UNIT OVERVIEW

Every living thing is part of an ecosystem. Food chains, food webs, and energy pyramids can be helpful tools for understanding how the living things in an ecosystem depend on each other for the energy they need to perform daily activities. The Food Chains unit helps students explore the roles that organisms play within an ecosystem, whether as producers, consumers, or decomposers. This unit explains the importance of predator–prey relationships and the differences among herbivores, carnivores, and omnivores. Students will learn about relationships among species as they compete for resources in order to survive. Finally, the unit explores ways that ecosystems can be threatened due to changes.

Certain reading resources are provided at three reading levels within the unit to support differentiated instruction. Other resources are provided as a set, with different titles offered at each reading level. Dots on student resources indicate the reading level as follows:

- low reading level
- middle reading level
- high reading level

THE BIG IDEA

Every plant, animal, and other living thing is part of a food chain as well as a larger food web. Whatever happens to one species in a food web can affect many other species that depend on it, or that it depends on, for survival. Humans are also part of food webs all around the world. We are affected when any part of our own food web is changed. We can also have an impact on many other living things within our own food web and in other food webs as well. Human actions can impact the climate, the availability of habitats and natural resources, and the cleanliness of essential resources such as water and air. Therefore, it is in our best interests to make a positive impact by protecting ecosystems and reducing behaviors that can disrupt natural food chains.

Other topics

This unit also addresses topics such as: underwater food webs, roles of microorganisms, the importance of apex predators, disruptions to food chains, and the effects of invasive species on ecosystems.

SPARK

The spark is designed to get students thinking about the unit's topics and to generate curiosity and discussion.

Materials

- chalkboard, whiteboard, or butcher paper
- chalk or markers

Activity

Ask students to name some foods they have eaten recently while you list them on the board or on butcher paper. After gathering a variety of responses, choose one of the foods that at least in part comes from an animal and ask students to try to identify the plants and/or animals used to make that food. For example, a piece of fried chicken comes from a chicken, and the beef in a taco may come from a cow, while the taco shell and toppings may come from plants. Ask students to help you list all the living things that go into the selected food.

Next, pick one of the animals that students said goes into the food and ask students to identify what that animal eats. For example, students may know that a chicken eats grain and a cow eats grass.

Sketch a simple food chain on the board or on butcher paper that shows one of the animals that students eat, along with what it eats and what eats it. The diagram should include a human because students have established that people eat this animal. Ask students if they have ever seen a diagram like this before and, if so, what it is called (a *food chain*). Explain that food chains show how living things are interrelated by what they eat.

If you have time, repeat the activity for other foods from the original list. You can have students create their own food chains in a science journal or on plain paper.

Below are questions to spark discussion.

What elements are always parts of a food chain?

What are other ways we could have illustrated the same information?

Do the animals in this food chain eat any other things besides those that are pictured? Do any other animals, besides those that are pictured, eat the living things in this food chain? How might we show these other things in our diagram?

Are any of the animals in this food chain predators? Prey?

Are any of the animals in this food chain carnivores? Herbivores? Omnivores?

Why do you think the living things in this food chain eat the things they do?

If one of the living things in this food chain became extinct, what do you think would happen to the rest of the living things in this food chain?

Use this activity to begin an introductory discussion about food chains. Review that a *food chain* demonstrates how different living things are related to each other by what they eat. Tell students that during this unit, they will learn more about food chains, food webs, and ecosystems.

Many of the unit's vocabulary terms are related to the spark activity and can be introduced during the spark. For vocabulary work, see the Vocabulary section in this Unit Guide.

PRIOR KNOWLEDGE

Invite students to explain their understanding of food chains and to identify examples of relationships in a food chain.

Probing Questions to Think About

Use the following questions to have students begin thinking of what they know about food chains.

- What is a *food chain?*
- Do food chains help explain what individual living things eat or what entire species of living things eat?
- Do food chains go in a straight line, in a circle, or in some other shape?
- How are food chains from various places on Earth different from one another?
- What do we call an animal that eats only plants? Only other animals? Both plants and animals?
- How do plants get energy?
- What is an *ecosystem?*
- How can ecosystems change?
- What do people do that can change an ecosystem?

Tell students they will learn more about these topics soon.

UNIT MATERIALS

Each unit provides a wide variety of resources related to the unit topic. Students may read books and other passages, work in groups to complete hands-on experiments and investigations, discuss science ideas as a class, watch videos, complete writing tasks, and take assessments.

