FLORIDA WILDFLOWER FOUNDATION

Wild About Wildflowers!

a classroom activity guide

Third- and Fourth-grade edition

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the State Wildflower license plate and Wildflower Foundation, Miami.
Some activities have been adapted in part from *Exploring the Native Plant World*, developed by the Lady Bird Johnson Wildflower Center.
Cover photo by Lisa Ludlum.

Overview

The purpose of the Florida Wildflower Foundation's *Wildflower Activity Guide* is to increase students' knowledge about Florida's wildflowers. The activities in this edition have been designed to meet specific third- and fourth-grade standards; however, many of them may be adapted to other grade levels.

For this guide, wildflowers are defined as flowers that grow in the wild or on their own, without cultivation. The Florida Wildflower Foundation informs us that wildflowers have adapted to Florida's conditions and pests; typically require less water, fertilizer and pesticides than other flowers; and support a myriad of native wildlife, including bees, butterflies, hummingbirds and more.

This activity guide is designed such that sections and activities may be used individually and independently. Each section contains a glossary of vocabulary terms that can be printed and provided to students, as well as a resources page with books and websites to help expand and enhance the activities.

In this guide, students will learn that, like animals, plants reproduce and have male and female parts. They will discover the important role that flowers play in the life cycle and reproductive process of wildflowers and other plants. Students will learn that wildflowers and other plants must adapt to their environments, and that the environment where a wildflower lives affects the way the organism looks and how its structures and behaviors have adapted to be able to survive in that environment. They will also learn of the many benefits of wildflowers to humans and to the planet.

In order to teach scientific concepts to students, other plants may be used for observation, experiments, and investigations. Wildflowers have the same parts and processes but are often smaller in size or more delicate to study. Students should be made aware that the other plants being substituted for wildflowers are models, and are similar in most characteristics to wildflowers but may vary in size, color, shape, etc. This program is designed to help students learn about flowering plants, specifically Florida native wildflowers, and does not address the characteristics and habits of non-flowering plants.

Photo by Bill Randolph

Introduction

What is a native plant?

A native plant is a plant species that occurs naturally in a particular region, state, ecosystem, and habitat without direct or indirect human actions. Native plants are a part of the natural neighborhood, a component of the local ecosystem, and they function with other organisms within that ecosystem. They are a critical component of nature's web, and they have evolved and adapted to meet climatic and environmental changes over time without intervention or assistance from humans.

Native plants provide food and habitat for animals of all kinds, including humans. They filter the air and reduce soil erosion. Because native plants fill a niche, or specific function, within their ecosystem, they seldom grow beyond the needs and capacities of that ecosystem. The interaction and interdependence of plants and animals within that niche make up our biological community.

Native plants are in crisis.

Farming, ranching, urban development, and chemical application have significantly reduced many of the Earth's native plant communities. Species have become endangered or extinct, natural habitats have degraded, soil erosion has increased, and the genetic diversity so essential for stable, balanced ecosystems has declined. Since the early nineteenth century, more than 200 of America's native plant species have been lost, and more than 5,500 species are endangered or threatened. This means that other organisms dependent on those species have lost or might lose an important part of their food chain.

In many places, well-meaning landowners have replaced native plants with non-native species in yards or landscapes. Non-native plants occasionally escape cultivation and become aggressive, invasive weeds, choking out both native and other non-native plants.

Photo by Bill Randolph

The importance of native plants

There are several important reasons to garden with native plants. They are adapted to the particular combination of soil, temperature, nutrients, and rainfall of their region. Once established they require little, if any, supplemental water, fertilizer, pesticides, or other chemicals. In planned landscapes around schools, homes, commercial developments, or roadsides, native plants require far fewer additional resources.

Besides the practical benefits of using native species, these plants provide habitat for a host of regional animals. Native plants are a welcome mat for the birds, butterflies, and so many other animals that enjoy the habitat. Using native plants in a garden or landscape can provide ecological, economic, and aesthetic benefits — it's a win-win situation for both the gardener and the natural community.

A good way to start protecting and preserving native plants is by learning about your region's native plants.

Why wildflowers?

Wildflowers do much more than give *La Florida*, the "land of flowers," its unique sense of place. Because they've adapted to Florida's conditions and pests, they typically require less water, fertilizer and pesticides than other flowers. They also support a myriad of native wildlife, and provide habitat for bees and other pollinators that are responsible for every third bite of food we eat.

Photo by Mary Keim

Concepts and Objectives

Interdisciplinary connections bridge student knowledge and prevent artificial boundaries from developing. Science and math lessons go hand-in-hand when students are quantifying data and results. Science and language arts pair up naturally as children observe the natural world around them and begin the monumental task of describing and explaining their observations. Social studies connections bring the past with the present, making real the connections between people and their environment. Through these connections, students learn the necessary skills to interpret their observations of the natural world.

The activities in this kit are designed to build good observation skills, develop systems to collect, organize, display and explain data, and furnish a strong basis for future learning. Before we can understand anything, we must first see it clearly.

Students will learn the following concepts through the activities and lessons found in this kit:

Section 1: Parts of a Wildflower

In this section, students will learn the different parts of a flower and be able to identify them by name and function in both simple and compound flowers.

Section 2: Life Cycle of a Wildflower

In this section, students will learn about and observe the different phases of a wildflower's life cycle: seed germination, seedling growth, flower production, fruit and seed production, and seed release and distribution. They will also examine the parts of a seed.

Section 3: Wildflower Adaptations

In this section, students will learn what adaptation means, why and how wildflowers and other plants adapt, and what adaptations have been made by Florida wildflowers.

Section 4: Pollination

In this section, students will learn about the process and necessity of pollination. They will investigate how different pollinators interact with different wildflowers, compare different forms of pollen, and examine methods by which pollen is transferred.

Section 5: Wildflower and Animal Interactions

In this section, students will learn about symbiosis and investigate how wildflowers and animals interact.

Section 6: The Importance of Wildflowers

In this section, students will learn how wildflowers are used by humans for food, medicine and other products, and will explore other benefits and services of wildflowers.

Photo by Amanda Martin

Florida State Standards

The following **Grade 3 Florida State Standards** are addressed in the lessons found in this activity guide:

Grade 3 English Language		Activity
LAFS.3.SL.2.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.	2.3 Extension, 3 Extension 2, 6 Extension 2
LAFS.3.W.2.4	With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose.	3 Extension 2, 3 Web Quest, 3 Writing Extension, 6 Extension 1, 6 Extension 2, Web Quest
LAFS.3.W.2.6	With guidance and support from adults, use technology to produce and publish writing (using keyboarding skills) as well as to interact and collaborate with others.	3 Extension 2, 3 Web Quest, 3 Writing Extension, 6.1 (Extension) 6 Extension 2, Web Quest
LAFS.3.W.3.7	Conduct short research projects that build knowledge about a topic.	3 Extension 2, 3 Web Quest, 3 Writing Extension, 6.1 (Extension) 6 Extension 2, Web Quest
LAFS.3.W.3.8	Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.	6 Extension 2, Web Quest
LAFS.K12.L.1.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.	3 Extension 2, 3 Web Quest, 3 Writing Extension, 6 Extension 1 6 Extension 2, Web Quest
LAFS.K12.L.1.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.	3 Extension 2, 3 Web Quest, 3 Writing Extension, 6 Extension 1 6 Extension 2, Web Quest
Grade 3 Math		**Activity**
MAFS.3.MD.2.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.	2.3, 3.3
MAFS.K12.MP.1.1	Make sense of problems and persevere in solving them.	3.3
Grade 3 Science		**Activity**
SC.3.L.14.1	Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.	1.1, 1.2, 1.3, 2.1, 2.2, 2.3
SC.3.L.14.2	Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity.	3 Extension 1, 3 Extension 2, 5.1
SC.3.N.1.1	Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.	3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3 Extension 1, 3 Web Quest, 3 Writing Extension, 4.1, 4.2, 4.3, 4.3 Extension, 4.4 5.1, 5.2, 6.1, 6 Extension 2, 6 Extension 3, Web Quest
SC.3.N.1.2	Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.	3.1, 3.2, 3.3, 3.6, 3 Extension 1, 4.4, 5.2, 6 Extension 3
SC.3.N.1.3	Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.	2.3, 3.3, 3.6, 5.2, 6 Extension 3
SC.3.N.1.5	Recognize that scientists question, discuss, and check each other's evidence and explanations.	3.1, 3.2, 3 Extension 1

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Grade 3 Science (continued)		Activity
SC.3.N.1.6	Infer based on observation.	3.1, 3.6, 4.2, 4.3, 4.3 Extension, 4.4, 5.1, 5.2
SC.3.N.1.7	Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.	2.3, 3.1, 3.3, 3.6, 3 Extension 2, 4.1, 4.2, 4.3, 4.3 Extension, 4.4, 5.1
SC.3.N.3.2	Recognize that scientists use models to help understand and explain how things work.	3.3, 3.4, 3 Extension 1, 4.1, 4.3, 4.3 Extension
SC.3.N.3.3	Recognize that all models are approximations of natural phenomena as such, they do not perfectly account for all observations.	3.3, 4.1, 4.3, 4.3 Extension

The following **Grade 4 Florida State Standards** are addressed in the lessons found in this activity guide:

Grade 4 English Language		Activity
LAFS.4.SL.2.4	Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.	2.3 Extension, 3 Extension 2, 6 Extension 2
LAFS.4.W.2.4	Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.	3 Extension 2, 3 Web Quest, 3 Writing Extension, 6 Extension 1, 6 Extension 2, Web Quest
LAFS.4.W.2.6	With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting.	3 Extension 2, 3 Web Quest, 3 Writing Extension, 6.1 (Extension), 6 Extension 2, Web Quest
LAFS.4.W.3.7	Conduct short research projects that build knowledge through investigation of different aspects of a topic.	3 Extension 2, 3 Web Quest, 3 Writing Extension, 6.1 (Extension), 6 Extension 2, Web Quest
LAFS.4.W.3.8	Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.	6 Extension 2, Web Quest
LAFS.K12.L.1.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.	3 Extension 2, 3 Web Quest, 3 Writing Extension, 6 Extension 1, 6 Extension 2, Web Quest
LAFS.K12.L.1.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.	3 Extension 2, 3 Web Quest, 3 Writing Extension, 6 Extension 1, 6 Extension 2 , Web Quest
Grade 4 Math		**Activity**
MAFS.4.MD.2.4	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.	2.3
MAFS.K12.MP.1.1	Make sense of problems and persevere in solving them.	3.3
Grade 4 Science		**Activity**
SC.4.E.6.3	Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.	6.2
SC.4.E.6.5	Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.	1.2, 1.3, 2.2, 3.3, 3.6, 4.2, 4.3, 4.3 Extension, 5.2
SC.4.L.16.1	Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination.	1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 2.3 Extension, 3.1, 3.2, 3.3, 4.2, 4.3, 4.3 Extension, 4.4
SC.4.L.16.2	Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.	1.3, 3.4, 3.5, 3 Extension 1, 5.1

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Grade 4 Science (continued)		Activity
SC.4.L.16.4	Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.	2.1, 2.3, 2.3 Extension
SC.4.L.17.4	Recognize ways plants and animals, including humans, can impact the environment.	3.1, 3.4, 3 Extension 1, 5.1, 6.2, 6 Extension 1
SC.4.N.1.1	Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.	3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3 Extension 1, 3 Extension 2, 3 Web Quest, 3 Writing Extension, 4.1, 4.2, 4.4, 5.1, 5.2, 6.1, 6 Extension 2, 6 Extension 3, Web Quest
SC.4.N.1.2	Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.	3.1, 3.2, 3.3, 3.6, 4.3, 4.3E, 4.4, 5.2, 6 Extension 3
SC.4.N.1.4	Attempt reasonable answers to scientific questions and cite evidence in support.	3.1, 3.2, 3.3, 3.4, 3.6, 3 Extension 1, 3 Extension 2, 3 Web Quest, 3 Writing Extension, 4.1, 4.2, 4.4, 5.1, 5.2, 6 Extension 3
SC.4.N.1.5	Compare the methods and results of investigations done by other classmates.	3.1, 3.2, 3.3, 3.6, 4.2, 6 Extension 3
SC.4.N.1.6	Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.	3.3, 3.6, 5.2, 6 Extension 3
SC.4.N.1.7	Recognize and explain that scientists base their explanations on evidence.	3.1, 3.2, 3.3, 3.6, 3 Extension 2, 3 Web Quest, 3 Writing Extension, 4.1, 4.2, 4.3, 4.3 Extension, 4.4, 5.1
SC.4.N.1.8	Recognize that science involves creativity in designing experiments.	3.3, 3.4, 4.1
SC.4.N.3.1	Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model.	2.2, 3.3, 3.4, 3 Extension 1, 4.1, 4.3, 4.3 Extension

Materials

The following materials are needed to complete the activities in this activity guide.
See individual activities for quantities and instructions.

Item	Activity
Antenna headbands (optional)	4.1
Beans, dried (or other fast-sprouting seeds)	2.3 Alternative
Boxes or tubs (cardboard or plastic)	4.1
Construction paper	1.2
Craft sticks	3.3, 4.3
Cups, 12 oz	2.3, 4.3, 4.3 Extension
Flowers (simple)	1.2
Flowers (composite)	1.2 Extension
Graph paper	3.3
Hand lens	1.2, 1.2 Extension, 2.2, 3.6, 4.2, 5.2
Marbles	4.3, 4.3 Extension
Measuring tapes	3.3, 6 Extension 3
Newspaper	2.3
Paper (notebook or drawing)	2.2
Paper towels	2.2, 2.3 Alternative
Plasti-bands	3.3
Plastic knives	2.2
Plastic sandwich bags	2.3 Alternative
Plastic spoons	3.3

Item	Activity
Pom-poms, 1/2”	3.3
Pom-poms, 5mm	4.3
Post-it notes, pads	4.1
Seed-sorting dishes	3.1
Scissors	3.3
Sheet or cloth (large, white)	5.2
Tape (masking)	3.1
Tape (Scotch)	1.2
Toothpicks	2.2
Tweezers	1.2
Velcro wands	4.3
Water	2.3, 2.3 Alternative
Wildflower seeds	2.2, 2.3
Miscellaneous craft supplies including construction paper, glue, yarn, paints, crayons, scissors, etc.	3.4 Alternative, 3 Extension 1
NOTE: Sunshine mimosa seeds, which are large enough for students to work with, are available from the Florida Wildflower Foundation at no cost to Florida teachers and non-formal educators. Email your request to info@flawildflowers.org at least two weeks before your activity; supply is limited.	

The following PowerPoint presentations may be downloaded using the links provided:

Item	Activity	Link
Parts of a Wildflower	1.1	www.flawildflowers.org/resources/docs/SEC1_PartsOfAWildflower.ppt
Wildflower Life Cycle	2.1	www.flawildflowers.org/resources/docs/SEC2_SeedDiagram.ppt
Seed Diagram	2.2	www.flawildflowers.org/resources/docs/SEC2_WildflowerLifeCycle.ppt

The following reproducible student worksheets and reference pages are included:

Item	Activity/Section
Parts of a Wildflower — Diagram	1.1
Parts of a Wildflower — Definitions	1.1
Parts of a Simple Wildflower	1.2
Compound Flower Investigation	1.2 Extension
Parts of a Wildflower — Word Find	1 Vocabulary Activity
Wildflower Life Cycle	2.1
Germination Lab Experiment	2.3
My Life Began as a Wildflower Seed	2.3 Extension
Wildflower Life Cycle — Crossword Puzzle (2 pages)	2 Vocabulary Activity
Adaptation descriptions (3 pages)	Section 3
Wildflower Seed Dispersal Adaptations (3 pages)	3.2
Seed Dispersal Adaptation Cards	3.2
I'm a Traveling Wildflower Seed	3.2
Flung, Flown or Ferried (4 pages)	3.3
Wildflower Adaptations	3.4
Wildflower Adaptations — Clue Cards	3.5
Wildflower Adaptations — Plant Cards (4 pages)	3.5
Adaptation Scavenger Hunt (2 pages)	3.6
Ecosystem Adaptation descriptions (4 pages)	3 Extension 2
Wildflower Adaptations — Web Quest	3 Web Quest
Adaptation worksheets (4 pages)	3 Writing Extension
Wildflower Adaptations — Definition Match	3 Vocabulary Activity
Pollination Specialty descriptions (2 pages)	Section 4
Pollinator Observations	4.4
Pollination — Word Find	4 Vocabulary Activity
Cohort Combo Matching Cards (2 pages)	5.1
Cohort Combo Information Sheets (2 pages)	5.1
Insect Evidence Survey	5.2
Wildflower and Animal Interactions — Definition Match	5 Vocabulary Activity
The Importance of Wildflowers (2 pages)	Section 6
Pass the Wildflowers, Please! (2 pages)	6.1
Dr. Wildflower's Natural Remedies (2 pages)	6.2
Why Wildflowers Are Important to Me	6 Extension 1
Wildflower Walkabout	6 Extension 3
Wildflower Walkabout — Observation Sheet	6 Extension 3
The Importance of Wildflowers — Crossword Puzzle (2 pages)	6 Vocabulary Activity
Wildflower Profile	Web Quest

See specific activities for quantites and instructions.

Parts of a Wildflower

Introduction

Most *flowers* contain four sets of parts, with each set playing an important role in the life cycle of the plant:

- *Sepals* are the outermost set of floral parts. They are small, leaf-like parts that protect the developing flower bud like a suit of armor. Together, they create a whorl called a *calyx*. When the flower blooms, the sepals usually remain green and are thicker than the petals.
- *Petals* function to attract *pollinators*. They use their shape, size and color to attract pollinators such as bees, butterflies and birds to their *nectar*. All of the petals together make up the *corolla*.
- The *pistil* is the innermost set of floral parts, and makes up the female part of the flower. It consists of one or more *carpels*. A carpel is comprised of a *stigma*, *style* and *ovary*. The stigma is sticky and captures *pollen*. The style is an elongated tube that connects the stigma to the ovary. The ovary contains the egg-bearing *ovules*. *Pollination* occurs once the pollen lands on the stigma, travels down the style to the ovary and fertilizes the egg. Once fertilized, the ovules become pollinated *seeds*.
- *Stamens* are the male part of the flower. They consist of an *anther*, where the pollen is produced, and a *filament*, which supports the anther. Stamens can stand free or are sometimes fused together.

The majority of plants need both male and female parts in order for *reproduction* to occur. While most species contain both male and female parts on the same plant, other species have separate plants containing either male parts or female parts. Female plants may require cross-*pollination* from male plants.

Vocabulary

anther
calyx
carpel
compound (composite) flower
corolla
disc floret
filament
floret
flower
ovary
ovule
petal
pistil
pollen
pollination
pollinator
ray floret
reproduction
seed
sepal
stamen
stem
stigma
style

Standards covered in this section

Grade 3: SC.3.L.14.1

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.L.16.2

Note

Teachers should instruct students not to pull apart wildflowers in the wild or at home as they are needed as food for pollinators. Explain that it is permitted here only as part of a guided learning experience.

Parts of a Wildflower

Objective

Students will learn the different parts of a flower and be able to identify them by name and function.

Directions

- Give each student a “Parts of a Wildfower — Diagram” and “Parts of a Wildflower — Definitions” worksheet.
- Show “Parts of a Wildflower” PowerPoint presentation.
- Define and discuss each part of the flower (as laid out in the slides) and have students label the flower on the “Diagram” worksheet accordingly.
- Once the diagram has been completed, have students complete the “Definitions” worksheet, filling in the function of each flower part.

Materials

- “Parts of a Wildflower — Diagram” worksheet (one per student)
- “Parts of a Wildflower — Definitions” worksheet (one per student)
- “Parts of a Wildflower” PowerPoint presentation

Standards

Grade 3: SC.3.L.14.1

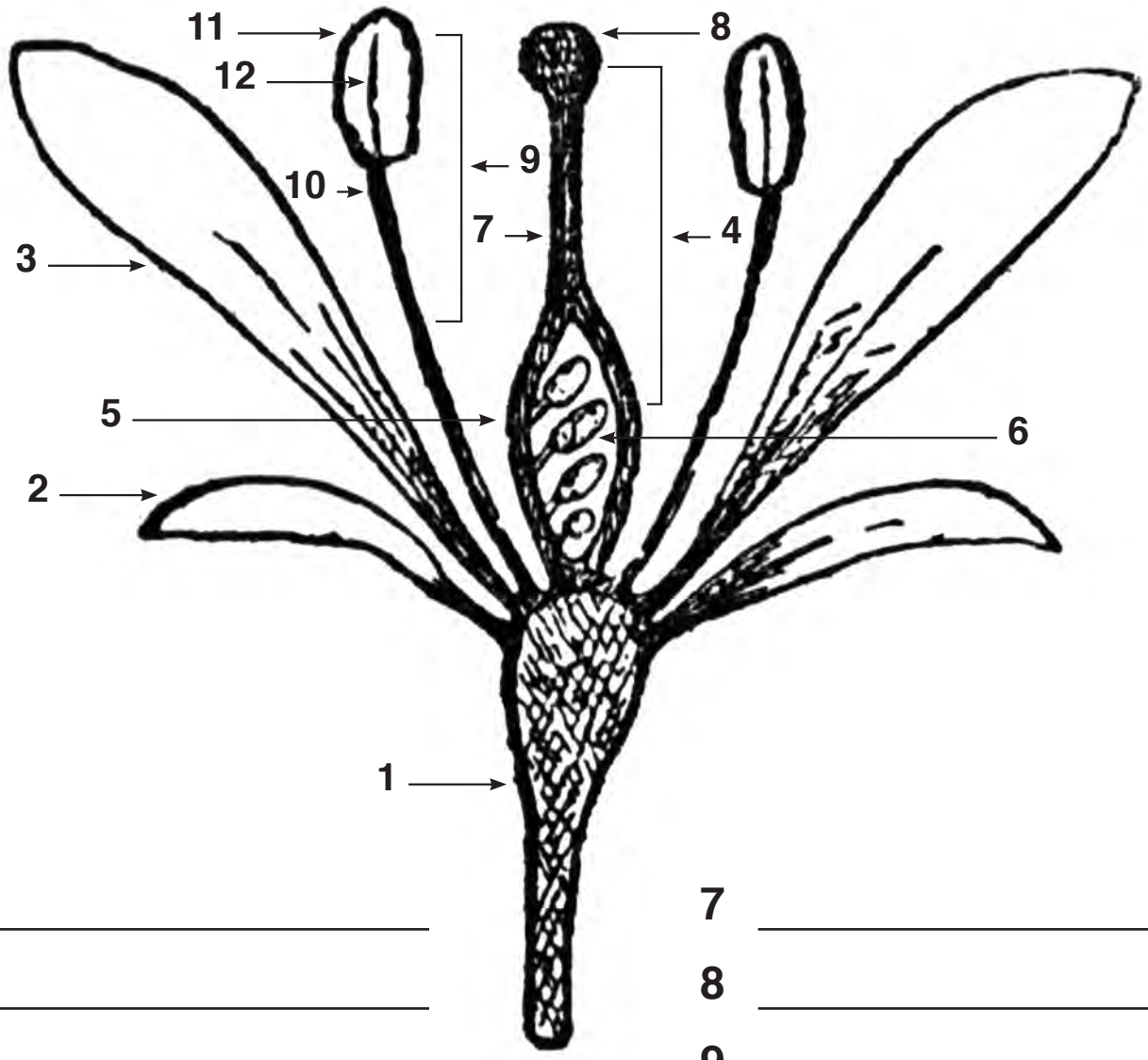
Grade 4: SC.4.L.16.1

Parts of a Wildflower — Diagram

Directions: Use the words in the Word Bank to fill in the blanks with the appropriate plant part.

Word Bank

anther	filament	ovary	ovule	petal / corolla	pistil / carpel
pollen	sepal / calyx	stamen	stem	stigma	style



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2 _____

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12 _____

Parts of a Wildflower — Diagram

Directions: Use the words in the Word Bank to fill in the blanks with the appropriate plant part.

Word Bank

anther	filament	ovary	ovule	petal / corolla	pistil / carpel
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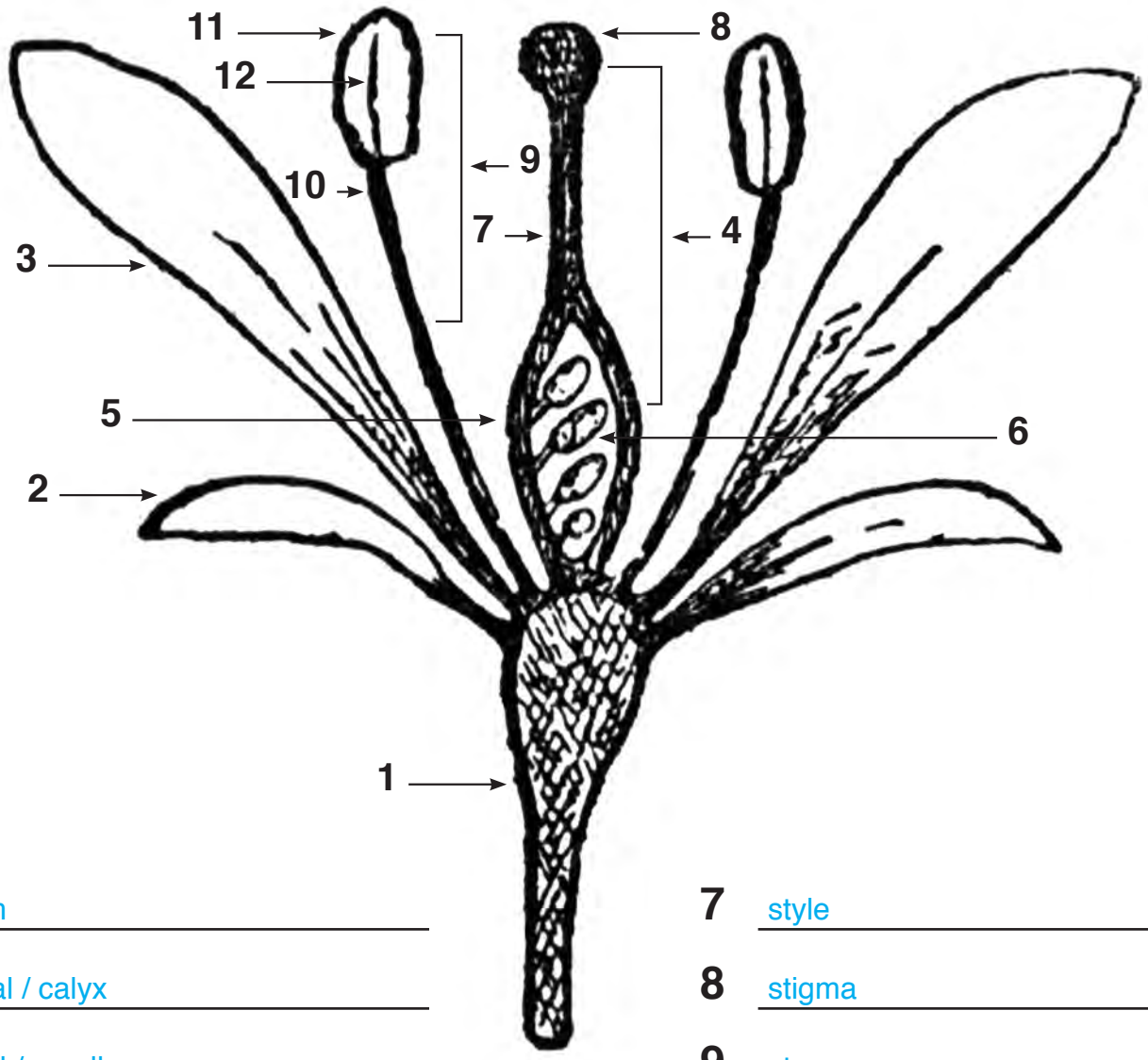


1 stem

2 sepal / calyx

3 petal / corolla

4 pistil / carpel

5 ovary

6 ovule

7 style

8 stigma

9 stamen

10 filament

11 anther

12 pollen

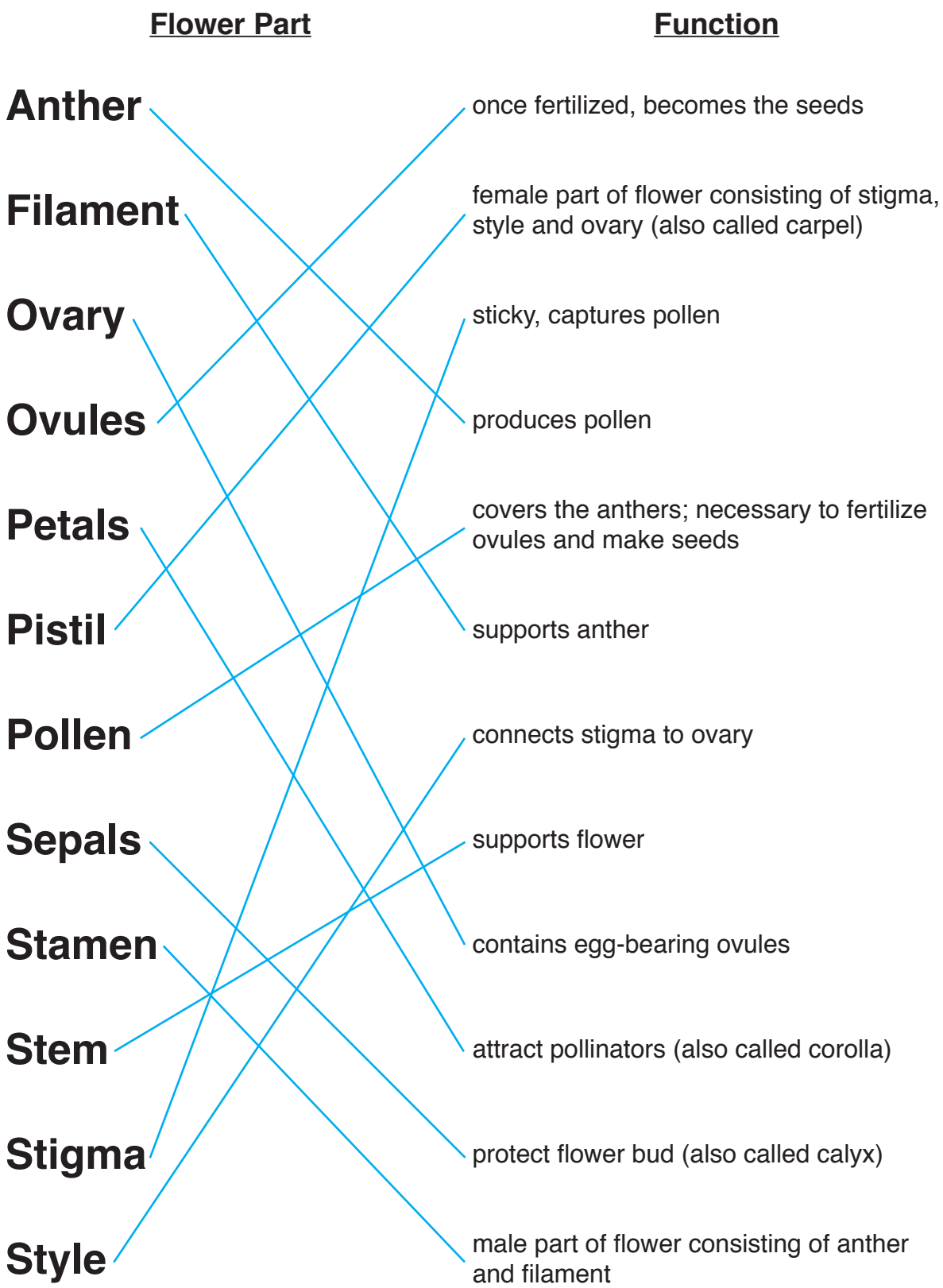
Parts of a Wildflower — Definitions

Directions: Match the flower part to its function.

Flower Part	Function
Anther	once fertilized, becomes the seeds
Filament	female part of flower consisting of stigma, style and ovary (also called carpel)
Ovary	sticky, captures pollen
Ovules	produces pollen
Petals	covers the anthers; necessary to fertilize ovules and make seeds
Pistil	supports anther
Pollen	connects stigma to ovary
Sepals	supports flower
Stamen	contains egg-bearing ovules
Stem	attract pollinators (also called corolla)
Stigma	protect flower bud (also called calyx)
Style	male part of flower consisting of anther and filament

Parts of a Wildflower — Definitions

Directions: Match the flower part to its function.



Operation Dissection

Objective

Students will identify the variety of flower parts among wildflower species.

Directions

Students should work in pairs.

