

## Go with the Flow

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<b>Strand</b>	Life Systems
<b>Topic</b>	Investigating food webs and food pyramids
<b>Primary SOL</b>	LS.6 The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include <ol style="list-style-type: none"><li>the carbon, water, and nitrogen cycles;</li><li>interactions resulting in a flow of energy and matter throughout the system;</li><li>complex relationships within terrestrial, freshwater, and marine ecosystems; and</li><li>energy flow in food webs and energy pyramids.</li></ol>
<b>Related SOL</b>	LS.5 The student will investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plant and animal life. Key concepts include <ol style="list-style-type: none"><li>photosynthesis as the foundation of virtually all food webs.</li></ol> LS.8 The student will investigate and understand interactions among populations in a biological community. Key concepts include <ol style="list-style-type: none"><li>the relationships among producers, consumers, and decomposers in food webs.</li></ol>

### Background Information

All living organisms must have energy to live. Energy in ecosystems comes directly or indirectly from the sun. Autotrophic organisms, through the process of photosynthesis, can turn sunlight into food. Heterotrophic organism must consume other organisms for the energy they need.

This transfer of energy by producers to consumers may be modeled through food chains. The amount of energy is greater at the producer level. In most ecosystems there will be many food chains that overlap creating a food web. An energy pyramid is a model that shows the amount of energy at each feeding level. Producers form the wide base of the pyramid because they hold the most energy in an ecosystem. The upper levels of the pyramid show consumers and decomposers. The narrowing top of the pyramid illustrates that there is less energy at those levels.

### Materials

- Yarn
- Index cards
- Hole punch
- Marker
- Scissors
- Copies of Energy Pyramid handout (attached)

## Vocabulary

*autotroph, carnivore, consumer, decomposer, ecosystems, energy pyramid, first-order consumer, food chain, food web, herbivore, heterotroph, omnivore, photosynthesis, producer, second-order consumer, third-order consumer*

## Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Write the names of different plants and animals on index cards. You can make your own list, have students select their own organism, or use the suggestions below. Be sure to include the sun, producers, herbivores, and flesh eaters.  
*sun, grasshopper, flea, mushrooms, fox, sparrow, wheat, berry bush, mouse, worm, microscopic bacteria, owl, cow, hawk, dandelion, rabbit, caterpillar, robin, tick, rabbit, wolf, grass, corn*
2. Give each student a labeled card. For students who don't have producers, have the student write what type of consumer is on the card (herbivore, omnivore, carnivore, etc.). Punch holes in the cards, and give each student a piece of yarn so that the card can be hung around his/her neck. Have students stand in a circle in the classroom.
3. Have students identify food sources for their organism. As each one is identified, pass a ball of yarn between the two students. If one student is a *grasshopper*, he would pass the ball of yarn to *grass*, because the grasshopper gets its energy from the grass. The student with *grass* would pass the yarn to the *sun*, because the grass gets its energy from the sun. When a string gets to the *sun*, snip it off, and start the ball of yarn in another place.
4. Continue making the web with all the other students in the class. Students can be in as many chains as time will allow. Discuss the food web that the class has formed.
5. Discuss how an energy pyramid diagram can show the energy levels in a food web. Discuss the producer level, the first-order consumer level, the second-order consumer level, and the third-order consumer level. Draw students' attention to the concept that just as the pyramid narrows at the top, so does the amount of energy available.
6. Give each student a copy of the blank "Energy Pyramid" handout. Have students complete the diagram with the organisms from the food web they demonstrated.

## Assessment

- **Questions**
  - What would happen if a species was removed (became extinct) from the web?
  - What might happen to the web if a forest fire occurred?
  - What would happen if all the predators were removed?
  - How is the sun an important part of the food web?
  - How is an energy pyramid an appropriate way to illustrate the energy in a food web?
- **Journal/Writing Prompts**
  - Stinkbugs have become rampant in Virginia. They pose a threat to destroying large amounts of food crops. At this time there is no natural predator of the stinkbug. Predict how these insects might affect the ecosystem.
  - The number of white-tailed deer has dramatically increased in Virginia's urban areas. Deer are mainly herbivores that eat any type of vegetation. Deer have become a

problem to drivers on Virginia roads. Explain whether you think lawmakers should take action to control the deer population.

