

## Food Webs: Learning Goals for Students and Teachers

Student and Teacher Learning Goals	Additional Teacher Learning
<ol style="list-style-type: none"> <li>1. Food provides matter and energy for all living things.</li> <li>2. Living things can be organized into food chains and food webs that show how organisms get their food matter and energy. Producers make their own food, consumers get their food by eating producers and other consumers, and decomposers (a special kind of consumer) get their food from once-living matter.</li> <li>3. Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die.               <ol style="list-style-type: none"> <li>a. Matter enters food chains/food webs when producers take simple materials from the air (carbon dioxide) and soil (water) to make food (sugar).</li> <li>b. Plants use the food they make to live and grow.</li> <li>c. When herbivores eat plants or carnivores eat other organisms, matter moves from one organism to another.</li> <li>d. Organisms use some of the matter in food for growth—to build body structures.</li> <li>e. Decomposers complete the cycle by breaking down the matter from wastes and dead organisms into small pieces and releasing them into the air as carbon dioxide and into the soil as water and minerals.</li> <li>f. The carbon dioxide and water the decomposers release can be used again by plants to make more food.</li> </ol> </li> <li>4. Energy flows from the Sun to producers to consumers in food webs:               <ol style="list-style-type: none"> <li>a. Producers (plants) transform light energy from the Sun into energy stored in food (sugar) molecules.</li> <li>b. When herbivores eat plants, or when carnivores eat other organisms, or when decomposers eat wastes and dead organisms, energy is passed from one organism to another.</li> <li>c. Organisms use some of this energy from food to live, move, and reproduce. In this process, some energy is released into the environment as heat.</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>2T. The feeding level an organism occupies in a food web is its trophic level, which includes producers, primary consumers (herbivores), secondary consumers (small predators that are carnivores or omnivores), and top-level consumers (large predators that are carnivores or omnivores).</li> <li>3Ta. The process of photosynthesis converts carbon dioxide and water into sugars and released oxygen. (See also 4Ta.)</li> <li>3Tb. Photosynthesis produces sugars that can be used immediately or stored for growth or later use.</li> <li>3Tc. Most of the matter plants use for growth originates from carbon dioxide and water.</li> <li>3Td. The sugar molecules made in photosynthesis plus inorganic nutrients like nitrogen and phosphorus are used to make larger molecules like proteins and DNA that in turn are used to form new cells, for example.</li> <li>3Te. Food molecules undergo a series of reactions in the process of cellular respiration and eventually react with oxygen molecules in living organisms to release the energy needed for life processes (growth, movement, warmth, and repair).</li> <li>3Tf. During cellular respiration, carbon dioxide and water are produced.</li> <li>4Ta. Photosynthesis converts light energy to stored chemical energy in food (sugar) molecules. (See also 3Ta.)</li> <li>4Tb. As organisms use the energy stored in food, they also give off heat energy into the environment.</li> <li>4Tc. Nearly all energy that enters a food web from sunlight during photosynthesis is eventually released back into the environment as heat energy. However, this may take a long time; for example, when coal that formed from ancient forests is burned for fuel in a power plant today.</li> <li>4Td. Only a portion (about 10%) of the energy available in one trophic level in a food web is available in the next trophic level.</li> <li>4Te. Because the heat energy that organisms give off cannot be used again by living things, a constant supply of new energy is needed in food webs.</li> <li>4Tf. Therefore, energy flows <i>through</i> food webs, is released as heat, and isn't recycled like matter.</li> </ol>