- Give each pair the following:
  - one pair of tweezers
  - one "Parts of a Simple Wildflower" handout (Students may use their completed worksheets from Activity 1 or you may provide them with a copy of the handout on the following page.)
  - one each of the same-variety flowers
  - contrasting-colored construction paper
- Tell students the flower's common name and have them write it on the paper. (You may also tell them and have them write the scientific name, if known.)
- Give student pairs the hand lens and tweezers and tell them to remove the *sepals* (outer petal-like structures) and tape them to the construction paper and label.
- Have them do the same with the *petals*, *stamens* and *pistil*. Before taping the stamens, tell them to shake some of the *pollen* grains from the anthers onto the paper and tape them down.
- Next, give student pairs one or two of the different-variety flowers.
- Have them follow the same procedure for dissecting, taping and labeling each of the flowers.

Discussion

Direct students to compare the differences among the flower varieties. Ask:

- Do the parts have different shapes?
- Do they have different amounts of parts?
- Are all the flowers complete with sepals, petals, stamens and pistils?

Materials

- one-half class set of "Parts of a Simple Wildflower" handout
- construction paper (one sheet per student)
- hand lens (one per pair)
- tape
- tweezers (one per pair)
- one-half class set of a single variety of simple wildflowers
- a variety of simple wildflowers

Standards

Grade 3: SC.3.L.14.1

Grade 4: SC.4.E.6.5, SC.4.L.16.1

Tips

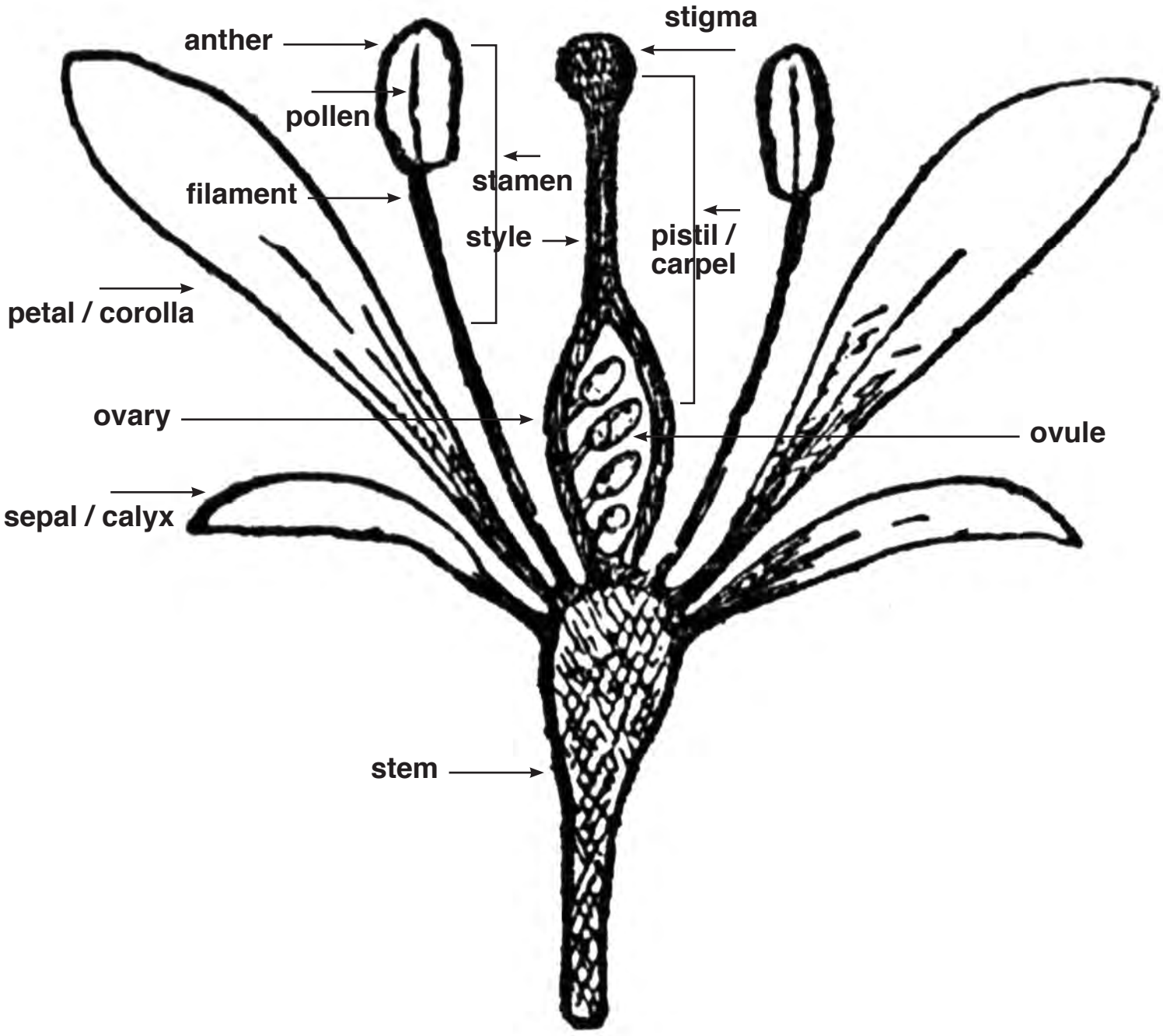
These flowers are good choices for this activity:

Wildflowers: hibiscus, partridge pea, spiderwort

Store-bought flowers: any with large petals, such as gladiolas or lilies

Avoid very small flowers, compound flowers, or flowers with specialized parts.

Parts of a Simple Wildflower



Compound Flower Investigation

Objective

Students will identify the male and female structures in a compound flower.

Discussion

The oldest and simplest flowers have many petals of the same shape. As flowers changed during the last 100 million years, newer species eliminated parts or had parts that fused into more complex and specialized structures.

A *compound* (or *composite*) *flower* is a flower that is actually made up of many small flowers, although it may look like a single bloom. When trying to identify the male and female structures in compound flowers, such as those in the Asteraceae or daisy family, may initially pose a challenge for both the teacher and students. Most members of the Asteraceae family have a daisy-like flower composed of two different types of flowers. For example, the "black eye" of the black-eyed Susan is actually composed of many *disc florets* surrounded by the outer *ray florets*.

Directions

Students should work in pairs or groups.

- Give a copy of the "Compound Flower Investigation" worksheet and one flower to each student pair/group, along with a hand lens to each student.
- Have them closely examine the flower to see if they can find the *pistils* and *stigmas* of the inner disc florets and the single *petals* of the outer ray florets.

Materials

- one-half class set of "Compound Flower Investigation" worksheet
- hand lens (one per student)

Provided by instructor

- one-half class set of flowers with composite heads

Standards

Grade 3: SC.3.L.14.1

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.L.16.2

Tips

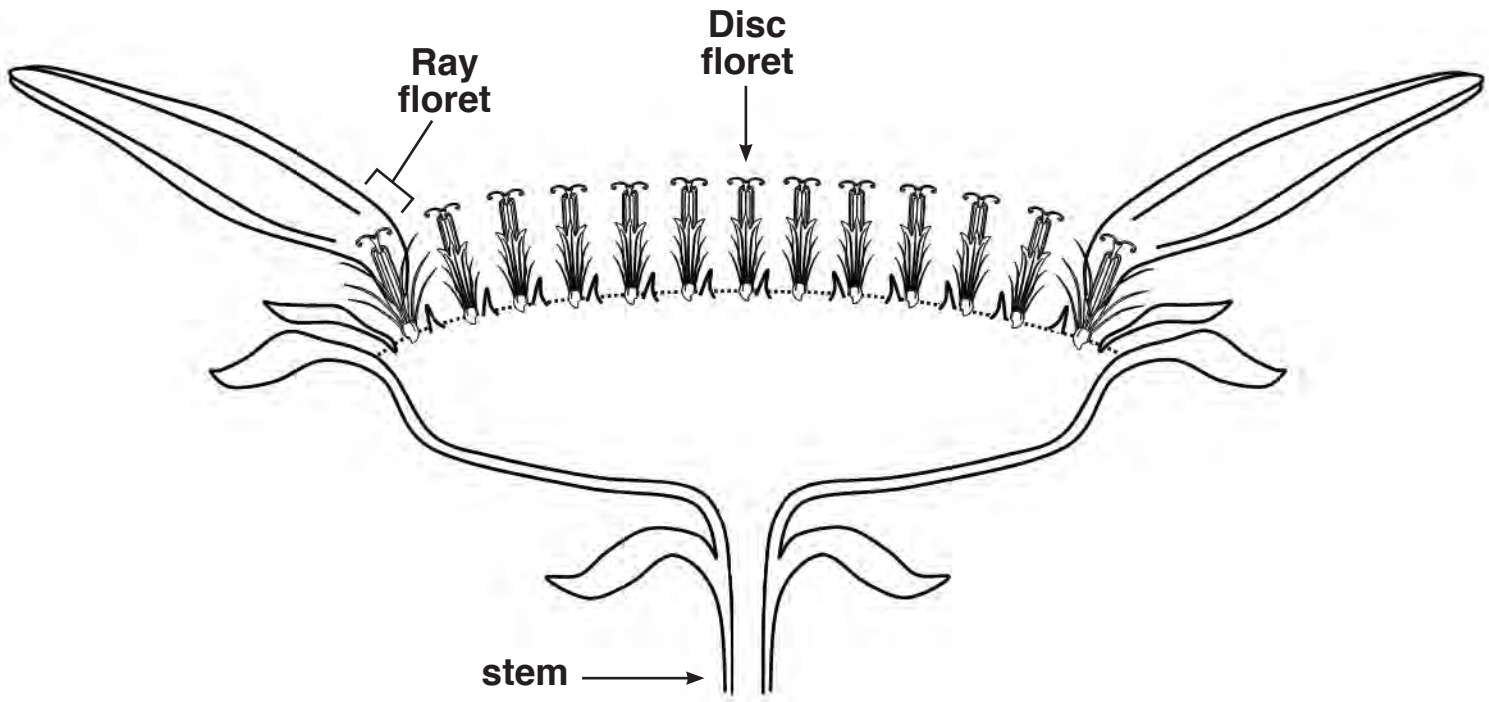
These flowers are good choices for this activity:

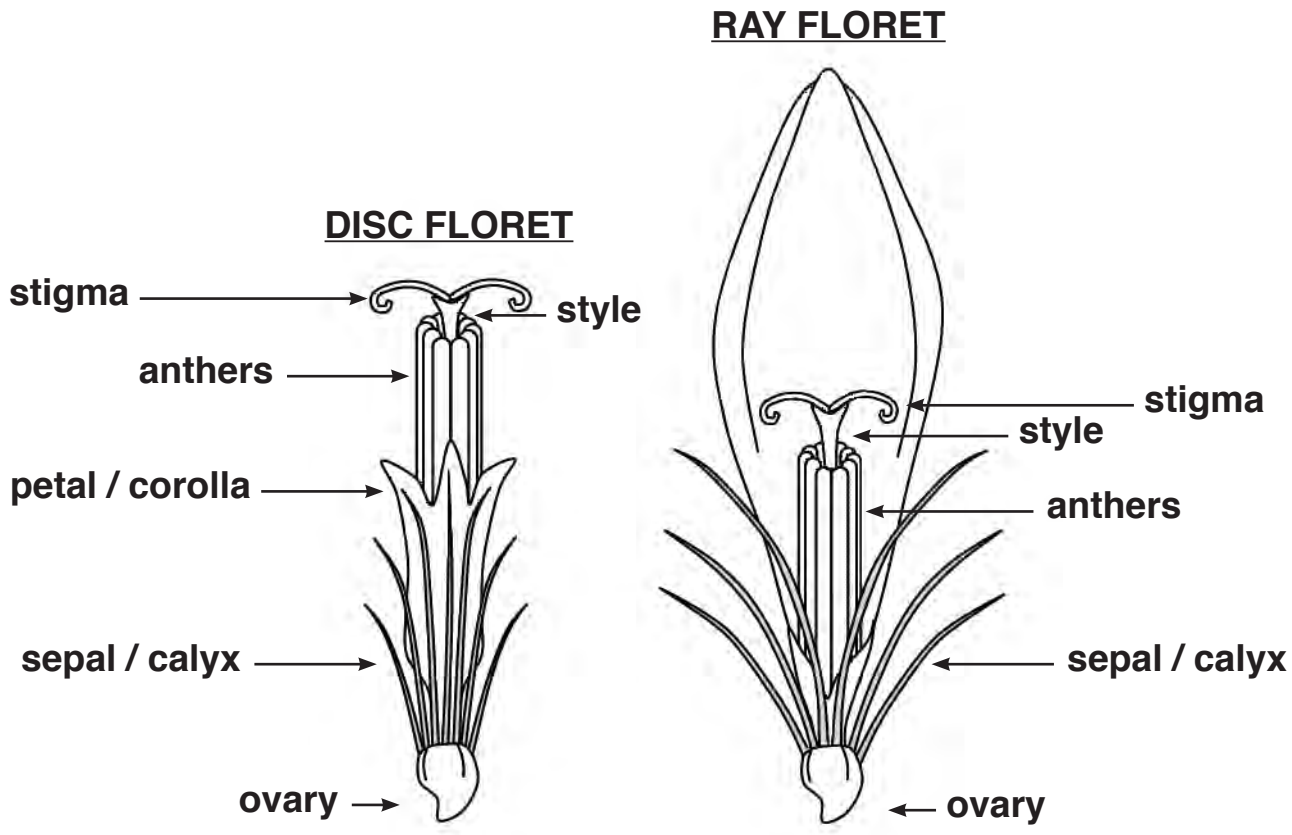
Wildflowers: black-eyed Susan, blanketflower, dune sunflower
Store-bought flowers: sunflower, Gerber daisy

Note

Some members of the Asteraceae family may be missing one of the flower types. Rayless sunflowers, for example, lack the outer ray flowers.

Compound Flower Investigation





Glossary

Anther: Yellow, pouch-like part inside of the flower that holds pollen grains, usually located on top of a long stalk that looks like a fine hair.

Calyx: The collective term for the sepals of one flower.

Carpel: All the female parts of a plant together.

Compound (Composite) flower: A flower made up of smaller flowers such as those in the Aster family.

Corolla: The collective term for the petals of one flower.

Disc floret: The small, tubular floret in a compound flower of the Aster family. A group of disc florets forms the disc or central part of the compound flower head. It is often surrounded by ray florets.

Filament: Fine hair-like stalk that supports the anther.

Floret: One of the small flowers making up a composite flower.

Flower: 1) Part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated; blossom.
2) Part of the plant that ordinarily contains the reproductive organs. Flowers can be male, female or bisexual. A male flower is staminate (has only stamens). A female flower has only pistils. If a flower has both pistils and stamens, it is bisexual or both male and female.

Ovary: Part of the plant, usually at the base of the flower, that contains ovules and eventually becomes fruit.

Ovule: Part of the ovary in a plant that, after fertilization, becomes the seed.

Petal: The colorful parts of the flower that often attract pollinators.

Pistil: 1) Organ of a flower that contains the ovule or ovules.
2) The female part of the flower made up of four parts—stigma, style, ovary and ovule.

Pollen: Fine, powder-like material that covers the anthers within a flower. This is what bees and other pollinators collect. Pollen is needed by plants to make seeds.

Pollination: 1) The movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower.
2) Pollination occurs when birds, bees, bats, butterflies, moths, beetles, other animals, water or wind carry pollen between flowers, or when it is moved within flowers.

Pollinator: An organism (usually an insect, bird or small mammal) that moves pollen from the anther of one plant to the stigma of another.

Ray floret: The strap-shaped floret in a compound flower of the Aster family. A group of ray florets form the ray or outer part of a compound flower head. Ray florets are not always present.

(Continued on following page.)

Tip

Develop a *Jeopardy*-style game for students with the vocabulary. *Jeopardy*-style PowerPoints are available at http://teach.fcps.net/trt10/PowerPoint.htm or you may use a smart board from http://exchange.smarttech.com/search.html?q=%22jeopardy%22l. Adapt one of these formats for your vocabulary words.

Reproduction: The act of generating new plants from parent plants.

Seed: Small part of a flowering plant that is capable of growing a new plant.

Sepal: Parts that look like little leaves or petals that cover the outside of a flower bud to protect the flower until it opens or blooms.

Stamen: 1) Stalk-like part of a flower that produces and bears pollen.
2) The male organ of a flower, bearing the anther and filament.

Stem: The main stalk of a plant that supports the leaves, branches and flowers.

Stigma: 1) One of the female parts of the flower.
2) The sticky bulb in the center of flowers where the pollen lands to start the fertilization process.

Style: Another female part of the flower; the long stalk that supports the stigma.

Parts of a Wildflower — Word Find

Directions: In the puzzle below, find and circle the words from the Word Bank.

Word Bank

anther	flower	floret	petal	pollinator	sepal
calyx	corolla	flower	pistil	ray floret	stamen
carpel	disc floret	ovary	pollen	reproduction	stem
compound	filament	ovule	pollination	seed	stigma

D	C	H	I	U	H	N	J	E	S	Q	A	A	S	T	U	I	L	W	I	J	A	B	H
N	D	K	L	M	G	I	U	B	D	Y	M	F	E	D	G	A	O	A	N	T	S	L	K
A	I	B	W	E	R	A	N	T	H	E	R	R	T	Y	U	I	V	O	P	S	S	E	M
Q	S	P	A	O	D	L	B	P	E	N	H	Y	F	M	C	R	A	O	S	Y	E	R	C
T	C	J	C	H	F	L	O	W	E	R	S	P	J	L	C	W	R	C	M	T	P	S	J
N	F	D	S	F	I	O	P	C	J	F	E	I	G	P	A	B	Y	J	W	A	A	I	M
A	L	J	C	A	L	Y	X	A	A	T	E	E	T	I	R	M	L	R	D	C	L	Y	P
I	O	I	S	B	A	E	R	F	B	L	D	S	H	D	P	E	T	A	L	E	S	S	R
F	R	T	Y	A	M	M	D	F	G	O	M	W	G	A	E	G	N	O	C	A	M	T	I
L	E	Z	J	N	E	C	R	T	I	S	C	O	R	O	L	L	A	H	R	P	C	Y	G
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L	P	E	K	P	T	B	N	E	F	I	L	D	A	U	E	D	F	E	R	L	E	E	N
V	E	C	R	A	Y	F	L	O	R	E	T	Y	P	L	T	E	M	P	B	L	R	N	L
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R	C	O	M	P	O	U	N	D	F	L	O	W	E	R	R	M	C	O	J	N	P	Y	H
Y	E	J	F	I	E	J	N	R	L	A	F	N	B	S	A	M	L	D	V	A	O	E	T
H	H	C	R	S	T	E	M	A	O	G	S	T	I	G	M	A	O	U	A	T	Y	M	A
T	P	G	S	T	L	O	D	H	R	D	T	S	U	D	P	F	C	C	J	I	T	S	O
I	Y	T	L	I	S	E	P	A	E	H	D	E	A	F	A	G	E	T	B	O	H	T	F
M	O	P	O	L	L	E	N	C	T	W	M	J	A	L	M	H	S	I	C	N	J	I	N
W	C	N	E	J	S	R	P	C	S	I	A	K	D	R	I	L	B	O	W	S	L	M	R
O	S	T	A	M	E	N	L	P	O	L	L	I	N	A	T	O	R	N	D	L	A	I	T
E	T	R	S	M	A	P	L	G	J	M	S	I	A	O	F	H	S	Y	N	R	E	W	P

Parts of a Wildflower — Word Find

Directions: In the puzzle below, find and circle the words from the Word Bank.

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anther	flower	floret	petal	pollinator	sepal
calyx	corolla	flower	pistil	ray floret	stamen
carpel	disc floret	ovary	pollen	reproduction	stem
compound	filament	ovule	pollination	seed	stigma

D	C	H	I	U	H	N	J	E	S	Q	A	A	S	T	U	I	L	W	I	J	A	B	H
N	D	K	L	M	G	I	U	B	D	Y	M	F	E	D	G	A	O	A	N	T	S	L	K
A	I	B	W	E	R	A	N	T	H	E	R	R	T	Y	U	I	V	O	P	S	S	E	M
Q	S	P	A	O	D	L	B	P	E	N	H	Y	F	M	C	R	A	O	S	Y	E	R	C
T	C	J	C	H	F	L	O	W	E	R	S	P	J	L	C	W	R	C	M	T	P	S	J
N	F	D	S	F	I	O	P	C	J	F	E	I	G	P	A	B	Y	J	W	A	A	I	M
A	L	J	C	A	L	Y	X	A	A	T	E	E	T	I	R	M	L	R	D	C	L	Y	P
I	O	I	S	B	A	E	R	F	B	L	D	S	H	D	P	E	T	A	L	E	S	S	R
F	R	T	Y	A	M	M	D	F	G	O	M	W	G	A	E	G	N	O	C	A	M	T	I
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L	P	E	K	P	T	B	N	E	F	I	L	D	A	U	E	D	F	E	R	L	E	E	N
V	E	C	R	A	Y	F	L	O	R	E	T	Y	P	L	T	E	M	P	B	L	R	N	L
E	R	S	A	E	I	D	I	L	G	S	C	F	M	E	V	T	C	R	A	I	I	N	S
R	C	O	M	P	O	U	N	D	F	L	O	W	E	R	R	M	C	O	J	N	P	Y	H
Y	E	J	F	I	E	J	N	R	L	A	F	N	B	S	A	M	L	D	V	A	O	E	T
H	H	C	R	S	T	E	M	A	O	G	S	T	I	G	M	A	O	U	A	T	Y	M	A
T	P	G	S	T	L	O	D	H	R	D	T	S	U	D	P	F	C	C	J	I	T	S	O
I	Y	T	L	I	S	E	P	A	E	H	D	E	A	F	A	G	E	T	B	O	H	T	F
M	O	P	O	L	L	E	N	C	T	W	M	J	A	L	M	H	S	I	C	N	J	I	N
W	C	N	E	J	S	R	P	C	S	I	A	K	D	R	I	L	B	O	W	S	L	M	R
O	S	T	A	M	E	N	L	P	O	L	L	I	N	A	T	O	R	N	D	L	A	I	T
E	T	R	S	M	A	P	L	G	J	M	S	I	A	O	F	H	S	Y	N	R	E	W	P

FLORIDA WILDFLOWER FOUNDATION

Resources

Literary Connections

- *From Flower to Fruit* by Anne Ophelia Downden
- *The Magic School Bus Plants Seeds: A Book About How Living Things Grow* by Joanna Cole
- *The Nature And Science Of Flowers (Exploring the Science of Nature)* by Kim Taylor and Jane Burton
- *The Secret Lives of Plants! (Adventures in Science)* by Janet Slingerland

Reference Books

- *Plant Life Cycles (Building Blocks of Science),* World Book, Inc.

Websites and other web resources

- "Biology of Plants." Missouri Botanical Garden (http://www.mbgnet.net/bioplants/main.html)
- "The Life Cycle of Plants" interactive website from Birmingham Grid for Learning (http://www2.bgfl.org/bgfl2/custom/resources_ftp/client_ftp/ks2/science/plants_pt2/index.htm)
- "Plant Morphology." American Museum of Natural History Curriculum Collections (http://www.amnh.org/explore/curriculum-collections/biodiversity-counts/plant-identification/plant-morphology)

Life Cycle of a Wildflower

Introduction

This section will use a simple *life cycle* graphic model but will expand the cycle at appropriate points to include *seed dispersal*, *germination*, reproductive parts of a flower, and *pollination*. This section will also focus on the *seed* phase. Students are probably most familiar with this phase.

A *cycle* is a series of steps or processes in which the last step leads back to the first, and all steps are repeated in the same order. The life of a wildflower can be seen as a cycle: It moves from seed to young plant (*seedling*) to a mature plant that then produces seeds. Some lesson plans on the plant life cycle may show from four to six steps. Simpler plans show only seed germination, plant growth, flowering and seed growth/release. More advanced plans may separate the steps further into seed germination, seedling growth, *flowering*, *fruit* production, seed dispersal and distribution, and the death of the original plant.

Seeds represent an evolutionary step forward for plants. A *seed* is a small package containing the *embryo*, or baby plant. Within the embryo are all the cells needed to develop into a mature plant. The embryo has three main parts: the root, or *radicle*; the shoot, or *epicotyl*; and the seed leaves, or *cotyledons*. The seed contains a "sack lunch" called the *endosperm*, which provides the embryo with nutrients, usually in the form of starch and proteins. These nutrients allow the seed to remain viable while it waits to germinate. The embryo and endosperm are enclosed in the *testa*, or *seed coat*, which provides protection against changing environments. This is what you see and feel when you hold a seed.

Plants are classified based on the number of seed leaves (cotyledons) within the seed. Plants such as grasses (which can also be wildflowers) can be *monocotyledons* (or monocots), containing one cotyledon. *Dicotyledons* (or dicots), such as sunflowers, are plants that have two cotyledons.

Vocabulary

cotyledon
- dicotyledon
- monocotyledon

cycle
embryo
endosperm
epicotyl
flower
fruit
germination
life cycle
pollination
radicle
reproduction
seed
seed coat
seed disperal
seedling
testa

Standards covered in this section

Grade 3: LAFS.3.SL.2.4, MAFS.3.MD.2.4, SC.3.L.14.1, SC.3.N.1.3, SC.3.N.1.7

Grade 4: LAFS.4.SL.2.4, MAFS.4.MD.2.4, SC.4.E.6.5, SC.4.L.16.1, SC.4.L.16.4, SC.4.N.3.1

Wildflower Life Cycle

Objective

Students will learn the different phases of a wildflower's life cycle.

Discussion

A wildflower's life cycle begins with a *seed*. The seed will sprout and produce a tiny, immature plant called a *seedling*. The seedling will grow to adulthood and form a mature plant. The mature plant will reproduce by forming new seeds, which will begin the next life cycle.

Directions

Students should work individually for Part 1 and in pairs or teams for Part 2.

Part 1

- Give each student a "Wildflower Life Cycle" worksheet.
- Show the "Wildflower Life Cycle" PowerPoint presentation. Define and discuss the different stages of the plant's life in order (as laid out in the slides) and have students label the diagram accordingly.

Part 2

- Lead students into the schoolyard and show them a beggar's tick (*Bidens alba*) plant. This weedy wildflower is often found in neglected flowerbeds or untended lawns. It blooms spring through fall, and year-round in warmer climes. Try to find specimens in various phases of their life cycle.
- Let students explore the schoolyard for other native plants. Using their "Wildflower Life Cycle" worksheets, have them look for other plants in the four main stages of their life cycles: seed, seedling, flowering, and mature plant.

Materials

- "Wildflower Life Cycle" worksheet (one per student)
- "Wildflower Life Cycle" PowerPoint presentation

Standards

Grade 3: SC.3.L.14.1

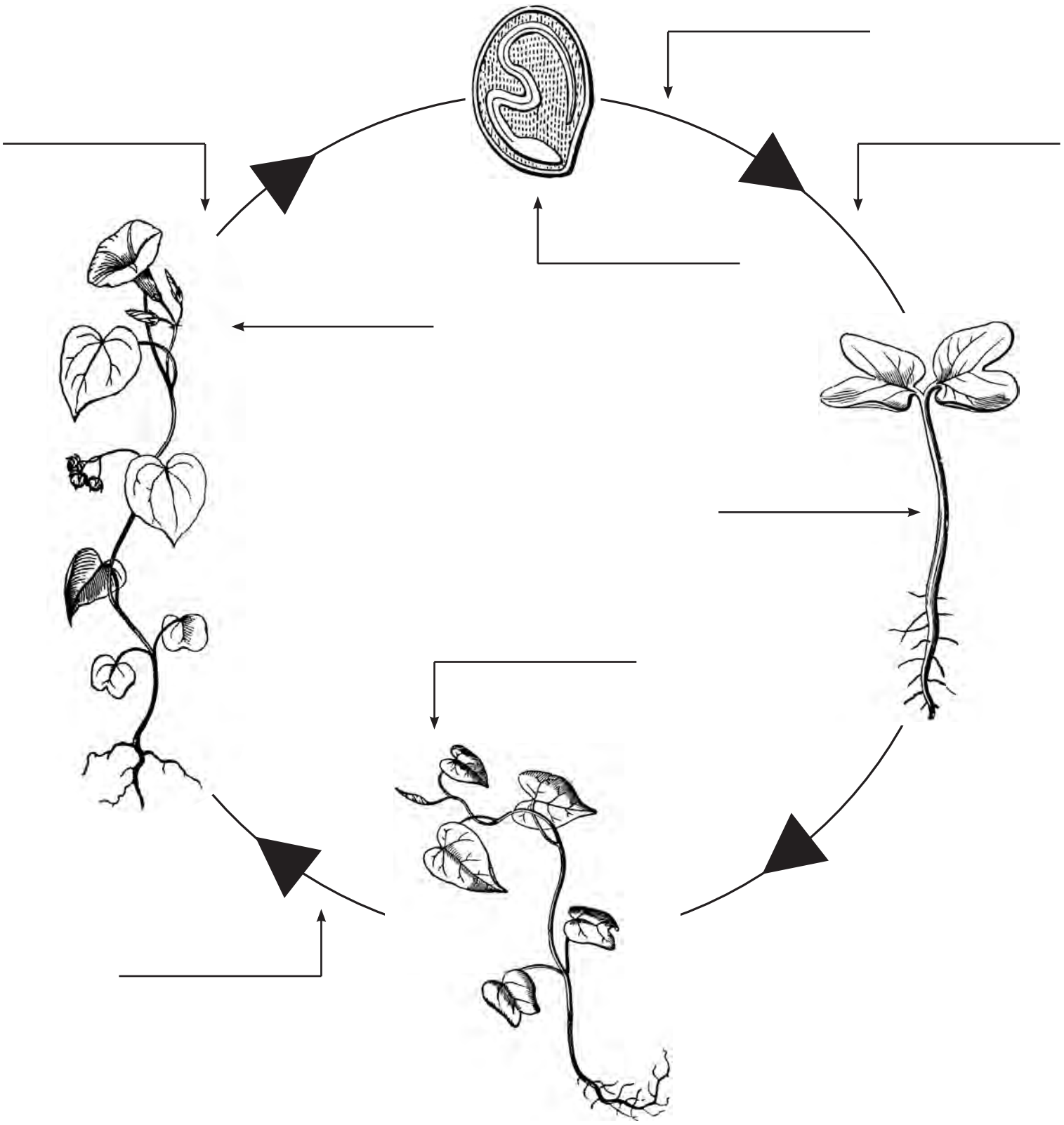
Grade 4: SC.4.L.16.1, SC.4.L.16.4

Note

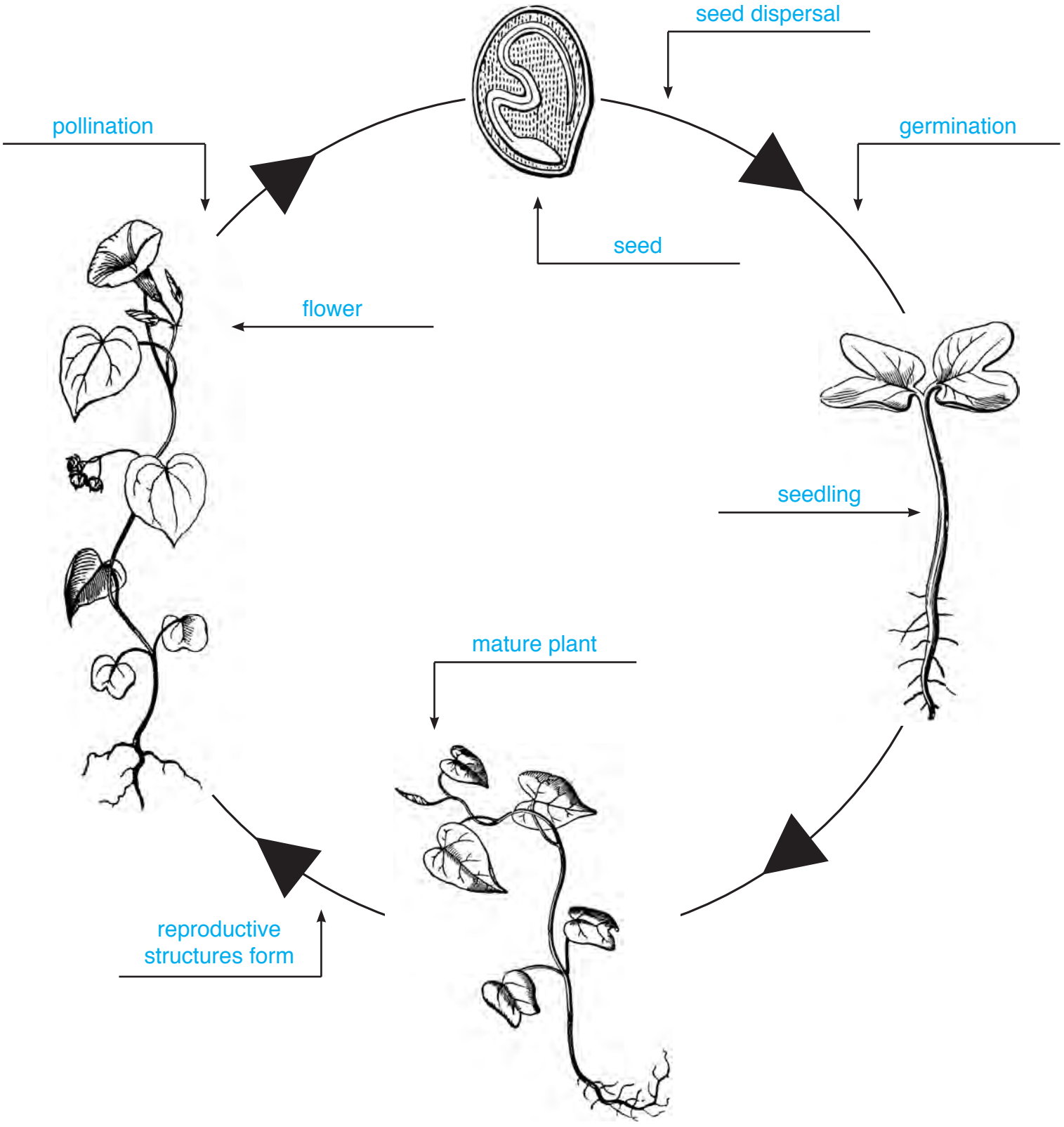
To help you identify if beggar's tick (pictured below) is present in your schoolyard, visit florida.plantatlas.usf.edu/Plant.aspx?id=3604. If beggar's tick is not present, consider using another "weedy" flowering plant that is common in your schoolyard.