Resources are available for printing or projecting, and many student resources are also available for students to access digitally on Kids A–Z.

Selected unit resources are available in more than one language.

For a complete list of materials provided with the unit, see the Food Chains unit page on the Science A–Z website.

VOCABULARY

Use the terms below for vocabulary development throughout the unit. They can be found in boldface in the *Nonfiction Book*, the *Quick Reads*, and/or other unit resources. These terms and definitions are available on *Vocabulary Cards* for student practice. Additional vocabulary lists are provided in the teaching tips for *Investigation Packs* and *FOCUS Books*.

Core Science Terms

These terms are crucial to understanding the unit.

carnivore	an animal that eats only other animals
competition	the struggle between organisms of the same or different species for limited resources, such as food, light, or territory
consumer	an organism in a food chain that eats other organisms, especially live ones
decomposer	an organism in a food chain that breaks down organic matter
ecosystem	a biological community of organisms together with their environment
food chain	a group of organisms that all have a relationship with each other through what they eat
food web	the interconnected feeding relationships within an ecosystem
herbivore	an animal that eats only plants
omnivore	an animal that eats both plants and animals
organism	a living thing
photosynthesis	the process by which plants use sunlight to convert water and carbon dioxide into food
predator	an animal that hunts and eats other animals to survive
prey	an animal that is hunted and eaten by a predator
producer	an organism in a food chain that is able to make its own food

Other Key Science Terms

The following vocabulary is not essential for comprehending the unit but may enrich students' vocabulary.

crustacean	a member of a group of mostly aquatic invertebrates that includes crabs, lobsters, and shrimp
host	an organism off of which a parasite feeds
invasive species	a species that moves into an ecosystem and does harm to the other species living there

mollusk	a type of animal with a soft body and no backbone, such as an oyster, clam, mussel, snail, slug, or octopus
parasite	an organism that grows and feeds on another organism
population	all the members of one species in a particular area
primary consumer	an organism in a food chain that eats a producer
scavenger	an animal that eats animals that are already dead
secondary consumer	an organism in a food chain that eats herbivores
species	a group of organisms that are physically similar and can produce offspring
tertiary consumer	an organism in a food chain that eats carnivores
top predator	a predator in a food chain that no other consumer eats

Vocabulary Activities

You may choose to introduce all the terms that will be encountered in the unit before assigning any of the reading components. *Vocabulary Cards* with the key science terms and definitions are provided. Dots on the cards indicate the reading levels of the *Nonfiction Book* or the *Quick Reads* in which each term can be found. If all level dots appear, the term may come from another resource in the unit. Students can use these cards to review and practice the terms in small groups or pairs. The cards can also be used for center activity games such as Concentration.

The *Word Work* activity sheets offer fun puzzles and practice with key vocabulary terms from the unit. For further vocabulary practice and reinforcement, you can choose from the vocabulary *Graphic Organizers*. To build customized vocabulary lessons with terms related to the topic, see Vocabulary A-Z.

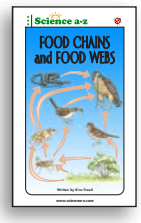
Students can use the *Word Smart* vocabulary *Graphic Organizer* to organize information on the science terms. You may want to assign each student one to three words to share his or her *Word Smart* knowledge with classmates. Students who have the same word should first compare their *Word Smart* sheets with each other and then report to the larger group.

The science terms can be used in oral practice. Have students use each term in a spoken sentence.

As students read, encourage them to create a science dictionary by recording new vocabulary terms and definitions in their SAZ Journal.

BACKGROUND AND MISCONCEPTIONS

Use this section as a resource for more background knowledge on unit content and to clarify the content for students if misconceptions arise. Refer to Using the Internet below for more ways to extend the learning.



Q: *Does a food chain work in one direction, with just the species shown on it?*

A: No. Food chains are often simplified representations of real-world ecological relationships. They can be helpful in showing how several selected species depend on one another. But, in reality, each of the species in a food chain is often related to many more species than just those depicted in the food chain. For this reason, food webs tend to be more accurate and comprehensive than food chains.

Q: *Does each ecosystem operate independently from all others and stay basically unchanged?*

A: While each ecosystem has distinctive biological and geographical features, no ecosystem on Earth is truly independent. Global weather patterns affect many ecosystems at once, as do broad changes to the environment. Also, many species move from one ecosystem to another, which makes relationships within ecosystems fluid and dynamic. A snapshot of a food web today may be different than it was in the past or will be in the future as species adapt and as conditions change.

