What is Energy Flow in Food Webs?

Worksheet

Energy flows through a food web from producers to consumers, but only about 10% of the energy at one trophic level is available to the next, because the rest is lost as heat, movement, and waste.

Questions

1. If producers have 5,000 kcal of energy, how much is available to primary consumers at 10% efficiency?

A) 500 kcal
B) 5,000 kcal
C) 50 kcal
D) 50,000 kcal

2. What happens to most of the energy at each trophic level?

A) It's stored forever
B) It's lost mainly as heat
C) It disappears instantly
D) It doubles

3. Which trophic level usually has the most available energy?

A) Top predators
B) Secondary consumers
C) Producers
D) Primary consumers

4. A food web differs from a food chain because it

A) only has producers
B) shows a single path of energy flow
C) shows multiple interconnected feeding relationships
D) has no consumers

5. A field of grass captures 10,000 kcal of energy. How much energy is available to the grasshoppers (primary consumers) that eat it, assuming 10% ecological efficiency?

6. Grasshoppers pass on their 1,000 kcal to frogs (secondary consumers). How much energy reaches the frogs?

7. If a snake (tertiary consumer) eats the frogs, how much of the original 10,000 kcal of grass energy remains available at the snake's level?

8. Define: What is a food web?

9. Define: What is the 10% rule?

10. Define: What is a trophic level?

Answer Key

1. A) 500 kcal - 5,000 0.10 = 500 kcal.

2. B) It's lost mainly as heat - Metabolic processes release most of the energy as heat, so only ~10% moves on.

3. C) Producers - Producers capture the most energy directly from sunlight, so they sit at the base with the most energy.

4. C) shows multiple interconnected feeding relationships - A food web combines many food chains into a network of feeding relationships.

5. E_next = E_current 0.10 E_next = 10,000 0.10 = 1,000 kcal

6. E_next = 1,000 0.10 = 100 kcal

7. Frogs Snake: 100 0.10 = 10 kcal Only 10 kcal of the original 10,000 kcal (0.1%) reaches the snake - energy loss compounds at each level

8. A network of interconnected food chains showing how energy flows between producers, consumers, and decomposers in an ecosystem.

9. On average, only about 10% of the energy at one trophic level is transferred to the next; the rest is lost as heat.

10. A feeding position in a food chain, e.g., producer, primary consumer, secondary consumer.