UNIT OVERVIEW

Our world is full of plants. Most plants have certain parts and attributes in common. There is also amazing diversity within the plant kingdom. The Plant Life unit helps students understand the parts of plants and the functions of those parts. It explains photosynthesis as the process by which plants make their own food. It also explains how and why plants reproduce, including the processes of pollination, fertilization, seed dispersal, and germination. Students will learn that plants grow almost everywhere on Earth. The unit explains some of the key relationships between plants and animals. It also describes some of the many ways people use plants for both food and materials.

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

Plants are a vital component of the natural world. Without plants, animals—including humans—could not survive. Humans in every culture on Earth eat plants. Many people also eat meat, which comes from animals that either eat plants or that eat other animals that eat plants. People also use plants to make paper, cloth, lumber, firewood, medicines, cosmetics, paint, gum, some plastics, and countless other products. Additionally, plants make our world beautiful with majestic forests, colorful flowers, autumn leaves, and vast fields of green. People can help ensure that the world will always have great plant diversity. We can take measures to provide plants with places to grow, access to water and light, and protection from harm. By helping plants, we help the environment and, in fact, help ourselves in the process.

Other topics

This unit also addresses topics such as: ways that seeds travel, air plants, plant pollinators, deforestation, and using renewable plant resources as building materials.

SPARK

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

Materials

- assorted fruits, vegetables, seeds, and nuts representing various edible parts of plants (for example, carrot, onion, grape, celery, apple, banana, broccoli, lettuce, raisin, peanut, sunflower seed)
- paper plates
- paper and pencil

Activity

Set up centers around the classroom, in which each food is displayed on a paper plate. Tell students that all the foods on the plates come from plants, but they don't all come from the same part of the plants. At this point, do not discuss the various parts of plants.

Challenge students to work in pairs as they move through the centers, guessing which part of the plants each food came from. Have students record the names of the foods on paper and write their guesses beside each food.

SPECIAL NOTE: For safety reasons, do not allow students to eat the foods. Compost or discard the foods when done.

Once all groups have had time to inspect all the foods, reconvene as a class and gather responses. Record class responses on the board. Use this feedback to assess students' prior knowledge about plants and their parts. Afterward, you might help students match the foods to the correct plant parts, either by telling them or allowing them to research the answers.

Below are questions to spark discussion.

Why do you think we eat certain parts of plants more than others?

For which foods was it most difficult to guess their plant part? Why?

What other foods do you eat that come from plants? Which part of a plant does each food come from?

Do all the foods you studied grow in the same conditions? What does each of these plants need to grow and survive?

Do any of the foods you studied provide food for animals (other than humans)?

How do people and other animals help these plants grow?

Where did the paper plates come from?

Use this activity to begin an introductory discussion about plants. This spark activity introduces several important concepts from the unit, including: plant parts, plant diversity, and the relationship between plants and animals (including humans). Throughout the unit, students will learn more about plants.

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

Ask students to explain whether or not they feel plants are important. Discuss what the world would be like if there were no plants. Invite students to describe the most interesting plants they have ever seen.

Probing Questions to Think About

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

- What is a plant?
- What are some differences between plants and animals?
- What parts do all plants have, and what parts do only some plants have?
- What do plants need in order to *start* growing? What do plants need in order to *keep* growing?
- Do plants need food? If so, how do plants get food? Do they eat?
- How do plants make more of themselves?
- How do animals (other than humans) rely on plants?
- How do plants rely on animals (other than humans)?
- How do people rely on plants?
- How do plants rely on people?
- Where can plants live?
- Where can plants not live?
- What do plants give people other than food?

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 Plant Life 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.

