

Checkups and follow-ups

CHAPTER 8 ANSWER KEY

ST

Questions 1–6, 10–22 and A–C

# The biosphere

## Checkup

### 1 WHAT IS THE BIOSPHERE? (p. 254)

1. Can the water in a lake be considered part of the biosphere? If so, explain your answer.

*Yes, if it contains living organisms.*

### 2 BIOGEOCHEMICAL CYCLES (pp. 255–261)

2. List the processes of the carbon cycle that are illustrated in the photos below.



*Answers will vary. Examples: photosynthesis in plants; carbon dioxide (CO<sub>2</sub>) emission by cars (from fossil fuel combustion), by a forest fire (combustion) and by respiration in plants and humans; and the manufacture of calcium carbonate by marine organisms (shells and skeletons).*

3. Carbon dioxide (CO<sub>2</sub>) is an important source of carbon for living organisms.

- a) Through which two processes does carbon enter the biosphere?

*Through photosynthesis and through the transformation of CO<sub>2</sub> dissolved in water into calcium carbonate (shells and skeletons of marine organisms)*



- b) The carbon absorbed by human beings usually ends up returning to the atmosphere as  $\text{CO}_2$ . Briefly describe the two processes involved in this transfer.

*Human beings exhale  $\text{CO}_2$  in the process of respiration. Meanwhile, the decomposition of human waste and remains also emits  $\text{CO}_2$  into the atmosphere.*

4. What process matches each of the following descriptions?

- a) the process by which bacteria take atmospheric nitrogen and change it into ammonia

*Nitrogen fixation*

- b) the process by which bacteria change ammonium into nitrites

*Nitrification*

- c) the process by which bacteria change nitrates into nitrogen

*Denitrification*

5. Without plants, herbivores would be unable to manufacture the DNA molecules they need to store their genetic information. Explain your answer.

*Nitrogen is an essential element for manufacturing DNA. Plants represent the only source of nitrogen available to herbivores.*

6. The nitrogen cycle is disrupted by human activity.

- a) Which farming practice is the main source of this imbalance?

*The application of fertilizers rich in ammonia, ammonium and nitrates*

- b) What are the consequences of this practice?

*Nitrogen surpluses alter the soil balance and interfere with plant growth.*

⇒ Questions 7 to 9 are not intended for students in the ST program.

### 3 BIOMES (pp. 262–279)

10. Answer the following questions on the factors that determine biome distribution.

- a) How does latitude affect the distribution of terrestrial biomes?

*Answers will vary. Example: Latitude determines the mean temperatures of a region. Plant and animal species live only in environments where they can adapt to the temperature.*

- b) What factors do you think could determine whether trees grow in a particular environment?

*Answers will vary. Examples: solar energy, soil type and the amount of precipitation.*

- c) What is the principal factor that differentiates aquatic biomes?

*The salinity of the water*

11. Answer the following questions, referring to the photo opposite.

a) What type of forest is it?

*A boreal forest*

b) What are the main differences between tropical forests, boreal forests and temperate forests?

*Answers will vary. Examples: Boreal forests are*

*composed mainly of conifers and are found in the*

*Northern Hemisphere, below the Arctic Circle.*

*Temperate forests lie farther south and are*

*composed of a mixture of conifers and deciduous*

*varieties in the northernmost forestland and primarily deciduous trees in the south. Tropical*

*forests lie along either side of the equator, in the tropics.*



12. The tropical forest is the terrestrial biome with the richest biodiversity, but it is threatened by certain human activities. What are these activities?

*Large areas of forest are being cut down or burned to make room for farmland or to sell the timber.*

13. In Québec and Ontario, a large part of the temperate forest has been cut down. Explain your answer.

*Urban areas have developed on former forestland. Large parts of the forest have been cleared to build homes, businesses, roads, infrastructure, etc.*

14. Which type of grasslands matches each of the following descriptions?

a) They are found mainly in Africa and South America, in regions where it is hot all year round.

*Savannas*

b) They cover a large part of Alberta, Saskatchewan and Manitoba, in regions where farming plays an important role.

*Derived (or artificial) grasslands*

c) They are found in certain regions of Asia and North America, where the summers are hot and the winters are cold.