Illustration courtesy of Elizabeth Smith (www.lizardart.com)

Wildflower Life Cycle



Wildflower Life Cycle



Let's Do Surgery on a Wildflower Seed

Objective

Students will dissect a seed to identify and draw a diagram of its three major parts.

Discussion

Seeds come in different sizes, shapes, and colors. Some can be eaten and some can't. Each seed has an important part to play in plant reproduction. Within each seed is almost everything needed to make a new plant.

Directions

Students should work in pairs.

- Give each pair a soaked wildflower seed, hand lens, plastic knife, toothpicks and paper towel.
- Show "Seed Diagram" PowerPoint presentation and advance each slide with appropriate step below.
- Have students place the wildflower seed on the paper towel and use the plastic knife and toothpicks to carefully remove the *testa*, or *seed coat*.
- Have them draw the seed outline and label with both names.
- Tell students that the part of the seed that is now visible is the *endosperm*. Remind students that this is the food supply for the seed. Have students label the endosperm on their diagram.
- Using the knife and toothpicks, tell students to very carefully open the seed like a book so that it splits into two parts. Make sure they do not cut the seed open! They should use the knife and toothpicks to pry it apart at the seam along the edge of the seed.
- Have students use the hand lens to find the area that looks like a new, tiny plant. Remind them that this is called the *embryo* and contains everything necessary to make a new plant. Have them draw and label the embryo on their seed diagram.
- If visible in the dissected seed, have students locate, draw and label the *radicle*, *epicotyl* and *cotyledons*.

(Continued on following page.)

Materials

- "Seed Diagram" PowerPoint
- wildflower seeds, soaked in water overnight (enough for each pair to have one seed, plus a few extras in case of mistakes)
- hand lens (one per pair)
- notebook or drawing paper (one sheet per student)
- paper towel (one per pair)
- plastic knife (one per pair)
- toothpicks (two per pair)

Standards

Grade 3: SC.3.L.14.1

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.N.3.1

Tip

If wildflower seeds are not available, beans may be substituted. Explain to the students that these will serve as a model for wildflower seeds. Remember to soak them overnight.

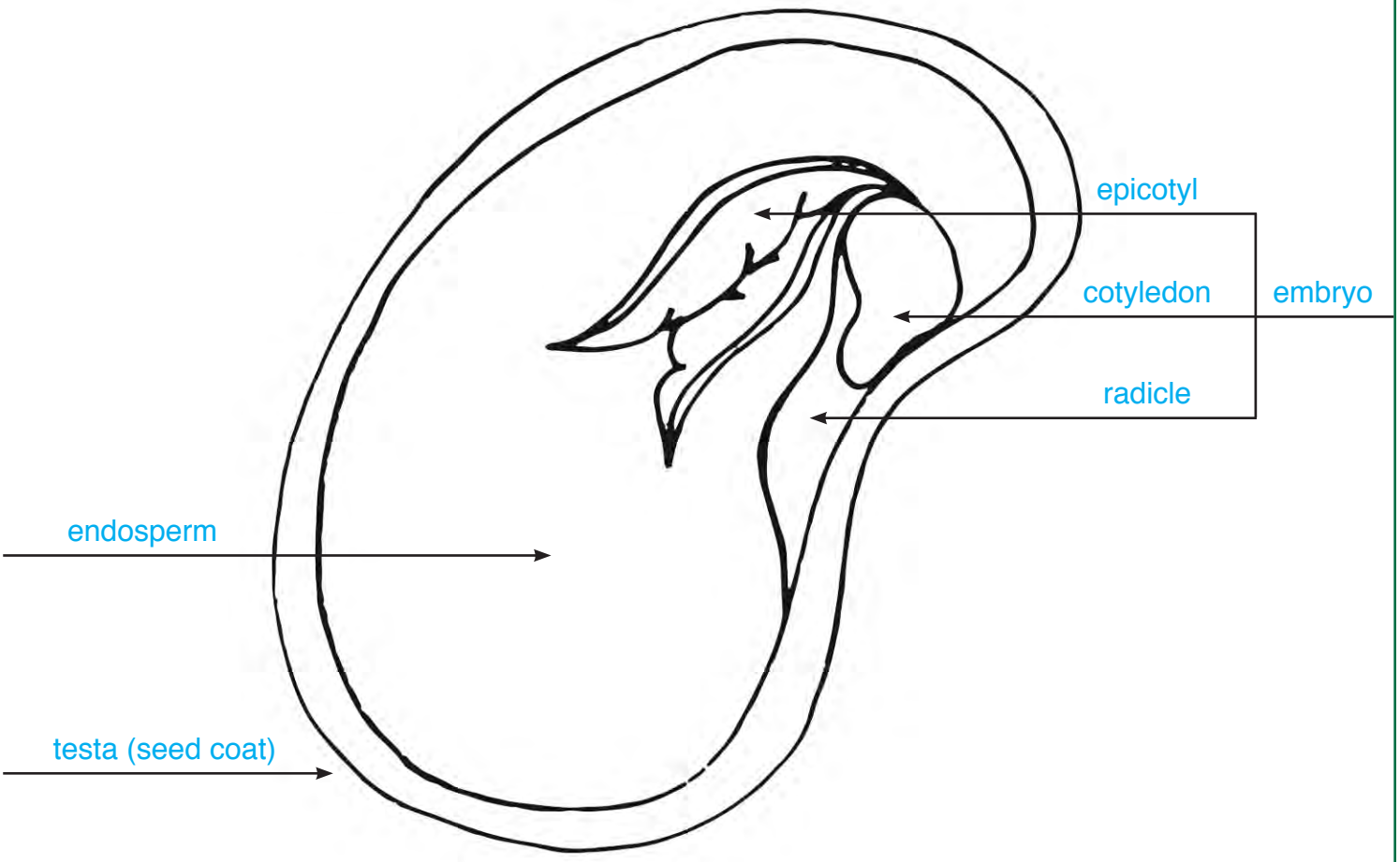
Discussion

Discuss the following questions as a group following the activity:

- What part of the seed protects the embryo from injury and also from drying out?
- What is the temporary food supply in a seed called?
- The part that looks like a tiny plant is called _____.
- Let's work together to make a definition for seed.

Fun Fact

A great way to learn about the endosperm is to eat it! Foods like popcorn, shredded coconut, and white rice are all endosperms. Two-thirds of all human calories come from endosperms.



Germination Lab Experiment

Objective

Over a four-week period, students will observe the baby plant inside a seed. See alternative on next page if time and space are limited.

Discussion

Germination is the growth of an embryonic plant contained within a seed. It results in the formation of the seedling. All seeds need water, oxygen, the proper temperature, and sometimes light or darkness in order to germinate.

Discuss the following questions with the students:

- What is a seed's job?
- What does a seed need in order to do its job?
- Think about the parts of a seed that you discovered when we did the seed 'surgery.' What were the three parts? What does each part do?

Directions

- Provide each student with a copy of the "Germination Lab Experiment" worksheet.
- Give each student a cup filled with soil, 4 seeds, and newspaper.
- Have each student follow the directions on the worksheet to plant the seeds in their cup of soil.
- So the students can look at the germination process in plants over time, each week, have them remove one seed/plant to examine.
- Have students measure, draw and label the progress on the worksheet. Have them use the back of the worksheet if additional room is needed.

† For MAF3.3.MD.2.4, have students graph the plant's size and increase in growth each week on a line plot.

† For MAFS.4.MD.2.4, at the end of the experiment, have students show the overall amount of growth by subtracting the recorded sizes each week from the final week's size.

Materials

- "Germination Lab Experiment" worksheet (one per student)
- cup (one per student)
- newspaper
- soil
- water
- wildflower seeds (4 per student)

Standards

Grade 3: MAFS.3.MD.2.4,† SC.3.L.14.1, SC.3.N.1.3, SC.3.N.1.7

Grade 4: MAFS.4.MD.2.4,† SC.4.L.16.1, SC.4.L.16.4

Tip

Be sure to choose seeds that are large enough for students to work with, such as sunshine mimosa seeds, which can be requested from the Florida Wildflower Foundation. See page viii for more information.

If using sunshine mimosa seeds, they must be "scarified" the night before the activity. To do this, place a piece of sandpaper on a flat surface and empty the packet of seeds onto it. Place a piece of sandpaper on top of the seeds (making a sandpaper sandwich) and rub the seeds back and forth across the sandpaper for up to 10 seconds.

If wildflower seeds are not available, beans may be substituted. Explain to the students that these will serve as a model for wildflower seeds.

Alternative Activity

If time and space are limited, consider this alternative version of the Germination Lab Experiment activity.

Students may work as individuals or in pairs.

- Provide each student or pair of students a damp paper towel, a plastic sandwich bag, and 4 seeds.
- Have students place beans/seeds on the paper towel and fold it in half.
- Have them place the folded paper towel into the bag so it lays flat. Then tape to the bags to a window with the beans facing inside the room.
- Have students keep a plant journal, recording observations daily and drawing pictures of changes the bean seeds go through as they grow.

† For MAF3.3.MD.2.4, have students graph the plant's size and increase in growth each day on a line plot.

† For MAFS.4.MD.2.4, at the end of the experiment, have students show the overall amount of growth by subtracting the recorded sizes each day from the final week's size.

Materials

- beans/seeds (4 per student/pair)
- paper towels
- plastic sandwich bag (1 per student/pair)
- water

Standards

Grade 3: MAFS.3.MD.2.4,† SC.3.L.14.1, SC.3.N.1.3, SC.3.N.1.7

Grade 4: MAFS.4.MD.2.4,† SC.4.L.16.1, SC.4.L.16.4

Tip

Be sure to choose seeds that will sprout quickly. Lima beans or other beans work best. Explain to students that the process they are about to observe with the beans will serve as a model for wildflower seeds.

Germination Lab Experiment

Procedure 1

1. Gather materials.
2. Lay newspaper down on your desk.
3. Add soil to each cup.
4. Lay wildflower seeds on top of soil. (If using beans, poke 4 holes about ½-inch deep and place one seed in each hole.)
5. Gently press wildflower seeds into soil. (If using beans, gently cover each with soil so that the top of the soil is level.)
6. Do not smash the dirt down into the hole!
7. Add water to cup until soil is damp all the way to the bottom — not too dry or wet.

Procedure 2

8. Each week, check soil and make sure it is damp. Plants will not need to be watered each day!
9. At the end of each week, take one plant from the cup. Do this by gently digging for the seed with a pencil or other object.
10. Brush away loose soil and examine the plant for changes.
11. Measure the plant and record its length and width in that week's box.
12. Draw and label what you see. Try to draw the plant at its actual size if it will fit in the box.

Week 1

Week 2

Week 3

Week 4

Story Chain: My Life Began as a Wildflower Seed

Objective

Students will demonstrate an understanding of the wildflower life cycle through collaborative story writing.

Materials

- "My Life Began as a Wildflower Seed" worksheet (one per student)

Standards

Grade 3: LAFS.3.SL.2.4

Grade 4: LAFS.4.SL.2.4, SC.4.L.16.1, SC.4.L.16.4

Directions

- Divide students into groups of four or eight and provide each student with a copy of the "My Life Began as a Wildflower Seed" worksheet.
- Have the students develop a science story chain about the life cycle of the wildflower to include plant reproduction stages. The story chain should begin with the seed, end with the wildflower dying after producing new seeds, and give information about the changes the wildflower is undergoing at each stage. Students should write the story from the point of view of the wildflower.
- Each student will write the opening sentence of his/her wildflower life cycle story chain (beginning with the seed).
- The students will then pass their papers to the student in their group sitting to their left, and that student will write the next sentence in the story, going on to the next stage.
- The paper is again passed to the left and that student will write the third sentence. The paper should continue to be passed from student to student until a sentence has been written about each stage of the life cycle.
- Have the students take turns reading their stories aloud to the group. All group members should be prepared to revise the story if the information is incorrect or not clearly stated.

Variation

- Assign to each student a specific portion of the story (e.g. seed, seed dispersal, germination, etc.). Depending on the number of students, more than one student may have the same section.
- Have students write as much as they know about their assigned section.
- Once all students have completed their sections, have them line up in the classroom and divide them into life cycle groups (i.e. one section per group to form a complete life cycle; depending on the number of students, there may be multiple life cycle groups.)
- Within each group, have students arrange themselves in the appropriate order based on their section of the story or life cycle.
- Have students read their sections to the others in their group in sequential order. All group members should be prepared to revise their part of the story if the information is incorrect or not clearly stated.
- Have each group present their story to the class.

My Life Began as a Wildflower Seed

Directions: You have three lines on which to write your part of each story. When finished, pass your paper to the person on your left. Take the new story that is handed to you and write the next part of the story. Continue passing papers and writing until the story is finished with a new seed being formed.

Seed	
Seed dispersal	
Germination	
Seedling	
Mature plant	
Reproductive parts form and grow	
Flower	
Pollination	
Seed	

Exchange papers until you get your own paper back. Take turns in your writing group to read and correct the stories until you each have an accurate story written. No two stories should be exactly alike!

Glossary

Cotyledon: One of the three main parts of a plant embryo; also known as the seed leaf.

Cycle: A cycle is a series of steps or processes in which the last step leads back to the first, and all steps are repeated in the same order.

Dicotyledon: A flowering plant whose embryo has two cotyledons.

Embryo: Part of the seed that contains all the parts necessary to develop into a new plant.

Endosperm: Part of the seed that contains the nutrients needed by the embryo to develop into a new plant.

Epicotyl: The part of the embryo that becomes the shoot or stem.

Flower: 1) Part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated; blossom.
2) Part of the plant that ordinarily contains the reproductive organs. Flowers can be male, female or bisexual. A male flower is staminate (has only stamens). A female flower has only pistils. If a flower has both pistils and stamens, it is bisexual or both male and female.

Fruit: 1) An edible plant product that has seeds and flesh, such as an apple, berry or banana.
2) The reproductive product of a plant; the seed of plants, or the part that contains the seeds.

Germination: Process when a seed comes to life or produces a plant.

Life cycle: 1) A series of steps or processes occurring in an animal or plant in which the last step leads back to the first; a series of steps moving from one development stage to the identical stage in the next generation.
2) The series of steps or processes in which a wildflower grows from seed to young plant (seedling) to mature plant that then produces seeds.

Monocotyledon: A flowering plant whose embryo has one cotyledon.

Pollination: 1) The movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower.
2) Pollination occurs when birds, bees, bats, butterflies, moths, beetles, other animals, water or wind carries pollen in and between flowers, or when it is moved within flowers.

Radicle: The part of the embryo that becomes the roots.

Reproduction: The act of generating offspring.

Seed: Small part of a flowering plant that is capable of growing a new plant.

(Continued on following page.)

Tip

Develop a *Jeopardy*-style game for students with the vocabulary. *Jeopardy*-style PowerPoints are available at http://teach.fcps.net/trt10/PowerPoint.htm or you may use a smart board from http://exchange.smarttech.com/search.html?q=%22jeopardy%22l. Adapt one of these formats for your vocabulary words.

Seed coat: Protective outer layer of a seed; also called a testa.

Seed dispersal: Scattering or distribution of seeds.

Seedling: Young plant that has grown from a seed.

Testa: Protective outer seed coat.

Wildflower Life Cycle — Crossword Puzzle

Directions: Use the clues and the words in the Word Bank to fill in the puzzle on the next page.

Word Bank

cotyledon	endosperm	germination	radicle	seed dispersal
cycle	epicotyl	life cycle	reproduction	seedling
dicotyledon	flower	monocotyledon	seed	testa
embryo	fruit	pollination	seed coat	

Across

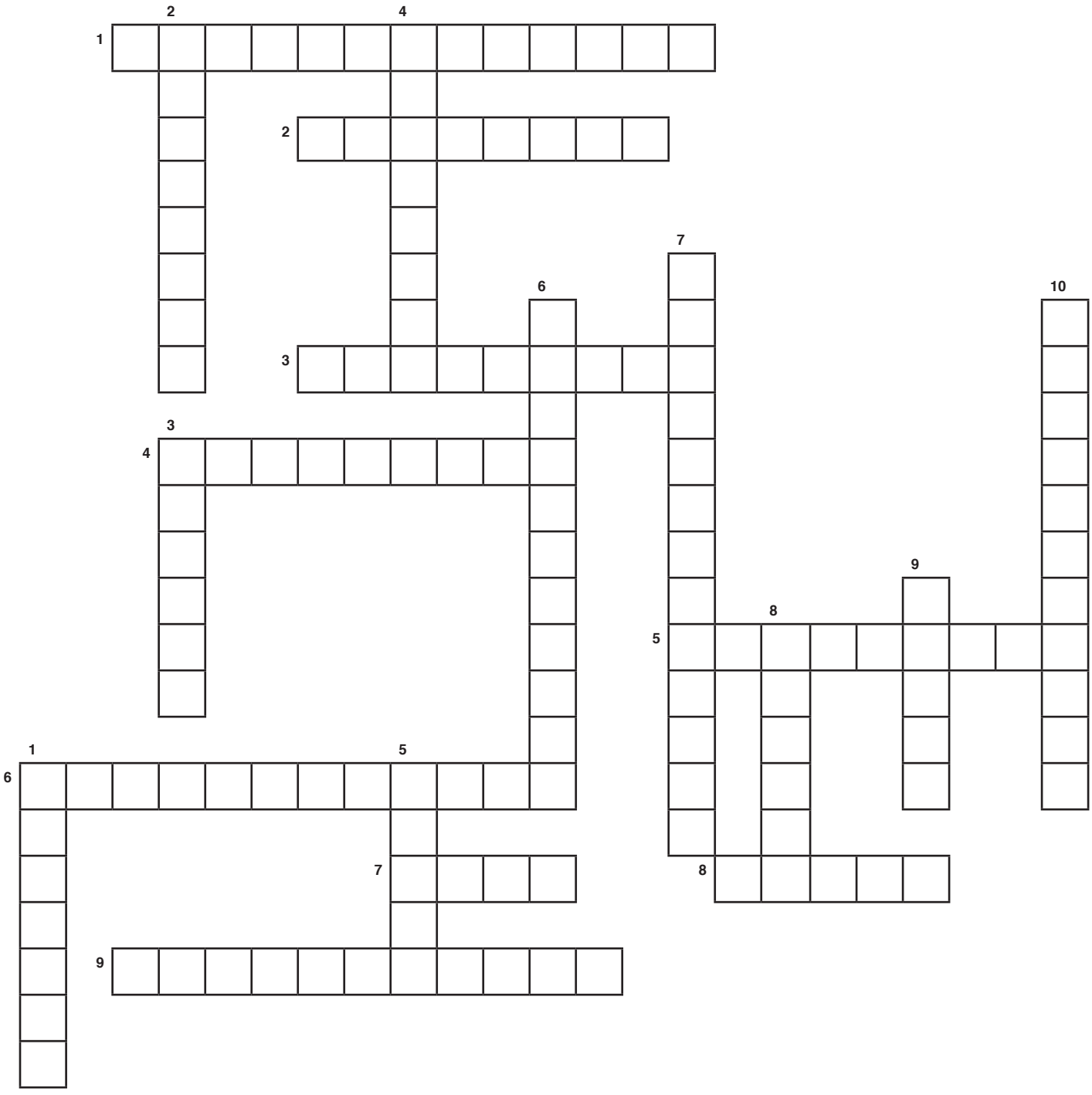
1. Scattering or distribution of seeds.
2. Young plant that has grown from a seed.
3. One of the three main parts of a plant embryo; also known as the seed leaf.
4. Part of the seed that contains the nutrients needed by the embryo to develop into a new plant.
5. The series of steps or processes in which a wildflower grows from seed to young plant (seedling) to mature plant that then produces seeds.
6. The act of generating offspring.
7. Small part of a flowering plant that is capable of growing a new plant.
8. The reproductive product of a plant; the seed of plants, or the part that contains the seeds.
9. The movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower.

Down

1. The part of the embryo that becomes the roots.
2. The part of the embryo that becomes the shoot or stem.
3. Part of the seed that contains all the parts necessary to develop into a new plant.
4. Protective outer layer of a seed; also called a testa.
5. Protective outer seed coat.
6. Process when a seed comes to life or produces a plant.
7. A flowering plant whose embryo has one cotyledon.
8. Part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated; blossom.
9. A series of steps or processes in which the last step leads back to the first, and all steps are repeated in the same order.
10. A flowering plant whose embryo has two cotyledons.

Wildflower Life Cycle — Crossword Puzzle

Directions: Use the clues and the words in the Word Bank from the previous page to fill in the puzzle.



Wildflower Life Cycle — Crossword Puzzle

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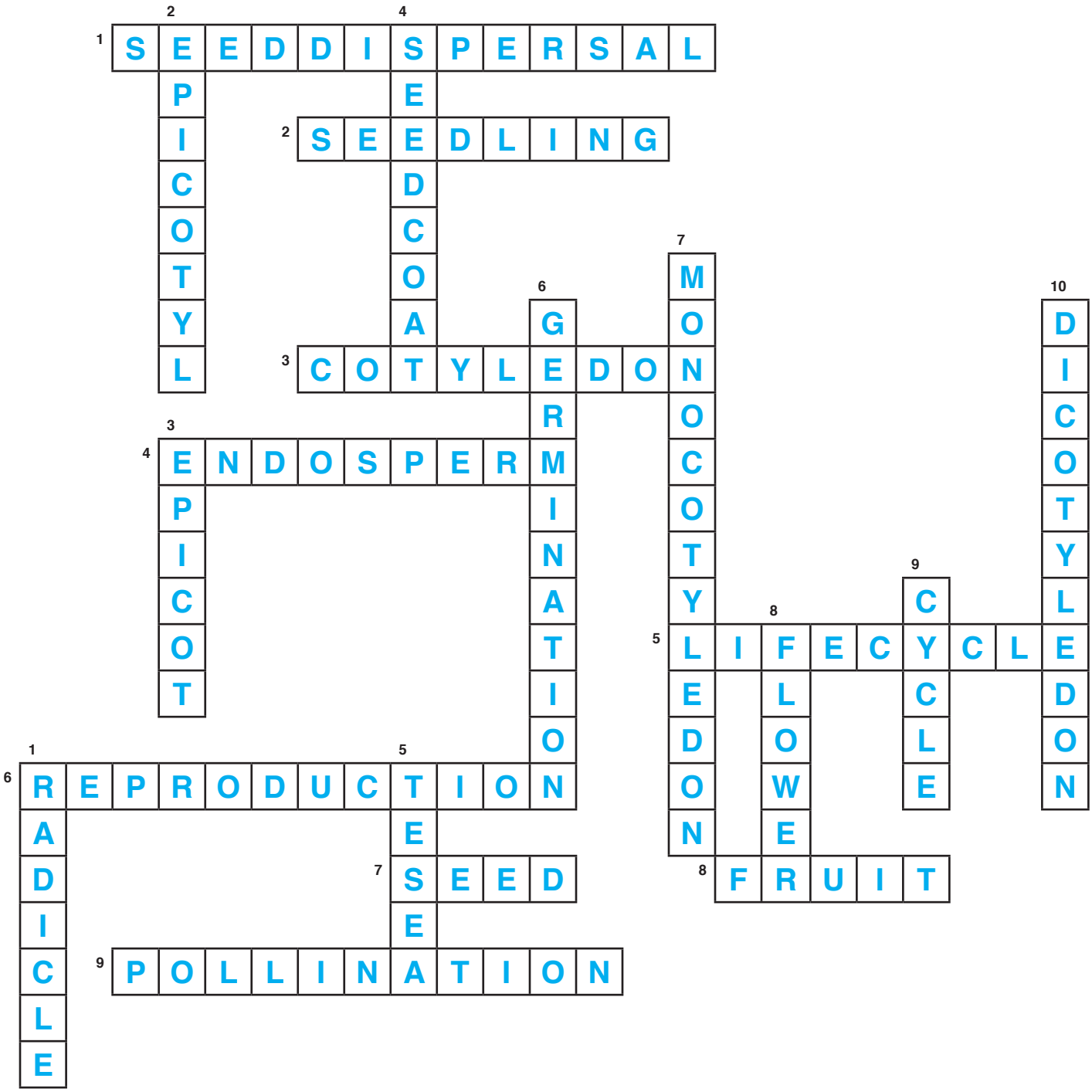


FLORIDA WILDFLOWER FOUNDATION

Resources

Literary Connections

- *How a Plant Grows* by Bobbie Kalman
- *The Life Cycle of a Flower* by Molly Aloian
- *The Magic School Bus Plants Seeds: A Book About How Living Things Grow* by Joanna Cole
- *Mysteries & Marvels of Plant Life* by Barbara Cork
- *The Nature And Science Of Flowers (Exploring the Science of Nature)* by Kim Taylor and Jane Burton
- *Plant Development (The Green World)* by William G. Hopkin
- *The Secret Lives of Plants! (Adventures in Science)* by Janet Slingerland
- *A Seed is Sleepy* by Dianna Hutt Aston
- *Seeds And Seedlings (Nature Close-Up)* by Elaine Pascoe
- *What Do Roots Do?* by Kathleen V. Kudlinski
- *What Is a Plant? (Science of Living Things)* by Bobbie Kalman

Websites and other web resources

- "The Life Cycle of a Plant for 4th Grade Science" by Wanda Thibodeaux (http://www.ehow.com/about_6112498_life-plant-4th-grade-science.html)
- "The Parts of a Seed for Elementary Children" by Zee Kay (http://www.ehow.com/list_7334174_parts-seed-elementary-children.html)

Wildflower Adaptations

Introduction

An *adaptation* is defined as anything that helps an organism survive and successfully reproduce in an ecosystem. Both animals and plants have adaptations that help them survive in their habitats. Unlike animals, however, wildflowers and other plants have only *physical adaptations*. Because they do not move by themselves, they do not have behavioral adaptations as animals do. Physical adaptations are more slowly developed than behavioral adaptations. If a wildflower develops a new or different adaptation that helps the plant, it is passed down to its seedlings. If the adaptation does not help, the plant will not survive and reproduce, and that adaptation will be lost.

Adaptations can be divided into three categories:

- *Functional* — adaptations that help an organism survive
- *Defensive* — adaptations that help a plant defend itself from *predators*
- *Reproductive* — adaptations that help the plant reproduce successfully

Following are descriptions and examples of each of the adaptation categories. Print the description pages and distribute them to students. Have students read the descriptions and discuss them with the class before beginning this section's activities. You may want to allow students to keep the description pages as a reference as they work through this section. Note: Vocabulary words are italicized within the description text.

Vocabulary

adaptation
alkaloid
aquatic
cross-pollination
defensive adaptation
drought
epiphyte
fire-dependent
functional adaptation
habitat
mimicry
physical adaptation
photosynthesis
pollen
pollinator
predator
reproductive adaptation
seed dispersal
succulent
waxy

Standards covered in this section

Grade 3: LAFS.3.SL.2.4, LAFS.3.W.2.4, LAFS.3.W.2.6. LAFS.3.W.3.7, LAFS.K12.L.1.1, LAFS.K12.L.1.2, MAFS.3.MD.2.4, MAFS.K12.MP.1.1, MAFS.K12.MP.4, SC.3.L.14.2, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.5, SC.3.N.1.6, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: LAFS.4.SL.2.4, LAFS.4.W.2.4, LAFS.4.W.2.6, LAFS.4.W.3.7, LAFS.K12.L.1.1, LAFS.K12.L.1.2, MAFS.K12.MP.1.1, MAFS.K12.MP.4, SC.4.E.6.5, SC.4.L.16.1, SC.4.L.16.2, SC.4.L.17.4, SC 4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6, SC.4.N.1.7, SC.4.N.1.8, SC.4.N.3.1

Reproductive Adaptations

It is important for wildflowers to reproduce. Flowering plants have co-evolved with their pollinating partners over millions of years, producing a fascinating and interesting diversity of *reproductive adaptations*. The variety in color, form and scent we see in flowers is a direct result of the need for flowers to be pollinated.

Wildflowers that depend on *pollinators* with high-energy diets, such as hummingbirds, produce huge amounts of *nectar* that have a much higher concentration of sugar and other nutrients as compared with flowers pollinated by other insects. Examples include trumpet vine (*Campsis radicans*) and coral honeysuckle (*Lonicera sempervirens*).

Some plants use a form of *mimicry* to help with pollination. For example, cardinalflower (*Lobelia cardinalis*) (pictured) attracts hummingbirds with its bright red, tubular flowers; however, the flowers have no nectar.

Bats and moths that are active at night are attracted to flowers that are white or very pale. These night-blooming flowers have a strong fragrance and a lot of nectar to attract pollinators that are active at night.

Beetle-pollinated flowers tend to be larger and more open to provide an easy landing pad since beetles cannot get around as easily as other flying insects. Landing pads provide a place where beetles can rest or feed while making contact with the flower's pollen.

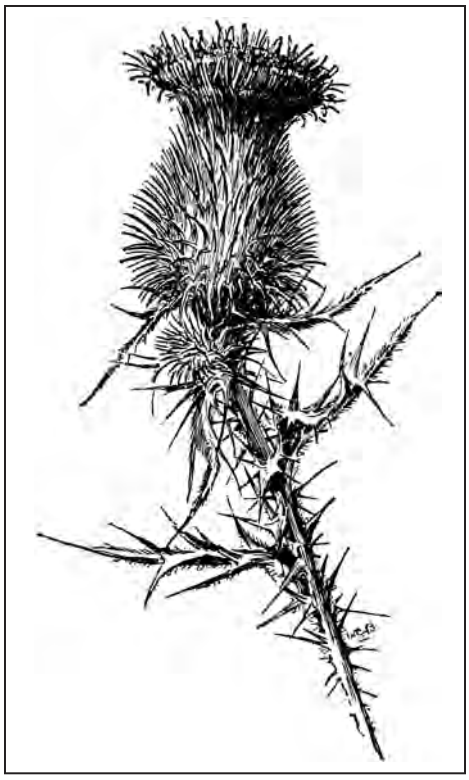
Pollen is high in protein, and many bees and beetles eat it. Flowers that depend on insects that eat pollen produce large amounts of pollen to ensure successful pollination.

Plants may use a combination of other strategies, such as visual cues (for example, bright colors or patterns, showy petals or sepals), scent, food, or mimicry to lure a pollinator. Some orchid flowers, for example, look very similar to the insects that pollinate them in order to attract them. Many bee-pollinated flowers reflect a low ultraviolet pattern near the center of each petal. The ultraviolet patterns are invisible to humans, as our vision does not see ultraviolet light; however, bees do.

Wildflowers have evolved to bloom at differing times throughout the seasons, from the first hints of warmth in late winter through spring and summer, until last call in autumn. This decreases competition and provides pollinators with a constant supply of food.

