

Wildflower Life Cycle

Overview

This unit 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 unit will also focus on the seed phase. Students are probably most familiar with this phase.

Understanding the life cycle helps students see wildflowers as dynamic organisms that change over time, not just static blooms in a field. Each stage of the life cycle – from seed to seedling to mature plant – prepares students to understand how wildflowers reproduce and adapt to their environments.

Activities

1. Wildflower Life Cycle
2. Let's Do Surgery on a Seed
3. Germination Lab Experiment
4. My Life Began as a Seed

Vocabulary

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

Vocabulary words are italicized within the introduction text and activities.

Standards

Grade 3: ELA.3.C.2.1, MA.3.M.1.1,
MA.3.M.1.2, MA.3.DP.1.1,
MA.3.DP.1.2, SC.3.L.14.1,
SC.3.N.1.3, SC.3.N.1.7

Grade 4: ELA.4.C.2.1, MA.4.DP.1.1,
MA.4.DP.1.3, SC.4.E.6.5,
SC.4.L.16.1, SC.4.L.16.4,
SC.4.N.3.1

Wildflower Life Cycle

Introduction

Have you ever planted a seed and watched it grow? The journey from tiny **seed** to flowering plant is called a **life cycle** — a series of changes that repeats over and over again.

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.

In this unit, you'll discover what's inside a seed, watch seeds sprout and grow, and learn how wildflowers make new seeds to continue the cycle. You'll even get to be a plant scientist and conduct your own **germination** experiment!

What's Inside a Seed?

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) are **monocotyledons** (or monocots), containing one cotyledon. **Dicotyledons** (or dicots), such as sunflowers, are plants that have two cotyledons.

Wildflower Life Cycle

Objective

Students will be able to identify and label 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.

1. Give each student a "Wildflower Life Cycle" worksheet.
2. Show the "Wildflower Life Cycle" visual 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.

Extension

Students may work individually, in pairs or in teams.

1. Lead students into the schoolyard and show them a Beggarticks (*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 climates. Try to find specimens in various phases of their life cycle.
2. 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" visual presentation ([click to download](#))

