

Energy Flow Through The Food Chain: 10 Percent Rule of Energy Flow

CLASS SET - Please Use a separate sheet of paper

Food chains show how energy moves through an *ecosystem*, the combined physical and biological elements in an environment. In a food chain, *producers*, organisms that make their own food, provide food for animals called *first-level consumers*. These animals are then eaten by *second-level consumers*, which may be consumed by *third-level consumers*. Scientists estimate that only 10 percent of the producers' energy is passed to the first-level consumer. This activity will help put that amount into perspective.

Materials

10 ml graduated cylinder, a beaker filled with 100 ml of water, Medicine dropper, and three plastic cups labeled with 1^o consumer, 2^o consumer, and 3^o consumer.

Activity

1. The first cup is labeled "first-level or 1^o consumer," cup 2 is labeled "second-level or 2^o consumer," and cup 3 "third-level or 3^o consumer." The beaker filled with 100 ml of water represents the energy supplied by producers. For this activity we will assume that the producer possesses 100 units of energy.
2. A first-level consumer eats the producer and absorbs only 10 percent of its energy. Use a graduated cylinder to pour 10ml of the producer's water into cup 1.
3. The second-level consumer eats the first-level consumer and gets only 10 percent of its energy. Use the graduated cylinder to pour 1 ml of water from cup 1 into cup 2.
4. The third-level consumer eats the second-level consumer and gets only 10 percent of its energy. Use the medicine dropper to transfer 0.1 ml of water from cup 2 into cup 3.

Follow-Up Questions

1. If the food chain had continued to the next level, what percentage of energy would the fourth-level consumer have received from the third-level consumer? How much water would you have transferred into the fourth-level consumer's cup?
2. Judging from this activity, why do you think most food chains never go higher than second- or third level consumer?

Extension

Draw a pyramid of energy showing the following organisms in the correct order: *caterpillar*, *grass*, *snake*, *lizard*, and *hawk*. Label the percentage of energy each organism gets through the food chain. Assume there is 100,000 units of energy available at the producer level.

