UNIT OVERVIEW

All living things need energy to survive. That energy comes from food. The Food and Nutrition unit compares and contrasts the ways in which plants and animals get food. Plants use the process of photosynthesis, while animals eat. Both plants and animals use respiration to produce energy from food. The unit categorizes animals by what they eat, and this classification helps to determine each animal's role in a food chain. Digestion is illustrated by following food on its journey through the human body. Finally, the unit defines and discusses the various organic and inorganic nutrients we need in order to be healthy.

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

Humans are like other organisms in that we need food to survive. Food is the fuel that powers us. Humans are part of food chains (and food webs) and, as such, are dependent on plants and other animals for our survival. Once we eat those foods, we must be able to break them down in our digestive systems in order to extract the nutrients they contain. Knowing which nutrients the body needs and in what proportions in our diet, as well as which foods contain those nutrients, are all important for maintaining our health.

Other topics

This unit also addresses topics such as: how agriculture has changed over the centuries, comparing nutrients in meals, and using nutrition labels to choose healthy foods.

SPARK

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

Materials

- white paper plates
- colored pencils or markers

Activity

Place students into small groups. Give each group four paper plates and provide colored pencils or markers for the group to share. Explain that students are to draw foods on each of the four plates that would make an appropriate "meal" for one of these four organisms: a human, a shark, a rabbit, and a sunflower plant. Explain that it's not important to know exactly what each organism actually eats, but students should try to choose appropriate types of food to draw on each plate. Students may not know what to draw on the sunflower plate, but encourage them to make their best guess. They may choose to draw or write things that a plant needs for food. Students may collaborate to help complete the drawing on each plate, or you might have each student be in charge of one plate.

Once everyone has finished, discuss students' work.

Below are questions to spark discussion.

Why do organisms need food?

What is different about what a rabbit eats and what a shark eats?

How would you describe the type of meal a person eats?

Which organism's meal was the most difficult to plan? Why?

Do plants and animals use the same methods to get food? Explain why they do or do not.

Why do you think some organisms eat a wider variety of foods than others?

Use this activity to begin an introductory discussion about food and nutrition. Explain that all living things need food to get energy. But plants and animals get food in different ways, as students will learn during the unit. Different kinds of foods serve different purposes for organisms. Throughout the unit, students will learn more about food and nutrition.

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

We all love to eat. But why do we do it? Ask students to brainstorm as many foods as possible in one minute as you record their ideas on the board. Then review this array of foods and discuss why humans need food. Then discuss why other animals as well as plants need food, too.

Probing Questions to Think About

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

- Do plants eat? How do they get food?
- What is *photosynthesis*?
- What are some ways to classify animals? How would you classify animals according to what they eat?
- What is a food chain? Give an example of a simple food chain.
- Which body parts and organs help you digest your food? What does each part or organ do?
- What makes certain foods healthy choices for you to eat and other foods less healthy?
- What are some nutrients that are important to being healthy?

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 and Nutrition 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 only eats other animals
carbohydrates	organic nutrients, including sugars and starches, that can provide an organism with energy
carbon dioxide	an invisible, odorless gas that is used during photosynthesis and given off as a waste product during respiration

chlorophyll	the green substance in plant cells that absorbs the light energy plants use to make food during photosynthesis
digestion	a series of chemical reactions that break food down into forms that the body can use
energy	the power to do work, make a change, or move objects
enzymes	proteins that speed up a chemical reaction in the body
fiber	a food substance that cannot be digested but which helps the process of digestion
glucose	a simple sugar made by plants during photosynthesis that is an important source of energy for all living things
herbivore	an animal that only eats plants
lipids	fats and oils
minerals	inorganic nutrients required in small amounts for health and normal growth
nutrients	substances in food or soil that organisms need to live, stay healthy, and grow
omnivore	an animal that eats both plants and animals
oxygen	an invisible, odorless gas essential for life that makes up part of the air
photosynthesis	the process by which plants use sunlight to convert water and carbon dioxide into food
protein	organic nutrients used by the body to grow and to repair cells
respiration	the process by which cells produce energy from stored sugars
vitamins	organic nutrients required in small amounts for health and normal growth

