VIRTUAL LAB

Investigate the food web of Chesapeake Bay.

Literacy Connection

Integrate with Visuals

Why is an energy pyramid shaped like a triangle with the point on top?

.....

.....

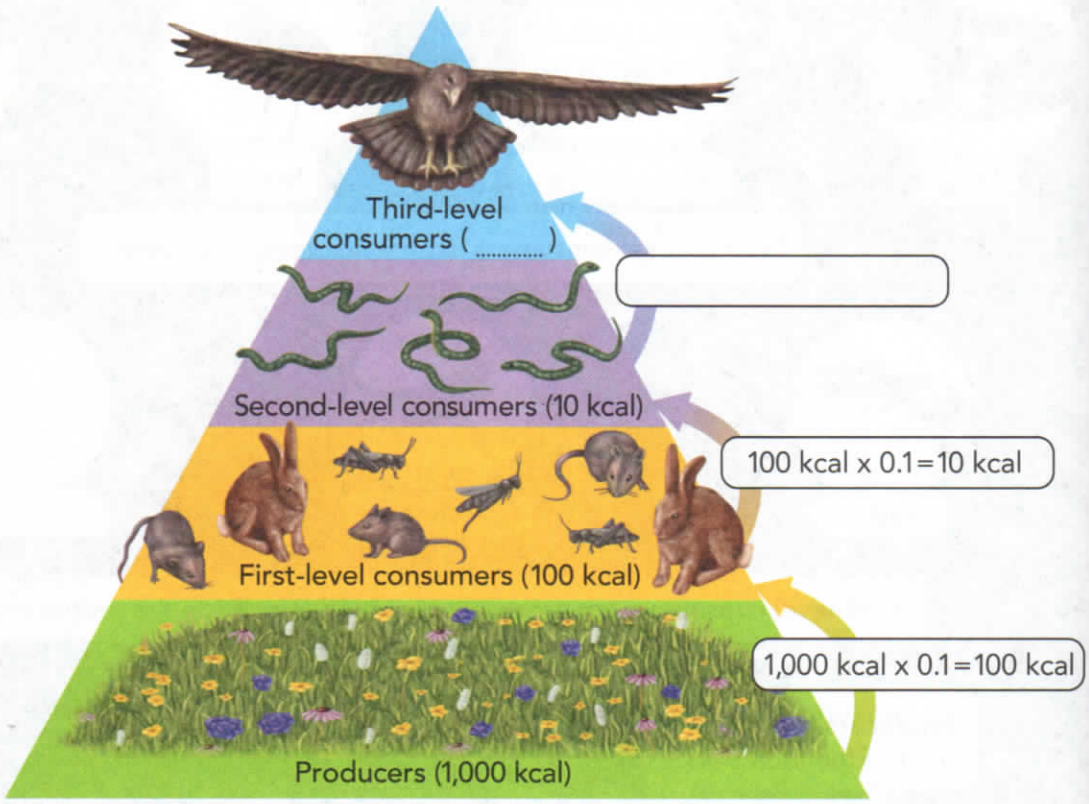
.....

.....

Energy Pyramids

A diagram called an **energy pyramid** shows the amount of energy that moves from one feeding level to another in a food web. Each step in a food chain or food web is represented by a level within an energy pyramid, as shown in **Figure 5**. Producers have the most available energy so they make up the first level, or base, of the pyramid. Energy moves up the pyramid from the producers, to the first-level consumers, to the second-level consumers and so on. There is no limit to the number of levels in a food web or an energy pyramid. However, the more levels that exist between a producer and a given consumer, the smaller the percentage of the original energy from the producers that is available to that consumer. Each level has less energy available than the level below.

When an organism consumes food it obtains energy and matter used to carry out life activities. These activities produce heat, which is released and lost to the environment, reducing the amount of energy available to the next level.



Energy Pyramid

Figure 5 This energy pyramid shows how the amount of available energy decreases as you move up an energy pyramid from the producers to the different levels of consumers. Only about 10 percent of the energy is transferred from level to level. Energy is measured in kilocalories, or kcal.

Calculate Write in the missing equation and fill in the energy that gets to the hawk at the top.

Energy Availability

As you can see in **Figure 5**, only about 10 percent of the energy at one level of a food web is available to the next higher level. This greatly limits how many different levels a food chain can have, as well as the numbers of organisms that can be supported at higher levels. This is why it is typical for there to be fewer organisms as you move from one level of a pyramid or one "link" in a food chain up to the next level.

INTERACTIVITY

Model how altering a food web affects the flow of energy and matter in an ecosystem.

READING CHECK **Summarize Text** Why is energy reduced at each level of the energy pyramid?

.....

.....

.....

Math Toolbox

Relationships in an Energy Pyramid

In a small forest ecosystem, caterpillars eat plants. Carolina wrens eat the caterpillars, and black rat snakes eat the wrens. Suppose that the plants contain 550,000 kilocalories.

1. **Calculate** Complete the pyramid by calculating the energy available to each level.
2. **Analyze Proportional Relationships** How would the amount of energy in the pyramid change if the caterpillars ate only half of the available plants?

.....

.....

.....

.....

.....