

CHAPTER 3—PRINCIPLES OF ECOLOGY

MULTIPLE CHOICE

1. Water is lost to the abiotic parts of the biosphere from the biotic parts by the process of _____.
 - a. precipitation
 - b. photosynthesis
 - c. transpiration
 - d. infiltrationANS: C DIF: B OBJ: 3-6
2. Nitrogen is released to the abiotic parts of the biosphere from the processes of death and _____.
 - a. decay by bacteria
 - b. infiltration of groundwater
 - c. runoff
 - d. lightning in storm cloudsANS: A DIF: B OBJ: 3-6
3. Carbon dioxide in the atmosphere enters the biotic parts of the biosphere through _____.
 - a. burning of forests
 - b. photosynthesis
 - c. combustion of fossil fuels
 - d. all of theseANS: B DIF: B OBJ: 3-6
4. Some birds are known as honey guides because they may be followed by humans to wild beehives. When the humans take honey from the hives, the birds are able to feast on the honey and bees, too. This type of relationship can best be described as _____.
 - a. parasitism
 - b. commensalism
 - c. mutualism
 - d. symbiosisANS: C DIF: B OBJ: 3-4
5. Starfish live in saltwater ecosystems. Some species live in shallow tidal pools, while others live in the deepest parts of the oceans. This is a description of the _____ of starfish.
 - a. habitat
 - b. community
 - c. niche
 - d. none of theseANS: A DIF: B OBJ: 3-3

3-1

6. Cougars are predators that often eat weakened or diseased animals. This is a description of the _____ of cougars.
 - a. habitat
 - b. community
 - c. niche
 - d. none of theseANS: C DIF: B OBJ: 3-3
7. An ecologist who studies how several species in an area interact among each other and with the abiotic parts of the environment is interested in the biological organization level called a(n) _____.
 - a. organism
 - b. population
 - c. community
 - d. ecosystemANS: D DIF: B OBJ: 3-2
8. An ecologist who studies how several species in an area interact is interested in the biological organization called a(n) _____.
 - a. organism
 - b. population
 - c. community
 - d. ecosystemANS: C DIF: B OBJ: 3-2

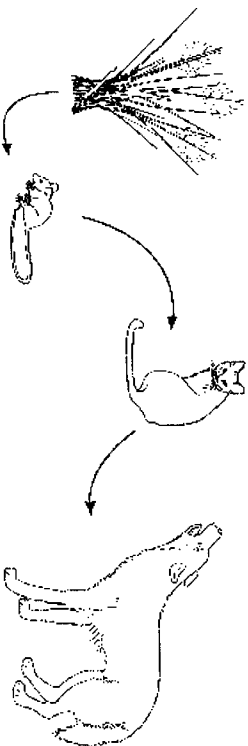


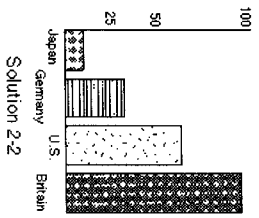
Figure 3-1

9. Referring to Figure 3-1, suppose 10 000 units of energy are available at the level of the grasses. What is the total number of energy units lost by the time energy reaches the coyote?
 - a. 90 units
 - b. 990 units
 - c. 9900 units
 - d. 9990 unitsANS: D DIF: B OBJ: 3-5

3-2

5. Make a bar graph of the information shown in Table 2-3, ordering the percentages from low to high.

ANS: See Solution 2-2 answer art.



DIF: A OBI: 2-1

OTHER

If the underscored word or phrase makes the sentence true, write "true" in the space provided. If the underscored word or phrase makes the sentence false, write the correct term or phrase in the space provided.

1. The liter is a metric unit of volume. _____

ANS: true DIF: B OBI: 2-1

2. For ease of understanding, scientists report measurements using the English system. _____

ANS: SI (or metric) DIF: B OBI: 2-1

3. Whether applications of science to everyday life are considered good, bad, right, or wrong comes under the category of technology. _____

ANS: ethics DIF: B OBI: 2-4

4. Counts or measurements are examples of data produced by descriptive research. _____

ANS: quantitative DIF: B OBI: 2-3

5. In an experiment, the control group is used to test the effect of the independent variable. _____

ANS: experimental DIF: B OBI: 2-1

6. A natural law is based on the analysis of data collected in a controlled experiment. _____

ANS: conclusion DIF: B OBI: 2-1

7. A sonogram is a picture of sound. _____

ANS: true DIF: B OBI: 2-1

8. A law is a possible explanation for a scientific question. _____

ANS: hypothesis DIF: B OBI: 2-2

9. A centrifuge is used to make small details of an object visible to a scientist. _____

ANS: microscope DIF: B OBI: 2-1

10. Biologists generally form hypotheses using deductive reasoning. _____

ANS: inductive DIF: B OBI: 2-1

11. Biologists discover problems by observing the world around them. _____

ANS: true DIF: B OBI: 2-1

10. Referring to Figure 3-1, as matter and energy move from grasses to coyotes, the amount of available energy _____.
- always decreases and population size always increases
 - always increases and population size always decreases
 - always decreases but population size may increase or decrease
 - increases or decreases but population size remains the same

