

GRADE 12 BIOLOGY

UNIT E – ECOLOGY AND CONSERVATION

PRACTICE QUESTIONS

Name: _____

Date: _____

Section 3.1 What is Ecology

Review Key Concepts

1. a. **Review.** What are the six different major levels of organization, from smallest to largest, that ecologists commonly study?

b. **Apply Concepts.** Give an example of two objects or activities in your life that are interdependent. Explain your choice.

2. a. **Review.** Is weather a biotic or abiotic factor?

b. **Compare and Contrast.** How are biotic and abiotic factors related? What is the difference between them?

3. a. **Review** Describe the three basic methods of ecological research.

b. **Apply Concepts** Give an example of an ecological phenomenon that could be studied by modeling. Explain why modeling would be useful.

4. Suppose you want to know if the water in a certain stream is safe to drink. Which ecological method(s) would you use in your investigation? Explain your reasoning and outline your procedure.

Review Key Concepts

1. a. **Review** What are the two primary sources of energy that power living systems?

b. **Pose Questions** Propose a question that a scientist might ask about the variety of organisms found around deep-sea vents.

2. a. **Review** Explain how consumers obtain energy.

b. **Compare and Contrast** How are detritivores different from decomposers? Provide an example of each.

Section 3.2 Energy, Producers, and Consumers

1. a. **Review** What are the two primary sources of energy that power living systems?

b. **Pose Questions** Propose a question that a scientist might ask about the variety of organisms found around deep-sea vents.

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b. **Compare and Contrast** How are detritivores different from decomposers? Provide an example of each

3. The word autotroph comes from the Greek words autos, meaning “self,” and trophe, meaning “food or nourishment.” Knowing this, what do you think the Greek word heteros, as in heterotroph, means?

3.3 Energy Flow in Ecosystems

1. a. **Review** Energy is said to flow in a “one-way stream” through an ecosystem. In your own words, describe what that means. b. **Form a Hypothesis** Explain what you think might happen to the Everglades ecosystem shown in Figure 3–9 if there were a sudden decrease in the number of crayfish.

2. a. **Review** On average, what proportion of the energy in an ecosystem is transferred from one trophic level to the next? Where does the rest of the energy go?

b. **Calculate** Draw an energy pyramid for a five-step food chain. If 100 percent of the energy is available at the first trophic level, what percentage of that energy is available at the highest trophic level?

3.4 Cycles of Matter

1. a. **Review** How does the way that matter flows through an ecosystem differ from the way that energy flows?

b. **Apply Concepts** What are the four types of processes that cycle matter through the biosphere? Give an example of each.

2. a. **Review.** By what two processes is water cycled from land to the atmosphere?

b. **Sequence** Describe one way in which water from the ocean may make one complete cycle through the atmosphere and back to the ocean. Include the names of each process involved in your cycle.

3. a. **Review.** Why do living organisms need nutrients?

b. **Predict** Based on your knowledge of the carbon cycle, what do you think might happen if humans were to continue to clear and burn vast areas of forests for building?

4. a. **Review** Explain how a nutrient can be a limiting factor in an ecosystem.

b. **Apply Concepts** Look back at the nitrogen and phosphorus cycles (Figures 3–18 and 3–19).

How is fertilizer runoff related to algal blooms?

ASSESSMENT QUESTIONS

3.1 What is Ecology?

1. All of life on Earth exists in:

- a. an ecosystem. b. the biosphere. c. a biome. d. ecology.

2. Which term describes a group of different species that live together in a defined area?

- a. a population b. an ecosystem
c. a community d. a biosphere

3. Name the different levels of organization within the biosphere, from smallest to largest.

4. How do ecologists use modeling?

5. Give an example of how a biotic factor might influence the organisms in an ecosystem.

6. **Design an Experiment** Ecologists have discovered that the seeds of many plants that grow in forests cannot germinate unless they have been exposed to fire. Design an experiment to test whether a particular plant has seeds with this requirement. Include your hypothesis statement, a description of control and experimental groups, and an outline of your procedure.