Other Key Science Terms

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

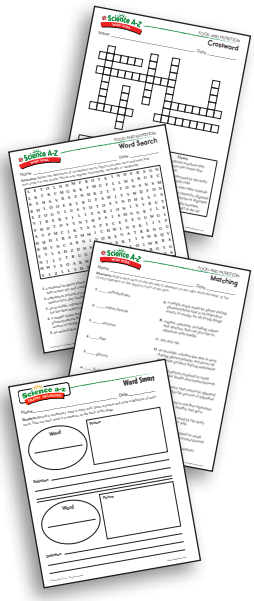
agriculture	the science of farming and raising livestock
calories	units used for measuring the amount of energy in food
cell	the smallest independently functioning unit in an organism
cholesterol	a fatty substance found in animal foods that is unhealthy for humans when consumed in large quantities

consumer	an organism in a food chain that eats a producer or another consumer
decomposer	an organism in a food chain that breaks down organic material
diet	the types of food that an animal regularly eats
esophagus	the muscle-lined tube down which food passes from the throat to the stomach
exercise	physical activity undertaken for the purpose of being fit and healthy
fat	a type of lipid found in plants and animals that is a necessary nutrient in small amounts
food plate	a plate-shaped model showing recommended proportions of food types in a balanced diet
health	a condition of well-being in which an organism is free of illness or injury
inorganic	not having to do with or coming from living organisms
liver	the large excretory organ that filters blood and helps with digestion
molecule	the smallest part of a substance that can exist by itself, made of two or more atoms bonded together
organic	having to do with or coming from living organisms
organism	a living thing
pancreas	an organ that produces a fluid to help digest food
producer	an organism in a food chain that is able to make its own food
ruminant	an even-toed hoofed mammal that has a multi-chambered stomach and chews its cud
saliva	a liquid in the mouth that mixes with food to help begin digestion
small intestine	the thin, coiled part of the digestive system, in which nutrients are removed from food and put into the bloodstream
starch	a chain of sugars that is made by plants and that makes up a carbohydrate
stomach	the organ in which food is mixed with chemicals and becomes partially digested

stomata	tiny pores in leaf cells that allow gases to enter and exit the leaf
villi	tiny ribbonlike structures lining the walls of the small intestine, through which molecules of food enter the bloodstream

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.

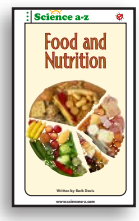
Students can use the *Word Smart* vocabulary *Graphic Organizer* to organize information on the science terms. You may want to assign each student one to three words to share his or her *Word Smart* knowledge with classmates. Students who have the same word should first compare their *Word Smart* sheets 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: *Do plants get their food from the Sun?*

A: No. Plants need sunlight in order to make food during the chemical process of photosynthesis, but sunlight is not their source of food.

Q: *Do plants absorb their food from the soil?*

A: No. A plant's roots bring water and minerals from the soil to the plant, but the plant does not "eat" them. Plants convert water and carbon dioxide into food (sugar) during photosynthesis. Minerals are nutrients that help plants carry out photosynthesis and other important processes, but plants do not convert minerals into food. Garden centers and plant nurseries sell "plant food," which is a product that supplies plants with minerals to help them grow. The use of the term *plant food* may create misconceptions about how plants get the energy they need.

Q: *I've heard that plants give off oxygen. So do plants release oxygen during respiration?*

A: No. This question confuses the gases exchanged during two important processes. During photosynthesis (the process in which plants make their own food), plants *use carbon dioxide*, and they *release oxygen* as a byproduct. But during respiration (the process in which organisms use food to produce energy), plants *use oxygen* and *release carbon dioxide*.

Q: *Is respiration in plants the same as respiration in animals? Is respiration the same thing as breathing?*

A: Respiration is a process that takes place in the cells of both plants and animals. During respiration, food and oxygen are used to produce energy, and carbon dioxide and water are produced as byproducts. But only in animals do we use the term *breathing* to explain the mechanical process of taking in (inhaling) oxygen and giving off (exhaling) carbon dioxide, the gases that are exchanged during respiration.