Standards

Grade 3: SC.3.L.14.1

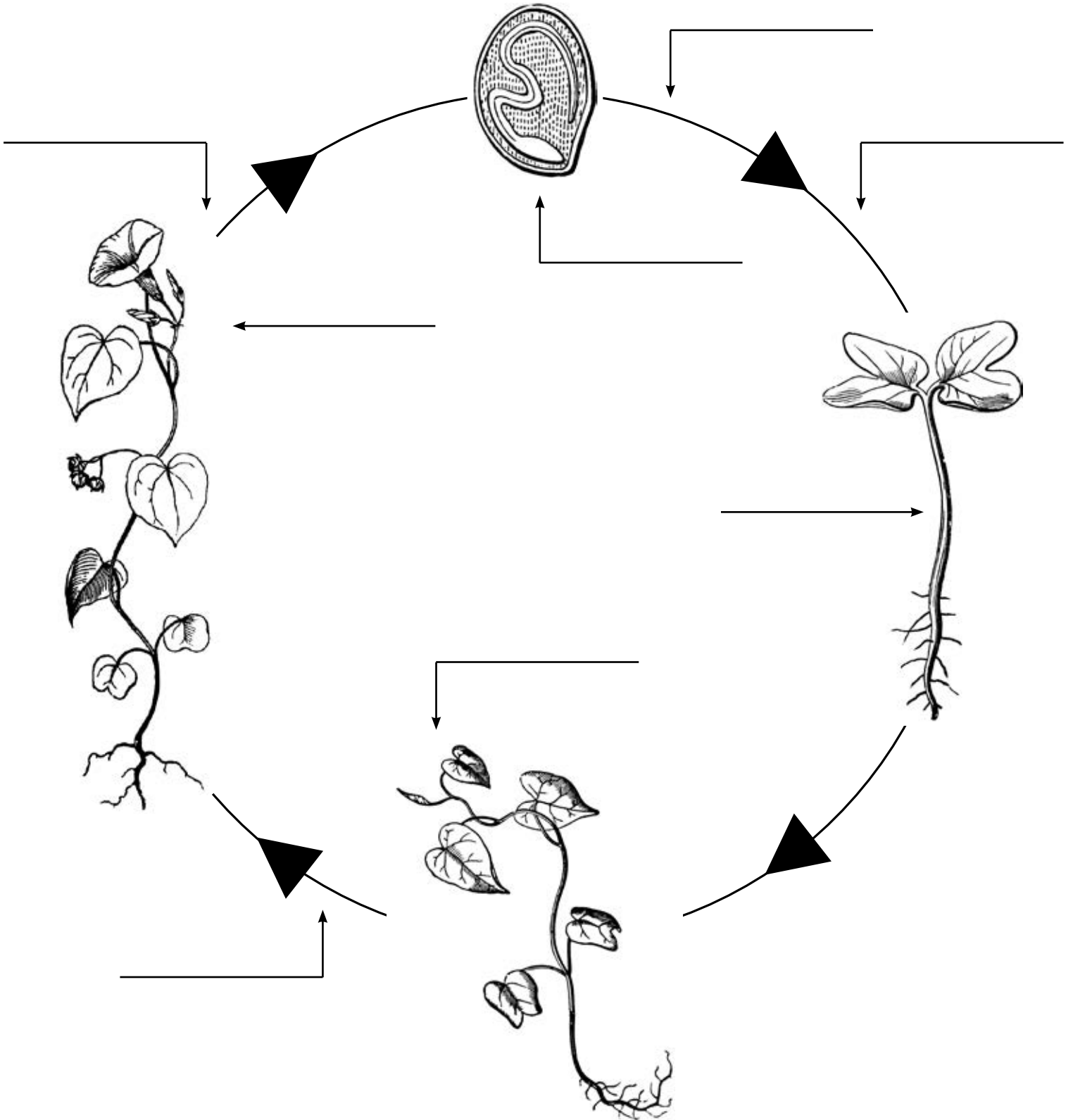
Grade 4: SC.4.L.16.1, SC.4.L.16.4

Note: To help you identify if Beggarticks (pictured below) is present in your schoolyard, visit florida.plantatlas.usf.edu/plant/species/3604. If Beggarticks is not present, consider using another "weedy" flowering plant that is common in your schoolyard.