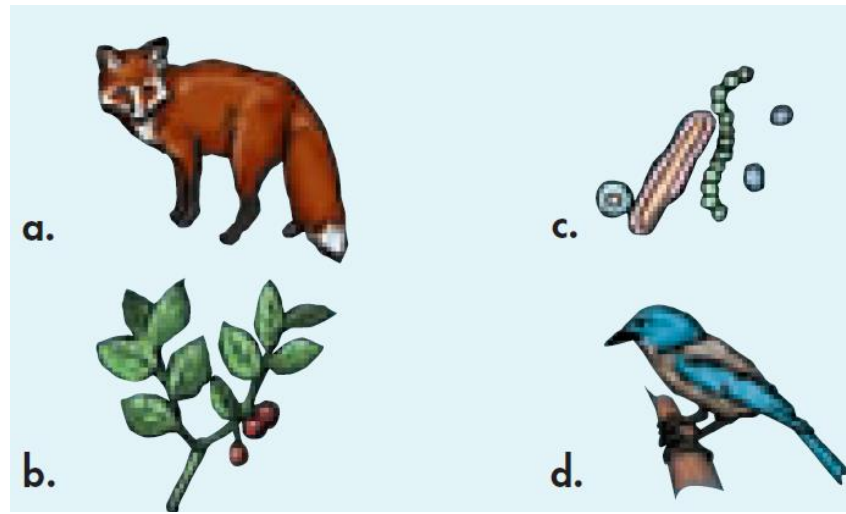
7. **Pose Questions** You live near a pond that you have observed for years. One year you notice the water is choked with a massive overgrowth of green algae. What are some of the questions you might have about this unusual growth?

3.2 Energy, Producers, and Consumers

Primary producers are organisms that:

- a. rely on other organisms for their energy and food supply.
- b. consume plant and animal remains and other dead matter.
- c. use energy they take in from the environment to convert inorganic molecules into complex organic molecules.
- d. obtain energy by eating only plants

9. Which of the following organisms is a decomposer?



10. Which of the following describes how ALL consumers get their energy?

- a. directly from the sun
- b. from eating primary producers
- c. from inorganic chemicals like hydrogen sulfide
- d. from eating organisms that are living or were once living

11. What is chemosynthesis?

12. **Classify** Classify each of the following as an herbivore, a carnivore, an omnivore, or a detritivore: earthworm, bear, cow, snail, owl, human.

13. **Form a Hypothesis** People who explore caves where there is running water but no sunlight often find them populated with unique types of fishes and insects. What hypothesis can you make to explain the ultimate source of energy for these organisms?

14. The series of steps in which a large fish eats a small fish that has eaten algae is a:

- a. food web.
- b. pyramid of numbers.
- c. food chain.
- d. pyramid of biomass.

15. The total amount of living tissue at each trophic level in an ecosystem can be shown in a(n)

- a. energy pyramid.
- b. biomass pyramid.
- c. pyramid of numbers.
- d. biogeochemical cycle.

16. Which group of organisms is always found at the base of a food chain or food web?

17. Apply Concepts Why is the transfer of energy in a food chain usually only about 10 percent efficient?

18. Use Models Describe a food chain of which you are a member. You may draw or use words to describe the chain.

Understand Key Concepts

20. Nutrients move through an ecosystem in

- a. biogeochemical cycles.
- b. water cycles.
- c. energy pyramids.
- d. ecological pyramids.

21. Which biogeochemical cycle does NOT include a major path in which the substance cycles through the atmosphere?

- a. water cycle
- b. nitrogen cycle
- c. carbon cycle
- d. phosphorus cycle

22. List two ways in which water enters the atmosphere in the water cycle.

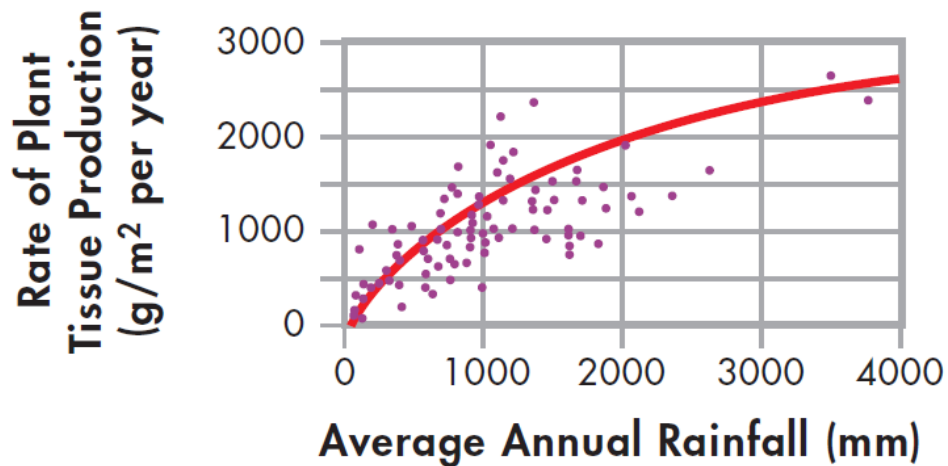
23. Explain the process of nitrogen fixation.

24. What is meant by “nutrient limitation”?

Use Science Graphics

The graph below shows the effect of annual rainfall on the rate of primary productivity in an ecosystem. Use the graph to answer questions 27–29.