*Temperate grasslands*

15. Which zone of an alpine biome matches each of the following descriptions?

- |                                                                  |                        |
|------------------------------------------------------------------|------------------------|
| a) Only bushes and grasses grow there.                           | <u>Alpine zone</u>     |
| b) A mixture of conifers and deciduous trees can be found there. | <u>Montane zone</u>    |
| c) Grain crops and deciduous forests dominate the landscape.     | <u>Submontane zone</u> |
| d) The snow there never melts.                                   | <u>Nival zone</u>      |
| e) It is the highest zone in which trees can still grow.         | <u>Subalpine zone</u>  |

16. Look at the two photos below.



- a) Which biome is pictured?  
Deserts
- b) What characteristics are common to these two environments and to all the environments that make up this biome?

Extreme temperatures, low precipitation and few animals or plants

17. Is it true that it is hot night and day in sandy deserts? Explain your answer.

It is false. Although it is hot in the day, as soon as the Sun sets, the temperature drops. The difference between daytime and nighttime temperatures is due to the absence of water, which usually has a moderating effect on temperature. Water retains part of the heat it collects during the day and releases it into the air at night.

18. Name three factors that affect aquatic biomes.

Answers will vary. Examples: water temperature, the chemical composition and depth of the water, exposure to sunlight, and the speed of the current.

19. Which type of aquatic biome is illustrated in the photo opposite? Explain your answer.

*A marsh. It is land covered with stagnant water and without trees.*



20. Wetlands help reduce the risks of flooding. Explain how.

*They can absorb huge amounts of water, like sponges.*

21. Which type of aquatic biome matches each of the following descriptions?

- a) They are home to more than 500 000 animal and plant species.

*Coral reefs*

- b) They are the places where rivers and oceans meet.

*Estuaries*

- c) They are bodies of fresh water surrounded by land.

*Lakes*

- d) They contain the greatest part of the water on Earth.

*Oceans*

22. Look at the photo opposite.

- a) Which biome is illustrated in this photo?

*A coral reef*

- b) Why is this biome at risk?

*Because of pollution, overfishing, global warming and increased sedimentation caused by human activity.*



- c) Why is it important to protect it?

*Answers will vary. Examples: It provides a habitat for thousands of marine species.*

*– Coral reefs are of major economic, social and cultural importance to the people who live nearby.*



**REVIEW QUESTIONS**

- A.** The photo opposite shows a black bear, the most common bear in North America. Black bears usually live in forests and mountains, where they can find food and shelter and easily climb trees when they wish to escape danger. They are omnivores although their diet consists primarily of plants; they sometimes feed on insects, rodents and fawns. Black bears are good swimmers and can catch fish in rivers to supplement their diet.



- a)** The forest where this black bear lives contains a mixture of coniferous and deciduous trees. What type of forest is it?

*A temperate forest*

- b)** How do plants obtain the carbon and nitrogen they need?

*Carbon: through photosynthesis*

*Nitrogen: by drawing on the ammonium and nitrates in the soil or water*

- c)** What are the black bear's sources of nitrogen?

*The plants and animals it feeds on*

- d)** The leaves and dead trees on the forest floor will be decomposed by earthworms and microorganisms. Name some products that will be released into the environment as a result of this decomposition.

*Answers will vary. Examples: carbon dioxide, methane, ammonia, ammonium and phosphates.*

- B.** Match each of the species described below with the appropriate biome.

- a)** The arctic fox lives in an environment with minimal vegetation: a few scrubby bushes, mosses and lichen. To hide from predators, the fox has adapted to its surroundings in a particular way: its fur turns white in winter to help it blend into the snowy landscape.

*Arctic tundra*

- b)** The Fraser fir puts down its roots in acidic soil. It lives in an environment consisting of mosses and lichen.

*Boreal forests*

- c) The minnow is a small fish, 10 cm long, which thrives in rapid currents and well-oxygenated water.

*Rivers*

- d) The Mojave yucca (illustrated opposite) receives an annual average of 13 cm of rain.

*Deserts*

- e) Alligators live in slow-moving, shallow waters that are rich in vegetation.

*Wetlands*



- C. Prepare your own summary of Chapter 8 by building a concept map.

*See the Concept maps section in Guide B.*

## Follow-up

1. What would be the negative consequences of the disappearance of peat bogs?

*Answers will vary. Examples: Plants unique to peat bogs could disappear.*

*– The carbon they capture would be released into the atmosphere, amplifying the greenhouse effect.*

*– Industries that use peat would be deprived of their raw material.*

2. Why is it so difficult to restore a peat bog once it has been destroyed?

*Sphagnum grow very slowly and require specific conditions for growth—for example, suitable mulch (such as straw) or the presence of other mosses.*