Q: *Are carnivores mean? Are herbivores calmer than carnivores?*

A: It's probably not fair to classify predatory animals as *mean* (and to imply that herbivores are *nice*). Carnivores eat foods that they are meant to eat. Characterizing carnivores as *mean* implies that they choose to be unkind or hurtful to their prey, when in fact they just eat other animals as part of their natural diets. Animals come in various dispositions, regardless of their diet.

Q: *Are all people omnivores?*

A: The terms *herbivore*, *carnivore*, and *omnivore* are used to describe entire species of organisms. Even if individual members of that species do not eat certain types of food, the classification of that species does not change. The human species is considered omnivorous. But some people choose not to eat meat or other products from animals for a variety of reasons.

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.

Q: *Is food digested once it reaches the stomach?*

A: No. Students may think digestion ends in the stomach, but it's really the small intestine that removes most of the nutrients from food. Once food leaves the small intestine, most of the nutrients are gone and digestion is complete. Then the large intestine does the job of moving what's left out of the body.

Q: *Are carbohydrates bad for you? I've heard that some people try hard to reduce their carbs.*

A: Actually, carbohydrates are important nutrients. Complex carbohydrates found in whole grains, beans, and vegetables are good for you and help keep your energy levels even all day. Simple carbohydrates found in sugar are the kind that digest very quickly—providing temporary spikes in energy—and can be stored as fat. Certain weight-loss diets suggest reducing carbohydrate intake, but carbohydrates should not be eliminated altogether.

Q: *Aren't all fats bad for you?*

A: No. While too much fat can hurt our body, fat is an essential nutrient that stores vitamins, protects organs, and regulates temperature, among other things. Nutritionists often recommend eating a healthy balance of omega-3 and omega-6 fatty acids. Omega-3s help reduce inflammation, which is a major factor in many diseases. Unsaturated fats found in vegetables, nuts, and seeds are often judged to be healthier than saturated fats, which contain cholesterol and mainly come from animal fats. Trans fats have been chemically altered and are not considered to be healthy choices. While fats are important nutrients, it is recommended that students choose foods containing a healthy balance of the various types of fats.

Q: *Foods that are good for you taste bad, and foods that taste good are bad for you—right?*

A: Certainly not! It's a popular misconception that "good-for-you" foods are bland and tasteless. While it's true that many unhealthy foods often do taste good (why else would you choose to eat them?), healthy ones can taste good, too. Taste is very subjective. Different people may eat the same food and feel differently about its taste. And tastes change over time, too.

EXTENSION ACTIVITIES

Using the Internet

Most search engines will yield many results when the terms *food* and *nutrition* are paired. Be aware that some sites may not be educational or intended for the elementary classroom. More specific inquiries are recommended, such as:

- photosynthesis
- food chains of South America
- diet of a rhinoceros
- nutrition for kids
- plant respiration
- digestive system model
- diet of a canary
- essential nutrients

Projects and Activities

- **Project:** Let students create and play a food-chain game in which some students are producers, some are primary consumers, and some are secondary consumers. Have students devise "rules" for the game that can help keep the system replenished and in balance.
- **Writing:** Ask students to write an amusing story that follows a piece of food along its digestion journey. They should write from the perspective of the food, describing what happens during each phase of the process. See Writing A-Z for writing tools and genre lessons to help students compose their stories.
- **Arts:** Have students create illustrated diagrams of photosynthesis and plant respiration that show the parts of the plant involved and the chemical reactions that take place.
- **Arts/Technology:** Have students create a model of the human digestive system. It could be made from paper, clay, or other art supplies, or it could be produced as a computer simulation. The object is to put the organs together in the proper order and be able to describe each organ and its function.
- **ELL/ESL:** Students from other cultures can share information about the foods they eat. Discuss how the foods are like or different from traditional American fare. You may even choose to have students or their families bring in some sample foods and let the class sample them. Discuss how foods with very different ingredients and flavors may still provide the same nutrients.
- **Guest:** Invite a nutritionist, pediatrician, or other health expert to discuss nutrition and healthy dietary choices with students.
- **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.