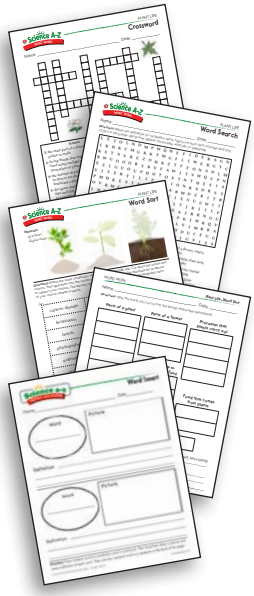
chlorophyll	the green substance in plant cells that absorbs the light energy plants use to make food during photosynthesis
chloroplast	a tiny part of a plant cell that contains chlorophyll and carries out photosynthesis
fertilization	the process of combining male and female cells to create a new animal or plant
food chain	a group of living things that all have a relationship with each other through what they eat
germinate	to begin to grow from a seed
materials	any kinds of physical substances that are used to make things
minerals	nutrients from nonliving things that are required in small amounts for health and normal growth
photosynthesis	the process by which plants use sunlight to convert water and carbon dioxide into food
pistil	the female part of a flower, where seeds begin to grow
plants	living things that make their own food using sunlight and do not move from place to place on their own
pollen	small grains that develop on stamens and can stick to pistils, pollinating flowers
pollination	the transfer of pollen from flower to flower for the purpose of fertilizing a plant
reproduce	to make offspring that are similar to the original living thing
seedling	a young, developing plant that has grown from a seed
species	a group of living things that are physically similar and can make offspring
stamen	the male part of a flower, where pollen is made

Other Key Science Terms

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

absorb	to soak up or take in
carbon dioxide	an invisible, odorless gas that plants use during photosynthesis and that animals breathe out as a waste product
disperse	to scatter or spread over an area
flower	the part of a plant that grows seeds
fruit	the part of a flowering plant that contains seeds and is often eaten by animals
leaves	the green parts of a plant, often thin and flat, that grow on stems or branches and make food
nutrients	substances that living things need to live, stay healthy, and grow
oxygen	an invisible, odorless gas needed for life that makes up part of the air
renewable	able to be replaced and not permanently used up
roots	the parts of a plant that grow underground, holding it in place and taking in water and nutrients from the soil
seed	the small plant part that can grow into a new plant
shelter	a structure or other place that gives protection from bad weather or danger
soil	the top layer of the ground, in which plants grow
sprout	to come out of a seed and begin to grow
stem	the main stalk or trunk of a plant that holds it up and brings water to its leaves
stomata	tiny openings in leaves and stems that allow gases to enter and exit
transpiration	the process of giving off water vapor through tiny openings in leaves and other plant parts
vegetable	a plant or plant part used as food, especially as a side dish in a meal
water vapor	water in the form of a gas

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 "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 make their own food (sugar) during photosynthesis. The matter (water and carbon dioxide) and energy (light) that plants use during photosynthesis are not considered food. Minerals help plants carry out photosynthesis and other important processes, but they are not considered food either. Garden centers and plant nurseries sell "plant food," which is a product that supplies plants with extra minerals and nutrients to help them grow. The use of the term *plant food* may create misconceptions about how plants get the matter and energy they need.

Q: *Do plants breathe? Do they drink?*

A: No and no. Breathing is specifically a behavior performed by an animal with lungs or gills. Plants do absorb carbon dioxide and give off oxygen as they produce sugars during *photosynthesis.* Plants also use the process of *respiration,* just as animals do, to turn food and oxygen into energy within their cells; they release carbon dioxide and water vapor as waste products. But this exchange of gases is not called breathing. Drinking is also an animal behavior. Plants do transport water within their vascular systems, but they do not "drink" as animals do.

Q: *Since plants are living things, does that mean they give birth and die?*

A: While plants do go through a life cycle, just as animals do, they do not lay eggs or give birth. They grow from seeds, which sprout and develop into seedlings and then adult plants. Plants do die. While the life cycle of an individual plant ends when it dies, the life cycle of its species continues as new plants of its kind grow.

Q: *How does that big plant come out of such a tiny seed?*

A: Students may believe that the material of plant growth comes from the soil. If this were true, the soil in a flowerpot or on a forest floor would gradually disappear. A small amount of plant matter does come from nitrogen and other minerals that plants get from soil. However, most plant matter comes from water and carbon dioxide, a gas plants get from air.

