CHAPTER 6

Study Guide

STUDY RESOURCES

Chapter 6 Self Test • Chapter 6 Worksheets • Chapter 6 Overview Presentation (for PowerPoint)

BIG QUESTION

How does the environment affect where and how an organism lives?

Lesson 1 What abiotic and biotic factors are used to classify biomes?

Lesson 2 What conditions and organisms characterize the world's biomes?

Lesson 3 What conditions and organisms characterize the world's aquatic ecosystems?

LESSON 1 Defining Biomes

- Biomes are characterized by their climates as well as typical plant and animal life.
- Ecologists use climatographs to show annual temperature and rainfall patterns.
- Biomes vary in their rates of net primary production. Warm and wet biomes have the highest net primary production, and cold, dry biomes have the lowest.

biome (164)
climate (165)
weather (165)
climatograph (165)
net primary production (167)

LESSON 2 Biomes

- There are ten major biomes: tropical rain forest, tropical dry forest, savanna, desert, temperate rain forest, temperate forest, temperate grassland, chaparral, boreal forest, and tundra. Organisms in these biomes show adaptations to their environments.
- Polar ice and mountains are not usually classified as biomes. Most life in polar regions is aquatic, and conditions on mountains change dramatically with altitude.

canopy (168)
emergent layer (168)
understory (168)
epiphyte (169)
deciduous (170)
estivation (170)
coniferous (173)
hibernation (174)
permafrost (178)

LESSON 3 Aquatic Ecosystems

- Ecologists classify aquatic ecosystems according to criteria such as salinity, depth, and whether the water is flowing or standing.
- Standing freshwater ecosystems include ponds, lakes, inland seas, and wetlands. Flowing freshwater ecosystems include rivers and streams.
- Estuaries are home to diverse ecosystems that protect coastal environments from soil erosion and flooding.
- The ocean can be divided into three zones based on their distance from shore: intertidal, neritic, and open ocean.

salinity (181)
photic zone (182)
aphotic zone (182)
benthic zone (182)
littoral zone (183)
limnetic zone (183)
wetland (184)
flood plain (185)
estuary (186)
upwelling (188)

MyEnvironmentalScience.com

INQUIRY LABS AND ACTIVITIES

- **Collecting Climate Data**
  Take temperature readings daily and collect precipitation data. How close is your data to the climate data for your biome?
- **Mapping Kelp Forests**
  Use maps of sea surface temperatures and ocean currents to identify where kelp forests are located.

ANSWERS

Chapter Assessment For answers to the Chapter Assessment see page A–9 at the back of the book.

Chapter Assessment

Make Your Case

The Central Case in this chapter explored the relationship between African elephants and their environments. What major effects are the elephants having on Africa's ecosystems and biomes? How do you think African nations should handle elephant overpopulation, if at all? Use examples from the Central Case and the lesson to support your answer.

Review Concepts and Terms

1. Climatographs are useful tools in describing a biome's climate. They typically show patterns in annual
   a. rainfall and snowfall.
   b. precipitation and humidity.
   c. precipitation and temperature.
   d. temperature and sunlight.

2. Which of the following terms describes the net amount of organic matter that an ecosystem or biome produces?
   a. gross production
   b. net productivity
   c. photosynthetic mass
   d. net primary production

3. Nearly all nutrients present in tropical rain forests are contained in the
   a. soil.
   b. epiphytes.
   c. emergent layer.
   d. trees, vines, and other plants.

4. What is the extended period of deep, sleeplike inactivity that an animal enters for the winter?
   a. hibernation **c.** drought
   b. estivation **d.** emigration

5. Which of the following types of organisms experience seasonal loss of leaves as an adaptation to their climate?
   a. coniferous trees **c.** deciduous trees
   b. succulent plants **d.** grasses

6. Which of the following describes the frozen underground soil that is found in the tundra?
   a. polar ice **c.** permafrost
   b. hard frost **d.** emergent layer

7. Life underwater is greatly affected by light availability, which is directly related to
   a. water quality. **c.** salinity.
   b. water depth. **d.** temperature.

8. In which of the ocean's zones would you expect to find the ecosystem seen below?
   a. the intertidal zone **c.** the open ocean zone
   b. the neritic zone **d.** the benthic zone

9. Which of the following aquatic ecosystems is NOT a type of wetland?
   a. swamp
   b. bog
   c. stream
   d. freshwater marsh

10. The vertical movement of cold, nutrient-rich water from the ocean depths to its surface is called
    a. upwelling.
    b. downwelling.
    c. tides.
    d. surface currents.

CHAPTER 6

Chapter Assessment

Modified True/False

Write true if the statement is true. If it is false, change the underlined word or words to make the statement true.

11. Weather describes the average conditions of an area over long periods of time.

12. The mud and muck at the very bottom of any body of water is called the aphotic zone.

13. High in the mountains, near a river's source, water tends to be cold and oxygen-rich.

14. Bogs are brackish ecosystems that occur where rivers flow into the ocean.

Reading Comprehension

Read the following selection and answer the questions that follow.