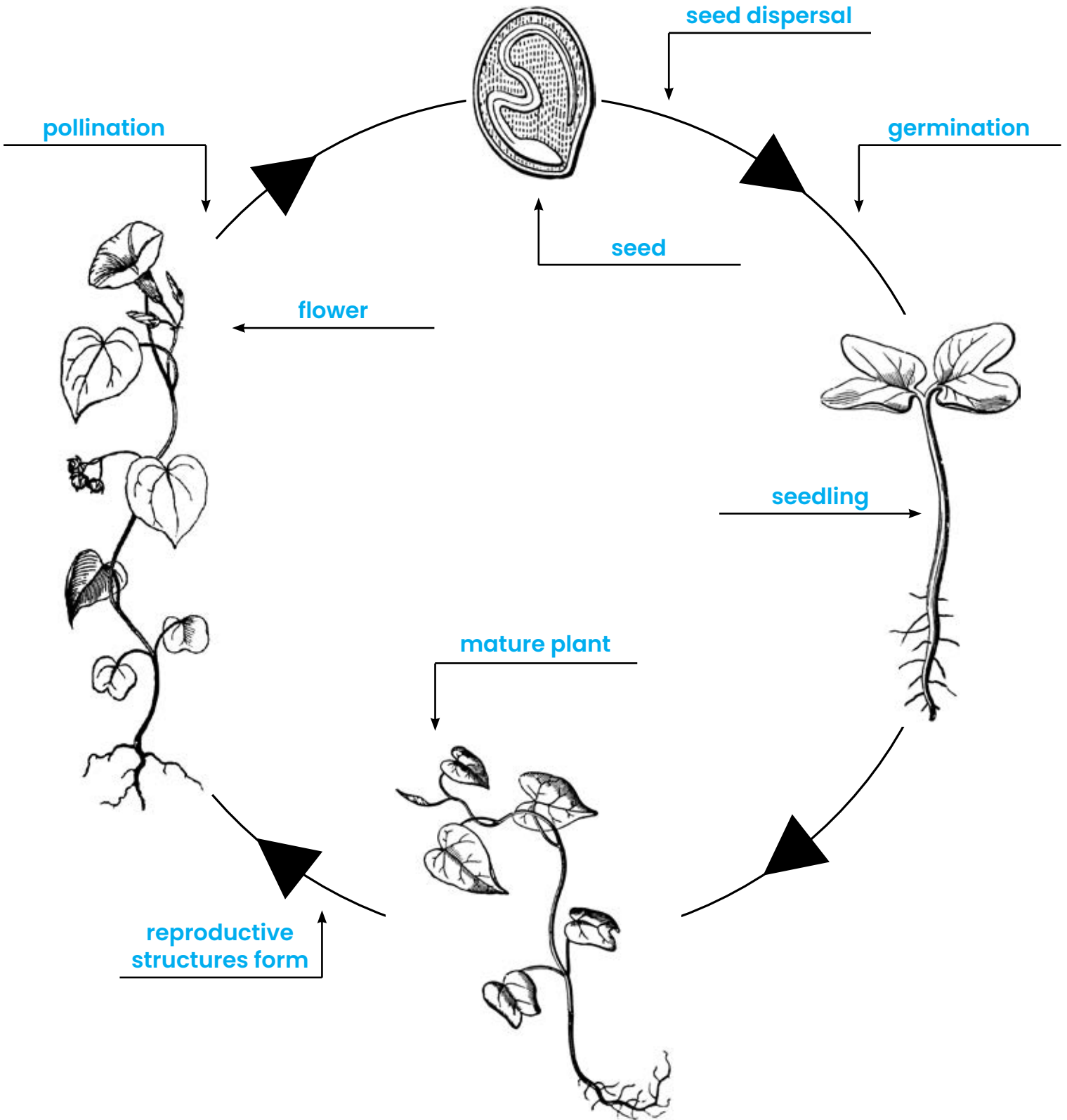
Wildflower Life Cycle

Label the stages of a wildflower's life cycle on the diagram below.



Wildflower Life Cycle

Label the stages of a wildflower's life cycle on the diagram below.



Let's Do Surgery on a Seed

Objective

Students will dissect a seed and be able 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.

1. Give each pair a soaked wildflower seed, hand lens, plastic knife, toothpicks and paper towel.
2. Show the "Seed Diagram" visual presentation and advance each slide with appropriate step below.
3. Have students place the wildflower seed on a paper towel. Explain that the outer coating is a protective layer called the **testa**, or **seed coat**. Have students carefully remove the testa using the plastic knife and toothpicks.
4. Have them draw the seed outline and label with both names. You may also provide each pair with a "Seed Diagram" worksheet to complete..
5. 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.
6. 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.
7. 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.
8. If visible in the dissected seed, have students locate, draw and label the **radicle**, **epicotyl** and **cotyledons**.

(Continued on following page.)

Materials

- "Parts of a Seed" visual presentation ([click to download](#))
- "Parts of a Seed" worksheets (optional; one per pair)
- 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.

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.