ANS: C DIF: B OBJ: 3-5

11. Referring to Figure 3-1, the relationship between cats and mice could best be described as _____.

- predator-prey
- scavenger-carrion
- parasite-host
- consumer-producer

ANS: A DIF: B OBJ: 3-5

12. Referring to Figure 3-1, the coyotes would be considered _____.

- herbivores
- third-order consumers
- second-order consumers
- decomposers

ANS: B DIF: B OBJ: 3-5

13. Referring to Figure 3-1, energy flows from _____.

- coyotes to grasses
- cats to mice
- mice to cats
- coyotes to cats

ANS: C DIF: B OBJ: 3-5

COMPLETION

1. The _____ consists of evaporation, precipitation, transpiration, runoff, and respiration.

ANS: water cycle DIF: B OBJ: 3-6

2. Omnivores, carnivores, herbivores, scavengers, and decomposers are all _____.

ANS: consumers DIF: B OBJ: 3-5

3. Ecosystems, biotic factors, and abiotic factors make up the _____.

ANS: biosphere DIF: B OBJ: 3-1

4. Organism, population, and community make up the _____.

ANS: ecosystem DIF: B OBJ: 3-2

5. Parasitism, commensalism, and mutualism are examples of _____.

ANS: symbiosis DIF: B OBJ: 3-4

6. Trophic level and food chain are parts of a _____.

ANS: food web DIF: B OBJ: 3-5

7. In a pond ecosystem, ducks, mosquitoes, pond plants, and frogs are _____ factors.

ANS: biotic DIF: B OBJ: 3-1

8. Both the alga and the fungus are benefited from their relationship in a lichen. This relationship is one of _____.

ANS: mutualism DIF: B OBJ: 3-4

9. Water, carbon, and nitrogen are released back into the atmosphere during _____.

ANS: decomposition DIF: B OBJ: 3-6

10. Energy that passes through a food chain is lost to the environment as _____.

ANS: heat DIF: B OBJ: 3-5

11. In the nitrogen cycle, _____ convert atmospheric nitrogen into nitrogen compounds usable by plants.

ANS: bacteria and lightning DIF: B OBJ: 3-6

12. To explain and show how the amount of living material at each trophic level of a food chain changes, you could use a pyramid of _____.

ANS: biomass DIF: B OBJ: 3-5

13. The size and extent of a population does not directly depend upon the availability of _____.

ANS: decomposers DIF: B OBJ: 3-5

14. Wind, humidity, and _____ would be considered abiotic factors in a terrestrial ecosystem.

ANS: rocks DIF: B OBJ: 3-1

15. The biosphere includes air and water, animals and plants, and _____.

ANS: mountains and oceans DIF: B OBJ: 3-1

MATCHING

Match each item with the correct statement below. Write the answer in the space provided.

a. mutualism	h. food web	
b. biosphere	i. food chain	
c. ecology	j. commensalism	
d. community	k. scavenger	
e. decomposer	l. heterotroph	
f. parasitism	m. trophic level	
g. habitat	n. autotroph	
1. _____	study of how living things relate to each other and to their environment	
2. _____	relationship between organisms in which both organisms benefit	
3. _____	network of interconnected food chains	
4. _____	relationship between organisms in which one organism benefits and the other is neither harmed nor benefited	
5. _____	layer of Earth that supports life	
6. _____	feeds on dead organisms	
7. _____	simple model for showing how matter and energy move through an ecosystem	
8. _____	group formed by several populations	
9. _____	manufactures food using energy from the sun or from chemical compounds	
10. _____	relationship between organisms in which one organism benefits at the expense of another	
11. _____	place where an organism spends its life	
12. _____	step in the passage of energy and matter through an ecosystem	
13. _____	obtains energy and nutrients from autotrophs	
14. _____	breaks down dead organisms	
1. ANS: c	DIF: B	OBJ: 3-1
2. ANS: a	DIF: B	OBJ: 3-4
3. ANS: h	DIF: B	OBJ: 3-5
4. ANS: j	DIF: B	OBJ: 3-4
5. ANS: b	DIF: B	OBJ: 3-1
6. ANS: k	DIF: B	OBJ: 3-5
7. ANS: l	DIF: B	OBJ: 3-5
8. ANS: d	DIF: B	OBJ: 3-2
9. ANS: n	DIF: B	OBJ: 3-5
10. ANS: f	DIF: B	OBJ: 3-4
11. ANS: g	DIF: B	OBJ: 3-3
12. ANS: m	DIF: B	OBJ: 3-5
13. ANS: i	DIF: B	OBJ: 3-5
14. ANS: e	DIF: B	OBJ: 3-3

SHORT ANSWER

- Compare and contrast the ways carbon and water cycle through the biosphere.

ANS: Answers will vary but should include that both carbon and water are found together in the biotic parts of the biosphere. The major reservoir for carbon is the atmosphere and oceans, while the major reservoir for water is the oceans. Students may describe or draw the water and carbon cycles.

DIF: A OBJ: 3-6

- Read the following information about mushrooms and determine their niche and habitat. Explain how you made your determination. Mushrooms break down organic matter. The products produced by the breakdown are then available for recycling to other organisms. Mushrooms live where it is moist and organic matter is available. Some mushrooms live on decaying logs, while others live underground in the nests of ants. Some even invade the living bodies of insects and other organisms.

ANS: Breaking down organic matter is the role, or niche, of mushrooms. Their habitat is anywhere moisture and organic matter are available, including decaying logs, ant nests, and living bodies of insects and other organisms.

DIF: A OBJ: 3-3

- List and describe the various levels of biological organization that may be studied by an ecologist.

ANS: Students should describe the levels of the individual organism, populations, communities, ecosystems, and the biosphere. Each level should be related to the levels above and below. Examples of each level might also be given.

DIF: A OBJ: 3-2



Figure 3-2

- Identify the abiotic and biotic factors in the picture in Figure 3-2.

ANS: 1. abiotic, 2. biotic, 3. biotic, 4. abiotic, 5. biotic, 6. abiotic

DIF: A OBJ: 3-1