Wildflowers that use wind for *croass-pollination* generally have flowers that appear early in the spring, before or as the plant's leaves are emerging. This prevents the leaves from interfering with the dispersal of pollen from the anthers and allows the stigmas to receive pollen. Pollen from wind-pollinated wildflowers is lightweight, smooth and small. Wildflowers that are wind-pollinated, such as most grasses, generally occur as large populations so female flowers have a better chance of receiving pollen.

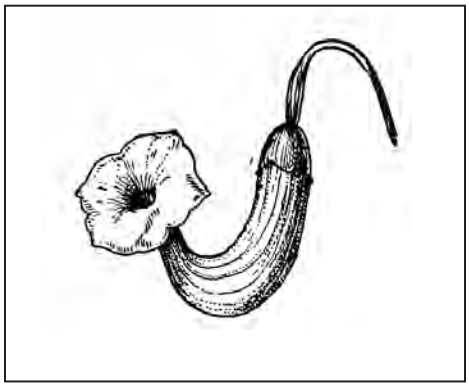
Defensive Adaptations



Defensive adaptations (defenses) are adaptations that help the plant defend or protect itself. The sensitive brier (*Mimosa quadrivalvis*) reacts to being touched by folding up its leaves. Some plants, such as coralbean (*Erythrina herbacea*) and some thistles (*Cirsium* spp.) (pictured, top) are armored with thorns, spines or sharp hairs.

Chemical defenses, such as the "milk" in milkweed (*Asclepias* spp.) help plants deter predation. The "milk" is actually an alkaloid that contains a toxic, latex-like chemical. (The monarch butterfly, however, is adapted to tolerate the "milk." The butterflies eat the milkweed and store the alkaloids in their bodies, which make them taste bad to birds and other *predators*.) Other plants produce a bitter taste, discouraging animals that might want to eat them.

Some plants have highly aromatic foliage that discourages insects, as well as herbivores such as deer, from eating them. The leaves of plants such as richweed (*Collinsonia canadensis*), St. John's mint (*Clinopodium brownei*) and others in the mint family produce a strong mint-like scent when crushed. Any sort of strong smell, even if it is a nice smell, is likely a chemical defense.



Some plants use scent to attract "defenders." Research has shown that certain plant species, when being eaten by insects, will emit a scent that attracts the predators of those insects (usually another species of insect). These predators eat the insects that are eating the plant, and thus, the plant is "saved."

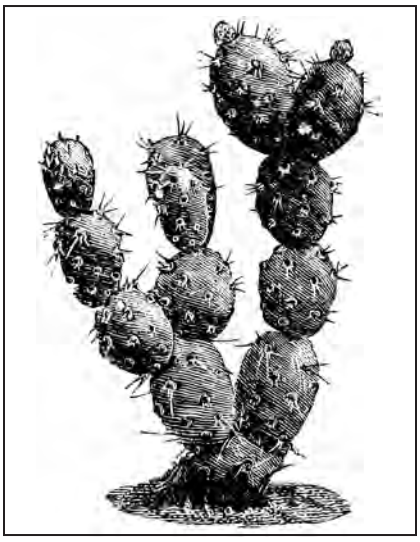
Plants can also use *mimicry* as a defense. For example, passionflower vines (*Passiflora* spp.) produce small, yellowish bumps at the base of their leaves. These bumps are the same size, shape and color as butterfly eggs. They fool butterflies into thinking another butterfly has already laid eggs on the plant. The butterfly will then look for another vine on which to deposit its eggs. Virginia snakeroot (*Aristolochia serpentaria*) (pictured, bottom) produces dark red flowers that smell like rotting meat. This attracts flies that are hoping to lay their eggs on the meat. In the process of moving around the flower in search of the meat, the flies pollinate the flowers.

Functional Adaptations

Functional adaptations help plants carry out major life functions such as *photosynthesis*, growth, and water and nutrient storage and transport. Wildflowers living in extreme weather conditions have to develop appropriate adaptations in order to survive. The Florida environment can be extreme with hot temperatures and light freezes, drought and excessive rain, salty and poor soils, and even more. One of the many benefits of native plants is that they have had millions of years to become adapted to the extremes of the regions in which they live.

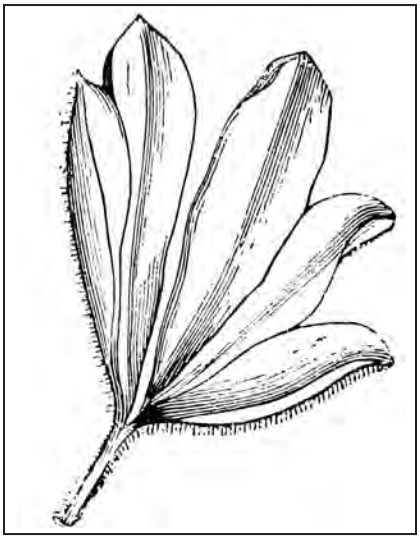
Wildflowers living in a water-limited environment — such as on Florida's sand dunes and in sandhills or scrub *habitats* — must develop ways to capture and store water. Plants in these areas typically have thick or *succulent* leaves where water can be stored. Many of these leaves have a thick, *waxy* covering on their surface that keeps the wildflowers cooler and reduces water loss due to evaporation. Examples are seapurslane (*Sesuvium portulacastrum*) and railroad vine (*Ipomoea pes-caprae*).

Small, needle-like leaves, such as those of Florida rosemary (*Ceratiola ericoides*) (pictured, top), have less surface area, which means less area that is exposed to the air and sunlight that causes evaporation and *transpiration*. Similarly, hairy dawnflower (*Stylisma villosa*) holds its leaves upright at 90° angles to reduce the amount of surface area exposed.



Some wildflowers can store water in their stems, trunks, or in underground structures like the pricklypear cactus (*Opuntia* spp.) (pictured, middle) or triangle cactus (*Acanthocereus tetragonus*). Cacti have round stems that store a lot of water. Their spines are actually leaves that help reduce the amount of water lost through transpiration.

Small hairs are also found on some wildflowers' leaves, such as skyblue lupine (*Lupinus diffusus*) (pictured, bottom) and softhair coneflower (*Rudbeckia mollis*). These small hairs can absorb water from the atmosphere, reflect sunlight and lower the leaves' temperature.



Bromeliads can survive both extremely wet and dry conditions. Some live on the bark of other trees and do not have access to wet soils, so they need ways to capture and store water when it rains. Their long, curved leaves overlap at the base, forming a little bowl. The rain runs down the leaves and is stored in the bowl. An example is the strap airplant (*Catopsis* spp.).

Seed Sort

Objective

Students will collect and identify different types of seeds. They will sort by size, shape, design, and dispersal method.

Materials

- masking tape (one 12-inch piece per student)
- seed-sorting dish (one per team)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.5, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.L.16.1, SC.4.L.17.4, SC 4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.7

Directions

Students should work in pairs or teams.

- Tell students they will be collecting and studying seeds to see how they are dispersed. Tell them they will be using two collection methods: their hands and a "seed collector."
- Give each student a 12-inch long strip of masking tape. Tell students to wrap the tape, sticky side out, around their shoe or sock. These are the "seed collectors."
- Take students to an area on campus where they may find wildflowers, grasses, and/or flowering vines, shrubs and trees that are producing seed. Explain that seeds have an important job to do, so they should only collect by hand one seed from each plant type.
- Take students to a weedy patch, meadow or untended part of the school campus in order to collect seeds on their "seed collectors."
  Alternative: Have each student collect seeds by hand at home and bring them to class.
- After the students bring their seeds back to the classroom, have the pairs/teams place them in the shallow dish where they can examine them to discuss possible dispersal methods.
- Have the pairs/teams work to sort the seeds into the following categories:
  - Seeds with stickers
  - Seeds with wings
  - Big seeds
  - Small seeds
  - Round, flat seeds
  - Ball-shaped seeds
  - Seeds from inside a fruit
  - Seeds we eat
  - Seeds from a pod
  - Seeds from an underground root

Discussion

- Ask students if they had any seeds that they were unable to categorize. What categories, if any, are missing from the list?
- Have students identify any seeds that fall into more than one category, or did not fit into any of the categories.
- Have them hypothesize how the size, shape, or design would affect how the seed is dispersed.

Extension

To extend this activity, have the students remove and plant the seeds that were collected on the masking tape — either in a window garden or in a designated and protected spot on campus — and discover what plant species they collected!

I'm a Traveling Wildflower Seed

Objective

Students will understand why and how seeds are adapted for *dispersal*.

Discussion

Wildflower seeds have a better chance for survival if they are scattered away from the parent plant where there is less competition for nutrients, sunlight, water and space. Wildflowers have adapted to use one or more method to disperse their seeds.

Seeds travel! They can't just get up and walk to a new location, but structures on the seed may allow it to move to a new location. Some of the moving forces might be wind, water and animals, while some seeds are propelled from an exploding seed pod. Other seeds may simply fall to the ground by way of gravity.

As a class, discuss and chart how a seed might be structured based on the following method of travel:

- Wind
- Exploding or bursting
- Water
- Animal

Materials

- "Wildflower Seed Dispersal Adaptations" handouts (one set per pair)
- "Wildflower Seed Dispersal Adaptation Cards" (one card per pair)
- "I'm a Traveling Wildflower Seed" worksheet (one per pair)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.5

Grade 4: SC.4.L.16.1, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.7

Directions

Students should work in pairs.

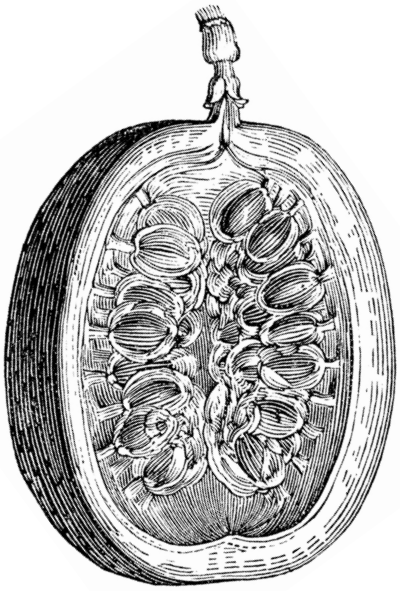
- Give each pair one set of "Wildflower Seed Dispersal Adaptations" handouts.
- Have them guess by which method each seed is dispersed based on the clue and drawing. Students should write their guesses in the box next to each seed type.
- Discuss the correct answers with the class.Give each pair of students at least one opportunity to discuss why they chose the method they did.
- Now give each pair one "Wildflower Seed Dispersal Adaptation Card" and one "I'm a Traveling Wildflower Seed" worksheet.
- Have them design and draw a seed that could travel by wind, water, gravity, bursting, or animal (eaten or carried), depending on the description found on the card they are given. Encourage the students to be creative.
- Have students trade cards so they can design multiple seeds.
- Once each pair of students has drawn at least 2 seeds (more if time permits), have them present their seeds to the class.

Wildflower Seed Dispersal Adaptations

Milkweed

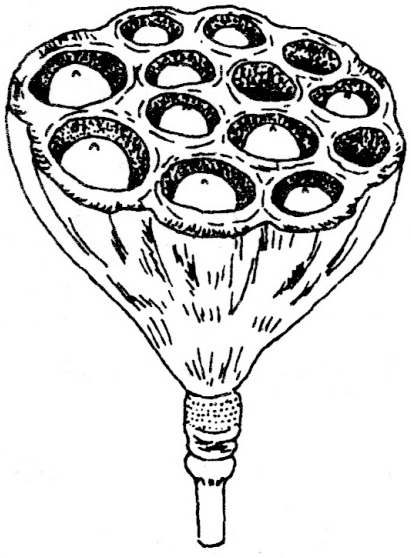
MIlkweed seeds
have fluffy hairs.

Passionfruit



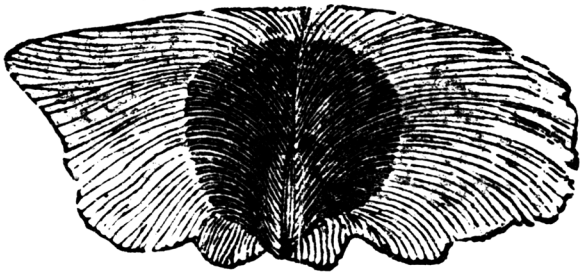
Passionfruit seeds are enclosed
in a tasty, juicy pulp.

American lotus



American lotus grows
along river and pond edges.

Trumpet creeper



Trumpet creeper vine seeds
have papery “wings.”

Wildflower Seed Dispersal Adaptations

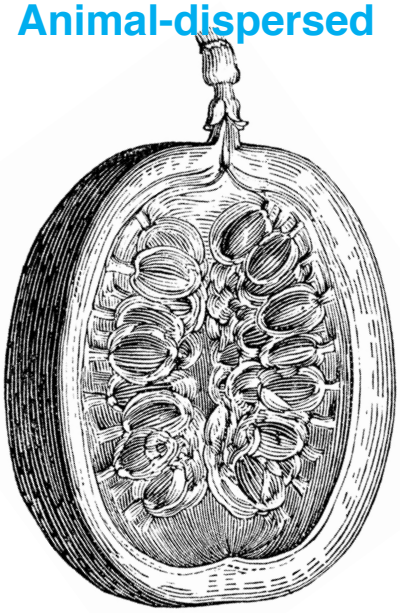
Milkweed

Air-dispersed

MIlkweed seeds
have fluffy hairs.

Passionfruit

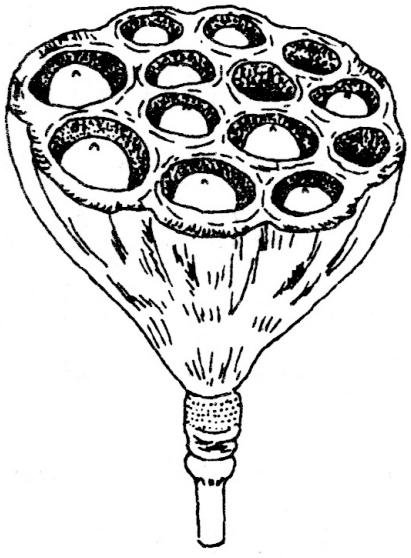
Animal-dispersed



Passionfruit seeds are enclosed
in a tasty, juicy pulp.

American lotus

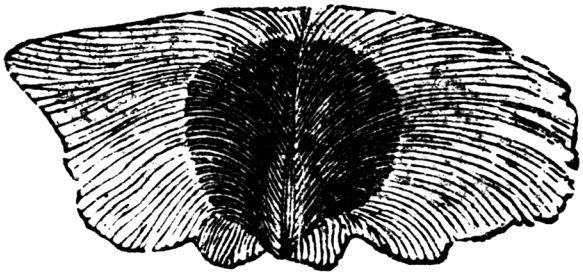
Water-dispersed



American lotus grows
along river and pond edges.

Trumpet creeper

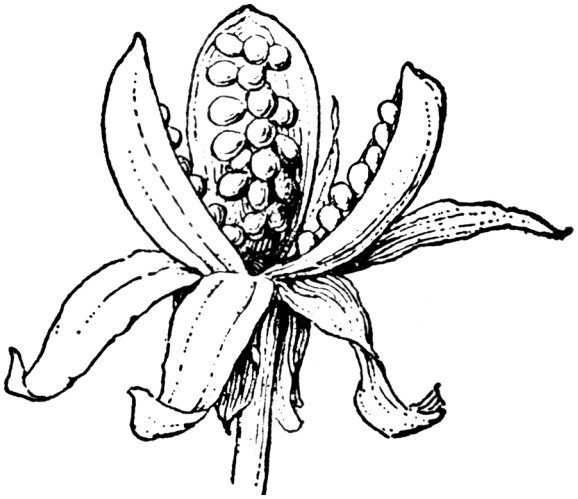
WInd-dispersed



Trumpet creeper vine seeds
have papery “wings.”

Wildflower Seed Dispersal Adaptations

Violet

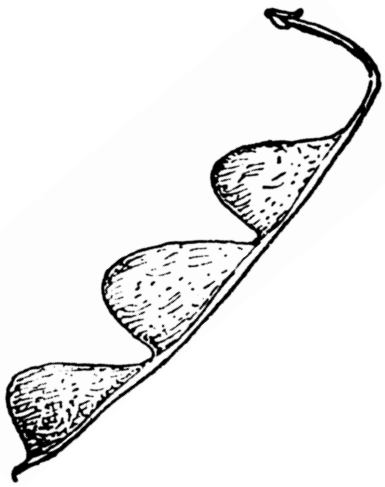


Violet seed pods
burst open when ripe.

Maple

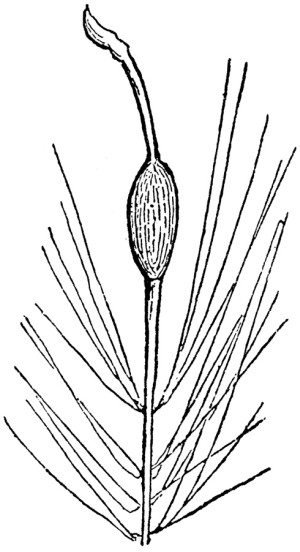
Maple seeds are winged
and twirl like a helicopter.

Ticktrefoil



Ticktrefoil seeds are covered
in tiny sticky hairs.

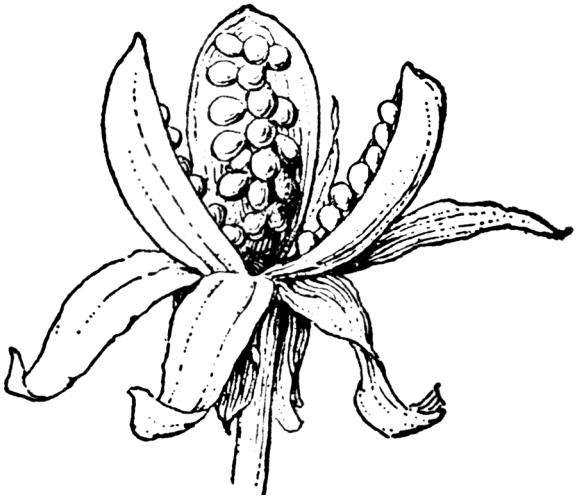
Cattail



Cattail seeds
have fine hairs.

Wildflower Seed Dispersal Adaptations

Violet
Burst-dispersed

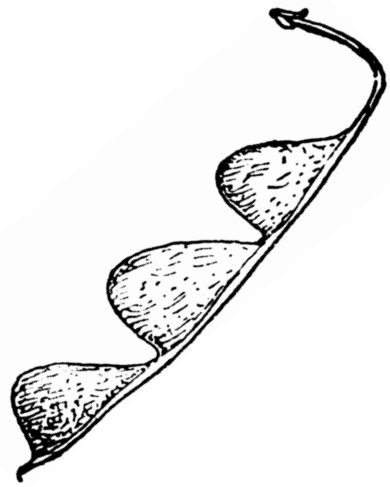


Violet seed pods
burst open when ripe.

Maple
Wind-dispersed

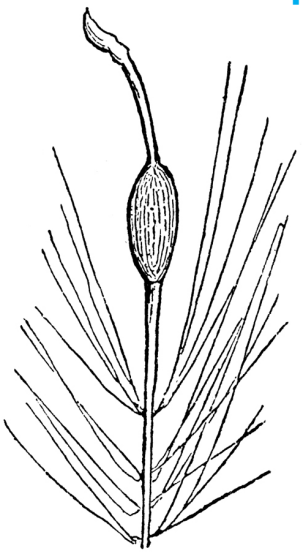
Maple seeds are winged
and twirl like a helicopter.

Ticktrefoil
Animal-dispersed



Ticktrefoil seeds are covered
in tiny sticky hairs.

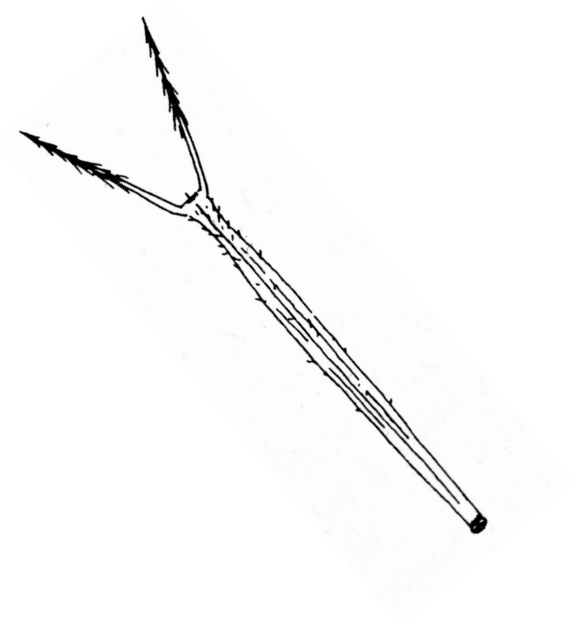
Cattail
WInd- and Water-dispersed



Cattail seeds
have fine hairs.

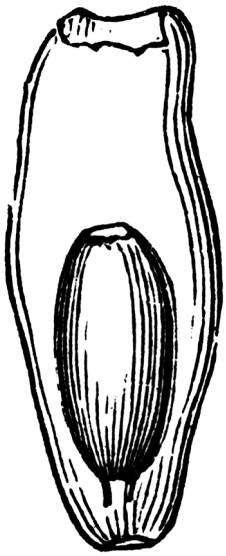
Wildflower Seed Dispersal Adaptations

Beggarticks



Beggarticks seeds
have tiny barbed hooks.

Water lily

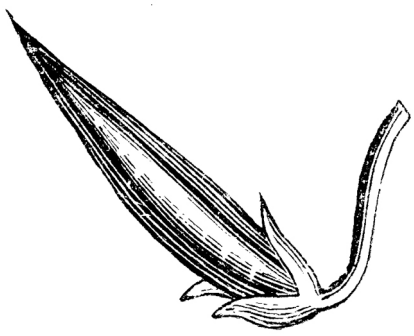


Water lily seeds
have are filled with air.

Dandelion

Dandelion seeds
have feather-like bristles.

Burst-dispersed

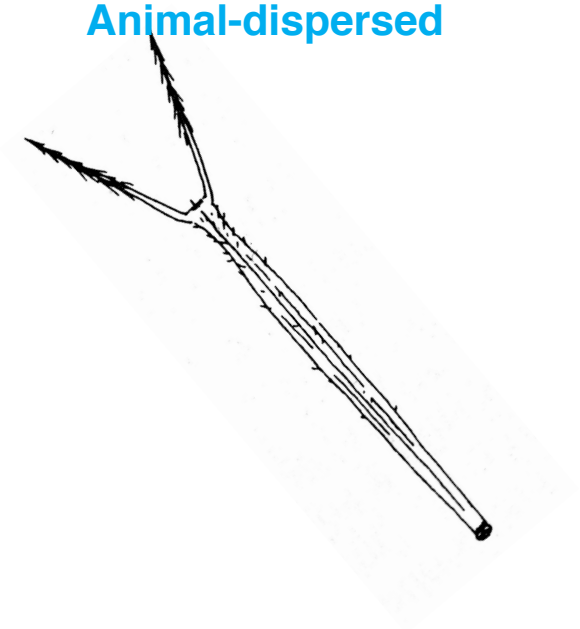


Woodsorrel seed pods
explode when touched.

Wildflower Seed Dispersal Adaptations

Beggarticks

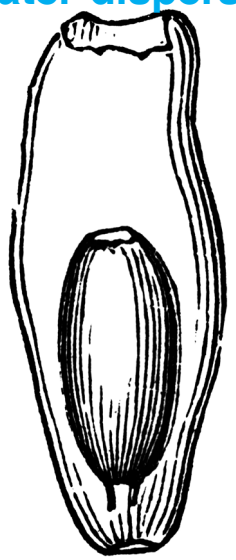
Animal-dispersed



Beggarticks seeds
have tiny barbed hooks.

Water lily

Water-dispersed



Water lily seeds
have are filled with air.

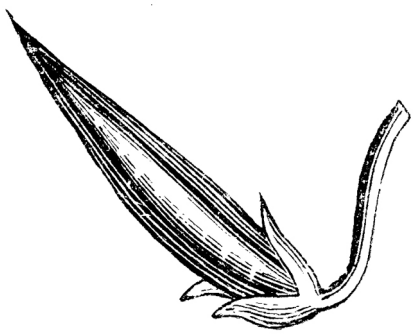
Dandelion

Animal-dispersed

Dandelion seeds
have feather-like bristles.

Burst-dispersed

Burst-dispersed



Woodsorrel seed pods
explode when touched.

Seed Dispersal Adaptation Cards

Seed Dispersal Adaptation Adapt your wildflower seed so that it can shoot into the air at least two feet.	**Seed Dispersal Adaptation** Adapt your wildflower seed so that it can stick on an animal or person.
Seed Dispersal Adaptation Adapt your wildflower seed to be eaten by a bird or an animal.	**Seed Dispersal Adaptation** Adapt your wildflower seed so that wind can carry it at least two feet.
Seed Dispersal Adaptation Adapt your wildflower seed so that it can fall and roll to a place two feet away from the parent wildflower.	**Seed Dispersal Adaptation** Adapt your wildflower seed to float on water to a new location.

I'm a Traveling Wildflower Seed

Directions:

1. **Look** at the wildflower seeds shown. **Think** about how these seeds might **travel from place to place**.
2. In the space below, **draw** and **describe** your seed and its adaptation.

Draw	Describe

Flung, Flown or Ferried

Objective

Students will compare and measure how far seeds travel using different dispersal methods.

Discussion

Explain to students that just as different kinds of plants use different methods to disperse their pollen, they also use different methods to disperse their seeds. Some have built-in catapults to propel their seeds; others use the wind, water, birds or other animals to carry their seeds away.

Directions

Students should work in pairs or groups.

- Provide student pairs or groups with one set of "Flung, Flown or Ferried" worksheets and appropriate supplies.
- Have students use the instructions that follow to create a "catapult," a "whirligig" (or helicopter) and an airplane to simulate different seed dispersal methods. (Teachers may need to demonstrate each process.) Tell students the catapult will represent seeds that are dispersed by exploding or bursting seed pods; the whirligig will represent winged seeds; and the plane will represent seeds that are blown by the wind.
- Have students measure how far the "flung" and "flown" seeds can travel and record the distances on the worksheet.
- Next, have students use the Internet or other reference and resource materials to research the distances that animals can travel. Specifically, have them take note of how far birds such as mockingbirds, blue jays and cardinals, and mammals such as opposums, raccoons and deer travel.
- Students can now compare the distances seeds can travel depending upon whether they are dispersed by catapult, wind, bird, or other animal.
- Have students graph the differences using various types of graphs (e.g. bar graph, line graph*, pie chart).

(Continued on following page.)

Materials

- "Flung, Flown or Ferried" worksheets (one set per pair/group)
- 1/2" pom-poms (several per pair/group)
- craft sticks (eight per pair/group)
- graph or plain paper (one sheet per student)
- 1/2 or 1/4 sheet of paper (one per pair/group)
- measuring tape (one per pair/group)
- plastic spoon (one per pair/group)
- plasti-bands (several per pair/group)
- scissors (one pair per pair/group)

Standards

Grade 3: MAFS.3.MD.2.4*, MAFS.K12.MP.1.1, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: MAFS.K12.MP.1.1, SC.4.E.6.5, SC.4.L.16.1, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6, SC.4.N.1.7, SC.4.N.1.8, SC.4.N.3.1

**** For MAF3.3.MD.2.4, have students graph the differences on a line plot.***

Discussion

- Ask:
  - Which method of dispersal is more effective and why?
  - When might one method be better than another?
  - What conditions are necessary for each to be successful?
  - What might happen when an animal such as a bird carries a seed to a very different habitat?

Flung, Flown or Ferried

Record and compare the distances that seeds travel when catapulted, air-lifted and wind-blown.

Distance for catapulted “seed”	Distance for air-lifted “seed”	Distance for wind-blown “seed”

When seeds travel in the fur or guts of moving animals, how much farther can they go?

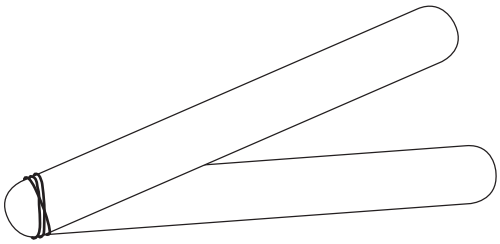
Animal	Distance traveled	Seed dispersal method

Flung, Flown or Ferried — Catapult

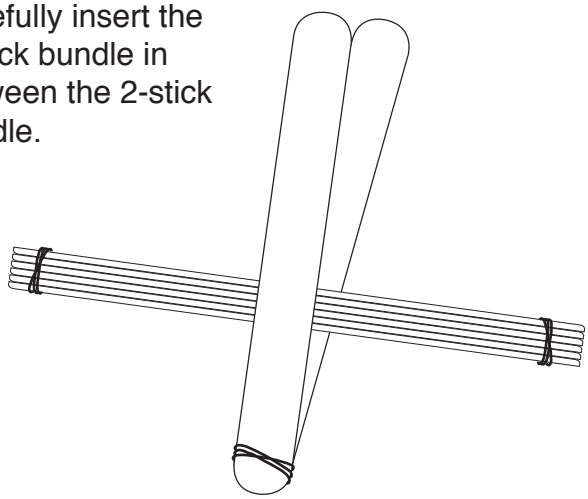
Directions:

1. Bind 6 craft sticks by wrapping a plasti-band around each end.

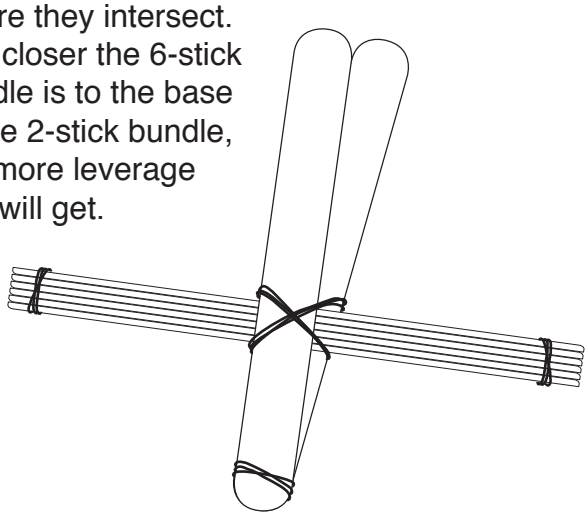
2. Bind the remaining 2 craft sticks at one end by wrapping a plasti-band around one end.



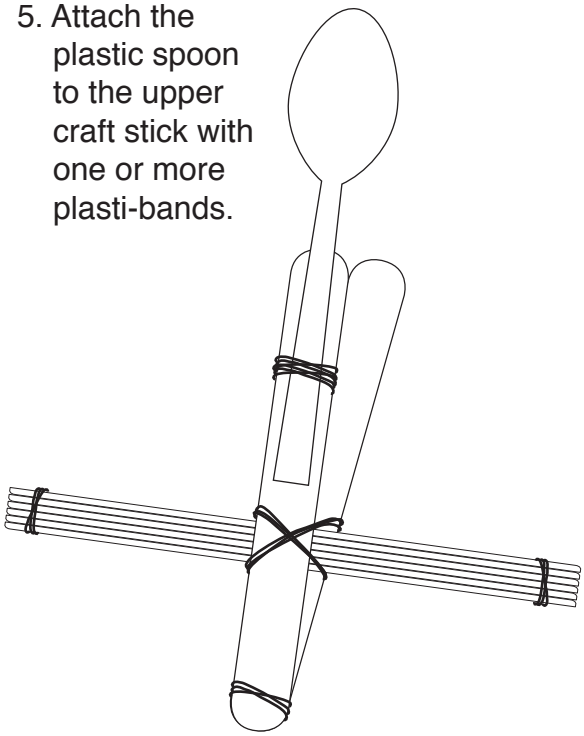
3. Carefully insert the 6-stick bundle in between the 2-stick bundle.



4. Join the two bundles together by wrapping 1–2 plasti-bands around where they intersect. The closer the 6-stick bundle is to the base of the 2-stick bundle, the more leverage you will get.



