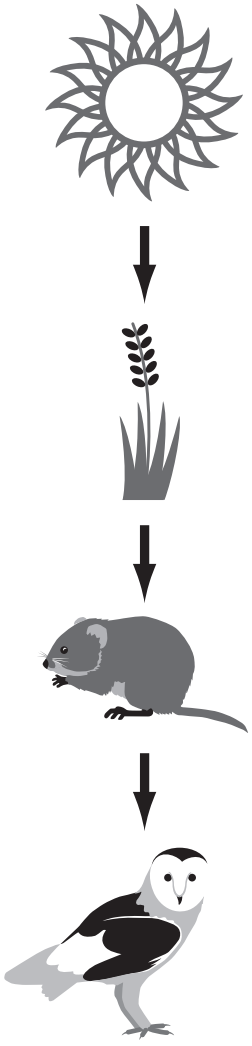
# A FULL PLATE

## Background Information for Activity Leaders

### Overview

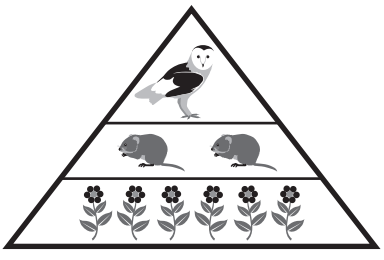
Children will explore how all animals transfer energy to each other through a food chain. Some animals eat plants for food. Other animals eat animals that eat the plants. An organism's behavior, such as what it eats, is related to its environment. An organism's ecosystem includes the kinds and numbers of other organisms present, and the availability of food, and its surroundings. When anything in the ecosystem changes, some plants and animals survive and reproduce, and others die.



**Food chain**

### Key Concepts

- **Producers** are green plants capable of making their own food using energy from the Sun. This process is called **photosynthesis**. Producers are at the beginning of a food chain.
- **Consumers** follow producers in a food chain. Consumers must eat to get energy. All herbivores, carnivores and decomposers are consumers.
- **Herbivores** are consumers, which feed directly on plants (plant eaters).
- **Carnivores** are consumers that feed on other consumers (meat eaters).
- **Decomposers**, such as bacteria and fungi, link producers with all other parts of the food chain because they break down dead organisms and return vital nutrients to the soil.
- There are many more producers (plants) than herbivores (plant eaters). There are more herbivores (plant eaters) than carnivores (meat eaters). There are also more small animals than large animals. Together they form what is known as the **energy pyramid.**
- Some animals compete with each other for food. Some animals depend on other animals for food. For example, wolves and owls both compete for mice.



**Energy pyramid**

- Not all the energy from the Sun is captured by plants. Plants are only able to absorb and use about 10% of the Sun's energy. When an herbivore eats plants, about 90% of the energy from the plants is used to stay alive, returned as wastes, or released as heat Only 10% of the energy is passed onto the next level, the carnivore. Energy is lost at each step of a food chain. That is why it takes a lot more producers to support a few top consumers.

## What to Expect

- Children will model the transfer of energy through the food chain. They will take on different roles; some children will be producers, some will be consumers and one child will be the Sun.

## Common Misconceptions

- *Children may think: "There are more animals than plants in the world."*

  All animals depend upon the producers, the plants. Only 10% of the energy and mass/weight of plants is passed on to the next level in a food chain. It takes 1,000 kg of plants to feed 100 kg of grasshoppers.

- *Children may think: "Food chains are only found on land, not in the water."*

  Food chains exist wherever life is found. Within oceans, seas, lakes, and even ponds there are very complex food chains.

- *Children may think: "Plants take in food from the outside environment, and plants get their food from the soil via roots."*

  Plants make their own food. This process is called photosynthesis. The food they make is called glucose (a kind of sugar). Plants make glucose out of carbon dioxide gas in the air, water from their water supply, and energy from sunlight.

- *Children may think: "Organisms higher in a food chain eat everything that is lower in the food chain."*

  Each organism has specific nutritional needs and adaptations for getting their food. Organisms at the top of the food chain may eat certain other organisms in the lower part of the food chain and not others.

- *Children may think: "All of the energy from the Sun is passed along the food chain."*

  Plants are only able to absorb and use about 10% of the Sun's energy.

