Biology · Ecology · Revision workbook

Energy flow in ecosystems

Name _____ Date _____

Key ideas

Food-chain arrows point from the food to the organism that eats it. Producers make organic material, and feeding transfers some of its chemical energy to consumers. Respiration, waste and uneaten material reduce the energy transferred to the next level.

Worked examples

In grass → grasshopper → lizard, identify the primary consumer.

The grasshopper is the primary consumer because it feeds directly on the producer, grass.

A producer level stores 20,000 kJ. The next level stores 3,000 kJ. Find the transfer efficiency.

Efficiency = (3000 ÷ 20000) × 100 = 15%.

Practice questions

Show your reasoning. Each question is worth 2 marks.

1. Identify the producer in algae → water flea → small fish and explain your choice.

2. Place a caterpillar, a leaf and a bird in a food chain. Explain the direction of the arrows.

3. In grass → rabbit → fox, identify the secondary consumer and explain your answer.

4. Give two reasons why energy transferred to one consumer level is below the energy stored at the previous level.

5. A plant population stores 8,000 kJ, and its grazers store 800 kJ. Calculate energy transfer efficiency.

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6. Explain how fungi can return mineral nutrients from dead leaves to soil.

7. An insect-eating bird eats beetles and caterpillars. Explain why a food web represents this relationship better than a single chain.

8. Producers store 40,000 kJ. Transfer efficiencies to the next two consumer levels are 20% and 10%. Find the energy stored at the second consumer level.

9. In a pond, fish eat insect larvae, and the larvae eat algae. Predict one possible effect of a sharp drop in predator fish and explain why it is uncertain.

10. Explain why a pyramid of numbers can be inverted in a woodland but a pyramid of energy for that chain is not.