



Plant Science: *Discussion Guide*

Overview

Delve into the fascinating world of plants, discovering how much plants differ even while their basic biology remains the same. Discover how plants change to adapt to their environment, how they employ unique means of getting nutrients, and how they manage to ensure their survival. Plant science presents an array of issues to debate as well.

Classroom Activities

1. Show “The Survival of Plants: Reproduction and Change” segment from the *Life Science: Plants* video.
 - **Photographs:** Show students photographs of a variety of different types of plants, from vegetables to trees to aquatic plants to flowering perennials. Discuss the diversity within the plant world, and ask students to describe the many ways in which plants differ.
 - **Discussion:** Discuss these questions with the class: Why do people need plants? How are plants used? What do plants need to survive? How can we protect plants from extinction? Invite students to jot down their conclusions.
 - **Investigation:** Have students observe seeds in nature and collect seeds of many common plants, such as oak, elm, cottonwood, watermelon, sunflower, and bean. Invite students to examine the seeds under a magnifying glass and hypothesize how the seeds could be dispersed. Review these methods: wind, water, animals, birds, insects, and humans.
 - **Chart:** Have students make charts listing 20 plants and how their seeds are dispersed to ensure the survival of the plant.
 - **Research:** Assign students to research and report on a plant—its needs, characteristics, origin, and value.
 - **Role Playing:** Invite students to imagine they are plant scientists and directors of botanic gardens, and have them discuss the value of storing seeds for plants that are threatened.

2. Show “Plant Cells—Unique Roles” segment from the *Assignment Discovery: Cells* video. (Access to *unitedstreaming* is required.)
 - **Diagramming:** After reviewing the plant parts described in the video, have students diagram these parts of a plant: root, stem, leaf, flower, fruit, and seed. Advise them to consult a science text as they label each part with its function.
 - **Glossary:** Ask students to define the terms *chloroplast*, *photosynthesis*, *gymnosperm*, *angiosperm*, and *seed case*. Have them keep glossaries of terms pertaining to plants, continuing to add to them throughout the unit.
 - **Dissection:** Have students cut into stems, leaves, and roots, examining these under a microscope. Ask them to observe the appearance of the tissues and to record their observations in a lab notebook.
 - **Outlining:** Invite students to outline the chemical process of photosynthesis, whereby green plants capture energy from light and convert it to fuel in the presence of chlorophyll.
 - **Experiment:** Have students conduct an experiment where they grow bean plants from seed, comparing seedlings that are grown under different conditions, such as low light vs. strong light, watered vs. unwatered, and cold temperature vs. warm temperature. Encourage students to draw conclusions about what plants need.

3. Show the “Classification of Plants” segment from the *TLC Elementary School: What Is a Living Thing?* video. (Access to *unitedstreaming* is required.)
 - **Photographs:** As you show students photographs of diverse plants, ask them to jot down characteristics that make each plant unique. Brainstorm to list the many ways that plants differ and to develop categories for classifying plants. Then discuss how scientists classify plants.
 - **Flashcards:** Have students create flashcards with plant terms from the video, such as *xylem*, *phloem*, *plant kingdom*, *vascular*, and *nonvascular*.
 - **Demonstration:** Demonstrate how vascular plants function by leaving a white carnation in a glass of dark-colored water for two days. Discuss how the phloem carries color to the flower petals.
 - **Debate:** Hold a debate on the genetic modification of food crops: Should crops be modified?
 - **Biography:** Ask students to read biographical articles about famous botanists and share information with the class. Subjects might include

Carolus Linnaeus, Gregor Mendel, Charles Darwin, Luther Burbank, and George Washington Carver.

4. Show the “How Plants Adapt” segment from the *Scientific Investigations Life Science: Investigating Bacteria, Plants, and Other Organisms* video. (Access to *unitedstreaming* is required.)
- **Discussion:** Review what plants need: sun, water, and nutrients. Discuss: What happens if a plant doesn’t get what it needs? How does a plant adapt to a harsh environment? How does environment affect plants?
 - **Illustration:** Have students make illustrations or comic strips to show how the plants in the video adapted to these conditions:
 - a. darkness
 - b. cold
 - c. dryness
 - d. poor soil
 - **Observation:** Explain that flowers attract pollinators to spread their seed, and review the types of pollinators. Note that bees are the number one pollinator, but that butterflies frequently pollinate too, and that each plant depends on certain pollinators. Have students consult a science text as they dissect flowers to see their structures for dispersing and receiving pollen: stigma, style, stamen, pistil, anther, ovary. Require students to record their observations.
 - **Photographs:** Explain that carnivorous plants have developed adaptations for trapping insects. Show photographs of carnivorous plants, and have students guess how insects become trapped and turned into plant nutrients.
 - **Experiment:** Have students take healthy plants and see how they adapt when they are moved away from the light. Explain that phototropism is the characteristic of plants adapting to low-light conditions by leaning toward light.
 - **Research:** Invite students to research and report on the adaptations plants such as these have developed:
 - a. yucca (deep taproot to get water)
 - b. cactus (stores water in stem)
 - c. Venus flytrap (lures and traps insects for nutrients)
 - d. orchids (climb trees to reach for light)
 - e. waterlily (leaf floats to capture light)
 - f. pine (needles reduce evaporating surface)

Academic Standards

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K–12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/compendium/browse.asp>.

This lesson plan addresses the following standards:

- Life Sciences
 - Understands the structure and function of cells
 - Understands the relationship among organisms and their environment
 - Understands biological evolution and the diversity of life
- Language Arts
 - Uses the general skills and strategies of the writing process
 - Gathers and uses information for research purposes

National Science Education Standards

The National Science Education Standards are detailed at <http://www.nap.edu/html/nses>.

This lesson plan addresses the following science standards:

- Structure and function in living systems
- Reproduction and heredity
- Diversity and adaptations of organisms