5. Attach the plastic spoon to the upper craft stick with one or more plasti-bands.



6. Place a pom-pom on the spoon.

7. Hold the catapult with one hand, and use the other hand to pull the spoon down.

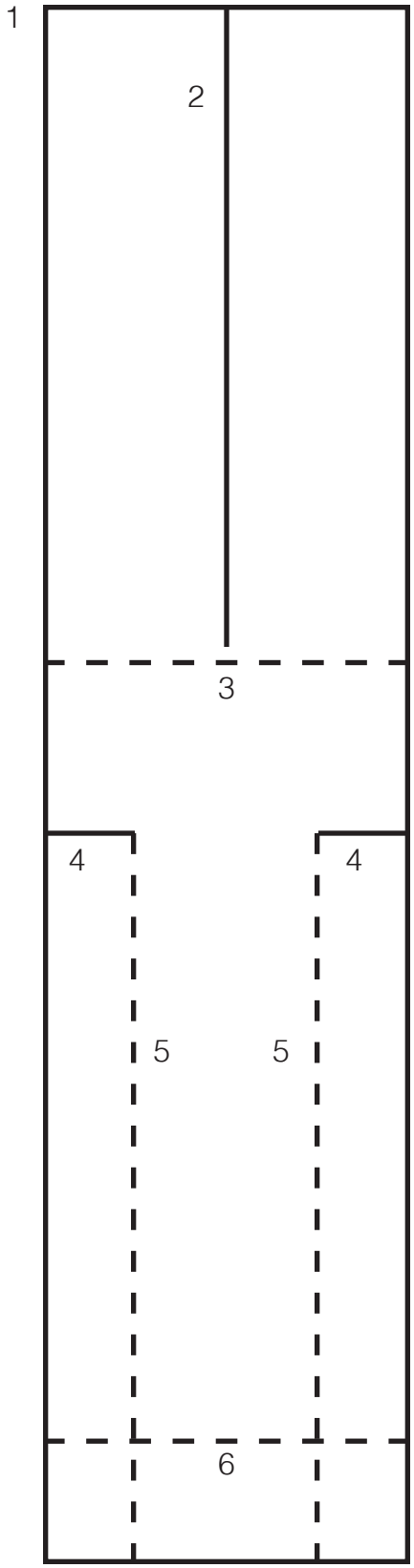
8. Release the spoon to launch your pom pom!

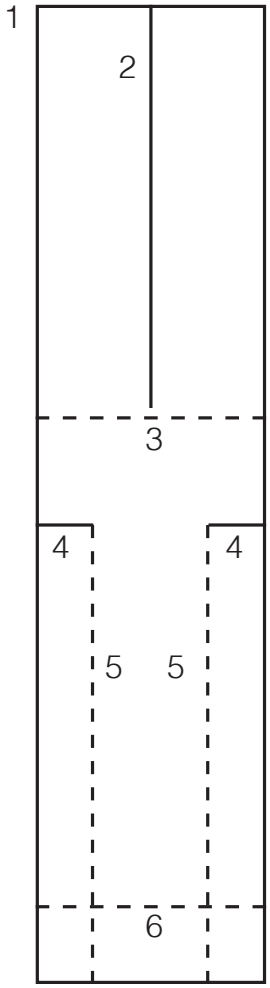
Flung, Flown or Ferried — Whirligig

Directions:

1. Cut a rectangle by cutting along the solid outline of the template to the right.
2. Make cut from the top along the solid line. These will form the “blades” of the whirligig.
3. Fold one blade forward and the other backward along the dotted line.
4. Make two cuts along the solid lines below the blades.
5. Fold each side in along the dotted lines.
6. Fold the bottom up along the horizontal line.

Repeat these steps with the smaller template below to compare how the size of the seed and wings might affect how far it travels.

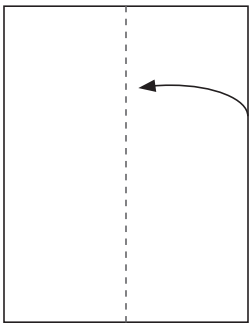




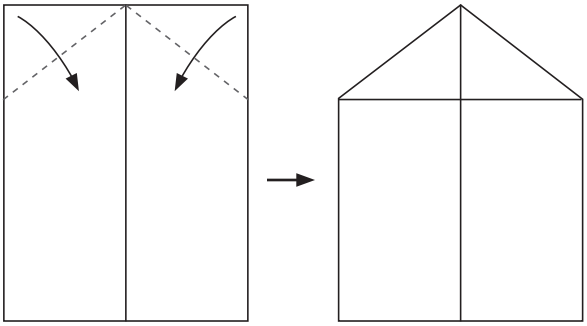
Flung, Flown or Ferried — Airplane

Directions:

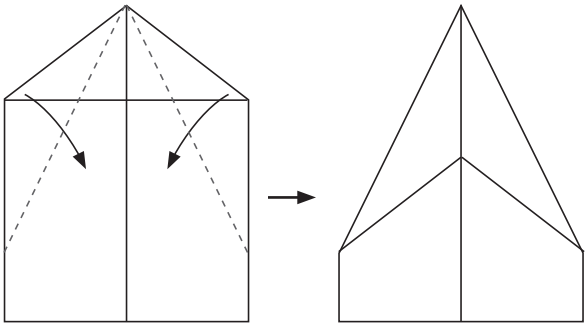
1. Fold the paper in half lengthwise.



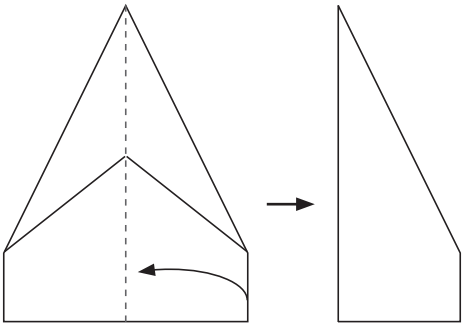
2. Open the paper, then fold the top two corners in toward the center crease. The edges should meet in the middle and form a triangle at the top.



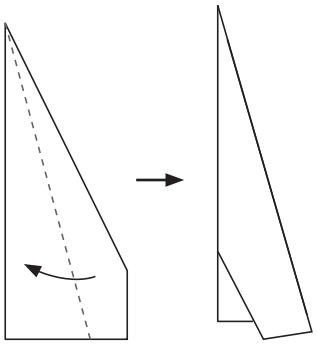
3. Take the top corners and fold them toward the middle. Just like in step 2, the edges should meet in the middle. The top should be pointed.



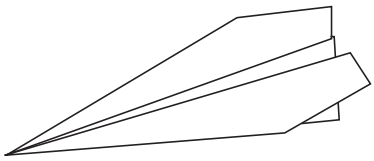
4. Fold the paper in half lengthwise again.



5. Starting from the tip, fold the sides (“wings”) down so the edges meet the bottom edge of the airplane.



6. To launch, open the wings, hold the airplane by its bottom edge and throw straight ahead.



Wildflower Adaptations

Objective

Students will identify and understand how plants are adapted for survival.

Directions

This is a two-part activity. Students can work individually, in pairs or in groups.

- As a class, brainstorm a list of types of adaptations that could be used by Florida wildflowers.
- Provide each student with a "Wildflower Adaptations" worksheet.
- Assign each student/pair/group a wildflower to research using the Internet or other reference and resource materials. Have them fill in Part One of the worksheet as it relates to their assigned wildflower.
- For Part Two, have students/pairs/groups design and draw an imaginary wildflower that would have at least three adaptations. Encourage students to use adaptations from the class list, but to also be creative and think of their own adaptations that may not be on the list.
- The wildflower drawing should include a sketch showing the adaptations, labels with reasons for each adaptation, and appropriate grammar, conventions, and neatness.

A scoring rubric is provided to help assess student work.

Alternative

- Provide students with craft materials and allow them to design a 3-dimensional model of an imaginary wildflower with at least three adaptations. Have them list and define the adaptations that are included in the model.

Materials

- "Wildflower Adaptations" worksheet (one per student)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.3.2

Grade 4: SC.4.L.16.2, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.8, SC.4.N.3.1

Wildflower Adaptations

Part One

Wildflower Name: _____

Adaptations	How does this adaptation help your wildflower survive? Why did it develop the adaptation?
1.	
2.	
3.	

Part Two

Sketch of plant and adaptations

Wildflower Adaptation Scoring Rubric (for teachers)

4	3	2	1
The sketch or model relates to topic, is large enough to see, and has labels.	The sketch or model relates to the topic but is small or unclear; most labels are present.	The sketch or model is somewhat neat; not all labels are included and/or the sketch isn't large enough.	The sketch or model is neither clear **nor** neatly displayed; the visual isn't large enough, or is lacking labels.
Each adaptation is identified with fully developed reasons given for the adaptation.	Each adaptation is identified with reasons given for the adaptation, but the reasons are only briefly stated.	One adaptation is missing, poorly done, or does not relate to the topic; reasons for the adaptations are not well-described or not complete.	One or more adaptations are missing, poorly done, or does not relate to the topic; reasons for the adaptations are missing or not appropriate.
Project is well-written: • Focused and on-topic; • Good grammar, spelling and punctuation; • Neatly done.	Project is well-written: • Focused and on-topic; • Good grammar, spelling and punctuation; • Could be more visually appealing.	Parts of project are difficult to understand: • Writing is not completely focused on topic; • Some adaptations or reasoning are confusing; • Somewhat messy appearance.	Project is poorly written and difficult to understand: • Writing is unfocused, off topic, and confusing to the reader; • Contains many punctuation, grammar and spelling errors; • Messy appearance.

Wildflower Adaptation Game

Objective

Students will discuss challenges to plant survival in Florida's environments, and identify ways wildflowers and other plants have adapted to these challenges.

Materials

- "Wildflower Adaptations — Clue Cards" (one set)
- "Wildflower Adaptations — Plant Cards" (two sets)

Standards

Grade 3: SC.3.N.1.1

Grade 4: SC.4.L.16.2, SC.4.N.1.1

Tip

Prior to starting this activity, print and laminate one set of "Wildflower Adaptations — Clue Cards" and two sets of "Wildflower Adaptations — Plant Name Cards." Use different colored paper to easily differentiate Clue Cards from Plant Name Cards.

Directions

- Have students list what plants and wildflowers need to survive. Be sure that they include water, soil, and sunlight.
- Discuss characteristics of Florida that make it difficult for wildflowers to grow. For example, it is hot with periods of heavy rainfall and drought; soils are well drained; fungi and algae attack some wildflowers; and animals and insects eat some wildflowers.
- Discuss with students some of the specific adaptations that are found in the plants featured in the game.
- Take the students outside and divide them into two groups or teams. Designate a starting line for them to form two lines behind.
- Place "Wildflower Adaptations — Plant Name Cards" together in two sets about 50 feet away.
- Give the students the following instructions:
  - The teacher will read a clue from the "Wildflower Adaptations — Clue Cards." Listen carefully to the clues being read.
  - As a team, discuss the clue and determine which plant it refers to or which wildflower is being described.
  - When time is called (about 15 seconds) and a signal given, one person from each team will run to their team's wildflower cards and select the name of the wildflower that matched the clue given, then run back to the team.
  - The first student back scores a point for their team if the correct card was picked.
  - If the correct card was not picked, the other team gets a point if their runner picked up the correct card. There may be more than one right answer to some clues.
  - The team with the highest score wins after all clue cards have been given.

Extension

Have students use the Internet or other reference and resource materials to research wildflowers found in Florida and develop adaptation clue cards of their own to use with this game.

Wildflower Adaptation Clue Cards

American white waterlily

This floating aquatic plant has pale white and pink flowers and broad, circular and spongy leaves that are rooted below the water's surface. A massive floating canopy of leaves is produced over weak stems that easily break and allow the plant to spread. The upper leaf surface, where most photosynthesis occurs, is covered with thick wax that repels water.

Ghost orchid

This epiphyte consists of large masses of photosynthetic roots with one to 10 fragrant flowers that open one at a time. The flowers emit a fruity fragrance during early morning that attracts the giant sphinx moth, an insect with a very long proboscis. The lower petals produce two long lobes that resemble the back legs of a jumping frog. It is found in moist, swampy forests in southwestern Florida, Cuba, and other Caribbean islands.

Coral honeysuckle

This woody vine has bright, reddish-orange, tubular flowers. It attracts butterflies and hummingbirds and blooms in the spring and summer.

Daisy fleabane

Primarily small bees and flies visit the flowers for nectar or pollen. The flowers have a mild fragrance. It can set fertile seed without cross-pollination. The seeds have small bristles or white hairs that promote distribution of the seeds by wind. The root system consists of a taproot. This plant spreads by re-seeding itself.

Yellow-eyed grass

This very tall native wildflower is common in flatwoods, savannas, bogs, and lake margins nearly throughout Florida. It grows in full sun in the wettest sites where the soil remains moist throughout the year. Its small yellow flowers open one at a time in a densely crowed cone-like head that resemble tiny pine cones. This flower survives best in habitat that requires frequent fire to eliminate competition.

Gulf Coast lupine

This small, endangered wildflower is endemic to the Panhandle region of Florida. It is adapted to tolerate extreme conditions found on coastal dunes. Leaves are pubescent or covered with fine hairs. Flowers are purplish-blue, with a deep purple central spot.

Pitcherplant

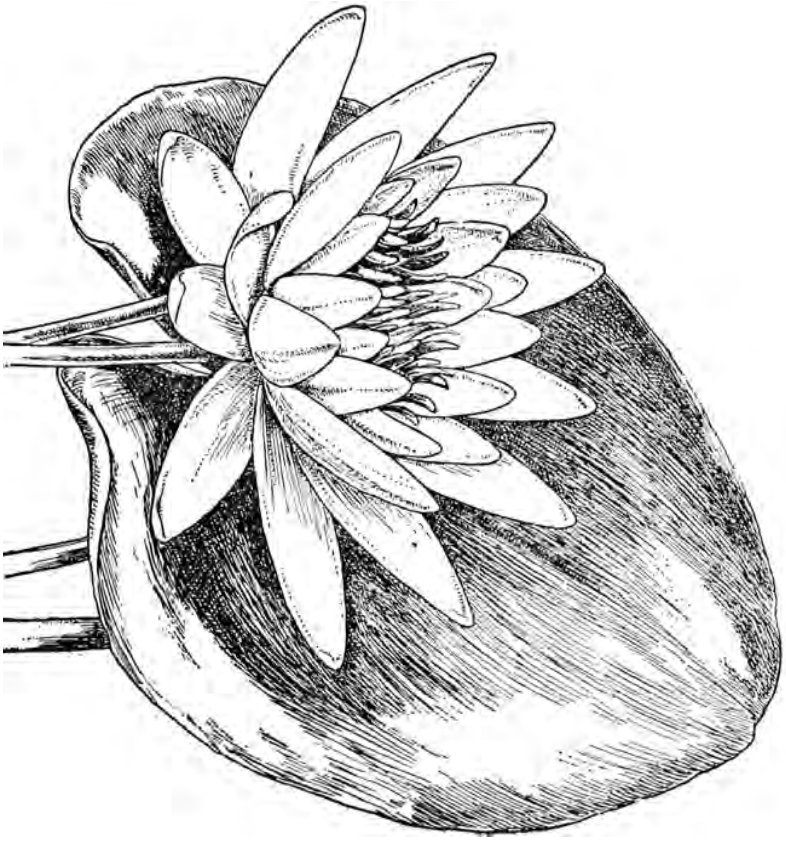
Leaves of this carnivorous plant have a deep fluid-filled cavity into which insects fall, drown, and are digested. The nutrients are absorbed by the plant.

Pricklypear cactus

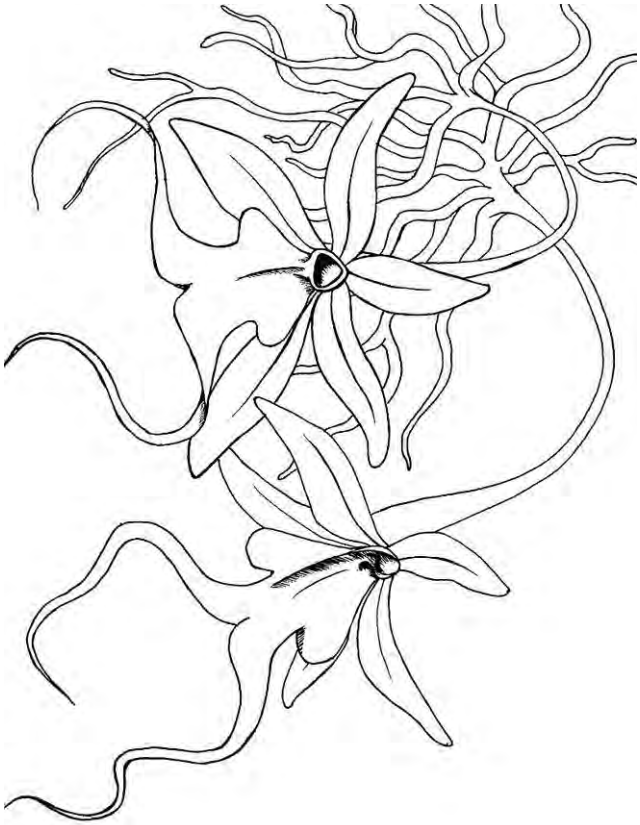
This prickly plant has yellow flowers that invite bees to enter. The spines found on its thick pads act like sponges to absorb and hold water.

Wildflower Adaptation Plant Cards

American white waterlily



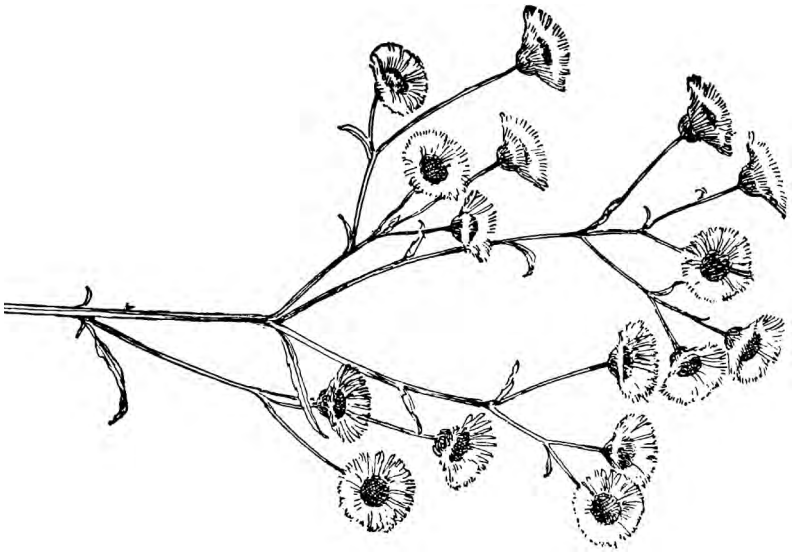
Ghost orchid



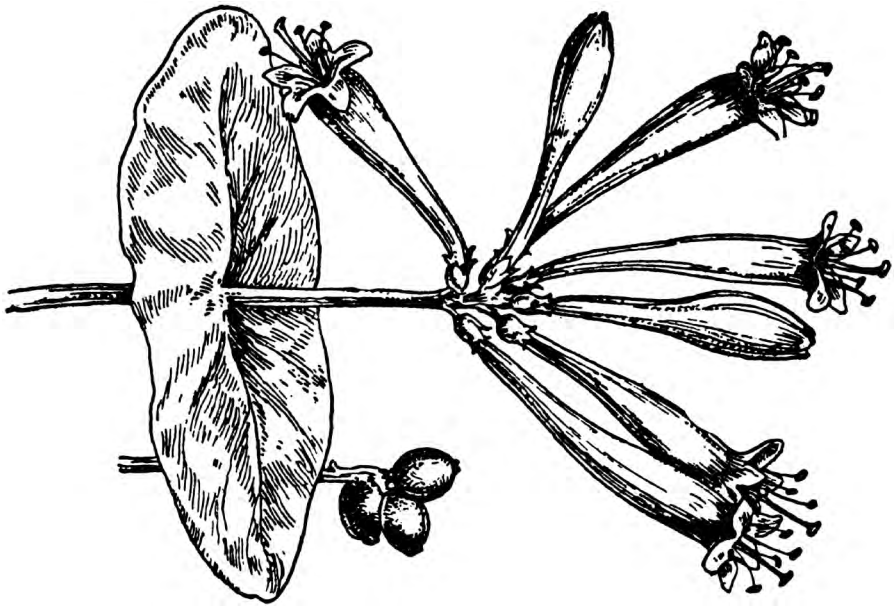
American white waterlily courtesy FCIT (http://etc.usf.edu/clipart)
Ghost orchid courtesy of Christina Lakish (http://christinacoleart.tumblr.com)

Wildflower Adaptation Plant Cards

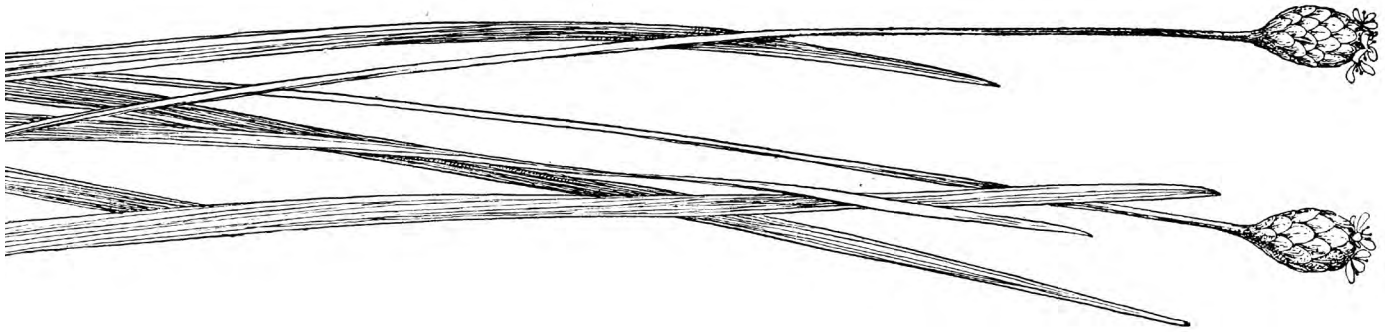
Daisy fleabane



Coral honeysuckle

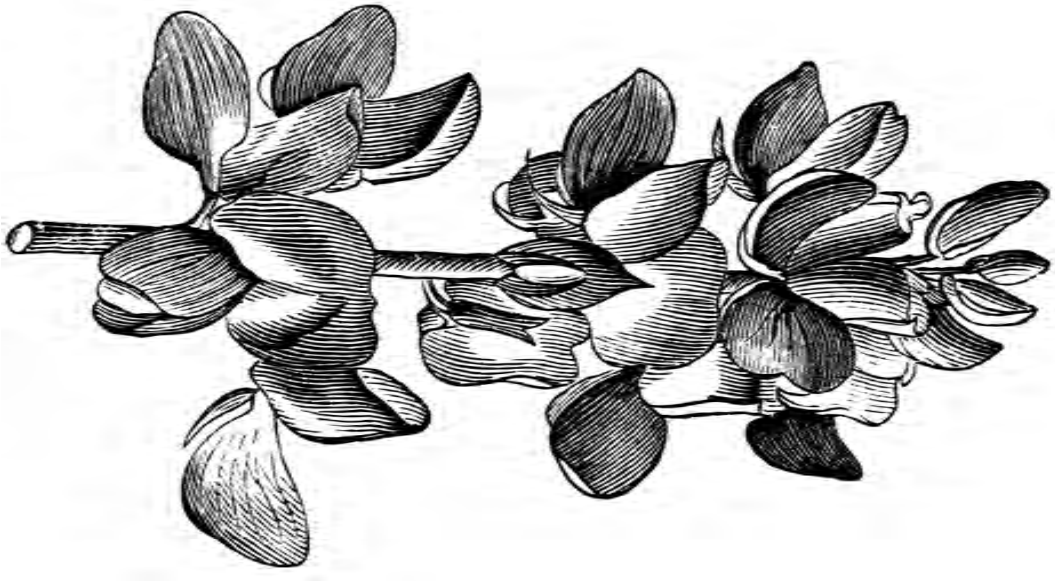


Wildflower Adaptation Plant Cards



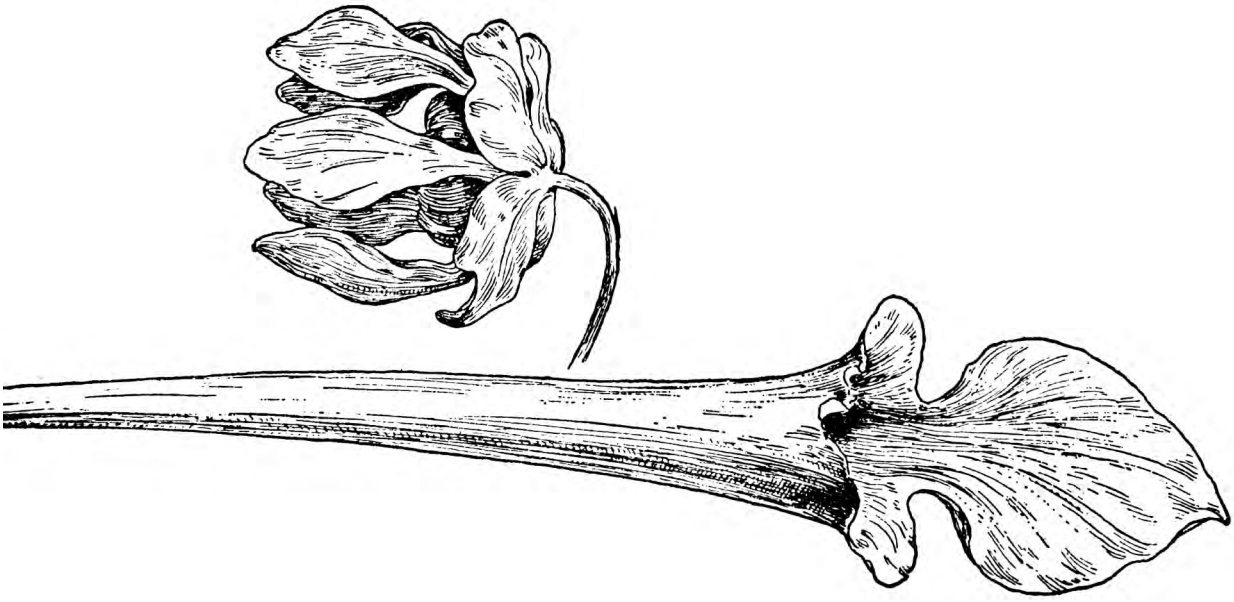
Yellow-eyed grass

Gulf Coast lupine

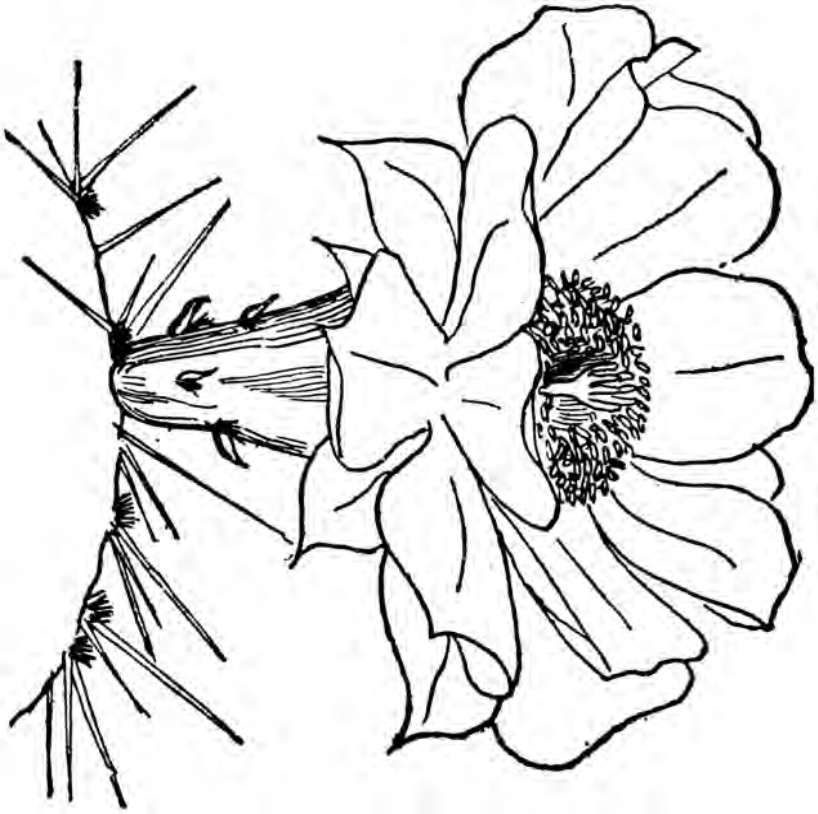


Wildflower Adaptation Plant Cards

Pitcherplant



Prickly pear cactus



Adaptation Scavenger Hunt

Objective

Students will identify and categorize adaptations found in wildflowers.

Directions

- Provide each student with a set of the "Adaptation Scavenger Hunt" worksheets to complete as a homework or class assignment.
- Students are to look for something in the leaves, stems, flowers, fruits, or other plant parts that appear to be an adaptation to the plant's environment.
- Students must determine which category the adaptation belongs in — functional, defensive or reproductive — and offer an explanation for their reasoning.
- Students will write a short description of the plant, its flower, and its adaptation; they will also sketch the wildflower and label its adaptation.
- Students should try to find one example of each type of adaptation.
- Have students share and compare their findings.

Variation

Have students use the Internet or other reference and resource materials to research Florida native wildflower adaptations and select three examples with which to complete the "Adaptation Scavenger Hunt" worksheet.

Materials

- "Adaptation Scavenger Hunt" worksheets (one set per student)
- hand lens (one per student)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.E.6.5, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6, SC.4.N.1.7

Note

If completing as a homework assignment, you may choose to suggest adaptations that do not require a hand lens.

Tip

This scavenger hunt requires access to wildflowers in bloom. Check to see if your campus has a wildflower garden or growing boxes, or ;ook in an unmowed area, near a fence line, or in a drainage ditch.

Some of the wildflowers found on school grounds are very small, so students will have to look closely.

Adaptation Scavenger Hunt

Adaptation Descriptions

Functional: Helps the plant carry out major life functions such as photosynthesis, water and nutrient storage and transport, and growth. It could include anything that seems to help the plant stay upright, climb, transport nutrients, capture water, store water, drain water from its leaves, or anchor itself.

Reproductive: Increases plant pollination or seed production. Look at the flowers and see how pollinators are attracted to the plant. Look at the seed-containing fruits and think about how they are dispersed and what kind of animal may help spread the seeds.

Defensive: Helps a plant defend itself from being eaten. Defensive adaptations can be physical (for example, leaves or stems with thorns, spines or sharp hairs), chemical (such as a toxic "milk" within the stems or leaves, or a strong odor), or mechanical (leaves that fold up when you touch them, for example).

Directions

1. Find three examples of flowering plants at home, in your neighborhood, or at school. Look at each plant and find an adaptation in its leaves, roots, stems, flowers or fruits that appears to be an adaptation to its environment.
2. Determine which category the adaptation you identified belongs in — functional, defensive, or reproductive. Circle the adaptation type that applies on the worksheet.
3. Write a short description of the plant and describe its adaptations.
4. Sketch a picture of the plant that shows its adaptations.
5. Try to find one example of each type of adaptation.

Plant name: _____ **Plant adaptation description:** **Functional Reproductive Defensive**	**Sketch of plant and adaptation**

Adaptation Scavenger Hunt

Plant name: _____ **Plant adaptation description:** **Functional Reproductive Defensive**	**Sketch of plant and adaptation**

Plant name: _____ **Plant adaptation description:** **Functional Reproductive Defensive**	**Sketch of plant and adaptation**

Plant Warriors

Objective

Students will demonstrate an understanding of plant defense mechanisms through individual creative design.

Directions

- Invite students to create a plant that uses at least one of the defense methods they have learned about. Remind them that a successful plant design increases the plant's chances of producing good seeds. Their designs should focus on protecting the plant itself or on protecting the plant's seeds.
- Students may use the Internet or other reference and resource materials to help identify additional plant defense mechanisms.
- Have students present their creations to the class and demonstrate the plant's defense mechanisms.
- Set up a "Hall of Warriors" for students to display their inventions. Each plant should have a card that identifies its name, location, and potential enemies, as well as the defense that helps protect the plant.

Materials

- miscellaneous craft supplies including construction paper, glue, yarn, paints, crayons, scissors, etc.

Standards

Grade 3: SC.3.L.14.2, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.5, SC.3.N.3.2

Grade 4: SC.4.L.16.2, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.3.1

Note

Remind students that plants do not have the freedom to move, so no karate-chopping vines!

Wildflower Adaptations in Florida's Varying Ecosystems

Objective

Students will understand the characteristics of Florida's four major ecosystems and identify the ways in which plants must adapt to survive in each ecosystem.

