



## FOOD/ENERGY PYRAMID/CYCLE OUTDOOR LAB LESSON PLAN

**Subject Areas:** Aquatic food web and energy transfer

**Grade Level:** Middle School

**Season:** Spring

**Instructional Time:** 45 minutes

**A. Learning Goal:** Learners will be able to collect and recognize segments of the food web and make connections between the terrestrial and aquatic ecosystems.

**B. Objectives:**

- Learners will learn to differentiate between energy and matter.
- Learners will learn that the ultimate source of energy is the sun.
- Learners will learn the “flow” of matter and energy through an ecosystem.
- Learners will learn the differences between decomposers, producers, primary, secondary, and tertiary consumers.
- Learners will be able to identify organisms and place them into appropriate places within a food web.
- Learners will be able to sketch collected specimens.

**C. State Standards**

- SCI.CC4.m – Students understand systems may interact with other systems: They may have sub-systems and be a part of larger complex systems. They use models to represent systems and their interactions — such as inputs, processes, and outputs — and energy, matter, and information flows within systems. They also learn that models are limited in that they only represent certain aspects of the system under study.
- SCI.CC5.m – Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.
- SCI.SEP2.m – Developing and using models.
- SCI.LS1.C.m – Plants use the energy from light to make sugars through photosynthesis. Within individual organisms, food is broken down through a series of chemical reactions that rearrange molecules and release energy.
- SCI.LS2.A.m – Organisms and populations are dependent on their environmental interactions both with other living things and with nonliving factors, any of which can limit their growth. Competitive, predatory, and mutually beneficial interactions vary across ecosystems but the patterns are shared.
- SCI.LS2.B.m – The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. Food webs model how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact within an ecosystem.

**D. Setting:** Designated woodland trail or course that is mapped out.

**E. Materials/Resources:** Students divided into small groups

- Student lab manuals, writing utensils, and clipboard.
- White board with marker.
- Variety of natural artifacts to represent various living organisms, placed along a woodland trail.
- Flags to mark position of artifacts.
- Stakes with various colored tops to denote starting positions of groups, staggered throughout trail and color-coded maps of the trail for instructors.
- Cameras to document artifacts and evidence of organisms.
- First Aid kit.

**F. General delivery, see teacher guide for detailed implementation suggestions:**

**Introduction of Lesson:**

- Before going outdoors, introduce the session and context for food web, including that photosynthesis is the basis for all food webs.
- Review safety aspects.

**Safety Considerations:**

- Learners should stay with their groups at all times. Partnered-up and within sight of the instructor at all times.

**Class Activity:**

**Large Group:** Review indoor material, safety precautions, formulate teams and distribute equipment.

**Small Group:** Each small group will be partnered with an instructor to walk the trail and share what they observe as evidence for organisms.

- Students will place the organisms on the appropriate pages in their lab manual to represent their place in the food web.
- Learners will draw arrows in direction materials and energy travels.
- Living representatives are returned to their habitat.

**G. Assessment:**

- Learners discuss how human activity might disturb the living cycles of an aquatic environment.
- Have an informal discussion of what they learned about the food web and connections between terrestrial and aquatic ecosystems.
- Optional: Learners may write an essay about what they learned and how humans fit into the scheme of living cycles.