Despite the daily heating and cooling of surface waters, ocean temperatures are much more stable than temperatures on land. Midlatitude oceans experience maximum yearly temperature variation of only around 10°C (18°F), and tropical and polar oceans are still more stable. The reason for this stability is that water has a very high *heat capacity,* a measure of the energy required to increase temperature by a given amount. It takes much more energy to increase the temperature of water than it does to increase the temperature of air by the same amount. High heat capacity enables the oceans to absorb a tremendous amount of energy from the atmosphere. In fact, the energy content of the entire atmosphere is equal to that of just the top 2.6 meters of the oceans. By absorbing thermal energy and releasing it to the atmosphere, the oceans help regulate Earth's climate.

15. According to the passage, which of the following will experience the LEAST amount of temperature variation?

a. a coastal city
b. an inland pond
c. a midlatitude ocean
d. a tropical ocean

16. A material, like water, that requires a large amount of energy to raise its temperature has a

a. high heat capacity.
b. low heat capacity.
c. high heat absorption.
d. stable temperature.

Short Answer

17. What is the difference between climate and weather?

18. Why do the same biomes tend to occur at similar latitudes?

19. Why do warmer and wetter biomes have higher net primary productivity?

20. What is estivation? How is it similar to hibernation?

21. Why are there no rooted plants in the limnetic zone of a lake or pond?

22. How has the succulent plant seen here adapted to the conditions of its desert environment?

Critical Thinking

23. **Apply Concepts** An organism that thrives in the desert does not do well in a tropical rain forest. When there is plenty of water, shouldn't the organism do even better? Explain.

24. **Relate Cause and Effect** Farms built on cleared grassland tend to be very productive. Farms built on cleared rain forest, however, tend not to do well. Explain the difference.

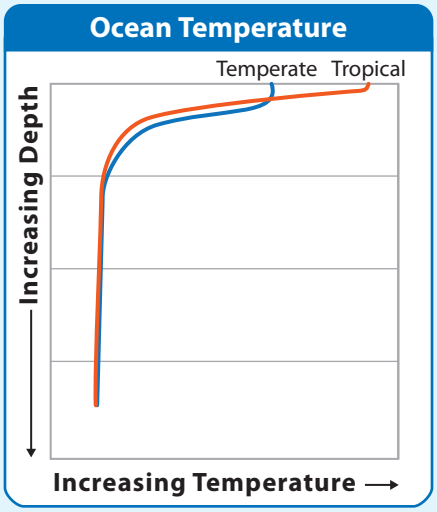
25. **Infer** There is very little rainfall in the tundra, but the ground is very wet during the summer. Why?

26. **Compare and Contrast** Wetlands and estuaries are both ecologically important. Describe both ecosystems, pointing out their similarities and differences. Then, explain their importance.

27. **Infer** The open ocean is among the least productive ecosystems on Earth. However, it contributes greatly to the overall productivity of the biosphere. How can you explain this paradox?

Analyze Data

The graph below shows the relationship between ocean depth and temperature. Use the data to answer the questions.



28. **Interpret Graphs** Describe the basic relationship between ocean depth and temperature seen in the graph.

29. **Infer** Why does the tropical ocean have a greater temperature range than the temperate ocean?

30. **Infer** What do you think the data line for polar oceans would look like? Explain your answer.

Write About It

31. **Explanation** How does your biome affect how you live? If you had to move, would you select a similar biome or a different one? Explain.

32. **Persuasion** The owners of a large tropical resort are considering a plan to destroy a large coral reef just offshore. They reason that, if the reef is gone, cruise ships will be able to dock closer to their resort and they will gain business. Write a letter to the resort's owners explaining how they might benefit more by preserving the reef instead.

33. Apply the **BIG**QUESTION Organisms evolve, through the process of natural selection, in ways that enable them to live successfully in their environments. Choose three biomes or aquatic ecosystems and describe how abiotic factors have influenced the organisms that live there.

Ecological Footprints

Read the information below. Copy the table into your notebook and record your calculations. Then, answer the questions that follow.

Commercial fishing has had a huge negative impact on the health of Earth's oceans. On average, every person consumes 16.4 kilograms of food from the ocean per year. In North America, we consume more from the oceans than the world average—about 24.1 kilograms per year. Use this information to fill in the footprint table.

Consumer Group	Population	North America (24.1 kg Per Person)	World (16.4 kg Per Person)
You			
Your class			
Your state			
United States			
World			

Data from U.N. Food and Agriculture Organization (FAO), Fisheries Department. 2008. ***The state of world fisheries and aquaculture: 2008.*** Data are for 2005, the most recent year for which comparative data are available.

1. How might commercial fishing affect ocean ecosystems?
2. If everyone in the world ate as much food from the ocean as a person from North America, how much more food from the ocean would be consumed per year?
3. The population of North America represents about 8% of the world's population. Does North America consume more or less than 8% of all the food from the ocean? (Hint: Your first step should be to calculate the population of North America.)

MATH SUPPORT For help multiplying with percentages, see the Math Handbook.