



***Dedicated
to Reducing
Pesticides***

Unit 1 Lesson 1: Everybody is Somebody's Lunch

Session I: Food Chains

Focus Areas: Pest Control: Biological/Natural; Environmental Science

Focus Skills: observing, discussing, comparing and contrasting, researching, concept forming, evaluating

Objectives

- To determine in what ways living things are connected
- To understand that systems are complex in their connections
- To learn what happens if certain components of a system are removed
- To determine the effect of pest management strategies on food chains and food webs

Essential Questions

- What is a food chain?
- What is a food web?
- What is the effect of a species being eliminated in a food chain?
- In a food web?
- How can Integrated Pest Management (IPM) help protect the way plants and animals interact in an ecosystem?
- How can the use of chemical pesticides impact a food chain and a food web?

Essential Understandings

- Food chains transfer energy from one organism to another.
- Food chains that overlap and interconnect are called food webs.
- When one species is eliminated in a food chain, the survival of the other links is threatened.
- Creatures in a food web have a better chance of survival when a plant or animal is eliminated because they can feed on other species.



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- Integrated Pest Management (IPM) helps to protect the creatures in both food chains and food webs by using natural controls, such as insect predators, rather than chemicals to control and only eliminate target pests.

Background

Food chains are a part of the web of life. A food chain starts with plants, **producers**, which use the sun's energy to produce food. The chain of energy next passes on to plant-eating animals, such as mice, known as **primary consumers**. It then proceeds to the animals that eat the primary consumers – for example, weasels – known as **secondary consumers**. If a third animal, such as an owl, were to eat the secondary consumer, it would be known as a **tertiary consumer**. Various organisms break down dead plants and animals into nutrients and energy. These organisms – such as earthworms, bacteria, fungi, and some types of insects – are known as **decomposers**.



Vocabulary

carnivore	an animal whose diet is mostly meat. Examples: wolf, owl
decomposer	an organism that breaks down the remains of plants and animals
herbivore	an animal whose diet is plants. Examples: rabbit, deer
insectivore	an animal that eats insects. Examples: some bats, frogs
instinct	the natural behavior a creature exhibits without thought or reasoning
microorganisms	fungi, molds, and bacteria that are only visible to the naked eye when present in large numbers



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omnivore

an animal that eats both plants and animals.
Examples: fox, bear

predator

an animal that hunts other animals for food

prey

an animal that is eaten by another animal for food



Logistics

Time: 45 to 60 minutes

Group Size: two groups of 10 to 15 children to play the **Food Chain Game**

Space: a room with comfortable seating and an area outside



Materials

Overhead 1 for Session II "Food Energy Pyramid" *
Handout 1 for Session I "Food Chains"
with Answer Key *

Handout 2 for Session II "Focusing on Food Webs"
with Answer Key *

Books from the school library about food chains and food webs. An excellent resource is: *Everybody Is Somebody's Lunch* by Cherie Mason and Julie Kellogg Markowsky. (A teacher's guide is available for purchase with the book.)

Word and picture cards, 8 ½" x 11" per word/picture *

Food Chain Picture Card Set *

boxes to paste food chain pictures on

Note: Materials needed for the **Food Chain Game** are found on page 7.

* single copy provided



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Preparation



1. Obtain the word and picture cards.
2. Tape the Food Chain picture cards on boxes of various sizes to represent the different links of the food chain. Cereal boxes work well. Use the snack pack size for plants and a family size box for the secondary predators.

Activity



Challenge: Demonstrate the interactions within a food chain and web.
(Display for group viewing)

Introduction

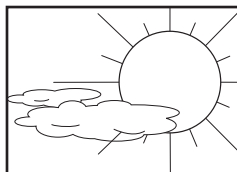
1. Ask the children, "What do you think is meant by the expression, *Everybody is Somebody's Lunch*"?
2. Tell the children that animal and plant populations have special names based on what they eat.
3. Introduce the word cards and ask the children to define them.