Directions

Students can do the research and presentation part of this activity individually, in pairs or in groups

- Give each student, pair or group a copy of one of the four "Ecosystem Adaptations" handouts.
- Direct students to read the information they've been presented and then, using the Internet or other reference and resource materials, research additional information such as Florida wildflowers endemic to the ecosystem or animal-plant interactions in the ecosystem. Have them keep track of the sources they use.
- Have each student write about their ecosystem and the wildflowers found within it. Instruct them to describe the adaptations of each wildflower and how they help or allow the wildflowers to survive within that ecosystem.
- Have each group design a presentation of their ecosystem information to share with the whole class. Presentations can be done on the computer or as poster sessions.

Note: Vocabulary words are italicized within the description text.

Materials

- "Ecosystem Adaptations" handouts (one sheet per group)

Standards

Grade 3: LAFS.3.SL.2.4, LAFS.3.W.2.4, LAFS.3.W.2.6, LAFS.3.W.3.7, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.3.N.1.1, SC.3.N.1.7

Grade 4: LAFS.4.SL.2.4, LAFS.4.W.2.4, LAFS.4.W.2.6, LAFS.4.W.3.7, LAFS.4.W.3.8, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.7

Ecosystem Adaptations — Coastal Dunes and Scrub

Although it rains quite a bit in Florida, our coastal dunes and scrub regions are very dry and hot, closely resembling a desert. One reason is that their soil is composed of deep, dry sands that allow water to quickly drain through it. Another reason is that there is a lot of sunlight shining directly on the plants and reflecting off the light-colored soils.

In coastal areas, winds are often strong, salty and blow constantly, drying plants out. In the scrub, plants receive little water, constant sun, and may be subject to high-intensity fires.

Florida plants are exposed to extreme temperatures and *drought* conditions. To survive, plants must avoid losing too much water and at the same time, stay cool. Plant *adaptations* to cope with these conditions include:

- Thick *succulent* leaves and/or stems where water can be stored.
- Few or no leaves, which helps reduce water loss during *photosynthesis*. Leafless plants conduct photosynthesis in their green stems.
- Long root systems that spread out wide or go deep into the ground to absorb water.
- Leaves with hair or spines that help shade the plant, reducing water loss. These hairs and spines can also provide protection from animals that would consume the plant.
- Leaves that turn throughout the day to reduce the amount of leaf surface that is exposed to the sun and heat. This reduces water loss and helps keep the plant cooler.
- *Waxy* coating on stems and leaves to help reduce water loss.
- Slower growth rates, which requires less energy. The plants don't have to make as much food and therefore do not lose as much water.

Ecosystem Adaptations — Aquatic and Wet Areas

Florida has a wide variety of aquatic *habitats*, including rivers, streams, springs, wetlands, and marshes. Wetland areas are often a mixture of forests and understory plants. Special *adaptations* to help plants thrive in a watery habitat include:

- Underwater leaves and stems are flexible to move with water currents.
- Some plants have air pockets in their stems, hollow stems, or air-filled bladders to help them stand up or float in the water.
- Submerged plants lack strong water transport systems in their stems. Instead, water, nutrients, and dissolved gases are absorbed directly from the water.
- Roots and root hairs are reduced or absent because the roots are only needed for anchorage, not for absorption of nutrients and water.
- Leaves that float on top of the water to expose themselves to sunlight.
- Seeds that can float.
- Drip tips and *waxy* surfaces that allow water to run off, discouraging the growth of bacteria and fungi.
- Buttresses and prop and stilt roots that help hold up plants in the shallow soil.

Ecosystem Adaptations — Flatwoods and Dry Prairies

Florida's flatwoods and dry prairies feature hot summers, cold winters and frequent fires. Flatwoods are dominated by an open canopy of pine species, and an understory of saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*) and other flammable evergreen shrubs, while dry prairies have little to no canopy. Both ecosystems typically contain many grasses and wildflowers. *Adaptations* developed for this type of area include:

- Deep root systems help the plants survive when fires consume their above-ground portions. The deep roots quickly sprout new growth. They also help some grasses obtain water from sandy soils. Many species in these ecosystems are *fire-dependent*, meaning they require fire in order to germinate, reproduce or thrive.
- Narrow leaves will lose less water than broad leaves.
- New growth emerges from near the base, not the tip of the plant, so they are not permanently damaged from grazing animals or fire.
- Wind pollination takes advantage of exposed, windy conditions.
- Soft stems bend in the wind.

Ecosystem Adaptations — Forests

Florida has both wetland and dry forested areas. During years of normal rainfall, they may receive up to 50 inches of rain. This abundance of water can cause problems such as promoting the growth of bacteria and fungi that could be harmful to plants.

Heavy rainfall also increases the risk of flooding, soil erosion, and rapid leaching of nutrients from the soil. (Leaching occurs when the minerals and organic nutrients of the soil are "washed" out of the soil by rainfall as the water soaks into the ground.) Plants grow rapidly and quickly use up any organic material left from decomposing plants and animals. This results in soil that is poor and provides few nutrients for plants.

Plants that live in forests have many *adaptations*:

- Leaves with drip tips and *waxy* surfaces allow water to run off, discouraging the growth of bacteria and fungi.
- Buttresses and prop and stilt roots help hold up plants in shallow soil.
- Some plants climb or grow on other plants so they can reach sunlight.
- Flowers on the forest floor are designed to attract animal *pollinators* since there is relatively no wind on the forest floor to aid in pollination.
- Smooth bark and smooth or waxy flowers speed the run-off of water.
- Shallow roots help capture nutrients from the top level of soil.
- Many bromeliads collect rainwater in a "bowl" formed at their base by overlapping leaves. The water is absorbed through hairs on their leaves instead of through roots. Some bromeliads are *epiphytes* (plants that live on other plants).
- Epiphytes have aerial roots that cling to the host plant, absorb minerals, and absorb water from the atmosphere.
- Wildflowers and other plants or trees in dry upland forests often have small leaves to prevent drying out between rainfalls.

Wildflower Adaptations

Objective

Students will investigate and demonstrate an understanding of wildflower adaptations through short answers and expounded writing.

Directions

Students may perform the research part of this activity individually or in pairs/groups, but should complete the short answers and single page response individually.

- Give each student a copy of the "Wildflower Adaptations" worksheet.
- Direct students to search the Internet to find answers to the questions on the worksheet.
- Have each student choose one question on which to write a single page response.

Materials

- "Wildflower Adaptations" worksheet (one per student)

Standards

Grade 3: LAFS.3.W.2.4, LAFS.3.W.2.6, LAFS.3.W.3.7, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.3.N.1.1

Grade 4: LAFS.4.W.2.4, LAFS.4.W.2.6, LAFS.4.W.3.7, LAFS.4.W.3.8, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.7

Note

Internet access is needed for this activity.

If Internet or computer access is limited, students may work together to research the questions in the library or using texts provided by the teacher.

Tip

One website for students to investigate is mbgnet.net/bioplants/main.html.

Wildflower Adaptations — Web Quest

Search the Internet to find short answers to the following questions. Then choose one question and write a single page response.

1. What is an adaptation?

2. How do plants change to suit their environment?

3. Why do some plants have spines?

4. What adaptations does a wildflower that is pollinated by animals have?

5. What adaptations do wildflowers that are mostly pollinated by wind have?

6. List four ways wildflowers disperse their seeds.

7. Why are adaptations for wildflowers important?

8. List one adaptation for wildflowers found in each of these three Florida ecosystems: coastal dunes, wetlands and pine flatwoods. Explain why those adaptations are necessary.

9. How do epiphytes (air plants) survive?

10. What special adaptations do orchids have?

11. What special root adaptation does a dandelion have?

12. Why are wildflowers different colors?

13. What is the Venus flytrap's special adaptation?

Adaptations

Objective

Students will demonstrate an understanding of wildflower adaptations through expounded research and writing.

Directions

- Give each student one of the four "Adaptations" worksheets ("People and Plants," "Defend and Protect," "Finding Food," and "Life as a Vine.")
- Direct students to write a single page response to the prompt on their worksheet.
- Allow students to reference their work from previous activities in this section or use the Internet or other reference and resource materials to research their topic.

Materials

- "Adaptations" worksheets

Standards

Grade 3: LAFS.3.W.2.4, LAFS.3.W.2.6, LAFS.3.W.3.7, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.3.N.1.1

Grade 4: LAFS.4.W.2.4, LAFS.4.W.2.6, LAFS.4.W.3.7, LAFS.4.W.3.8, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.7

Note

Copies of the adaptation descriptions from this section's introduction may also be provided to students for this activity.

Adaptations — People and Plants

Like people, plants must get food, deal with predators, and protect their young. Think about similarities between the ways that plants and people deal with these issues. Write an explanation of the similar ways in which people and plants try to survive.

Adaptations — Defend and Protect

Many plants have spines or thorns that protect them from being eaten by animals. Think about ways that people might protect themselves from animals. Write an explanation of the similar ways in which plants and people might defend themselves.

Adapted from Pelotes Island Nature Preserve, JEA & FPL (http://pelotes.jea.com/)

Adaptations — Finding Food

When plants need more of the sun's energy, they grow toward sunlight. Think about what people do when they need more energy resources (like food). Write an explanation of what a group of people might do if there was no more food where they lived.

Adaptations — Life as a Vine

Imagine that you are a green thorny vine growing in a shady area with lots of predators. Think about what your life might be like as you try to survive. Write a story about a day in your life as a vine.

Adapted from Pelotes Island Nature Preserve, JEA & FPL (http://pelotes.jea.com/)

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Glossary

Adaptation: Anything that helps an organism survive and successfully reproduce in an ecosystem.

Alkaloid: A chemical substance produced by many flowering plants. It serves mainly as a defense against herbivorous insects.

Aquatic: Growing or living in or near water.

Cross-pollination: Pollination of one flower with pollen from another flower.

Defensive adaptation: Any adaptation that helps a plant defend itself from predation.

Drought: A long period with little to no rainfall.

Epiphyte: A plant that grows on another plant, using it only for support.

Fire-dependent: Plants that depend on naturally occurring fires for their survival, to clear out underbrush and make way for seedlings.

Functional adaptation: Any adaptation that helps an organism survive.

Habitat: The natural environment in which an organism (plant or animal) lives.

Mimicry: The close resemblance of an animal or plant (or part of one) to another animal or plant.

Physical adaptation: Any adaptation to the physical or structural part of an organism that helps it survive.

Photosynthesis: The process by which plants use sunlight to create food from carbon dioxide and water.

Pollen: Fine, powder-like material that covers the anthers within a flower. This is what bees and other pollinators collect. Pollen is needed by plants to make seeds.

Pollinator: An organism (usually an insect, bird or small mammal) that moves pollen from one plant to another.

Predator: An organism that naturally preys on other organisms.

Reproductive adaptation: Any adaptation that helps a plant reproduce successfully.

Seed dispersal: Scattering or distribution of seeds.

Succulent: A plant or leaf adapted to dry conditions and having fleshy tissues that store water.

Waxy: A coating on leaves (called a cuticle) to prevent excess water loss through transpiration. This coating is similar to bee's wax or paraffin wax and is usually on the top surface of the leaf.

Tip

Develop a *Jeopardy*-style game for students with the vocabulary. *Jeopardy*-style PowerPoints are available at http://teach.fcps.net/trt10/PowerPoint.htm or you may use a smart board from http://exchange.smarttech.com/search.html?q=%22jeopardy%22l. Adapt one of these formats for your vocabulary words.

Wildflower Adaptations — Definition Match

Directions: Match the vocabulary words in the Word Bank to their definitions.

Word Bank

adaptation	fire-dependent	physical adaptation	succulent
alkaloid	functional adaptation	pollinator	waxy
defensive adaptation	habitat	predator	
drought	mimicry	reproductive adaptation	
epiphyte	photosynthesis	seed dispersal	

_____ Any adaptation that helps a plant protect itself from predation

_____ A plant or leaf adapted to dry conditions and having fleshy tissues that store water

_____ A long period with little to no rainfall.

_____ Any adaptation to the structural part of an organism that helps it survive

_____ Anything that helps an organism survive and successfully reproduce in an ecosystem

_____ A chemical substance found in some plants that serves as a defense against herbivorous insects

_____ A plant that grows on another plant, using it only for support.

_____ Any adaptation that helps an organism survive

_____ The process by which plants use sunlight to create food from carbon dioxide and water

_____ Plants that depend on naturally occurring fire for their survival, to clear out underbrush and make way for seedlings

_____ Scattering or distribution of seeds

_____ The natural environment in which an organism (plant or animal) lives

_____ An organism (usually an insect, bird or small mammal) that moves pollen from one plant to another.

_____ The close resemblance of an animal or plant to another animal or plant

_____ Any adaptation that helps a plant successfully produce offspring

_____ An organism that naturally preys on other organisms

_____ A coating on leaves to prevent excess water loss through transpiration

Wildflower Adaptations — Definition Match

Directions: Match the vocabulary words in the Word Bank to their definitions.

Word Bank

adaptation	fire-dependent	physical adaptation	succulent
alkaloid	functional adaptation	pollinator	waxy
defensive adaptation	habitat	predator	
drought	mimicry	reproductive adaptation	
epiphyte	photosynthesis	seed dispersal	

defensive adaptation	Any adaptation that helps a plant protect itself from predation
succulent	A plant or leaf adapted to dry conditions and having fleshy tissues that store water
drought	A long period with little to no rainfall.
physical adaptation	Any adaptation to the structural part of an organism that helps it survive
adaptation	Anything that helps an organism survive and successfully reproduce in an ecosystem
alkaloid	A chemical substance found in some plants that serves as a defense against herbivorous insects
epiphyte	A plant that grows on another plant, using it only for support.
functional adaptation	Any adaptation that helps an organism survive
photosynthesis	The process by which plants use sunlight to create food from carbon dioxide and water
fire-dependent	Plants that depend on naturally occurring fire for their survival, to clear out underbrush and make way for seedlings
seed dispersal	Scattering or distribution of seeds
habitat	The natural environment in which an organism (plant or animal) lives
pollinator	An organism (usually an insect, bird or small mammal) that moves pollen from one plant to another.
mimicry	The close resemblance of an animal or plant to another animal or plant
reproductive adaptation	Any adaptation that helps a plant successfully produce offspring
predator	An organism that naturally preys on other organisms
waxy	A coating on leaves to prevent excess water loss through transpiration

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Resources

Literary Connections

- *Flip, Float, Fly!: Seeds on the Move* by JoAnn Early Macken
- *How Plants Survive* by Kathleen Kudlinski
- *How Seeds Travel (A Lerner Natural Science Book)* by Cynthia Overbeck
- *Lily's Pesky Plant* by Kirsten Larsen
- *Mysteries & Marvels of Plant Life* by Barbara Cork
- *The Nature And Science Of Flowers (Exploring the Science of Nature)* by Kim Taylor and Jane Burton
- *Plants Bite Back!* by Richard Platt
- *Seed Surprises* by Andrew Willett
- *Seeds Pop-Stick-Glide* by Patricia Lauber
- *Wetlands* by Lynn M. Stone
- *Wetlands* by Peter Benoit
- *What Do Roots Do?* by Kathleen V. Kudlinski
- *What Is a Plant? (Science of Living Things)* by Bobbie Kalman

Reference Books

- *Florida Wildflowers in Their Natural Communities* by Walter Kingsley Taylor

Websites and other web resources

- "Biology of Plants." Missouri Botanical Garden (http://www.mbgnet.net/bioplants/main.html)
- "Seed Dispersal" interactive website from Birmingham Grid for Learning (http://www2.bgfl.org/bgfl2/custom/resources_ftp/client_ftp/ks2/science/plants_pt2/dispersal.htm)

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Pollination

Introduction

Pollination is the first step in a plant's reproductive cycle and involves the transfer of *pollen* from one *flower* to another flower of the same species. Pollen is a fine, powder-like material that covers the anthers within a flower. It is often yellow, but can be white, black, orange, green or any other color. It is what bees and other pollinators collect. Pollen is needed by plants to make seeds.

Many different insects and animal pollinators carry pollen, and these "work horses" of the natural world ensure the continuation of plant species. But these *pollinators* do not get up in the morning and "go off and pollinate." *Pollination* is really a lucky result of each pollinator's search for food. When a pollinator visits a wildflower in search of food such as *nectar* (a sugary liquid made by the flowers), pollen, or other insects, the pollinator brushes up against the *anthers* and *stigmas*, picking up and depositing pollen with each visit. This leads to *fertilization*, which results in the production of seeds. If it were not for the pollinators performing this service, many plants would not reproduce, and many fruit trees would not produce fruit.

Pollination is important because most flowering plants can only reproduce with help from pollinators. Some common pollinators include bees, butterflies, and other insects. Some plants also use other pollinators such as the wind, birds or bats. Insects are attracted to plants by nectar, scent, and colorful *petals*.

Following are descriptions and examples of different types of pollinator specialties. Print the description pages and distribute them to students. Have students read the descriptions and discuss them with the class before beginning this section's activities. You may want to allow students to keep the description pages as a reference as they work through this section.

Vocabulary

anther
fertilization
flower
nectar
petal
pollen
pollination
pollinators
stigma

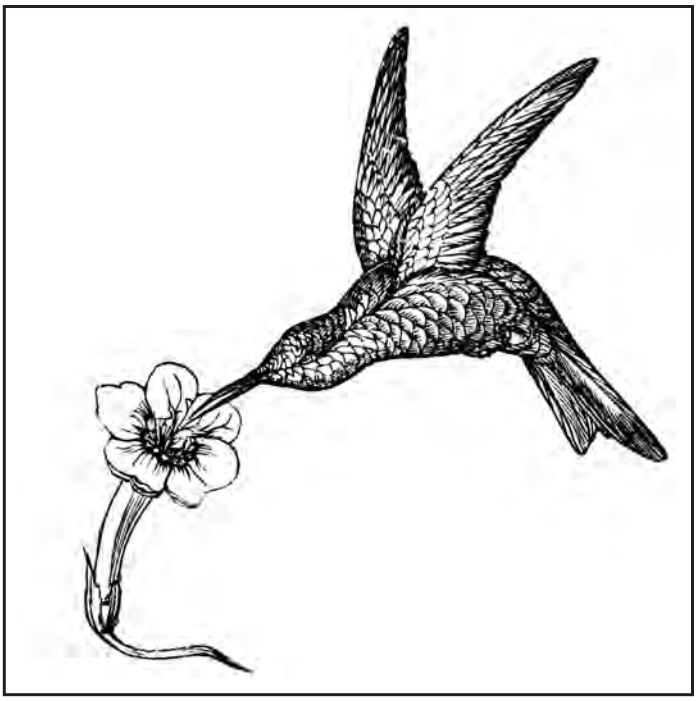
Standards covered in this section

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.6, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.7, SC.4.N.1.8, SC.4.N.3.1

Pollination Specialties

Hummingbirds: Hummingbirds have keen eyesight and are attracted to tubular-shaped flowers that are red, orange or bright pink. (The color red is not visible to most insects, but it is very visible to hummingbirds.) Nectar is produced at the base of the deep flower tubes and is not accessible to most insect pollinators.

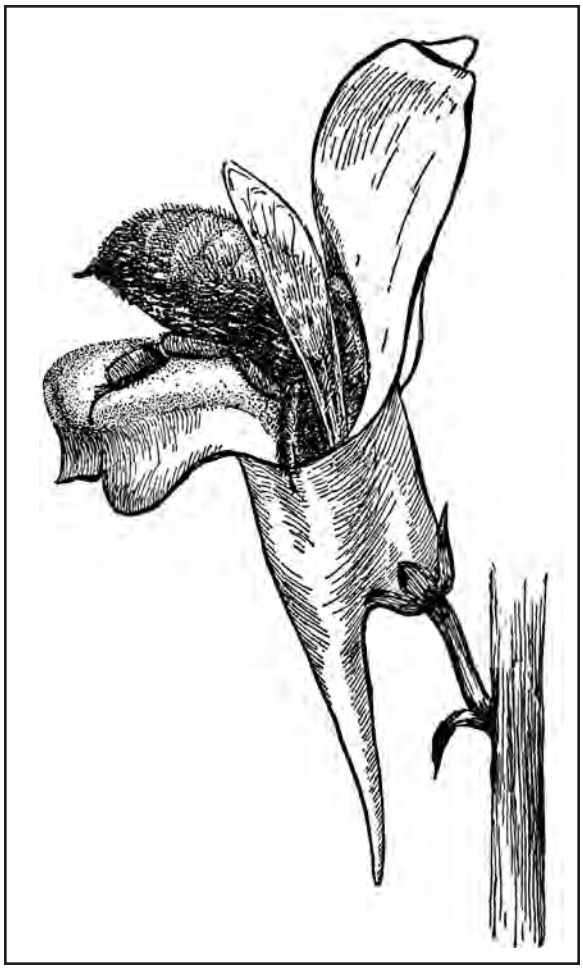


Hummingbirds do not have a good sense of smell, so the flowers they visit tend to have little or no fragrance. Coral honeysuckle (*Lonicera sempervirens*), crossvine (*Bignonia capreolata*) (pictured) and coralbean (*Erythrina herbacea*) are examples of hummingbird-pollinated flowers.

Butterflies and moths: Butterflies are lazy pollinators and prefer flowers that provide a sturdy place to sit while they sip nectar. Like bees, they are attracted to flowers that are sweetly scented and brightly colored. However, butterflies can see the color red, so they tend to visit red, blue and yellow flowers. They also look for flowers with long, slender flower tubes that can fit their long tongues. Nectar guides or tongue grooves on the flower petals guide the butterfly's tongue to the rich nectar at the base of the flower. Butterfly-pollinated flowers include milkweeds (*Asclepias* spp.), blazing star (*Liatris* spp.) and firebush (*Hamelia patens*).

Moths, like their butterfly cousins, are also attracted to fragrant flowers, but because they forage at night, they prefer white or light-colored flowers that stand out against the darkness. Moonflower (*Ipomoea alba*) is an example of a moth-pollinated plant.

Pollination Specialties



Bees: Bees visit flowers to feed on the nectar, and also to collect pollen to feed their larvae. They eat the nectar with a tongue that extends out through a sucking tube. Body hairs on their legs and abdomens act as brushes that pick up the pollen, which they comb out and force into pollen baskets on their third pair of legs.

Bees can see color, although in a different light spectrum (ultraviolet) than humans. Bee-pollinated flowers are generally showy and brightly colored, usually in shades of blue or yellow (the color red appears black to them). Flowers tend to be sweet-smelling and often have special markings — called honey guides or nectar guides — that only bees can see. Nectar guides are designed to lead the bees straight to the nectar. They also are associated with landing platforms that provide a place for bees to sit. Bee-pollinated flowers include spiderwort (*Tradescantia ohiensis*), skullcap (*Scutellaria* spp.), toadflax (*Linaria canadensis*) (pictured) and most members of the daisy family.

Some of the more unusual bee-pollinated flowers have spring-loaded traps or complex passageways that force the bee to follow a particular route. This ensures the bee will collect and deposit pollen in the proper locations. For example, the anthers of penstemon (*Penstemon* spp.) are arranged so they tap the bee's back as it moves into the flower in search of nectar.

Beetles: Beetles prefer flowers that are large, greenish, white or dull in color, and give off a strong fruity, yeasty or spicy fragrance. Most beetle-pollinated flowers are flat or disc-shaped with pollen that is easy to access. Southern magnolia (*Magnolia grandiflora*) is a good example of beetle-pollinated flowers.

Flies: Flies are attracted to rotting food on which to lay their eggs, so they tend to visit flowers with a similarly nasty smell. The plant provides the flies with no rewards, and so they typically leave quickly unless the plant has traps that delay or slow them down. The tiny flower of Virginia snakeroot (*Aristolochia serpentaria*) is fly-pollinated.

Pollination Game

Objective

Students will learn how wildflowers and insects interact in the process of pollination.

Discussion

- Ask your students to name some pollinators (bees, hummingbirds, moths, bats, butterflies, beetles, flies).
- Write the different types of pollinators on the board. Discuss the preferred characteristics of different pollinators (e.g. flower color, odor, and shape, nectar content, pollen type, etc.).
- Discuss how the flower's job is to attract pollinators, while the pollinators are simply looking for food.
- Ask students if plants and animals want to help each other. (Answer: No, but it works out well that they do. Explore what happens.)

Directions

- Place the two beehives at one end of the field or classroom.
- Select two students to be bees and have them wear antenna headbands (if available).
- Tell the rest of the students they will be wildflowers.
- The teacher will be the "Queen Bee" to keep order and monitor the game.
- Give four or more small Post-its (all the same color) to each wildflower and have wildflowers write their initials on each note before putting them on the front of their shirts.
- Upon a signal from the Queen Bee, the bees run to a wildflower, pick up two Post-its and run back to the hive.
- Have the bees leave one Post-it in their hive, and run with the other Post-it to another wildflower.
- Bees will then leave the Post-it with the new wildflower and take two of that wildflower's Post-its.

(Continued on following page.)

Materials

- two antenna headbands for "bees" (optional)
- two boxes or tubs for "beehives"
- Post-it notes (minimum of four per student)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.7, SC.3.N.3.2, SC.N.3.3

Grade 4: SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.7, SC.4.N.1.8, SC.4.N.3.1

- Have the wildflower put the new Post-it on his/her shirt, while the bee runs back to the hive and again deposits one Post-it.
- Have the bee take one Post-it back to a new wildflower, and repeat the process of giving one, taking two, depositing one until the Queen Bee calls time.
- Have the wildflowers look at their Post-its:
  - If they have at least one Post-it with someone else's initials on it, they will survive. (The more Post-its with different initials each wildflower has, the greater chance for the wildflower to reproduce.)
  - Those who have no Post-its are not likely to survive because there was no pollen deposited to start the reproductive process.
  - Wildflowers with the same four Post-its they started with will not survive.
- Draw the students into a summary about pollination and how it might work in nature by reflecting on the results of the game.
- Have them hypothesize scenarios or actions that might increase or decrease the chances of pollination.

Flower Dust

Objective

Students will explore the characteristics of different native plant pollens.

Directions

Students should work in pairs.

- Give each student pair a blank piece of white paper. Have them tape it to a notebook, clipboard or other hard, portable surface. (Sheets of white foamcore or sturdy cardboard can also be used.)
- Take students to an outdoor area where flowers are present and where pollen can easily be collected.*
- Tell students they will be collecting and studying pollen. Explain that flowers and pollen have a job to do, so students must not pick any flowers; instead, they will simply collect some pollen. Demonstrate by gently bending a blossom over and shaking the pollen free onto a piece of paper.
- Tell students not to disturb any insect or bird pollinators that are visiting a flower; instead, they should go to flowers that do not have visitors.
- Give students 15-20 minutes to collect pollen from several different species. Be sure to point out flowers and flowering grasses with pollen.
- Have students gather together to examine their pollen samples with hand lenses. Some of the pollen will be larger, some stickier, and some might even be different colors.

Discussion

- Ask:
  - Is there a difference in size of the pollen grains from different flowers?
  - Why might some flowers have larger pollen grains than others?
  - Do all of the flowers have available pollen, or is it only present on some?
  - Are there special areas or structures that hold the pollen?
- Discuss why plants need pollination to survive.

Materials

- hand lens
- white paper, cardboard or foamcore (one per student pair)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.7

Note

*Prior to doing this activity, locate an area in the schoolyard where pollen can easily be collected from flowering plants.

Wandering Pollen

Objective

Students will explore different methods for how pollen is transported.

Directions

Students should work in groups of four.

- Give each group a cup, six marbles,12 pom-poms and a Velcro wand.
- Explain that the cups represent flowers; the marbles and pom-poms represent different types of pollen; and the Velcro wand represents pollinators (bees, beetles, butterflies, flies, bats, hummingbirds and other birds) that visit the flowers to feed on their nectar.
- Instruct the group to place the marbles in the cup, and to place the cup on the tabletop.
- Explain that pollen can be sticky or non-sticky.
- Ask:

  - Why might some pollen be sticky and some not?

  - How would pollen that is not sticky be carried away?
- Explain that pollen that is not sticky depends on wind to be carried away.
- Have one student in each group simulate a pollinator visiting a flower by stirring the wand in the cup and pulling it out.
- Now have another student in each group simulate the blowing wind by gently tipping the flower cup and allowing the marbles to flow out and travel away.
- Ask:

  - Which method was more effective in carrying away the non-sticky pollen? Why?

  - What about sticky pollen? What do you think will be the best method for carrying away pollen that is sticky?
- Explain how plants with sticky pollen depend on pollinators such as insects and other animals to carry away their pollen.

(Continued on following page.)

Materials

- cups (one per group)
- marbles (six per group)
- 5mm pom-poms* (15± per group)
- Velcro “wands” (one per group) (see note)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.6, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.N.1.2, SC.4.N.1.7, SC.4.N.3.1

Note

Velcro “wands” can be made by adhering 2 pieces of velcro (hook side) to the ends of a large craft stick. Self-adhesive velcro hook dots are available at most office or home supply stores.

If 5mm pom-poms are not available, felt dots may be substituted.

- Have students replace the marbles in the flower cup with pom-poms.
- Again, instruct one student to simulate the blowing wind by gently tipping the cup.
- Point out that the pom-poms (i.e. sticky pollen) stay inside or very near the cup, illustrating that the wind cannot carry away sticky pollen.
- Ask:

  - Which method was more effective in carrying away the sticky pollen?

  - Why would one method be more effective?
- Explain to students how the pom-poms grip the wand in the same way that sticky pollen grips visiting insects and other animals, and is then carried to the next flower.
- Point out that some of the pollen falls off, and ask students to consider how that might be a good thing. (This illustrates how pollen is transferred from one flower to the next.)

Why Wind?

Objective

Students will explore different methods for how pollen is transported.

Directions

- Have students sit in a semi-circle on the floor and place their hands on the floor in front of them.
- Fill a cup with marbles. (Depending on how many students you have, you may want to fill two or three cups.) Explain that the cup will represent a flower and the marbles will represent its pollen.
- Explain that wind-dependent wildflowers must produce huge amounts of pollen for the species to survive.
- Sit in front of the students and tell them that each student will represent a flower that needs to be pollinated.
- Tip the flower cup(s) full of pollen marbles onto the floor. Tell students that they are to "collect" any pollen that comes in contact with them. Remind students that flowers can't move quickly or with a purpose, so to be fair, they should close their eyes.

Discussion

- Have students discuss how many of the pollen marbles actually reached another flower.
- Ask:
  - What would happen if students sat farther apart?
  - What if they sat closer together?
  - Can they think of other things that might change the odds of the pollen reaching the other flowers?

Materials

- cups
- marbles

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.6, SC.3.N.1.7, SC.3.N.3.2, SC.3.N.3.3

Grade 4: SC.4.E.6.5, SC.4.L.16.1, SC.4.N.1.2, SC.4.N.1.7, SC.4.N.3.1

The Perfect Fit

Objective

Students will observe pollinators at work and compare and contrast the characteristics of the flowers that various pollinators visit.

Directions

Students should work in pairs.

- Give each pair (or each student) a “Pollinator Observations” worksheet.
- Take students outside to an area where wildflowers and other flowering plants are in bloom.
- Have student pairs spend about 10 minutes observing pollinators and the types and characteristics they see at work. Remind students not to disturb the pollinators they see.
- Have students record their observations on the worksheet.
- Have students regroup for discussion.
- Ask:
  - What types of pollinators were observed?
  - Were individual flowers visited by two or more kinds of pollinators?
  - What do the different pollinators hang on to when collecting their food?
  - How many kinds of flowers were pollinated by butterflies?
  - Do the butterfly-pollinated flowers have any special characteristics, such as scent, color or shape?
  - How many kinds of flowers were being pollinated by bees?
  - Do the bee-pollinated flowers have any special characteristics, such as scent, color or shape?

Materials

- “Pollinator Observations” worksheet (one per student pair)

Standards

Grade 3:SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.L.16.1, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.7

Note

This activity requires access to wildflowers or plants in bloom.

Pollinator Observations

Directions: Spend about 10 minutes observing pollinators and the types and characteristics you see at work. Record your observations below. **Do not disturb the pollinators you see; just observe them.**

1. What types of pollinators were observed? Indicate how many of each type below.

_____ Butterflies _____ Bees _____ Wasps

_____ Flies _____ Beetles _____ Birds

_____ Other insects (list what they were) _____ Other animals (list what they were)

2. Were individual flowers visited by two or more kinds of pollinators? If yes, explain.

3. What do the different types of pollinators hang on to when collecting food?

4. How many kinds of flowers were pollinated by butterflies?

5. Do the butterfly-pollinated flowers have any special characteristics such as scent, color or shape?

6. How many kinds of flowers were pollinated by bees?

7. Do the bee-pollinated flowers have any special characteristics such as scent, color or shape?

FLORIDA WILDFLOWER FOUNDATION

Glossary

Anther: Yellow, pouch-like part inside of the flower that holds pollen grains, usually located on top of a long stalk that looks like a fine hair.