Q: *Are all plants green and small?*

A: No. Plants come in all sizes (for example, sequoia trees), and they are not always green (for example, red rhubarb stems). Students sometimes think that plants have to be small and green, in which case they conclude that trees are not plants, especially when they grow big. In fact, trees are plants, and they come in countless varieties. In addition, some plants are so small that they may not seem like plants at all.

Q: *Aren't fruits and vegetables different things?*

A: The answer depends on the context. The terms *fruit* and *vegetable* are often used to describe types of foods that come from plants. As foods for humans, vegetables are often distinguished from fruits by their lack of sweetness and the portion of a meal in which they are normally eaten. But in botanical terms, many vegetables (such as cucumbers, squash, and pea pods) are actually fruits; they contain the seeds that allow the plant to reproduce. We also use plant parts other than the fruit as vegetables, such as the roots (potatoes, carrots), leaves (lettuce, spinach), stems (rhubarb, celery), and flowers (broccoli, asparagus tips) of certain plants.

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

A: No, not directly. Many animals do eat plants, but many animals eat other animals that eat plants. Some animals rely on non-plant producers, such as members of aquatic food chains that rely on protozoa or algae for producing energy.

Q: *Do food chains 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 often has relationships with many more species than just those depicted in the food chain. For this reason, food webs tend to be more accurate and comprehensive representations of ecological relationships than food chains.

Q: *Does a species that is higher on a food chain eat all of 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 the flow of energy from the producers to the consumers. However, species that are higher on the food chain do benefit from the energy that was gained by species below them on the food chain, even if they didn't eat the lower species directly.

EXTENSION ACTIVITIES

Using the Internet

Most search engines will yield many results when the term *plant* is paired with a related term (such as *plant parts, plant growth,* or *plant foods*). You can also search for information on a known specific plant or any topic related to plants. Be aware that some sites may not be educational or intended for the elementary classroom. More specific inquiries are recommended, such as:

- Which plants have flowers/cones/pods?
- parts of a seed/flower
- pollination, fertilization, and germination
- endangered plants of Tennessee
- seed dispersal by wind/water/animals
- photosynthesis diagram
- list of materials from trees
- nearby botanical gardens
- Argentina native plants
- agriculture careers

Projects and Activities

- **Arts:** Invite students to decorate a classroom door, wall, or bulletin board as a plant or as a collage of various plants.
- **Arts/Writing:** Combining one distinctive feature from a few different plants, have each student draw and name his or her new plant (for example, the giant meat-eating daisy or the fuzzy apple grass tree). Students may also enjoy writing or dictating a story or poem about it.

- **Writing:** Have students write instructions for how to care for plants in general or one plant specifically. For extensive resources to teach writing, including writing procedural text, visit Writing A-Z.
- **Project:** Plant a class garden using seeds known to grow well in your area and at the current time of year. Hold a class vote to select plants. Have students keep a growth log with pictures, measurements, and observations as the plants (hopefully) grow. If edible plants are included and if local policies allow, schedule a day to enjoy the "fruits" of your labor.
- **Project:** Have groups of students create a menu made exclusively of foods from plants. Challenge them to include breakfast, lunch, dinner, dessert, and beverages.
- **Project:** Ask students to help you build mock plant regions in the classroom, such as a desert, coniferous forest, rainforest, grassland, wetland, and farm.
- **Field Trip:** Plan a trip to a local nursery, botanical garden, forest, farm, or nature preserve. Take photos or provide art materials so students can create pictures of their favorite plants. Back in class, display these on a bulletin board. Use them for practice in labeling plant parts and comparing plants from different areas.
- **Technology:** Have students work in pairs or small groups to create a slideshow, digital story, or movie about plants. For example, they might show images of plants at different stages of development, compare the same plant part on different plant species, or identify ways that plants and animals depend on each other. Invite students to present their projects to the class.
- **Community Service:** Provide students with opportunities to take part in an effort to protect endangered plant species, clean up local habitats, remove invasive species, or plant flowers, trees, and other plants in their community. (Please consult local authorities for regulations prior to all community projects.)
- **Research:** Help students conduct research to compare how a transplanted plant species can adapt to living in a new environment (for example, a pine tree in a desert or a cactus in a coastal city).
- **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.