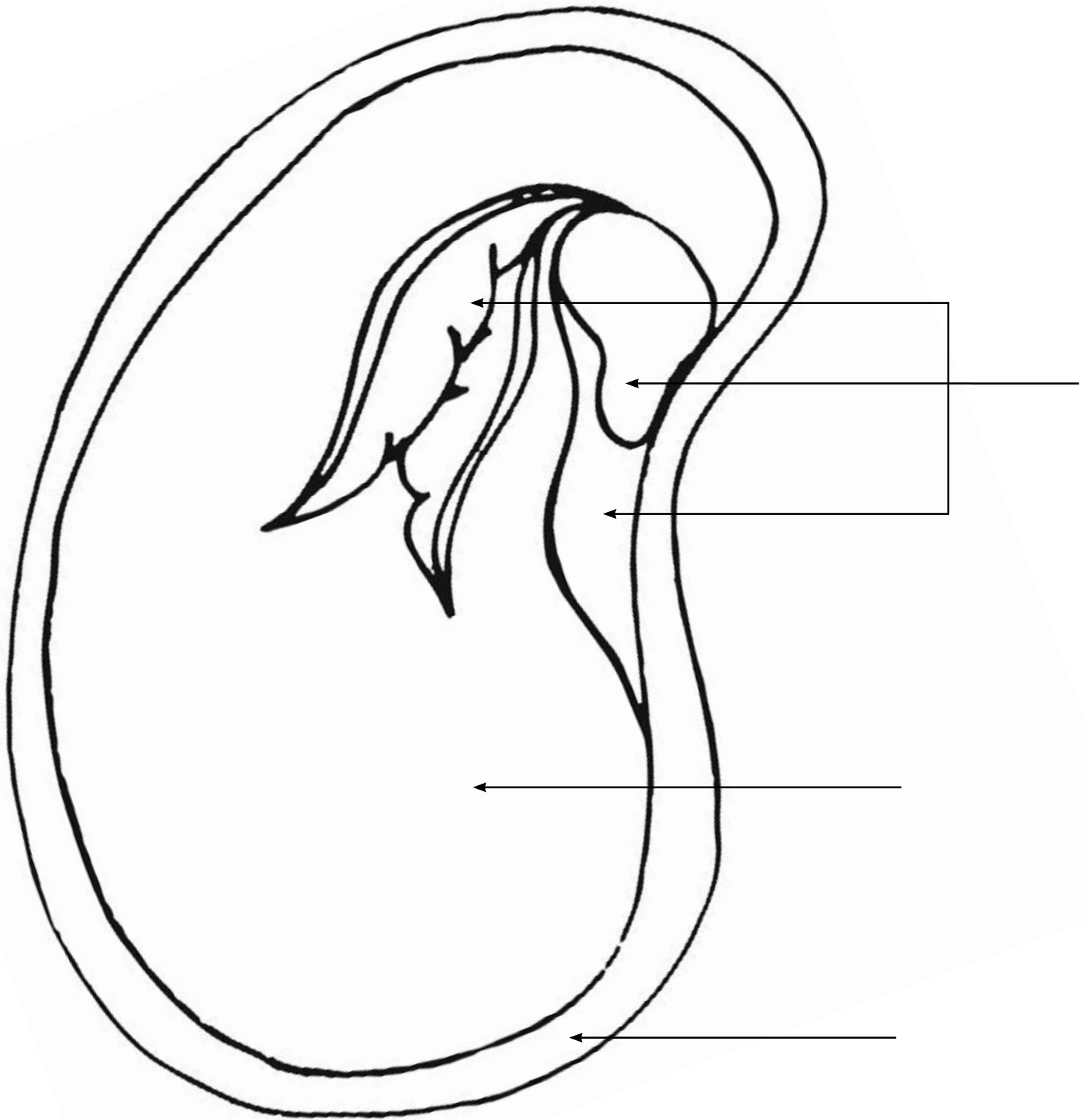
Discussion

Discuss the following questions as a group following the activity:

