

Food Chains, Energy Flow, and Shortening the Food Chain

Name: _____ Date: _____

Instructions: Complete the questions below. Draw diagrams and show calculations where needed.

Section 1: Energy Flow Through Producers

1. Explain why photosynthesis is less than 10% efficient.
2. On the diagram below, show what happens to sunlight energy when it reaches a leaf. (Draw arrows for absorbed, reflected, transmitted, and lost energy.)
3. Why is only a small percentage of sunlight energy converted into useful chemical energy?
4. What happens to the chemical energy stored in plants when herbivores feed on them?
5. Describe two ways in which decomposers are involved in the carbon and energy cycle.

Section 2: Shortening the Food Chain

6. What is the estimated number of people supported by 1000 tonnes of plant plankton if they eat cod?
7. How many people could be supported if they ate sand eels instead of cod?
8. If people ate shrimps directly, how many could be supported?
9. If people ate only plant plankton (vegetarian diet), how many could be supported?
10. Why do fewer people get supported when the food chain is longer?
11. Why might people in less wealthy countries rely more on vegetarian diets?
12. Discuss how cutting down trophic levels helps conserve energy in a food chain.
13. What percentage of energy is typically lost at each trophic level?
14. Give one example of energy being 'wasted' in a food chain.
15. Why do Western countries often consume meat-rich diets despite being less energy efficient?

Section 3: Application & Critical Thinking

16. Draw and label a pyramid of numbers showing plant plankton → shrimps → sand eels → cod → people.
17. Explain how energy efficiency relates to world food security.
18. Suggest one environmental benefit of shortening food chains.

19. Suggest one economic or cultural reason why people still prefer meat-based diets.

20. Debate: 'Vegetarian diets are essential for feeding the growing global population.' Do you agree or disagree? Explain.