

Chapter 3 Review Questions + Problem Set

Directions- On loose-leaf paper, answer the following questions in well-written complete sentences. You do not need to write the question. Number each answer so the number corresponds the question that you have answered. **Only hand-written responses will be accepted. Typed or emailed copies will not be graded.**

Chapter 3 Review Questions

1. What are three harmful effects resulting from the clearing and degradation of tropical rain forests?
2. Define ecology.
3. Define organism, population, and community.
4. Distinguish between the living and nonliving components in ecosystems and give two examples of each.
5. What is a trophic level?
6. Distinguish among producers (autotrophs), consumers (heterotrophs), and decomposers and detritus feeders and give an example of each in an ecosystem.
7. Distinguish among primary consumers (herbivores), secondary consumers (carnivores), tertiary (third-level) consumers, and omnivores, and give an example of each.
8. Distinguish between photosynthesis and chemosynthesis.
9. Distinguish between aerobic respiration and anaerobic respiration (fermentation).
10. Explain the importance of microbes.
11. Distinguish between a food chain and a food web.
12. Explain what happens to energy as it flows through the food chains and food webs.
13. What is biomass?
14. What is the pyramid of energy flow?
15. Why are there more insects than tigers in the world?
16. Distinguish between gross primary productivity (GPP) and net primary productivity (NPP), and explain their importance.
17. What happens to matter in an ecosystem?
18. What is a biogeochemical cycle (nutrient cycle)?
19. Explain how clearing a rainforest can affect local weather (Core Case study).

Biogeochemical Cycles

20. Summarize each biogeochemical cycle (in paragraph or bullet form), explain how human activities are affecting each cycle, and draw a diagram of each cycle. **Use your textbook, the Biogeochemical Cycles Activity page on buteraapes.wikispaces.com, or both.**
 - a. carbon cycle
 - b. nitrogen cycle
 - c. phosphorus cycle
 - d. sulfur cycle

Chapter 3 Problem Set

On loose-leaf paper, using the format modeled by your instructor, solve the following problems.
SHOW ALL OF YOUR WORK. MAKE IT LOOK BEAUTIFUL ☺

1. The Fullerton School District uses oil to heat school buildings. Go Green! is a new project the district will implement. The superintendent has declared that the district will dedicate itself to reducing its carbon footprint. In addition to taking serious energy-conservation measures, the district is planning to help offset its carbon dioxide emissions by raising money to help conserve a portion of a large tract of forestland neighboring the high school campus.

Use the assumptions below to answer the questions that follow. For each calculation, show all work.

The biomass of the forest increases at an annual rate of 2.7×10^5 kg/ha.

The forest biomass is 50 percent carbon by mass.

Each year the district uses 4.0×10^5 gallons of fuel oil for heating and hot water.

10 kg of CO_2 is produced when 1 gallon of fuel oil is burned.

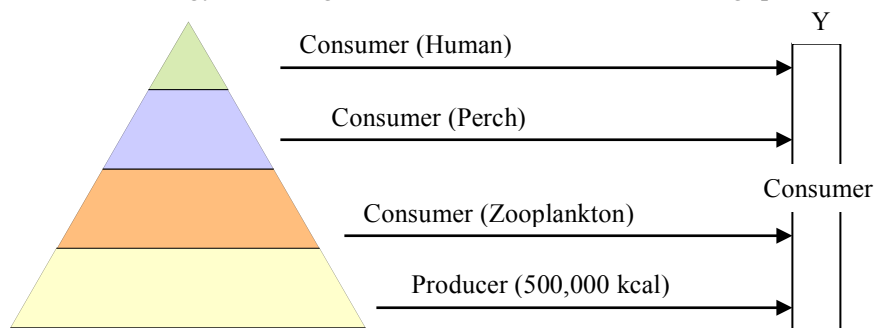
1.0 kg of CO_2 contains 0.27 kg of carbon.

The cost of putting 1 ha of the forest into conservancy is \$12,000.

- Calculate the mass of carbon, in kg, that is accumulated and stored in 1.0 ha of forest in one year.
- Calculate the mass of carbon, in kg, that is emitted by the school as a result of its fuel-oil consumption in one year.
- Calculate the number of hectares of forest the school district needs to conserve in order to offset the carbon released in one year by the school burning its fuel oil.
- Calculate the amount of money the school district must raise for the conservation project.

2. The NPP for a particular river ecosystem is measured at $8,833 \text{ kcal/m}^2/\text{year}$. Respiration by the aquatic producers in this ecosystem is estimated at $11,977 \text{ kcal/m}^2/\text{year}$. Calculate the GPP for this ecosystem.

3. Refer to the energy flow diagram below to answer the following questions:



- If there are 500,000 kilocalories (kcal) in the producer level, how many kcal will become incorporated in the tissues of the secondary consumers?
 - How many kcal will become incorporated in the tissues of the tertiary consumers?
4. Use the diagram (below) depicting Energy Flow Through a Food Chain to answer this question: Assuming that 10,000 kcal of energy are available to the grass plant, how much useful energy will be available to the hawk in this food chain?