Predator

Prey

Explain that predators and their prey make up the **Food Chain**.

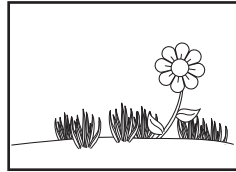
4. Ask them to define food chain. (A food chain is a linear series of predator and prey relationships within an ecosystem.)
5. Display the **Sun** card, as the first link in the food chain. Inquire why it is always the first link. (Sunlight provides the energy that green plants need to produce food.)





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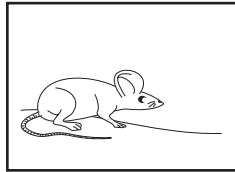
6. Display the **Plant** card and ask why it is the second link. (Plants use sunlight to make food from air, water, and minerals.)



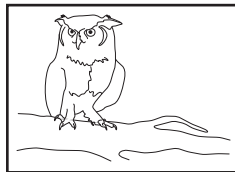
7. Display the **Mouse** card. A mouse is an

Herbivore

. What word do you see inside the word? (herb) Herbivores eat plants. The sun's energy is trapped by the plant and moves as food into the body of the herbivore.



8. Display the **Owl** card.



What is an owl? What does an owl eat? (meat) A meat eater is a

Carnivore

Food energy moves into the body of the predator that eats the herbivore.

9. Display the

Decomposer

 word card. Why are Decomposers important? (Decomposers are organisms that break down dead plants and animals into nutrients and energy.)

Demonstration of a Food Chain

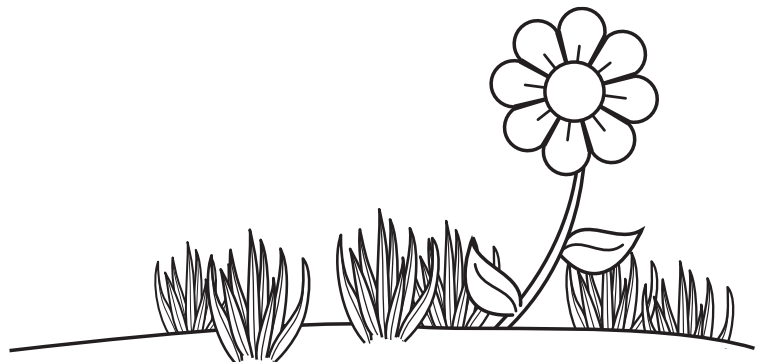
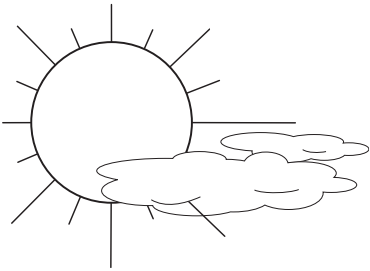
1. To demonstrate how a food chain works, set up a display, using boxes to represent the various parts of a food chain. Each box represents a link in the food chain. Make sure that the boxes



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are placed so that if you push on the Decomposers box, the rest will fall like dominoes, and if you remove a box from the row, the boxes beyond that one will remain standing when you push the Decomposers box over.

2. The action of the falling boxes symbolizes one animal receiving food from the preceding member of the food chain. When all of the boxes have fallen, it means that all of the links (members) have connected (eaten) and will survive. If a box remains standing, it means that a link of the food chain has not connected with (eaten) its food source and is in danger of dying.
3. Demonstrate a cereal box food chain by pasting on the following pictures or words: Hawk (bird of prey), Snake, Songbird, Ladybug, Aphid, Plant, and Decomposer. Show the children how a missing link in the food chain, in this case the ladybug, affects all of the other creatures in the chain. Set the boxes up in this order: Hawk, Snake, Songbird, Ladybug, Aphid, Plant, and Decomposer. Remove the Ladybug box from the row. Tell the participants that pesticides killed all of the ladybugs. (Make sure the boxes are spaced so that the Aphid box will not touch the Songbird box when it falls.) Push the Decomposers box over. The Songbird, Snake, and Hawk boxes will still be standing. This activity physically depicts that without some members of the food chain, other members of the food chain could be in danger of extinction.
4. Ask the children to determine which would be the bottom (Decomposers) and which would be the top (Hawk) of the food chain.