The Effect of Rainfall on Plant Productivity



27. **Interpret Graphs** What happens to productivity as rainfall increases?

28. **Predict** What do you think the graph would look like if the x-axis were extended out to 6000 mm? Represent your prediction in a graph and explain your answer.

29. Apply Concepts What factors other than water might affect primary productivity?

Write About Science

30. **Explanation** Write a paragraph that (1) names and defines the levels of organization that an ecologist studies; (2) identify the level that you would choose to study if you were an ecologist; (3) describes the method or methods you would use to study this level; and (4) gives a reason for your choice of method or methods.

31. **Description** Describe how biogeochemical cycles provide organisms with the raw materials necessary to synthesize complex organic compounds. Refer back to Chapter 2 for help in answering this question.

32. Assess the Big Idea. Explain how an element like carbon can be included in both the biotic and abiotic factors of an ecosystem.

Samples of ocean water are taken at different depths, and the amount of oxygen in the water at each depth is measured. The results are shown in the table.

Concentration of Oxygen	
Depth of Sample (m)	Oxygen Concentration (ppm)
0	7.5
50	7.4
100	7.4
150	4.5
200	3.2
250	3.1
300	2.9

33. Interpret Tables Which of the following is the best description of what happens to the amount of available oxygen as you get deeper in the ocean?

- a. Available oxygen decreases at a constant rate.
- b. Available oxygen increases at a constant rate.
- c. Available oxygen remains steady until about 100 m, then drops rapidly.
- d. Oxygen is available at all ocean depths.

34. Draw Conclusions Light can penetrate to only a depth of between 50 and 100 m in most ocean water. What effect does this have on the water's oxygen concentration? Explain.

Standardized Test Prep

Multiple Choice

1. A group of individuals that belong to a single species and that live together in a defined area is termed a(n)

- A population.
- B community.
- C ecosystem.
- D biome.

2. Which of the following is NOT true about matter in the biosphere?

- A Matter is recycled in the biosphere.
- B Biogeochemical cycles transform and reuse molecules.
- C The total amount of matter decreases over time.
- D Water and nutrients pass between organisms and the environment.

3. Which is a source of energy for Earth's living things?

- A wind energy only
- B sunlight only
- C wind energy and sunlight
- D sunlight and chemical energy

4. Which of the following is a primary producer?

- A a producer, like algae
- B a carnivore, like a lion
- C an omnivore, like a human
- D a detritivore, like an earthworm

5. Human activities, such as the burning of fossil fuels, move carbon through the carbon cycle. Which other processes also participate in the carbon cycle?

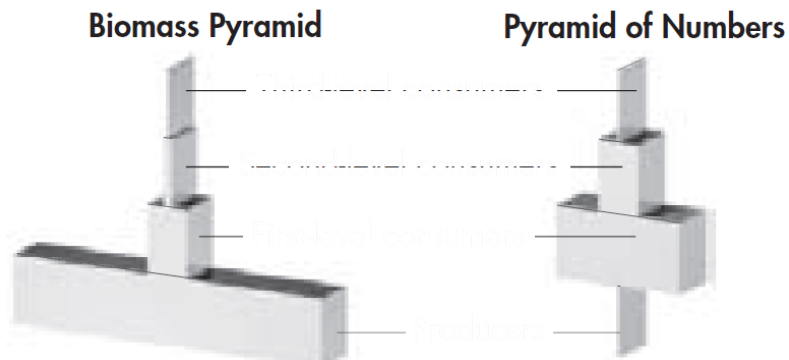
- A biological processes only
- B geochemical processes only
- C chemical processes only
- D a combination of biological, geological, and chemical processes

6. What are the physical, or nonliving components of an ecosystem called?

- A abiotic factors
- B temperate conditions
- C biotic factors
- D antibiotic factors

Questions 7–8

The diagrams below represent the amount of biomass and the numbers of organisms in an ecosystem.



7. What can you conclude about the ecosystem from the pyramid of numbers shown?

- A There are more first-level consumers than producers.
- B There are more third-level consumers than second-level consumers.
- C There are more producers than first-level consumers.
- D There are more second-level consumers than first-level consumers.

8. What can you conclude about the producers in the ecosystem based on the two pyramids shown?

- A The producers in the ecosystem are probably very small organisms.
- B There are no producers in the ecosystem.
- C The producers in the ecosystem are probably large organisms.
- D Decomposers in the ecosystem outnumber the producers in the ecosystem.

9. What ultimately happens to the bulk of matter in any trophic level of a biomass pyramid—that is, the matter that does not get passed to the trophic level above?