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

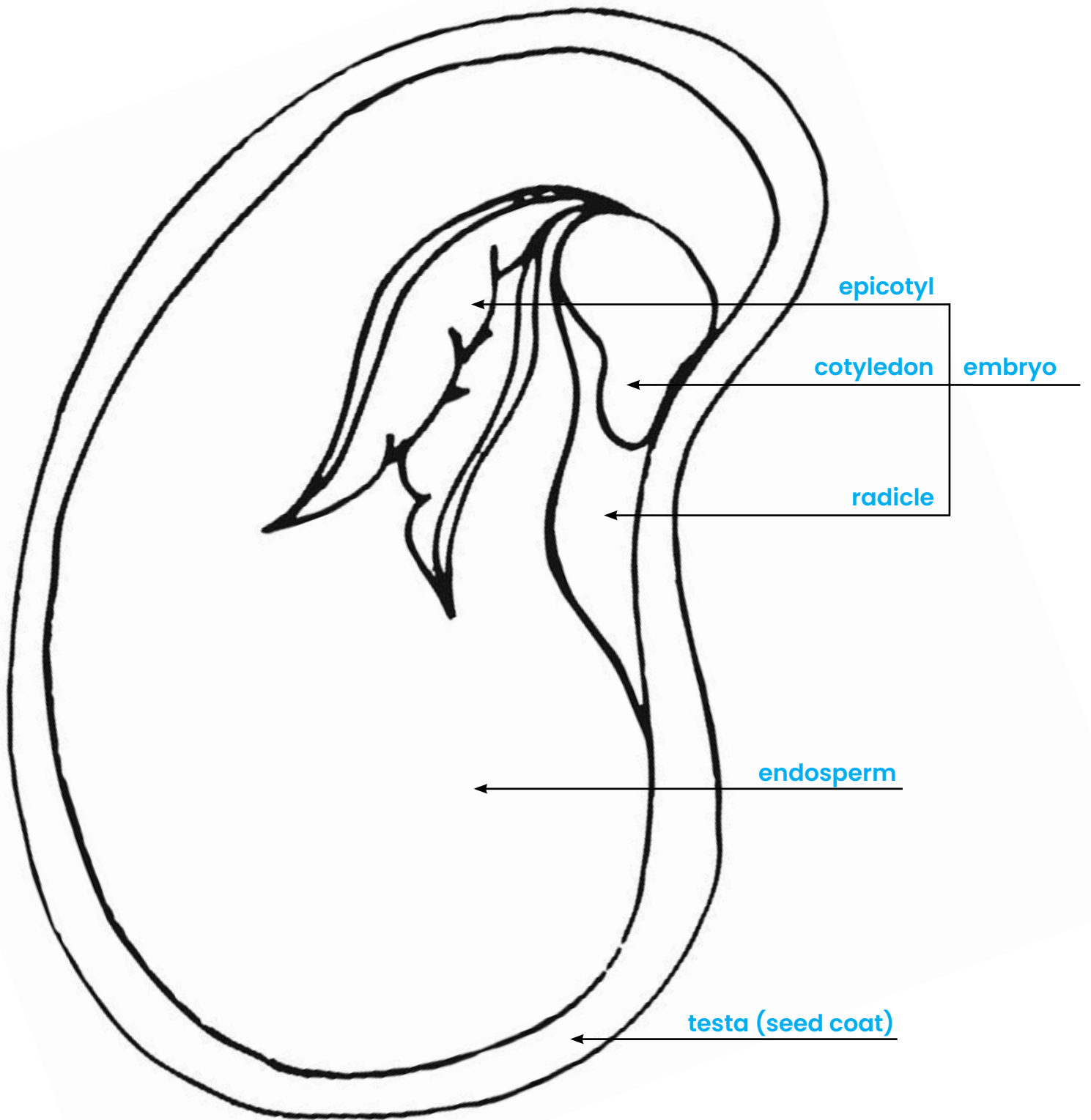
Parts of a Seed

Use the dissected seed to help you label the five parts on the diagram below.



Parts of a Seed

Use the dissected seed to help you label the five parts on the diagram below.



Germination Lab Experiment

Objective

Students will be able to observe the germination of a seed and the growth of a baby plant over a four-week period. See alternative on next page if time and space are limited.

Discussion

Germination is the growth of an **embryo** 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

1. Provide each student with a copy of the "Germination Lab Experiment" worksheet.
2. Give each student a cup filled with soil, 4 seeds and newspaper.
3. Have each student follow the directions on the worksheet to plant the seeds in their cup of soil.
4. So students can observe the germination process over time, each week, have them remove one seed/plant to examine.
5. Have students measure, draw and label the progress on the worksheet. Have them use the back of the worksheet if additional room is needed.
6. At the end of the four-week experiment, have students graph their data:
 - Grade 3: Create a line plot showing the plant's size and increase in growth each week.
 - Grade 4: Create a line plot and calculate the overall amount of growth by subtracting the recorded sizes each week from the final week's size.

(Continued on following page.)

[†] To complete this activity without the math component, skip step 6. You may also choose to modify the discussion questions. Students can simply observe, measure, draw and discuss the physical changes they see in their plants each week.