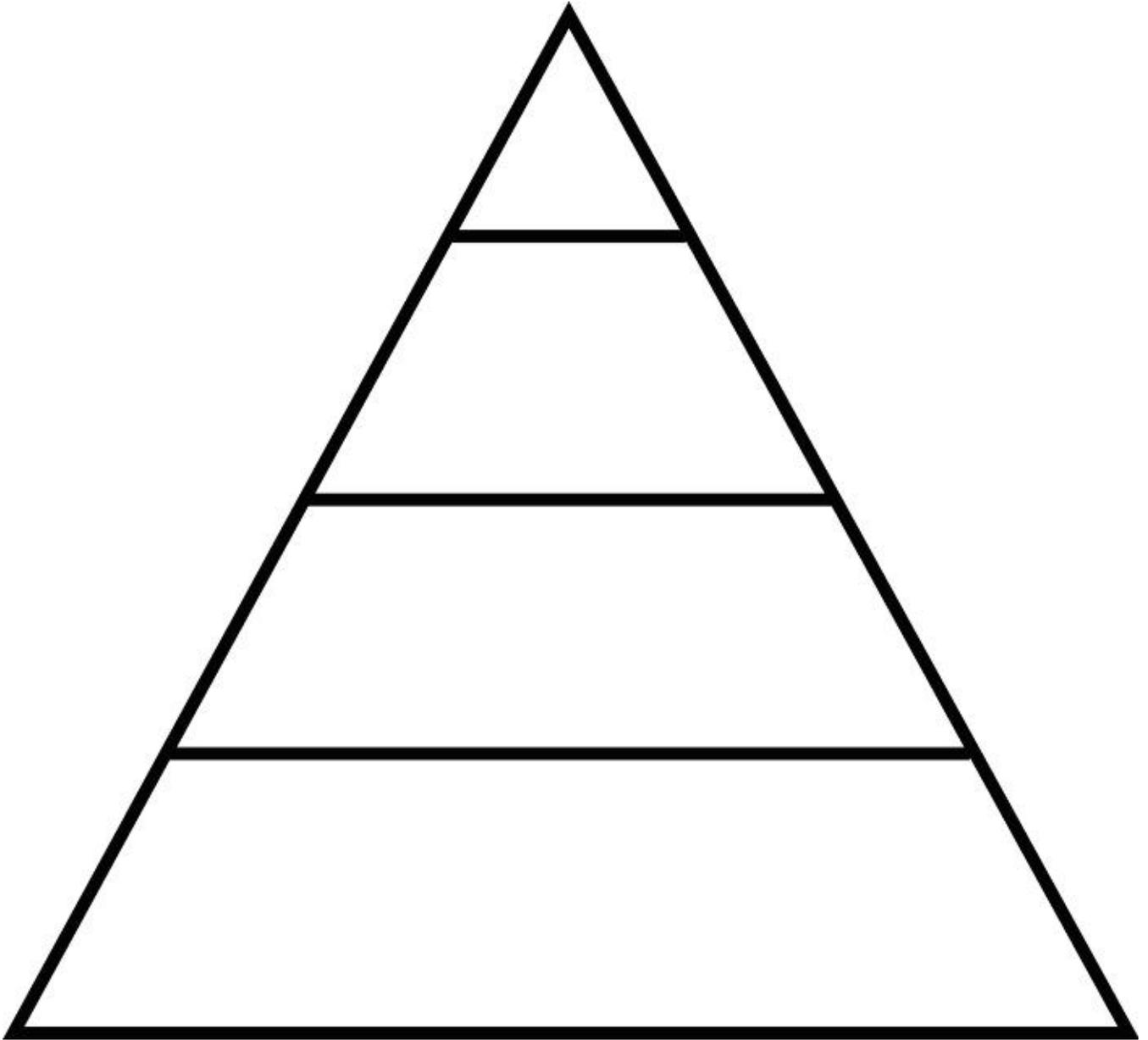
**Extensions and Connections (for all students)**

- Share the picture book, *The Great Kapok Tree*, with students. Have students identify and illustrate the food chains found in the story.

**Strategies for Differentiation**

- Provide illustrated organism cards, if necessary.
- Create a magnetic word wall of important vocabulary for this lesson (photosynthesis, sun, bacteria, mouse, energy, grass, producer, carnivore, etc.). Have students organize the words according to how they are related or how they might appear in an ecosystem.
- Select another ecosystem. Have students work in pairs to create an energy pyramid for that ecosystem.

## Energy Pyramid



1. **Label using these terms:**  
producers, first-order consumer, second-order consumer, third-order consumer
2. **Insert the organisms that were used in our class food web on the correct level.**