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Involvement

Set Up for Food Chain Game

Materials	5 large bags or one giant bag of popcorn tags with ribbons or pinneys from the Physical Education Department whistle stop watch pencil and paper to record 20 small plastic bags to hold popcorn (Supervise the use of the bags.) masking tape chart paper string or yarn
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Food Chain Game

Preparation for Game:

Before beginning this lesson, pick a large area outside for the game. Designate a safe area and a time-out zone. Have 2 groups play together to simulate the numbers in a real population.

Write on the board: Grass → Cricket → Anole → Owl

Introduction for Game

1. Write **predator** on the board. Review that this is the term for an animal that hunts and eats another animal.
2. Write **prey** on the board. Review that this is the term for animals that are eaten by other animals. Explain that prey can be primary or secondary consumers. (Refer to a food chain drawing.)
3. Tell the children, "We are going to pretend to be predators and their prey. **_____ of you will be crickets, **_____ of you will



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be anoles, and **_____ of you will be owls. (Numbers will be determined by the group size.) Why do you think so many of you will be crickets?" Draw a response from the player indicating that there are more crickets than owls and anoles. For every anole, there are 100 crickets.

- ** Designate over half of the group to be crickets ($\frac{1}{2}$ to $\frac{3}{4}$), about $\frac{1}{4}$ to be anoles, and 2 or 3 to be owls, depending on the number of children playing the game.

Before going outside, assign players their roles for the game. They will each have a turn being an owl, an anole, and a cricket. Have each child record the order of their roles on a small piece of paper. Assign the roles as follows:

O = owl
A = anole
C = cricket

CHILD	ROUND 1	ROUND 2	ROUND 3
1	O	A	C
2	O	A	C
3	O	A	C
4	A	C	O
5	A	C	O
6	A	C	O
7	A	C	O
8	A	C	O
9	A	C	O
10	A	C	O
11	C	A	O
12	C	A	O
13	C	A	O
14	C	A	O
15	C	A	O
16	C	A	O
17	C	A	O
18	C	O	A
19	C	O	A
20	C	O	A
21	C	O	A
22	C	O	A
23	C	O	A
24	O	A	C
25	A	C	O
26	C	O	A

Example: Child 1 is an Owl ("O") in the first round, an Anole ("A") in the second round, and a Cricket ("C") in the third round.



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This gives three different rounds. In the first round, the crickets outnumber the owls and anoles in a way that is similar in nature. In the second round, all three roles have about the same number. In the third round, the owls greatly outnumber the anoles and crickets.

In the first round, the leader simply counts the number of each role left playing the game. In the second and third rounds, the leader counts all that are left, but asks each predator whether or not they ate. If they did not eat, they are counted as dead.

Directions

Explain to the children, "We are going to play a game called the **Food Chain Game**. You will each receive a bag that you will wear around your neck when you are a cricket so that you can gather your food. Half of you will get to be crickets. Why? Because there are more prey than predators. There will be three rounds. You may play the same animal twice." (Review the game chart to show the order of the roles.)

Distribute the tags. Line up and go outside. The leader brings the stopwatch, paper, and pencil to record the results.

One leader explains the rules while the other sprinkles the popcorn.

All children will sit down and listen to the rules:

Purpose For each predator to eat:

Crickets gather popcorn and put it in their bag but do not eat it!

Anoles gently tag crickets.

Owls gently tag anoles.

If you are tagged, you sit down in the designated area. Please be honest and sit down if you get touched!



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Note: There is a safe area for prey to rest. Prey may rest for 20 seconds. Predators must stay 10 steps away from the safety area.

You may begin the game when your animal name is called.