Fertilization (in plants): Joining of pollen with an ovule to form a seed.

Flowers: 1) Part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated; blossom.
2) Part of the plant that ordinarily contains the reproductive organs. Flowers can be male, female or bisexual. A male flower is staminate (has only stamens). A female flower has only pistils. If a flower has both pistils and stamens, it is bisexual or both male and female.

Nectar: Sugary liquid made by flowers.

Petal: The colorful parts of the flower that often attract pollinators.

Pollen: Fine, powder-like material that covers the anthers within a flower. This is what bees and other pollinators collect. Pollen is needed by plants to make seeds.

Pollination: 1) The movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower. 2) Pollination occurs when birds, bees, bats, butterflies, moths, beetles, other animals, water or wind carries pollen in and between flowers, or when it is moved within flowers.

Pollinator: An organism (usually an insect, bird or small mammal) that moves pollen from the anther of one plant to the stigma of another.

Stigma: 1) Female part of the flower.
2) The sticky bulb in the center of flowers where the pollen lands to start the fertilization process.

Tip

Develop a *Jeopardy*-style game for students with the vocabulary. *Jeopardy*-style PowerPoints are available at http://teach.fcps.net/trt10/PowerPoint.htm or you may use a smart board from http://exchange.smarttech.com/search.html?q=%22jeopardy%22l. Adapt one of these formats for your vocabulary words.

Pollination — Word Find

Directions: In the puzzle below, find and circle the words from the Word Bank.

Word Bank

anther	butterfly	fly	nectar	pollination
bee	fertilization	hummingbird	petal	pollinator
beetle	flowers	moth	pollen	stigma

H	A	I	W	G	N	O	I	L	L	P	T	I	J	V	R	P	S	R	E	O	J	E	A
K	F	L	H	W	E	A	E	I	D	I	L	G	S	C	P	T	Y	A	M	F	U	B	S
B	R	W	U	A	O	P	O	L	L	E	N	C	O	R	O	Z	J	N	E	E	N	T	S
P	Y	A	M	P	A	O	J	V	R	P	A	T	I	J	L	I	W	G	N	R	B	E	E
J	P	C	M	J	C	H	A	U	E	D	A	L	D	A	L	E	K	P	T	T	O	W	K
D	I	S	I	D	S	F	P	L	T	E	N	T	Y	P	I	C	R	A	Y	I	P	C	A
J	E	C	N	A	B	K	M	E	V	T	T	C	F	M	N	S	A	E	I	L	X	A	L
I	S	D	G	F	A	E	N	H	Y	U	H	O	W	E	A	O	M	P	O	I	R	F	S
F	L	Y	B	N	C	E	R	S	P	O	E	M	T	S	T	I	G	M	A	Z	D	F	M
Z	O	J	I	B	D	J	F	E	I	T	R	D	E	A	O	R	T	I	S	A	R	T	C
I	I	W	R	F	I	L	A	M	E	N	T	L	G	P	R	I	L	L	P	T	I	L	A
E	D	K	D	L	A	F	A	G	E	T	B	O	H	T	F	N	B	F	I	I	N	E	E
C	Y	R	E	O	A	L	M	H	S	I	C	N	J	I	N	L	U	R	E	O	L	O	R
S	F	A	G	W	X	R	O	T	S	P	O	L	L	I	N	A	T	I	O	N	I	L	I
O	W	M	T	E	S	B	A	E	R	F	B	L	D	M	D	F	T	O	J	C	N	D	P
J	N	F	V	R	Y	A	M	M	D	F	G	O	M	C	R	T	E	S	D	R	N	B	O
C	T	R	B	S	E	T	A	L	E	S	S	P	A	O	I	L	R	P	J	O	M	A	Y
G	S	S	E	A	G	N	M	C	A	M	T	E	G	E	R	F	F	L	I	C	D	T	T
T	E	L	D	F	G	L	O	H	B	E	E	T	L	E	I	L	L	O	J	D	P	A	H
P	J	O	S	N	E	C	T	A	R	S	F	A	E	K	P	T	Y	N	E	S	N	C	J
N	K	E	C	A	D	U	H	E	N	E	C	L	C	R	A	Y	F	L	O	E	P	C	L
T	I	A	S	T	L	O	D	H	R	D	T	S	U	D	P	F	C	C	J	I	L	P	A
R	I	S	O	L	L	E	N	C	T	W	M	J	A	L	M	H	S	I	C	N	L	G	E

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Directions: In the puzzle below, find and circle the words from the Word Bank.

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beetle	flowers	moth	pollen	stigma

H	A	I	W	G	N	O	I	L	L	P	T	I	J	V	R	P	S	R	E	O	J	E	A
K	F	L	H	W	E	A	E	I	D	I	L	G	S	C	P	T	Y	A	M	F	U	B	S
B	R	W	U	A	O	P	O	L	L	E	N	C	O	R	O	Z	J	N	E	E	N	T	S
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D	I	S	I	D	S	F	P	L	T	E	N	T	Y	P	I	C	R	A	Y	I	P	C	A
J	E	C	N	A	B	K	M	E	V	T	T	C	F	M	N	S	A	E	I	L	X	A	L
I	S	D	G	F	A	E	N	H	Y	U	H	O	W	E	A	O	M	P	O	I	R	F	S
F	L	Y	B	N	C	E	R	S	P	O	E	M	T	S	T	I	G	M	A	Z	D	F	M
Z	O	J	I	B	D	J	F	E	I	T	R	D	E	A	O	R	T	I	S	A	R	T	C
I	I	W	R	F	I	L	A	M	E	N	T	L	G	P	R	I	L	L	P	T	I	L	A
E	D	K	D	L	A	F	A	G	E	T	B	O	H	T	F	N	B	F	I	I	N	E	E
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T	I	A	S	T	L	O	D	H	R	D	T	S	U	D	P	F	C	C	J	I	L	P	A
R	I	S	O	L	L	E	N	C	T	W	M	J	A	L	M	H	S	I	C	N	L	G	E

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Resources

Literary Connections

- *The Nature And Science Of Flowers (Exploring the Science of Nature)* by Kim Taylor and Jane Burton
- *Pollination* by Mary King Hoff
- *What Is a Plant? (Science of Living Things)* by Bobbie Kalman

Websites and other web resources

- "The Beauty of Pollination" video by Louie Schwatrzberg (https://www.youtube.com/watch?v=MQiszdkOwuU)
- "Biology of Plants." Missouri Botanical Garden (http://www.mbgnet.net/bioplants/main.html)
- "Pollinators." United States Department of Agriculture Forest Service (http://www.fs.fed.us/wildflowers/pollinators/index.shtml)
- "Selecting Plants for Pollinators" produced by the Pollinator Partnership and North American Pollinator Protection Campaign (http://pollinator.org/PDFs/Guides/OuterCoastalrx7FINAL.pdf)

Wildflower and Animal Interactions

Introduction

Plants, including wildflowers, have a variety of *relationships* and *interactions* with animals and other plants that affect the survival of both the plants and the animals.

Symbiosis is a partnership between two types of organisms. In the plant world, there are three types of symbiotic relationships:

- *Mutualism* — both organisms *benefit* from the relationship
- *Commensalism* — only one of the organisms benefits, but not both; neither is harmed by the relationship
- *Parasitism* — only one organism (the parasite) benefits from the relationship while the other (the *host*) is harmed

Symbiosis can be between two plants, between a plant and an insect, or between a plant and an animal. Plants, insects, and animals that have symbiotic relationships are called *cohorts*.

Vocabulary

benefit
cohort
commensalism
host
hypothesis
interaction
mutualism
parasitism
relationship
symbiosis

Standards covered in this section

Grade 3: SC.3.L.14.2, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.E.6.5, SC.4.L.16.2, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.6, SC.4.N.1.7

Cohort Combos

Objective

Students will distinguish different types of symbiotic relationships between plants and animals.

Directions

- Hand out the classroom set of "Cohort Combos Matching Cards," one card per student.
- Tell students to find their "cohorts," i.e. the student with a card bearing the same number but different organism.
- When all the cohorts are together, tell each pair of students to make a *hypothesis* about how their relationship might work. (If the students have not been introduced to the term hypothesis, define the word for the students at this time. You may also wish to go over the definition of the word cohort.)
- Give them some leading questions, such as:
  - Do the cohorts depend on each other?
  - Does one partner accidentally assist the other?
  - Does one partner cause problems for the other?
- After the students have had a few minutes to discuss their relationship with each other, have them write down their hypothesis. Then hand out the appropriate "Cohort Combo Information Sheet" to the corresponding students.
- Ask the students to discuss with their partners what they now know about the symbiotic relationship between their animal or plant cohort, and how it differs from their hypothesis.
- Have students plan a way to present their relationship to the rest of the class. (Encourage students to use the terms *mutualism*, *commensalism*, and *parasitism*, and to "act out" the relationship. Be sure to have the term definitions on the white board, a chart, or another prominent place in the room).
- Correct any misconceptions with an explanation as the acts proceed.

(Continued on following page.)

Materials

- "Cohort Combo Matching Cards" (enough sets so that each student gets one card)
- "Cohort Combo Information Sheets" (enough copies so each pair gets their appropriate sheet)

Standards

Grade 3: SC.3.L.14.2, SC.3.N.1.1, SC.3.N.1.6, SC.3.N.1.7

Grade 4: SC.4.L.16.2, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.4, SC.4.N.1.7

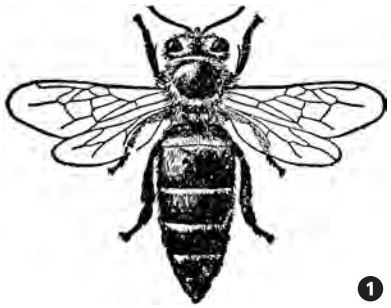
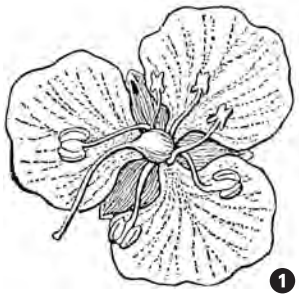
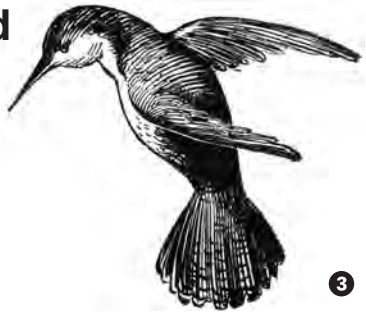
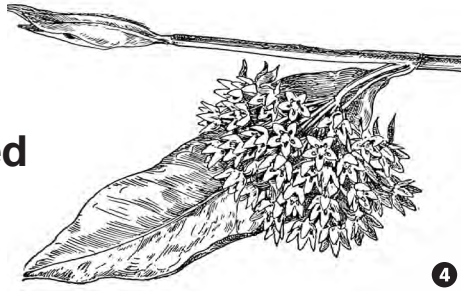
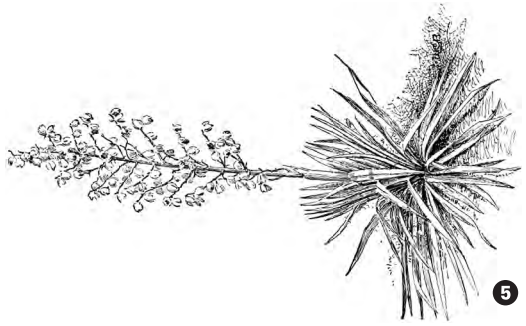
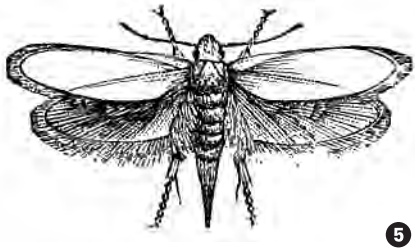
Note

Print cards and information sheets on card stock and laminate for multiple uses.

Extension

- Have the cohorts gather in three groups: mutualism cohorts, commensalism cohorts, and parasitism cohorts.
- Have them compare and contrast the different examples of each symbiotic relationship within their larger group.
- Have students return to their seats for a follow-up discussion to review what they learned in this lesson. (Topics should include terms and types of relationships.)

Cohort Combo Matching Cards

Bee  1	**Spiderwort**  1
Blue jay  2	**Mistletoe**  2
Cardinalflower  3	**Hummingbird**  3
Milkweed  4	**Monarch butterfly**  4
Yucca  5	**Yucca moth**  5

Clipart courtesy FCIT (http://etc.usf.edu/clipart) except yucca moth, a public domain image (http://srufaculty.sru.edu/david.dailey/public/insects.html)

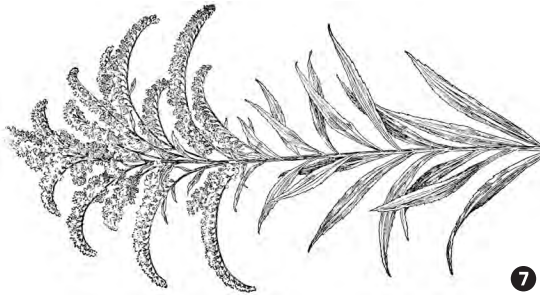
Beggarticks

6

Raccoon

6

Goldenrod

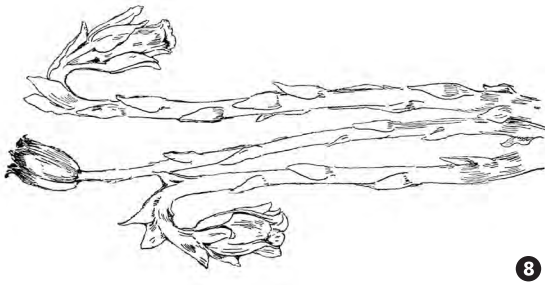


7

Gall fly

7

Indian pipes

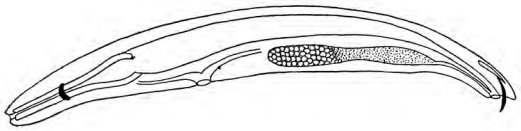


8

Soil fungi

8

Nematode



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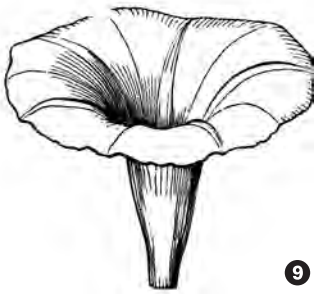
Morning glory



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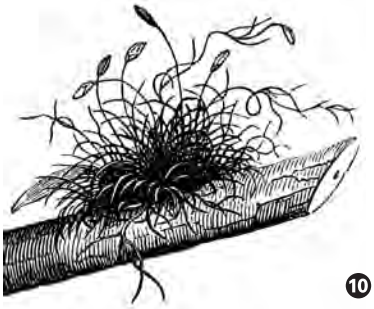
Spanish moss



10

Live oak

10

Cohort Combo Information Sheets

Teachers: Reproduce these sheets and cut them into information slips for each Cohort Combo pair.

Bee and Spiderwort
Bees are attracted to this wildflower's showy petals. When a bee's head enters the flower to draw up the nectar with a proboscis, sticky pollen on the flower's hanging stamens is caught by the bee's hairy body. When the bee goes to the next flower, some of the pollen is left behind on the flower's pistil, where it will fertilize the ovules. Plants have no use for nectar other than as an attractant for pollinators. The flower provides food for the bee, and the bee carries the pollen between blossoms to fertilize the flowers.

Blue jay and Mistletoe
The blue jay eats the mistletoe berries. Inside each berry is a seed that is inedible, and the blue jay tries to spit it out. However, the seed is sticky, making it difficult to shake, so the bird scrapes it off on tree bark. This is where mistletoe needs to grow to survive. If the blue jay accidentally swallows the seed, it passes through the bird and is left on another tree branch in the bird's waste. Either way, the blue jay carries the beginnings of the plant to new homes, while enjoying a meal in the process.

Goldenrod and Gall fly
The female goldenrod gall fly injects her fertilized eggs into the stem of the goldenrod. In about 10 days, the eggs hatch and the larvae begin to eat the goldenrod stem. The saliva of the larvae has a chemical that irritates the stem and causes a sphere-shaped scar, or "gall," to form. This is where the larvae will live and feed for the next year until they burrow out to look for mates.

Spanish moss and Live oaks
Although it is called a moss, Spanish moss is not a moss at all, but is a bromeliad related to pineapples. The Spanish moss sits on the branches of live oak trees, where it can gather sunlight, rainwater and nutrients. It does not penetrate the tree bark. Spanish moss seeds are blown off by wind and carried to nearby trees, wires, and other supports. The trees are usually not bothered by the Spanish moss, but it can sometimes slow a tree's growth by reducing the amount of light the tree can receive.

Morning glory and Root knot nematodes
Nematodes are a type of roundworm that live in the soil. Nematodes burrow into the roots of morning glories (as well as several other plants). They feed on the roots and lay their eggs within the roots. As the nematode eggs hatch, large galls are formed that prevent the root from properly absorbing water and nutrients.

Cardinalflower and Hummingbird
Because hummingbirds do not have a sense of smell, the cardinalflower does not need a strong scent to attract the hummingbird. Rather, hummingbirds are attracted to the flower's bright red color. The cardinalflower's nectar is almost all sugar. To feed, the hummingbird inserts his long, thin beak into the tube-shaped flower. Pollen is brushed off the flower stamens onto the bird and carried to the next flower's pistil where it is deposited. The cardinalflower provides food to the hummingbird, and the hummingbird helps the flower make new seeds by pollinating it.

Indian pipes and Soil fungi
Indian pipes do not have chlorophyll so they cannot make their own food as green plants commonly do. Instead, it gets its food from a fungus found in or on the soil. The roots of the Indian pipe tap into the root-like structures (mycelium) of the fungus and steal the nutrients that the fungus is simultaneously gathering from nearby trees.

Milkweed and Monarch butterfly
Monarch butterfly larvae feed on plants in the milkweed family. Monarchs lay their eggs on milkweed leaves and, when the eggs hatch, the small larvae feed on the plant's leaves. Milkweed plants contain a chemical that is toxic to vertebrates (animals with backbones). The butterfly larvae are able to store this chemical. When a bird catches the butterfly and eats it, the milkweed chemicals cause the bird to get sick and throw up. The recovered bird avoids eating another Monarch butterfly and teaches its young to stay away.

Yucca and Yucca moth
The yucca plant is fertilized only by this special moth. The moth climbs in and gathers pollen under her chin. She then carries the pollen to another yucca flower and, after depositing the pollen ball, breaks into one of three chambers of the ovary of the plant and lays her eggs. Her developing larvae feed on one of the ovules (developing seeds) but leave the other two chambers with ovules alone. Pollen fertilizes those two ovules, which mature into seeds.

Beggarticks and Raccoon
Beggarticks is also called pitchfork weed because its seeds have two or more prongs that stick to almost anything—especially to the fur of a small animal like a raccoon as it wanders through a patch of the plant. The raccoon carries the seeds to another location where they are scratched or rubbed off, away from their former site, to grow in an area with less competition from the parent plant.

Cohort Combo Information Sheets

Teachers: Reproduce these sheets and cut them into information slips for each Cohort Combo pair.

Bee and Spiderwort Mutualism

Bees are attracted to this wildflower's showy petals. When a bee's head enters the flower to draw up the nectar with a proboscis, sticky pollen on the flower's hanging stamens is caught by the bee's hairy body. When the bee goes to the next flower, some of the pollen is left behind on the flower's pistil, where it will fertilize the ovules. Plants have no use for nectar other than as an attractant for pollinators. The flower provides food for the bee, and the bee carries the pollen between blossoms to fertilize the flowers.

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Goldenrod and Gall fly Commensalism/Parasitism

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Insect Evidence Survey

Objective

Look for and identify evidence of insects.

Directions

This activity can be done in pairs.

- Give each student an "Insect Evidence Survey" worksheet and a hand lens. Explain that they will be conducting a survey of insect damage on plants.
- Lead students into a natural or landscaped area of the school campus.
- Tell them to look for evidence of insects on the plants and record it on their "Insect Evidence Survey" worksheet.
  - In the "Evidence" column, have students draw the damage that they see.
  - In the "Location" column, students will write where on the plant they saw the insect damage.
  - If students see an insect causing the damage, have them note that and indicate if it is an insect other than the example given.
- Select a tree or shrub and lay the cloth under it. Shake the plant gently, but vigorously. Then invite students to examine the cloth to see what kinds of insects fell from the plant. Be sure to select a plant that is not fruiting so that the fruit is not lost.

Discussion

- Ask students to hypothesize what the different types of damage may mean. Have them provide support for their hypothesis.
- Ask students how a plant might protect itself from insects.
- Have students make a list of possible plant defenses.

Materials

- "Insect Evidence Survey" worksheet (one per student)
- large white cloth or sheet
- hand lens (one per student)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.6

Grade 4: SC.4.E.6.5, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.6

Insect Evidence Survey

Evidence	Plant	Location on Plant	Examples of insects
Tunnels			Beetle 
Wrapped leaf			Bee 
Chewed leaf			Butterfly 
Galls			Fly 
Foam			Grasshopper 

Glossary

Benefit: 1) A service provided.
2) something that promotes or enhances well-being; an advantage.

Cohort: 1) A group or pair that has something in common.
2) Plants, insects, and animals that have symbiotic relationships.

Commensalism: A relationship between two organisms (plants and/or animals) in which one benefits, while the other obtains neither benefit nor harm.

Host: In a symbiotic relationship, an organism that supplies nutrients, support, or additional resources to another organism.

Hypothesis: Something not proved but assumed to be true for purposes of argument or further study or investigation.

Interaction: A particular way in which organisms affect one another.

Mutualism: An association between two different organisms in which both organisms benefit.

Parasitism: An association between two different organisms in which one benefits while the other is harmed.

Relationship: The way in which two (or more) organisms are connected.

Symbiosis: Two different organisms (plant and/or animal) living together in close association, typically benefitting both organisms.

Tip

Develop a *Jeopardy*-style game for students with the vocabulary. *Jeopardy*-style PowerPoints are available at http://teach.fcps.net/trt10/PowerPoint.htm or you may use a smart board from http://exchange.smarttech.com/search.html?q=%22jeopardy%22l. Adapt one of these formats for your vocabulary words.

Wildflower and Animal Interactions — Definition Match

Directions: Match the vocabulary words in the Word Bank to their definitions.

Word Bank

benefit	commensalism	hypothesis	mutualism	relationship
cohor	host	interaction	parasitism	symbiosis

_____ A relationship between two organisms (plants and/or animals) in which one benefits, while the other obtains neither benefit nor harm.

_____ An association between two different organisms in which one benefits while the other is harmed.

_____ The way in which two (or more) organisms are connected.

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_____ A particular way in which organisms affect one another.

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commensalism A relationship between two organisms (plants and/or animals) in which one benefits, while the other obtains neither benefit nor harm.

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relationship The way in which two (or more) organisms are connected.

host In a symbiotic relationship, an organism that supplies nutrients, support, or additional resources to another organism.

benefit A service provided or something that promotes or enhances well-being; an advantage.

interaction A particular way in which organisms affect one another.

symbiosis Two different organisms (plant and/or animal) living together in close association, typically benefitting both organisms.

mutualism An association between two different organisms in which both organisms benefit.

hypothesis Something not proved but assumed to be true for purposes of argument or further study or investigation.

cohort A group or pair of plants, insects, or animals that have symbiotic relationships or something in common.

Resources

Literary Connections

- *From Flower to Flower: Animals and Pollination by Patricia Lauber*
- *Insects and Flowers* by Oda Hidetomo
- *The Milkweed and Its World of Animals* by Ada & Frank Graham
- *The Nature And Science Of Flowers (Exploring the Science of Nature)* by Kim Taylor and Jane Burton
- *Seeds, Bees, Butterflies, and More! Poems for Two Voices* by Carole Gerber

Websites and other web resources

- "Plant defense against herbivory." (https://en.wikipedia.org/wiki/Plant_defense_against_herbivory)

The Importance of Wildflowers

Introduction

What would our world look like if there were no wildflowers? It is hard to imagine, isn't it? Everywhere we look, from the country roadsides to cracks in city sidewalks to pine forest meadows, Florida has an abundance of wildflowers. After all, it was named "La Florida," which means "Land of Flowers," by Spanish explorer Ponce de Leon when he arrived in 1513.

It is awesome that there is such a variety of wildflowers that dazzle us with their beauty all across our state. But wildflowers aren't just for looking at. Besides providing beauty, they also sustain populations of wildlife and provide homes for critters you may not have thought about. Humans, too, rely on wildflowers for many different purposes.

In this section, we will be looking at some of the less obvious *benefits* of wildflowers, including their *ethnobotanical* uses and their roles in the *environment*

Following are descriptions and examples of how wildflowers are used by humans. Print the description pages and distribute them to students. Have students read the descriptions and discuss them with the class before beginning this section's activities. You may want to allow students to keep the description pages as a reference as they work through this section. Note: Vocabulary words are italicized within the description text.

Vocabulary

benefit
consume
Creek
diversity
edible
environment
erosion
ethnobotany
forage
habitat
indigenous
native plant
pollutant
Seminole
textile
Timucua

Standards covered in this section

Grade 3: LAFS.3.SL.2.4, LAFS.3.W.2.4, LAFS.3.W.2.6, LAFS.3.W.3.7, LAFS.3.W.3.8, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.3.N.1.1,SC.3.N.1.2, SC.3.N.1.3

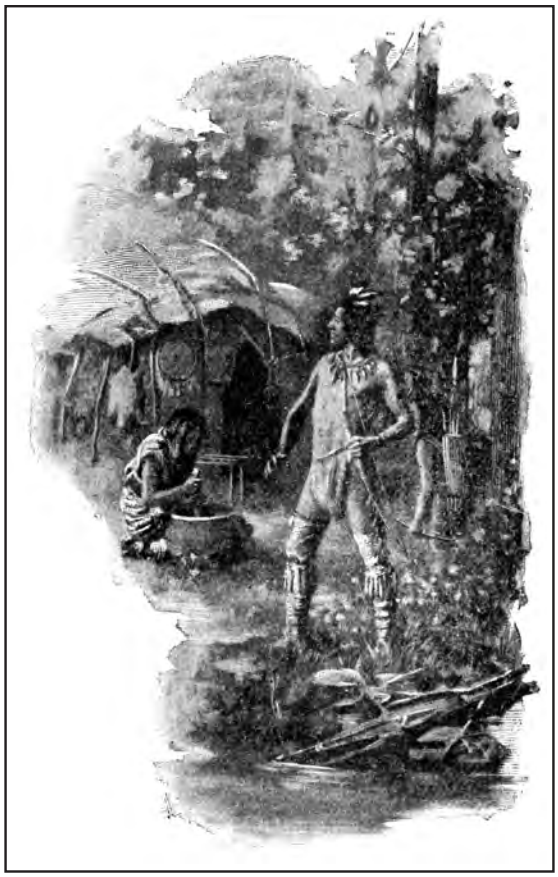
Grade 4: LAFS.4.SL.2.4, LAFS.4.W.2.4, LAFS.4.W.2.6, LAFS.4.W.3.7, LAFS.4.W.3.8, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.4.E.6.3, SC.4.L.17.4, SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6

Note

Many edible plants closely resemble poisonous plants. **Students should be warned never to eat any wild plants without an expert's/adult's authorization.**

The Importance of Wildflowers

Ethnobotany is the scientific study of the relationship between people and plants, specifically those used by primitive societies for food, medicine and products such as *textiles*, tools and construction materials for shelter.



***Edible* wildflowers:** For centuries, people have been eating native wildflowers and plants. Throughout history, many people have *foraged* for wildflowers, roots, berries, leaves and other plant parts for a large portion of their food. Many of the plants and wildflowers that Ponce de Leon encountered in 1513 provided an important source of food for the *indigenous* people who lived here. Among the edibles were cocoplum fruit, saw palmetto berries, cabbage palm hearts and coontie roots.

The *Timucua consumed* a wide variety of *native plant* foods. They collected fruits such as persimmon, blackberry, blueberry and pricklypear; vegetables such as wild onions and cabbage palm hearts; acorns and hickory nuts; and grains, including wild rice and pigweed. They even made gum from the sap of the sweetgum tree.

Other Native Americans in Florida consumed native plants and wildflowers. The diet of the *Creeks* in North Florida included nuts from hickory and black walnuts, as well as crabapples and groundnuts. *Seminoles* ate red mulberries, wild plums and grapes.

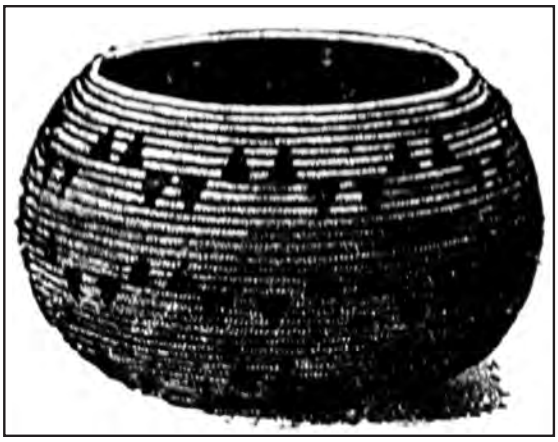
Today, although we in the United States buy most of our food from grocery stores and markets, some people still forage for food in the wild.

Wildflowers used as medicine: In the past, almost from the beginning of recorded history, certain plants have been used as medicine. Before there were doctors and pharmacies, people knew the healing powers of wildflowers and other plants for many injuries and illnesses.

Members of the Creek tribe treated fever with partridgeberry, tonsillitis with grapevine, and tuberculosis with mistletoe. The Timucua treated coughs with the inner bark of the black cherry tree. They made teas out of passionflower leaves for relaxation, and from elderberries to treat what we now know as the common cold. Seminoles used beautyberry to treat skin conditions, buttonbush for stomach and digestive ailments, and milkwort to help with breathing issues.

A brief scan of the Internet or a trip to a health food store will reveal many plant-based medicines still available today.

The Importance of Wildflowers



Other uses for wildflowers: Native Americans in Florida used the native vegetation for many everyday items, including construction materials, tools and textiles. Many leaves, grasses, stems and vines were woven into a variety of products: palm fronds into thatching; grasses such as wiregrass, bluestem and sugarcane, and vines such as grape into baskets; cattail leaves into mats; and other fibrous plants such as Indianhemp into fabric.

Dyes made from plants such as bloodroot, pokeberry and sumac provided color for textiles, crafts, pottery, and even hair and skin. Different parts of plants were used to make dye: beach sunflower, *Coreopsis* and St. John's wort flowers; elderberry, red mulberry and rouge plant berries; red maple, oak and wax myrtle leaves, just to name a few.

Did you know that native wildflowers and plants are still used in many commercial products today? From scented shampoos to fibers in clothing, plant materials are big components in everyday items. Look around your house at tags and labels, and see what types of materials you use that are made from wildflowers. You may be surprised! Next time you go grocery shopping, look for products that use natural components like flowers and plants. Or go "shopping" around your home and see what kind of products you already have that were made from wildflowers.

Other ways in which wildflowers are important: Wildflowers are critically important for humans and their environment in many ways.

- **Air quality:** Wildflowers, like all plants, produce oxygen and absorb carbon dioxide.
- **Ecosystem stability:** *Diversity* of plants is important to the health of an ecosystem. Wildflowers play an important role in maintaining diversity.
- ***Erosion* control:** Soils are held in place by the root systems of wildflowers and other plants. Without them, wind and water would carry the soil away.
- **Water quality:** Wildflowers in wetlands help filter *pollutants* from water and hold soil in place, which helps regulate water flow.
- **Wildlife *habitat*:** Plants, including wildflowers, provide food and shelter for wildlife.

Pass the Wildflowers, Please!

Objective

Students will demonstrate an understanding of edible parts and uses of wildflowers using creative writing skills to create a restaurant "menu."

Directions

Students should work in pairs.

- Tell students they will be designing a meal featuring wildflowers.
- Give each pair a "Pass the Wildflowers, Please!" worksheet set.
- Review the informational list that identifies the edible parts of a wildflower (leaves and stems, roots and tubers, fruit and nuts, and flowers).
- Have student pairs create a menu using items from the list. Instruct them to include a minimum of one item from each "part" of a wildflower.
- Once they've selected their menu items, have students be creative and add descriptive words to make each menu item sound very appealing. Encourage them to approach it as if they manage a very exclusive restaurant that serves meals featuring wildflowers.
- Have them write out their menu and descriptions on the worksheet.
- If time permits, allow students to decorate their menus with illustrations of the flowers used in their creations.
- Have students present their menus to the class. Students should explain what they have selected and why.