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**Data Collection Sheet**

**Name:_____ Date:_____**

**WONDER** How do living things in an ecosystem depend on the Sun and each other?

## RECORD

***Data Table***

| name of organism | number of individuals | role in the food chain: producer, herbivore or carnivore |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**CONCLUDE** What did you discover about the number of organisms in each part of the food chain?

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# A FULL PLATE

## Activity Leader's Guide

**Group Size:** 4-6 children
**Time:** 60 minutes

## Set Up the Expedition

### Materials

**For the activity leader:**
- (12) Styrofoam™ plates

**For each group:**
- ***A Full Plate*** Learning Cards
- (1) pack of crayons
- (1) meter stick
- (4) craft sticks
- (5) meters of packing string or yarn

**For each child:**
- (1) ***A Full Plate*** Data Collection Sheet
- (1) magnifier
- (1) clipboard
- (1) sheet of drawing paper

**Prepare the demonstration:**
1. Cut twelve plates in half to create "energy" plates.
2. Identify a large area (indoors or outdoors) to play the game during the Engage segment of the activity.

**Prepare the exploration:**
1. Identify a safe outdoor area where groups of children will observe living things.
2. Prepare a set of materials for each group. Each child will get a magnifier, a sheet of drawing paper, a copy of the Data Collection Sheet, and a clipboard. Each group will get four craft sticks, five meters of packing string or yarn, a meter stick, and a pack of crayons.

## Engage

1. Gather the children together. Assign the children roles. One child will represent the Sun; divide the remainder of the children into three groups to represent plants, plant-eaters and meat-eaters. Ask the Sun to stand at the front of the area. Ask the plants to line up facing the Sun. Ask the plant-eaters to line up behind the plants. Ask the meat-eaters to line up behind the plant-eaters.

2. Give the Sun all the "energy" plate halves.

   **Say:**
   ***"The plates represent energy from the Sun. The Sun gives plants the energy they need. Plants produce food with that energy. That is why they are called producers."*** The Sun gives each plant a whole plate of energy (two plate halves per plant child).

3. **Addressing the plants, say:**
   ***"Plants need energy to grow, to flower and to make seeds. They use one half of the food they get from the Sun, so hold on to the half that you will use to live. Do not pass it on. The other half becomes food for plant-eaters."*** The row of plants should turn to face the plant-eaters; they should hold one half plate behind their back and the other half plate in front of them.

4. **Addressing the plant-eaters, say:**
   ***"Herbivores are animals that eat plants; they get energy from their leaves, fruit or seeds. Each herbivore needs a whole plate of food. At my signal, go to the plants and take the half plates they have to offer to complete the full plate you need."*** Encourage herbivores to gather half plates from the plants. They will need to get food from two plants to make a full plate. Herbivores who do not collect a full plate must stand to the side.

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***"Herbivores need energy to grow, move and reproduce. To do these things, they use half of the food they get from the plants, so hold on to one half plate. The other half plate becomes food for meat-eaters."*** The row of herbivores should turn to face the carnivores; they should hold one half plate behind their back and the other half plate in front of them.

5 **Addressing the meat-eaters, say:**
***"Carnivores are meat-eaters. Carnivores get their energy by eating herbivores. Each carnivore needs a whole plate of food. At my signal, go to the herbivores and take what you need to get a full plate."*** Carnivores who do not collect a full plate must stand to the side.

6 As time permits, repeat the game, but vary the numbers of children in the groups. For example, start by reducing the number of plants, and increasing the number of herbivores.

**Ask:**
***"Why were the producers and the herbivores only able to pass on a half plate?"*** They used the other half to grow, move or reproduce.

***"What happened when we started with fewer producers?"*** Fewer producers would support fewer herbivores, and fewer herbivores would support fewer carnivores.

***"Can you think of anything that might reduce the number of plants in a habitat?"*** Deforestation, fires, and over eating by herbivores are some examples.

# Explore

7 If you are working with more than 4-6 children, divide the children into groups. Distribute the Data Collection Sheets and the Learning Cards.

Distribute the materials and direct children outside to the area they will be observing.

8 **Say:**
***"Follow the directions on the Learning Card to investigate how living things depend on the Sun and each other."***

Allow children enough time to complete the WONDER, EXPLORE, RECORD and EXPAND sections of their Learning Card.