Crickets get 30 seconds to gather popcorn before anoles can begin. The owls start 30 seconds after the anoles start tagging crickets. Play for 5 minutes. When the whistle blows, if children are still playing, say, “Freeze!”

Play Checklist

1. Once the crickets have their plastic bags, tell them to “Go!” They gather popcorn for 30 seconds. Then tell the anoles to go, and 30 seconds later have the owls start hunting.
2. Play continues for 5 minutes. Blow the whistle and have the players remove tags or other identification.
3. Record the results.
4. Have the players line up and assign their new roles.
5. Popcorn is scattered by crickets.
6. The leader has each role get appropriate tags, ribbons, or pinneys for Round two.
7. Rounds two and three are played the same way.
8. Children remove tags, ribbons, or pinneys and put them into a box.
9. Volunteers gather popcorn and put in bags to throw away.

Game developed by Joan Boire, Parker Memorial School, Tolland, Connecticut





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Follow Up



Ask the following discussion questions:

- 1. Which animals in this game were predators? Which were prey?**
The owls and the anoles were predators, and the anoles and the crickets were both prey.
 - 2. What was it like to be a cricket or an anole?**
Both the crickets and the anoles had the challenge of finding food while trying to stay away from their predators.
 - 3. What was it like being an owl?**
As the top predator, owls did not have to worry about anything hurting them, but they had less availability of food than did the crickets and the anoles.
 - 4. What particular traits helped each kind of animal stay alive?**
Children will probably say that it was helpful to be fast, to be able to change directions quickly, and to have a place to hide (the “safe” area).
- ** Point out to the children that these same traits are useful for real animals.
- 5. How could we change the game to make it more like real life?**
Children may realize that being able to camouflage themselves like the anoles or hide under leaves like the crickets would be helpful to their survival.
 - 6. Were all of the animals in any one group eaten?**
It is unlikely that this would happen, since the game is set up with more of each type of prey than predator.
 - 7. What would happen in real life if all of the prey animals were eaten?**
Eventually the predators would suffer from hunger because of lack of food. They might even starve to death if their diet consisted of only one type of prey.



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** Tell the children that in nature there are usually many more prey animals than predator animals, and just as in the game, it is very rare that **all** prey animals are eaten.

8. **What would happen in the game if a pesticide were sprayed and most of the crickets died as a result? How long do you think the game would last?**

The game would be over very quickly because the anoles would starve.

9. Have children complete and review Handout 1, "Food Chains."

Assessment

Correct Handout 1, "Food Chains" using the Answer Key.

Follow Through

Play the game with plants and primary, secondary, and tertiary consumers that are typical to your region and environment. For example, you might play the game and change the roles to be hawks, snakes, mice, and seeds.

Have children create examples of various food chains from habitats around the world.

Resources

Everybody Is Somebody's Lunch by Cherie Mason and Julie Kellogg Markowsky. *A Teacher's Guide to Resources* is available for purchase with the book.



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Session II: Food Webs

Additional Focus Skills: analyzing, organizing information in graphic form

Additional Objectives

- To identify various sources of foods
- To distinguish a food chain from a food web

Background

Food webs are made up of many interconnected food chains. For example, chipmunks are eaten by many predators such as foxes, bobcats, coyotes, and hawks. Some of these animals may also eat things the chipmunk eats such as nuts, fruit, and insects. Food webs show many and varied food chains and how they connect. In every habitat on the earth, green plants and animals form food chain links that branch into food webs. Any change in one link affects all other parts of the food chain and impacts the food web as well.

For example, green plants → caterpillars → wren → hawk are links in a food chain. If all of the caterpillars are sprayed with pesticides and die, a major source of food for songbirds such as wrens will be gone. Songbirds are part of more than just one food chain. They also eat other insects, so their survival would be maintained. If they were only capable of eating caterpillars, their survival would be seriously threatened. For this reason, it is much safer to be a part of a food web where there are many more choices of foods to eat.