Extension

- Direct student pairs to use the Internet or the libary to research other edible Florida native wildflowers to add to their menus.
- Have them present information on the additional species to the class, including what parts are edible.

Materials

- "Pass the Wildflowers, Please!" worksheets (one set per pair)

Standards

Grade 3: SC.3.N.1.1, LAFS.3.W.2.6 (Extension), LAFS.3.W.3.7 (Extension)

Grade 4: SC.4.N.1.1, LAFS.4.W.2.6 (Extension), LAFS.4.W.3.7 (Extension)

Note

The wildflowers included in this activity are only a few of the Florida wildflowers that are used for food now or have been used in the past.

If possible, you may wish to provide students with field guides or other books that explore Florida's edible wildflowers. Suggestions may be found in the Resource Guide at the end of this section.

Pass the Wildflowers, Please!

Work with a partner to design a meal featuring wildflowers. Include at least one item from each "part" of a wildflower. Choose from the list below or find others from books or the Internet.

Never eat any wild plants without an expert's/adult's authorization.

Many edible plants closely resemble poisonous plants.

Leaves and Stems

- Wild onion (seasoning in cooked vegetables or salads)
- Smilax (cooked greens)
- Pine needles (tea)
- Fern fiddleheads (sautéed)
- Cattails (young shoots eaten raw or in salads)
- Creeping water mint (tea, raw in salads or as garnish)

Roots, Bulbs and Tubers

- Cattails (boiled as a vegetable)
- Jack-in-the-pulpit (ground into flour)
- Arrowhead (boiled as a starch or vegetable)
- Sassafras (tea, candy flavoring)
- Wild onion (seasoning in cooked vegetables)

Fruit and Nuts

- Red mulberry (eaten fresh, made into jelly, pie, or sauce)
- Blackberry (eaten fresh, made into jelly or pie)
- Pawpaws (eaten fresh, made into jelly or pie)
- Blueberry (eaten fresh, made into jelly or pie)
- Muscadine or Scuppernong grapes (eaten fresh or made into jelly)
- Elderberry (eaten fresh, made into jelly or syrup)

Flowers

- Yucca (boiled, battered and fried)
- Elderberry (battered and fried, cooked into pancake or biscuit batter)
- Spanish needle (salads, as a garnish)
- Violets (tea, salad)
- Spiderwort (candied, as a garnish)
- Cattails (pollen used as flour for bread, cakes or pancakes; flower stalks boiled and eaten like corn-on-the-cob)

Please note that the entries above are only a few of the Florida wildflowers that can be gathered and used for food. You are encouraged to find others to add to your menu. You might do an Internet or library search for Florida edible plants, edible wildflowers of Florida, Florida edible wildflowers, and similar topics. If you do not add "Florida" to your search, you may find plants that do not live in Florida!

Now that you have selected your menu items, it is time to be creative! Pretend that you manage a very exclusive restaurant that serves meals featuring wildflowers. Add descriptive words to make each menu item sound very appealing, such as, "freshly picked," "crisp and juicy," or "dew-misted petals." Each team will add a unique page to the menu. Use the template on the following page as your sample menu page.

Wildflower Menu Selection

by

_____

(Team member names)

Appetizer

Entreé

Sides

Dessert

Beverage

Dr. Wildflower's Natural Remedies

Objective

Students will understand traditional medicinal uses of wildflowers using historical context and clues within the worksheet.

Discussion

- Explain to students that, had they lived in the United States in the 1600s, 1700s, or 1800s, they would probably be very familiar with many wildflowers that were used to treat injuries and illnesses.
- For this activity, students will imagine that they are an early settler in the New World. There is no doctor, pharmacy or hospital available for their settlement. Tell them that, upon arriving in the New World, they learned from a Timucuan medicine man that many of the native plants have healing properties that can help sick or injured people.

Directions

- Provide each student with a set of "Dr. Wildflower's Natural Remedies" worksheets.
- Discuss the information on page 1 of the worksheet that they will be using for the activity and answer any questions they might have about the plants or illnesses.
- Have them read the scenarios on page 2 of the worksheet, and instruct them to use the table on page 1 to help them find "cures" for the scenarios.
- After the worksheets have been completed (and scored, if desired), discuss the answers and then let students create new injuries or illnesses to treat. This could be presented as a group activity in which one student creates a scenario and the rest of the students race to look for a cure.

Materials

- "Dr. Wildflower's Natural Remedies" worksheets (one set per student)

Standards

Grade 4: SC.4.E.6.3, SC.4.N.1.4

Dr. Wildflower's Natural Remedies

If you had lived in the United States in the 1600s, 1700s or 1800s, you would probably be very familiar with many wildflowers that were used to treat injuries and illnesses. For this activity, you will imagine that you are an early settler in the New World. There is no doctor, pharmacy, or hospital available for your settlement.

Upon arriving in the New World, you learn from a Timucuan medicine man that many of the native plants have healing properties that can help sick or injured people.

Here is a list of native wildflowers. (Remember that vines, small bushes, and other plants that have flowers can all be considered wildflowers).

Wildflower	**Disease, illness or injury**
Pink sundew	Skin disorders and warts
Black-eyed Susan	Colds, worms, snakebite, swelling, earache
Colicroot	Stomach ache, colic, dysentery
Butterflyweed	Pleurisy (lung condition), bruises, sore muscles
Witch Hazel	Bruises and sprains, coughs, asthma, insect bites, teething infants, and backaches
Wax myrtle	Fever, stomach pain, intestinal worms, inflamed tonsils, and sore gums
Partridge pea	Fainting, fatigue, nausea
Skullcap	Headache
Boneset	Flu, fever, and malaria
Maypop (Passionflower)	Bruises and sores, insomnia, muscle spasm, and anti-anxiety
Wild persimmon	Sore throat, mouth or lip sores, heartburn, and toothache
Button snakeroot (Rattlesnakemaster)	Blood disorders, fever, snakebite
Pricklypear cactus	Headache, eye trouble, insomnia
Greenbrier (Smilax vine)	Health tonic, poultice for sore legs and skin ulcers
American beautyberry	Colic, dizziness
Devil's walkingstick	Rattlesnake bite

Dr. Wildflower's Natural Remedies

After you read through some of the many uses for Florida wildflowers as medicine to treat illnesses, continue on to the text below to "treat" patients that have come to you for help!

Read each scenario below and "prescribe" medicine made from wildflowers that you think will help.

1. A young mother brings her baby to you; the baby has been crying for hours. You diagnose the baby with colic (stomach pains). What two wildflowers could you prescribe for the mother to give to her baby?

   _____ and _____

2. A young boy comes to you to ask you to get rid of a large wart growing on his finger. You decide to apply a remedy used by Native Americans, a wildflower named

   _____.

3. Flu and high fevers seem to be spreading throughout your settlement. You need to stock up on medicinal plants to help treat your patients. The two wildflowers you need to gather are

   _____ and _____

4. You have just prescribed a poultice (dressing) of devil's walkingstick for a man that was brought to you. What was most likely wrong with him?

   _____.

5. Many people come in complaining of headaches. You keep a good supply of

   _____ and _____

6. Describe below an illness or injury that you could treat, and list the Florida wildflower that you would use to treat it.

   _____.

   _____.

   _____.

Dr. Wildflower's Natural Remedies

After you read through some of the many uses for Florida wildflowers as medicine to treat illnesses, continue on to the text below to "treat" patients that have come to you for help!

Read each scenario below and "prescribe" medicine made from wildflowers that you think will help.

1. A young mother brings her baby to you; the baby has been crying for hours. You diagnose the baby with colic (stomach pains). What two wildflowers could you prescribe for the mother to give to her baby?

   colicroot and American beautyberry

2. A young boy comes to you to ask you to get rid of a large wart growing on his finger. You decide to apply a remedy used by Native Americans, a wildflower named

   pink sundew.

3. Flu and high fevers seem to be spreading throughout your settlement. You need to stock up on medicinal plants to help treat your patients. The two wildflowers you need to gather are

   wax myrtle and boneset

4. You have just prescribed a poultice (dressing) of devil's walkingstick for a man that was brought to you. What was most likely wrong with him?

   He was bitten by a snake.

5. Many people come in complaining of headaches. You keep a good supply of

   skullcap and pricklypear cactus

6. Describe below an illness or injury that you could treat, and list the Florida wildflower that you would use to treat it.

   Answers will vary.

Why Wildflowers are Important to Me

Objective

Through group and class discussions, students will demonstrate an understanding of the general benefits of wildflowers. Students will then use exploratory creative writing to reflect personal opinions on the importance of wildflowers.

Materials

- "Why Wildflowers are Important to Me" worksheet (one per student)

Standards

Grade 3: LAFS.3.W.1.3, LAFS.3.W.2.4, LAFS.K12.L.1.1, LAFS.K12.L.1.2

Grade 4: LAFS.4.W.2.4, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.4.L.17.4

Directions

Students should work in groups.

- Ask students to list all of the benefits of wildflowers. (Define benefit if necessary.) Since the class has just studied wildflowers used as medicine and as food, these two will almost certainly be on the list. Encourage the students to dig deeper into their thoughts to find other good things about wildflowers.
- Add the following to the class list if not suggested by a student:
  - Wildflowers help reduce stress.
  - Wildflowers help clean the air.
  - Wildflowers help lower background noise.
  - Wildflowers help stabilize the ecosystem.
  - Wildflowers contribute to a healthy lifestyle.
  - Wildflowers inspire our creativity.
- Discuss each of the benefits and chart student responses to the following questions:
  - How do you think wildflowers can help reduce stress?

    Let the students add their ideas to the discussion. If necessary, lead their responses with suggestions such as:

    - Being close to nature makes people feel more relaxed and at ease.
    - Most people have an instinctive need to be in natural settings.
    - Fields or small patches of wildflowers make us happy because of their beauty."

    Add any other reasons that come from you or the students.

(Continued on following page.)

- How do wildflowers help clear the air?

  Solicit ideas from the students. Be sure to include:

  - Wildflowers absorb some toxins into their roots and convert them into food.
  - They remove carbon dioxide from the air and convert it into oxygen.
  - They increase humidity.
  - Wildflowers reduce airborne dust levels.
  - They keep air temperatures down.

- How do wildflowers help lower background noise?

  Begin a class discussion with students expressing their ideas. Your summary should include that leaves and flowers can absorb or reflect background noise so that nearby road or city noises are softened.

- How do wildflowers help stabilize the ecosystem?

  Again, lead a class discussion that allows students to express their ideas. Be sure that your conclusion includes that the wildflower community is an important part of the natural food web, and other plants and animals might perish without the wildflowers.

- How do wildflowers help contribute to a healthy lifestyle?

  Lead a discussion and try to encourage students to include walking to enjoy the beauty of wildflowers, or tending a wildflower garden, and refer back to some of the other things listed above like cleaner air, reduction of stress (and thereby fewer stress-related diseases), and food/medicinal uses.

- How do wildflowers inspire creativity?

  Allow students to express their ideas on what creativity is and how it might be influenced by wildflowers. Be sure that the following ideas come out:

  - Artists often choose to paint wildflowers.
  - Songwriters write about flowers.
  - Poets feature wildflowers in many lyrical or poetic descriptions.
  - Children often pick bouquets of wildflowers for their mothers.
  - Many people have picked wildflowers to bring into their house to beautify an area.

- Provide each student with a “Why Wildflowers are Important to Me” worksheet set. Have them be creative and express how or why wildflowers are important to them. They may write a song, poem, narrative or other descriptive expression. Have them come up with a creative title for their paper. They may also draw a picture to illustrate their writing.
- Leave the list and responses up to help students remember all of the benefits that we get from wildflowers.

Why Wildflowers are Important to Me

Use your creativity to write a song, poem or description or draw a picture of how wildflowers are important to you. You can use our class discussion notes to help you remember all of the benefits we get from wildflowers. Include a title on your paper that is appropriate for your topic.

Title _____

Get to Know a Wildflower

Objective

In this enrichment activity, students will use the Internet or library to research a particular wildflower and its cultural uses.

Discussion

- Tell students they will be selecting a Florida native wildflower to research.

Directions

- Direct students to use the Internet or other reference and resource materials to research a Florida native wildflower that has historic and cultural uses. Have them take notes on the plant's natural habitat and features. Tell them to also look for information on how the wildflower may be used today. Have them keep track of the sources they use.
- Have students write a detailed and organized report on the wildflower.
- Have them design a presentation in which they introduce their wildflower to the class. Presentations can be done on the computer or as poster sessions.

Standards

Grade 3: LAFS.3.SL.2.4, LAFS.3.W.2.4, LAFS.3.W.2.6, LAFS.3.W.3.7, LAFS.3.W.3.8, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.3.N.1.1

Grade 4: LAFS.4.SL.2.4, LAFS.4.W.2.4, LAFS.4.W.2.6, LAFS.4.W.3.7, LAFS.4.W.3.8, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.4.N.1.1

Wildflower Walkabout

Objective

In this enrichment activity, students will work in teams to find wildflowers growing on campus. Some wildflowers are very tiny, so the students will have to look carefully.

Discussion

- Tell students that they are going to do a Wildflower Walkabout to try to identify the wildflowers that are growing right here on the school grounds.
- Ask if anyone remembers seeing flowers growing anywhere? Invite them to discuss where they've seen wildflowers
- Tell them they will use their best scientific observation skills to find lots of wildflowers that they haven't seen before.

Directions

Students should work in pairs or teams.

- Give each student a set of "Wildflower Walkabout" worksheets.
- Lead the students to pre-selected areas on the campus. Let them spread out to search for wildflowers, but remind them that they must stay in your sight at all times.
- Instruct them to try and find one that they've not seen before, and to record the information about that wildflower on their worksheet. This can include drawing or making notes about what they see. If students have and are permitted to use cameras, they may prefer to take photos of the wildflowers.
- Remind them that some wildflowers are very tiny, so they will need to look carefully.
- If feasible, rotate the groups around the area so they each have access to the different species that are present.

(Continued on following page.)

Materials

- "Wildflower Walkabout" worksheets (one per student)
- Measuring tape (one per pair or team)

Standards

Grade 3: SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3

Grade 4: SC.4.N.1.1, SC.4.N.1.2, SC.4.N.1.4, SC.4.N.1.5, SC.4.N.1.6

Note

You should walk the campus before the activity to find areas where you can locate wildflowers (fence line, near buildings, in a field or playground, near the parking lot, along ditches beside the school grounds, behind the cafeteria, etc.).

Areas on your school grounds that are not tended or landscaped would be the best places to take the students.

- After the students have had sufficient time to explore the area, take them back to the classroom.
- Lead a class discussion and chart the results for the students. You can ask such questions as:
  - What colors were the wildflowers you found?
  - What sizes were the wildflowers you found?
  - In which microhabitats did you find the most wildflowers?
  - What kinds of wildflowers were found most often?
  - Remind them that wildflowers often go unnoticed because of their size and location and ask how that could be important for their survival.

Wildflower Walkabout

Your task today is to find as many kinds of wildflowers growing on our school grounds as possible. As you find a wildflower you haven't seen before, describe its color and shape, its location on campus, and the microhabitat in which it is growing.

Tips for observing wildflowers

Microhabitat Climate Descriptions

Sunny all day
Sunny part of the day
Shady all day
Sometimes underwater
Other:

Location

Near a fence
Near a building
On a field or playground
In a mowed, grassy area
In an unmowed area
Near a parking lot
Near or in a ditch
Other:

Size and Shape of the Wildflower Plant

Small, close to ground
Small, spreading across the ground
Medium-sized, 4 to 12 inches tall
Large, over 12 inches tall
Other:

Wildflower Walkabout — Observation Sheet

For each type of flower located, describe the flower's color, shape, location, and microhabitat.

Flower #	Flower Description				
	Flower name (Take a guess)	**Color**	**Size/Shape**	**Location**	**Microhabitat**
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Glossary

Benefit: 1) A service provided.
2) something that promotes or enhances well-being; an advantage.

Consume: To eat, drink or ingest food or drink.

Creek: Native American people who lived in the Southeastern United States in the 1700s and 1800s. The Creek were a confederation of as many as 100 separate tribes.

Diversity: A range or variety of plant and animal species.

Edible: Something that can be eaten, especially by humans.

Environment: 1. The surroundings or conditions in which a person, animal, or plant lives.
2. The natural world.

Erosion: The process of wearing away by wind, water, or other natural agent.

Ethnobotany: The scientific study of the relationship between people and plants.

Forage: To search for food.

Habitat: The natural home or environment in which an organism (plant or animal) lives.

Indigenous: Originating or occurring naturally in a particular place.

Native plant: Any plant that is indigenous to an area. In Florida, a native plant is any plant that naturally occurred there at the time of Columbus' arrival in the New World.

Pollutant: Something that contaminates, dirties or harms air, water or a natural environment.

Textile: A type of cloth or woven fabric.

Seminole: Native American people (namely Creek and Miccosukee) who migrated into the Florida peninsula and established their own identity. Many still live in Florida today.

Timucua: Native American people who lived in Northeast and North Central Florida. Their presence dates back to between 1100 and 1300 AD.

Tip

Develop a *Jeopardy*-style game for students with the vocabulary. *Jeopardy*-style PowerPoints are available at http://teach.fcps.net/trt10/PowerPoint.htm or you may use a smart board from http://exchange.smarttech.com/search.html?q=%22jeopardy%22l. Adapt one of these formats for your vocabulary words.

The Importance of Wildflowers — Crossword Puzzle

Directions: Use the clues and the words in the Word Bank to fill in the puzzle on the next page.

Word Bank

benefit	edible	forage	pollutant
consume	environment	habitat	textile
Creek	erosion	indigenous	Seminole
diversity	ethnobotany	native plant	Timucua

Across

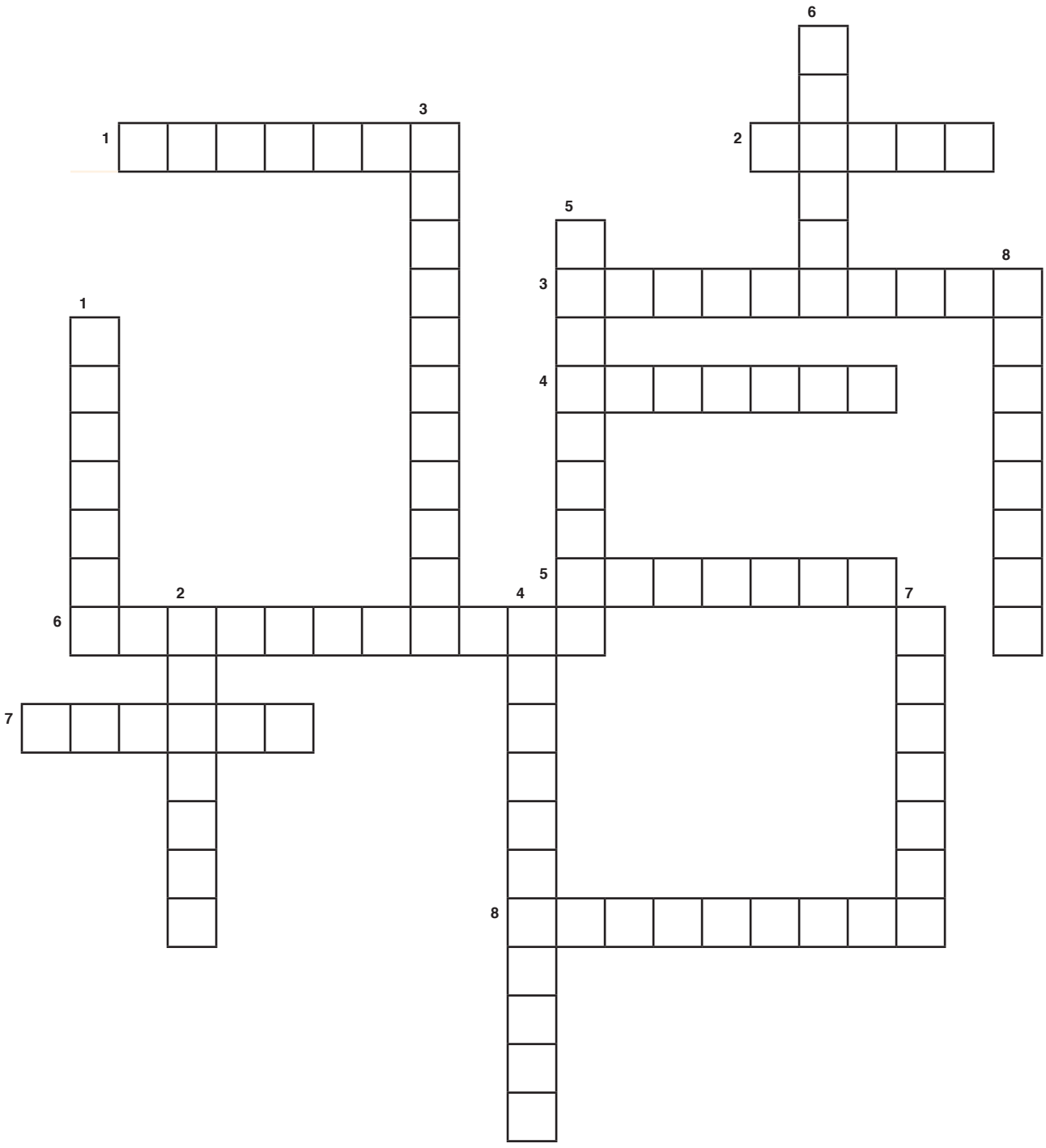
1. To eat, drink or ingest food or drink.
2. Native American people who lived in the Southeastern United States in the 1700s and 1800s. The Creek were a confederation of as many as 100 separate tribes.
3. Originating or occurring naturally in a particular place.
4. The process of wearing away by wind, water, or other natural agent.
5. Native American people who lived in Northeast and North Central Florida. Their presence dates back to between 1100 and 1300 AD.
6. The scientific study of the relationship between people and plants.
7. Something that can be eaten, especially by humans.
8. Something that contaminates, dirties or harms air, water or a natural environment.

Down

1. A type of cloth or woven fabric.
2. The natural home or environment in which an organism (plant or animal) lives.
3. The natural world, or the surroundings or conditions in which a person, animal, or plant lives.
4. Any plant that is indigenous to an area. In Florida, a native plant is any plant that naturally occurred there at the time of Columbus' arrival in the New World.
5. A range or variety of plant and animal species.
6. To search for food.
7. A service provided or something that promotes or enhances well-being; an advantage.
8. Native American people (namely Creek and Miccosukee) who migrated into the Florida peninsula and established their own identity. Many still live in Florida today.

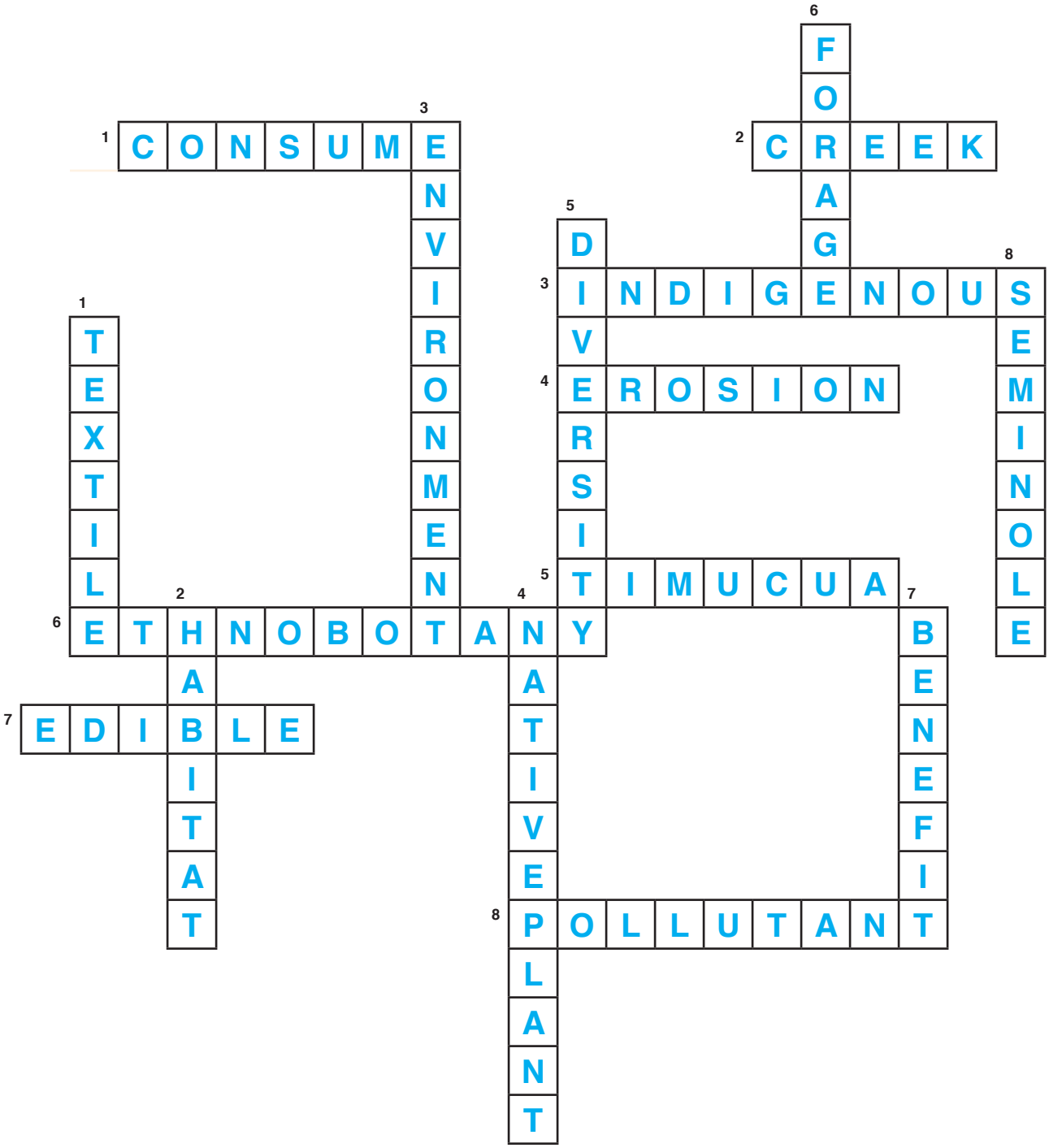
The Importance of Wildflowers — Crossword Puzzle

Directions: Use the clues and the words in the Word Bank from the previous page to fill in the puzzle.



The Importance of Wildflowers — Crossword Puzzle

Directions: Use the clues and the words in the Word Bank from the previous page to fill in the puzzle.



Resources

Literary Connections

- *The A to Z Book of Weeds and Other Useful Plants* by Michael P. Earney
- *Acorn Pancakes, Dandelion Salad, and Other Wild Dishes* by Jean Craighead George
- *Claire Goes Foraging* by Margaret Aycock
- *Jack's Garden* by Henry Cole
- *My Wild Garden: An introduction to edible and non-edible wild plants* by Ruth Johnson

Social Studies Connections

- *The Crafts of Florida's First People* by Robin C. Brown
- *The Creek (First Books--Indians of the Americas)* by Shirlee Petkin Newman
- *The Flower Hunter: William Bartram, America's First Naturalist* by Deborah Kogan Ray
- *Miss Lady Bird's Wildflowers: How a First Lady Changed America* by Kathi Appelt
- *Native American Gardening: Stories, Projects and Recipes for Families* by Micahel J. Caduto
- *Nature's Pharmacy: Potent Medicines from Plants* (Science & Society) by Renee A. Kidd & J.S. Kidd
- *Pharmacy in the Forest: How Medicines Are Found in the Natural World* by Fred Powledge
- *The Seminole* by Liz Sonneborn
- *The Timucua* by Emily J. Dolbear and Peter Benoit

Reference Books

- *The Calusa and Their Legacy: South Florida People and Their Environments* by Darcie A. Macmahon and William H. Marquardt
- *Field Guide to Edible Wild Plants of Eastern and Central North America* by Lee Allen Peterson
- *Florida's Edible Wild Plants: A Guide to Collecting and Cooking* by Peggy Sias Lantz
- *Florida's Ethnobotany* by Daniel F. Austin
- *Healing Plants: Medicine of the Florida Seminole Indians* by Alice Micco Snow and Susan Enns Stans
- *Southeast Foraging:120 Wild and Flavorful Edibles from Angelica to Wild Plums* by Chris Bennett.
- *Surviving the Wilds of Florida* by Reid Tillery

(Continued on following page.)

Websites and other web resources

- “50 Common Native Plants Important In Florida’s Ethnobotanical History” by Ginger M. Allen, Michael D. Bond, and Martin B. Main (http://edis.ifas.ufl.edu/pdffiles/UW/UW15200.pdf)
- “Biology of Plants” Missouri Botanical Garden (http://www.mbgnet.net/bioplants/main.html)
- “Celebrating Wildflowers.” National Park Service (www.nps.gov/plants/cw/variety.htm)
- “Eat the weeds — and other things, too” by Green Dean (http://www.eattheweeds.com)
- “Native American Ethnobotany,” a database of the University of Michigan–Dearborn (http://herb.umd.umich.edu)
- “Native Plant Dyes” by the United States Department of Agriculture, Forest Service (http://www.fs.fed.us/wildflowers/ethnobotany/dyes.shtml)

Florida Wildflower Foundation

Web Quest

Wildflower Profiles

Objective

Students will research and document specific native wildflowers.

Directions

- Assign students a wildflower to research. If time and resources permit, you may wish to assign multiple wildflowers or assign different wildflowers to each student. Profiles can also be assigned after each section using species relevant to that section.
- Provide each student with a "Wildflower Profile" worksheet.
- Have them research their wildflower(s) on the Internet to complete the worksheet. If computers are not available, consider reproducing pages from the websites to allow the students to find information to complete the profile sections.
- Instruct students to use complete sentences when filling in the worksheet.
- Completed profiles can be used as an additional assessment tool.

Below are some web resources that may help students complete this activity:

- Florida Wildflower Foundation, Flower Friday profiles (FlaWildflowers.org/category/flower-friday)
- Florida Native Plant Society plant profile pages (www.fnps.org/plants)
- Institute for Regional Conservation, Natives for Your Neighborhood (regionalconservation.org/beta/nfyn/PlantList.asp)
- Native Florida Wildflowers (hawthornhillwildflowers.blogspot.com)
- Florida's Native and Naturalized Orchids (www.flnativeorchids.com)

Materials

- "Wildflower Profile" worksheet (at least one per student)

Standards

Grade 3: LAFS.3.W.2.4, LAFS.3.W.2.6, LAFS.3.W.3.7, LAFS.3.W.3.8, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.3.N.1.1

Grade 4: LAFS.4.W.2.4, LAFS.4.W.2.6, LAFS.4.W.3.7, LAFS.4.W.3.8, LAFS.K12.L.1.1, LAFS.K12.L.1.2, SC.4.N.1.1

Wildflower Profile

Wildflower Scientific Name:	Common Name(s):
Size, Color, General Appearance:	Habitat (in Florida):
Wildlife Interactions:	Interesting Facts:
Wildflower Sketch:	

Additional Resources

Florida Wildflower Foundation Resources

- "**Seedlings for Schools**" **grants** are available to schoolteachers statewide from the Florida Wildflower Foundation. Each grant provides $50 worth of plants with which to establish a campus wildflower garden. (FlaWildflowers.org/grants)
- The **Florida Wildflower Foundation website** has extensive information on wildflower propagation, planting and other resources, and offers more than 150 plant profiles, as well as unique articles on wildflowers, pollinators and other related topics. (Flawildflowers.org)

Resources for purchasing native wildflowers and seeds

- To find a nursery in your area that specializes in native plants, visit the **Florida Association of Native Nurseries** website. (plantrealflorida.org)
- The **Florida Wildflowers Growers Cooperative** offers high quality, Florida native wildflower seeds. Florida Wildflower Foundation members receive a discount on seeds purchased through the cooperative. (www.floridawildflowers.com)

Other resources on native wildflowers

- The **Florida Native Plant Society** website's "Natives for Landscaping" page offers profiles hundreds of Florida native plants. (www.fnps.org/plants)
- The **Florida Native Plant Society** website's "Resources" page provides links to books and other resources on native plants. (fnps.org/resources/resources)
- *Florida plant checklist; names, accent, family and origin of approximately 1200 plants, in 15 groups* by Mary Nunez Ten Eick.
- Although not specific to Florida, the Lady Bird Johnson Wildflower Center's website provides a wealth of information on wildflowers, including many that are native to Florida. (www.wildflower.org)