

Chapter 3 – Review Questions

Read Chapter 3 and answer the following questions on a separate sheet of paper.

ANSWERS MUST BE HANDWRITTEN! Typed responses will not be accepted.

1. Why are insects important for many forms of life and for you and your lifestyle?
2. What is *ecology*? What five levels of the organization of matter do ecologists focus on?
3. Explain why microbes (microorganisms) are so important.
4. Distinguish among *species*, *population*, *community*, *habitat*, *ecosystem*, and *biosphere*.
5. Distinguish among the *atmosphere*, *troposphere*, *stratosphere*, *hydrosphere*, *lithosphere*, and *biosphere*.
6. What three processes sustain life on earth?
7. List five ways in which the sun helps sustain life on the earth. How is this related to the earth's natural greenhouse effect?
8. What are *biomes*, and how are they related to climate? What are *aquatic life zones*?
9. Distinguish between the *abiotic* and *biotic* components of ecosystems, and give three examples of each.
10. Give an example of how a species can have a narrow *range of tolerance* for one environmental factor and a wider range of tolerance for another factor. At what point in their life cycles are most organisms least tolerant?
11. What is a *limiting factor*, and how do such factors affect the composition of ecosystems? What are two important limiting factors for terrestrial ecosystems? For aquatic ecosystems?
12. Distinguish between *producers* and *consumers* in ecosystems, and give three examples of each.
13. What is *photosynthesis*, and why is it important to both producers and consumers? What is *chemosynthesis*?
14. Distinguish among *primary consumers (herbivores)*, *secondary consumers (carnivores)*, *tertiary consumers*, *omnivores*, *scavengers*, *detritivores*, *detritus feeders*, and *decomposers*. Why are decomposers important, and what would happen if they disappeared?
15. What is the key difference between the movement of matter through an individual organism and the movement of matter in an ecosystem?
16. What are the four components of biodiversity? Why is biodiversity important to the earth's life-support systems? To the economy?
17. What do the letters in the acronym HIPPO stand for? These words represent the five major causes of what?
18. Distinguish between a *food chain* and a *food web*.
19. What is *biomass*? What is the *pyramid of energy flow* for an ecosystem? What is *ecological efficiency*? What is the effect of the second law of thermodynamics on the flow of energy through an ecosystem and on the amount of food energy available to top carnivores and humans?

20. Distinguish between *gross primary productivity* and *net primary productivity*. Explain how net primary productivity affects the number of consumers in an ecosystem and on the earth. List two of the most productive ecosystems or aquatic life zones and two of the least productive ecosystems or aquatic life zones. Use the concept of net primary productivity to explain the problems with harvesting plants from estuaries, clearing tropical forests to grow crops, and harvesting the primary producers in oceans to feed the human population.
21. About what percentages of total potential net primary productivity of first, the entire earth, and second, the earth's terrestrial ecosystems are used, wasted, or destroyed by humans?
22. What is a *biogeochemical cycle*? How do such cycles connect past, present, and future forms of life?
23. Describe the *water cycle*, and list three human activities that alter this cycle.
24. Describe the *carbon cycle* and explain the roles of photosynthesis and aerobic respiration in this cycle. Why is carbon a component of nature's thermostat? List two human activities that alter the carbon cycle.
25. Describe the *nitrogen cycle*. Distinguish among *nitrogen fixation*, *nitrification*, *assimilation*, *ammonification*, and *denitrification*. Explain why the level of nitrogen in soil often limits plant growth. List six ways in which humans alter the nitrogen cycle.
26. Describe the *phosphorus cycle*. Explain why the level of phosphorus in soil often limits plant growth on land and why phosphorus also limits the growth of producers in many freshwater streams and lakes. List three ways in which humans alter the phosphorus cycle.
27. Describe the *sulfur cycle*, and list three ways in which humans alter this cycle.
28. Distinguish among *field research*, *laboratory research*, and *systems analysis* as methods for learning about ecosystems. What are *geographic information systems*, and how are they used to study ecosystems?
29. Explain why baseline ecological data is important to scientists.