January through April
94. July and August
95. approximately 26 or 27 degrees C°
96. The sun heats up ocean water, especially in the tropics. The rotation of the earth, along with prevailing winds, works to establish surface water currents. Those currents distribute heat to northern Europe and Iceland. The now cooler water sinks and returns along the Atlantic seaboard of North and South America, making a loop into the tropical Pacific. The system works on water temperatures and densities and is driven by the prevailing winds and the earth's rotation.

97. Uneven heating of the earth's water would result in the tropics becoming much warmer and the sub-polar regions becoming much cooler. This would have dramatic effects on regions such as northern Europe. Climatic patterns would be altered. Many cities would become uninhabitable. Food production would be disrupted. Ice would likely form at the poles and move north and/or south.

98. Prevailing winds from the Pacific coast of South America drive warm surface water toward Southeast Asia. The increased moisture in the air in Southeast Asia causes an increase in storms in that region. Periodically, the prevailing winds lessen, allowing the warm surface waters to move off the coast of South America. The change increases storms in the Americas.

99. The availability of moisture determines the type of vegetation, which, in turn, determines the type of biome. For example, tall grass prairie requires more moisture than does short grass prairie. In the case of a tropical savanna, there is somewhat more moisture, indicated by the presence of clumps of trees. The temperature is a determining factor to separate the savanna from other types of prairies. Moisture and temperature combine in the tundra, as moisture is held in permafrost and is unavailable throughout the year. In this manner, permafrost acts as a limiting factor in much the same fashion as drier climates. A similar explanation could be used for forests.

100. Highly subjective. Could include a review of the specifics of the degradation of the specific resource. Student might discuss the fact that using the capital reduces the potentially sustainable use of the income from the capital. Student might also discuss the impact on future generations of the reduction of capital/elimination of capital.