Q: *Does a species that is higher on a food chain eat all the species lower than it on the food chain?*

A: It may, or it may not. A food chain isn't meant to illustrate exactly what each species eats. It demonstrates how energy and matter move from producers to consumers. The food chain shows that organism A eats organism B, organism B eats organism C, and so on. But organism A does not necessarily also eat organisms C, D, and E (although it might). However, species that are higher in the food chain do benefit from the energy and matter that were gained by species below them on the food chain, even if they didn't eat the lower species directly. A food web is a better illustration of how organisms A through E are interconnected.

Q: *Do all animals depend on plants for food?*

A: No, not directly. Many animals do eat plants, but many animals instead eat other animals that eat plants. And some animals eat animals that eat other animals that eat plants.

Q: *Are herbivores calmer than carnivores?*

A: Not necessarily. Animals come in various dispositions, regardless of their diet. Some plant eaters, including rhinoceroses and hippopotamuses, are relatively aggressive, while some meat eaters, such as domestic cats and emperor penguins, are relatively passive.

Q: *Do plants "eat" soil as food?*

A: No. Plant roots absorb water and minerals from the soil, but this is not the same thing as eating food. Plants produce their own food inside their cells during photosynthesis. The raw materials that plants convert into food are water and carbon dioxide, a gas plants get from air. The energy plants use to make food comes from the Sun. The food they make is *glucose*, a form of sugar. Minerals help plants make food and carry out many other important processes, but plants do not "eat" minerals or convert them into glucose. Confusion may come from the loose use of terms such as *plant food* and *feeding plants* when referring to mineral solutions that people add to soil.

Q: *Am I an animal?*

A: Yes, humans are a type of animal, as are fish, birds, insects, spiders, crustaceans, mollusks, and many other creatures. Students may understand what makes humans different from other animals. But they may not realize that humans are in fact animals, in a scientific sense. We share the essential needs and characteristics of all animals. In some contexts, it can be useful to make a distinction between humans and other animals, such as a sign in a restaurant that reads, "No animals allowed." But students should also be able to recognize what humans and other animals have in common that makes us all animals.

EXTENSION ACTIVITIES

Using the Internet

Most search engines will yield many results when the term *food chain* is entered. Try refining the search by including a species name or a type of ecosystem. Be aware that some sites may not be educational or intended for the elementary classroom. More specific inquiries are recommended, such as:

- wetland food chain
- food webs of Africa
- predator-prey relationships
- producers, consumers, and decomposers
- ocelot food chain
- list of omnivores
- forest parasites
- desert scavengers

Projects and Activities

- **Project:** Build a mock ecosystem in the classroom and have students create three-dimensional models of the organisms that live there. Students can create a food web by connecting certain organisms with colorful yarn and hanging paper arrows on the yarn to show the direction of consumption. Students can also post a key to explain the relationship shown by each yarn color.
- **Project:** Have students brainstorm foods eaten by many animals. Groups can create a funny menu—to include breakfast, lunch, dinner, drinks, and desserts—made up of foods that animals would eat (for example, Grassy Pancakes, Pond Water Float, Gopher Meatballs on Worm Spaghetti).
- **Drama:** Have groups of students work together to write a script for a skit related to food chains or food webs. Each actor should portray an organism in the chain, and the dialogue should help the rest of the class learn something about the relationships within the ecosystem being portrayed.
- **Art:** Have students clip pictures from magazines that show various living things that might be connected in a food chain or food web. Students can create a food web on posterboard, or they can hang cards in a certain sequence to make a food chain mobile with pictures on one side and explanations of the organism's predators and diet on the other.
- **Field Trip or Guest:** Have a naturalist explain to the class some food-chain relationships within a local natural area or wildlife sanctuary.
- **Community Service:** Provide students with opportunities to take part in an effort to protect endangered species or clean a habitat.
- **Research:** Help students conduct research to describe the food relationships within a specific ecosystem. Students can present their findings in a written paper, an oral presentation, a Web project, a visual display, or any combination of these.
- **Research/Math:** Help students conduct research on how the populations of certain species have changed over time. Students can create graphs to display trends, write and exchange math problems based on the data, and make predictions about the population of each species in the future.
- **Research/Home Connection:** Students can conduct research as a family/home project or in the library/media center to extend the learning about a topic in one of the *Quick Reads* or other unit resources.