# Expand

9 Children will draw a picture of their ecosystem showing the Sun, producers, herbivores and carnivores. They will use arrows to show the flow of energy.

# Conclude

10 Gather the children together and ask the following questions:

***"What living things did you notice inside your square?"*** Answers will vary.

***"How are they related?"*** Some living things will be producers, some herbivores and some carnivores.

11 **Say:** ***"Congratulations! You have earned your 'Ask Me About Food Chains' stamp. You are ready to tell people about the food chain. "***

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# A FULL PLATE

## Expedition Learning Card

How does the Sun's energy drive the food chain?

**producer**
**herbivore**
**carnivore**

Explore how living things depend on the Sun's energy for the energy they need to survive.

**1 WONDER** How do living things in an ecosystem depend on the Sun and each other?

Write or draw your ideas on your Data Collection Sheet.

**2 EXPLORE** Use your observation skills to notice everything you can about a natural ecosystem. Find a good spot out in a field and see what you can find. Everything, from plants to ants, counts in a food chain.

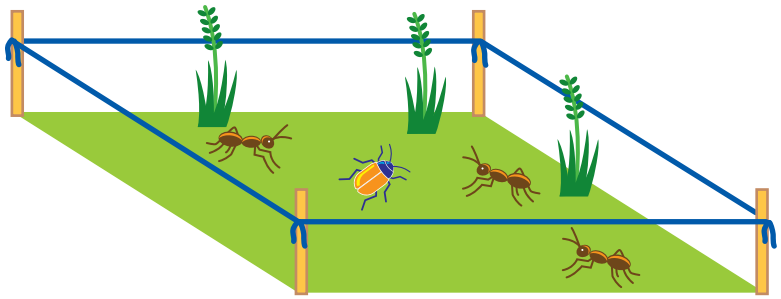
### Instructions

1. Place a craft stick in the ground so that half of it is sticking out.
2. Tie one end of a string to the craft stick.
3. Using a ruler measure one meter from the craft stick and insert a second craft stick into the ground.
4. Attach the string from the first craft stick to the second.
5. Repeat steps one through four to create a one-square meter area.

### Precautions

Be careful to leave everything as you found it.

Don't touch wild living things; they might sting, bite or scratch.



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## Expedition Learning Card

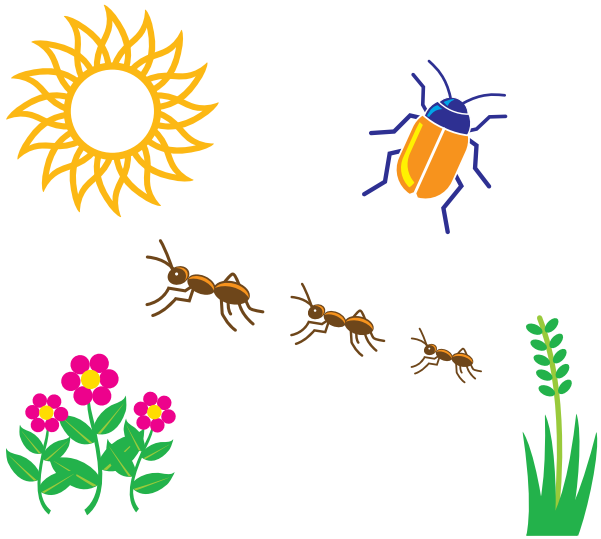
**3 RECORD** Carefully examine the area inside your square.

Use your Data Table to record what you observe about the living things within your square, and what role they play in the food chain.

You might have to do some research using print or online resources to find out more about each of the living things you find.

**4 EXPAND** Energy flows from the Sun to producers, to herbivores, and to carnivores.

Draw a picture of your one-meter square ecosystem on drawing paper showing the Sun and any producers, herbivores and carnivores that you observed. Use arrows to show the flow of energy.



**5 CONCLUDE** What did you discover about the number of organisms in each part of the food chain?

### Discovery

**Why did we do that?**

- Food, or energy, comes from the Sun.
- The Sun passes energy to producers.
- Producers pass energy on to consumers.

### Congratulations!

You have earned your "Ask Me About Food Chains" stamp! Now you are ready to tell people about food chains.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