Food webs are just one example of Nature's many cycles. In a food web, omnivores, herbivores, and carnivores ensure the flow of energy from one organism to another. While the food web can be viewed as a network of chains, it is also a series of trophic or nutritional levels. Green plants, because they are primary producers, form the first level of the pyramid. Herbivores consume green plants and, therefore, form the second level.

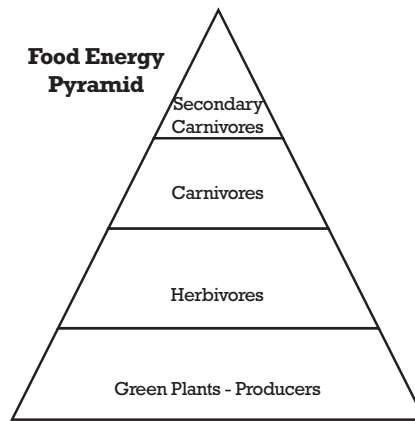


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Carnivores are all predators that feed on the herbivores. They form the third layer of the pyramid. Secondary carnivores are predators that feed on other predators and form the fourth trophic level. Omnivores, because they eat both plants and animals, can be found in the second and third trophic levels.



Logistics

Time: 30 to 45 minutes

Group Size: 5 to 30

Space: a room with comfortable seating



Materials

Overhead 1 "Food Energy Pyramid" *

Handout 2 "Focusing on Food Webs"

with Answer Key *

* single copy provided



Activity

Introduction

1. Review the concept of a food chain that was the focus of Session I. (Food chains show the flow of energy, starting with plants that store it from the sun and pass it on to the various living links that feed on each other for fuel to move, grow, and reproduce.)



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2. Explain to the participants that when they drew (or constructed) food chains, the arrow showed the path of the transfer of energy. It ended with a link called "the top of the food chain." This is the animal that is last eaten that no one else consumes.

What are some living things at the top of the food chain? (These creatures can be consumed by other living things, but this is not a natural event.)

Answer: Humans, sharks, bears, eagles, and other birds of prey

3. Display Overhead 1, "Food Energy Pyramid" and explain the following:

Ecology is the study of relationships between organisms and their environments. Ecologists represent the feeding relationships between organisms in the form of an ecological pyramid. In any ecosystem, the number and types of producers determine the number and types of consumers that can survive in that environment. For this reason, producers always form the base on which the rest of the pyramid is built. The different levels of consumers form the remaining levels of the pyramid.

Every time you eat, you become the top of several food chains and webs. Draw a picture of a glass of milk, an apple, and a peanut butter and jelly sandwich. Have the children make a diagram of the "flow of energy" into their meal. For example:

grass → cow → milk
peanut bush → peanut butter
grapes → grape jelly
wheat → bread
apple tree → apple



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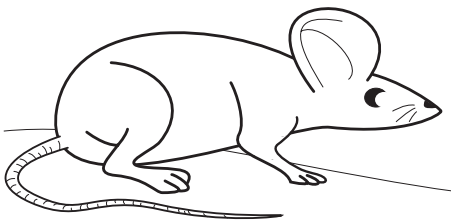
4. Have children list the foods that make up their favorite meal. Have the groups analyze where every item on their dinner menu comes from. Have children construct a flow diagram or chain that illustrates the sources of each food, from the product they eat all the way back to the plant origin.

Are there places where the food chains interact?
What food webs are they part of?

5. Brain Teaser: Tell the children that all food chains start somewhere with a rock: Why is this statement true? (The soil and nutrients that plants need come from rocks.)

Involvement

Have the participants cut out or draw pictures of the following organisms to create their own examples of a food web. (All of the pictures will not be used.)



people	mountain lions	mice
rabbits	robins	insects
grass	earthworms	wheat
lettuce	hawks	cows
corn	pigs	deer
acorns	horse	snake
frog	eagles	algae

Follow Up

1. Have children complete Handout 2, "Focusing on Food Webs."
2. Have volunteers share and analyze their food webs.

Assessment

Using the Answer Key for Handout 2, "Focusing on Food Webs," rate each question 1 to 25 points.