Materials

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

Standards

Grade 3: MA.3.M.1.1, MA.3.M.1.2, MA.3.DP.1.1, MA.3.DP.1.2, MA.K12.MTR.7.1,[†] SC.3.L.14.1, SC.3.N.1.3, SC.3.N.1.7

Grade 4: MA.4.DP.1.1, MA.4.DP.1.3, MA.K12.MTR.7.1,[†] 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 (*Mimosa strigillosa*) seeds, which are generally available from the Florida Wildflower Growers Cooperative. Visit www.FloridaWildflowers.com or call 352-988-8117 to check availability.

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.

Discussion

After completing their graphs, ask the following questions:

- What trends do you notice in your graph?
- During which week did your plants grow the most? The least?
- What factors may have caused less growth during some weeks? More growth?
- How does your graph compare to your classmates' graphs? What similarities and differences do you notice?

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.

1. Provide each student or pair of students a damp paper towel, a plastic sandwich bag, and 4 seeds.
2. Have students place beans/seeds on the paper towel and fold it in half.
3. 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.
4. Have students keep a plant journal, recording observations daily and drawing pictures of changes the bean seeds go through as they grow.
5. Students can track growth measurements in their journals and create a graph showing daily or weekly growth patterns. Use the discussion questions above to analyze their graphs.

Materials

- seeds/beans (four per student/pair)
- paper towels
- plastic sandwich bag (one per student/pair)
- water

Standards

Grade 3: MA.3.M.1.1, MA.3.M.1.2,
MA.3.DP.1.1, MA.3.DP.1.2,[†]
SC.3.L.14.1, SC.3.N.1.3, SC.3.N.1.7

Grade 4: MA.4.DP.1.1, MA.4.DP.1.3,[†]
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.

[†] To complete this activity without the math component, skip step 6. You may also choose to modify the discussion questions. Students can simply observe, measure, draw and discuss the physical changes they see in their plants each week.

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.

Week 1

Week 2

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 3

Week 4

My Life Began as a Seed

Objective

Students will be able to demonstrate an understanding of the wildflower **life cycle** through collaborative story writing.

Directions

1. 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.
2. 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.
3. Each student will write the opening sentence of his/her wildflower life cycle story chain (beginning with the seed).
4. 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.
5. 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.
6. 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

1. 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.
2. Have students write as much as they know about their assigned section.
3. 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.)
4. Within each group, have students arrange themselves in the appropriate order based on their section of the story or life cycle.
5. 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.
6. Have each group present their story to the class.

Materials

- “My Life Began as a Seed” worksheet (one per student)

Standards

Grade 3: ELA.3.C.2.1

Grade 4: ELA.4.C.2.1, SC.4.L.16.1,
SC.4.L.16.4

My Life Began as a Seed

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 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

dormancy: a state of rest or inactivity; when a seed waits for the right conditions before it begins to grow

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: part of a plant containing petals and sepals, often marked by a distinctive color or fragrance, where fruit or seeds are generated; part of a plant that ordinarily contains the reproductive organs

Note: Flowers can be male, female or bisexual. A male flower 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: an edible plant product that has seeds and flesh, such as an apple, berry or banana; the reproductive product of a plant; the seed of plants, or the part that contains the seeds.

germination: process by which a seed comes to life and produces a plant

life cycle: the series of steps or processes in which a wildflower grows from seed to young plant (seedling) to mature plant that then produces seeds

mature plant: a fully grown plant that is able to produce flowers and seeds

monocotyledon: a flowering plant whose embryo has one cotyledon

pollination: the movement of pollen from the anther to the stigma, or from the male parts to the female parts of a flower

Note: 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

seed coat: protective outer layer of a seed; also called a testa

seed dispersal: the scattering or distribution of seeds away from the parent plant to grow in new places

seedling: young plant that has grown from a seed

testa: protective outer seed coat

Tip

Turn the vocabulary words into a Jeopardy-style game for a fun, interactive way to review with your students. Free online templates are available at JeopardyLabs.com, or you can download templates for PowerPoint or Google Slides.

Wildflower Life Cycle Crossword Puzzle

Use the clues and 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

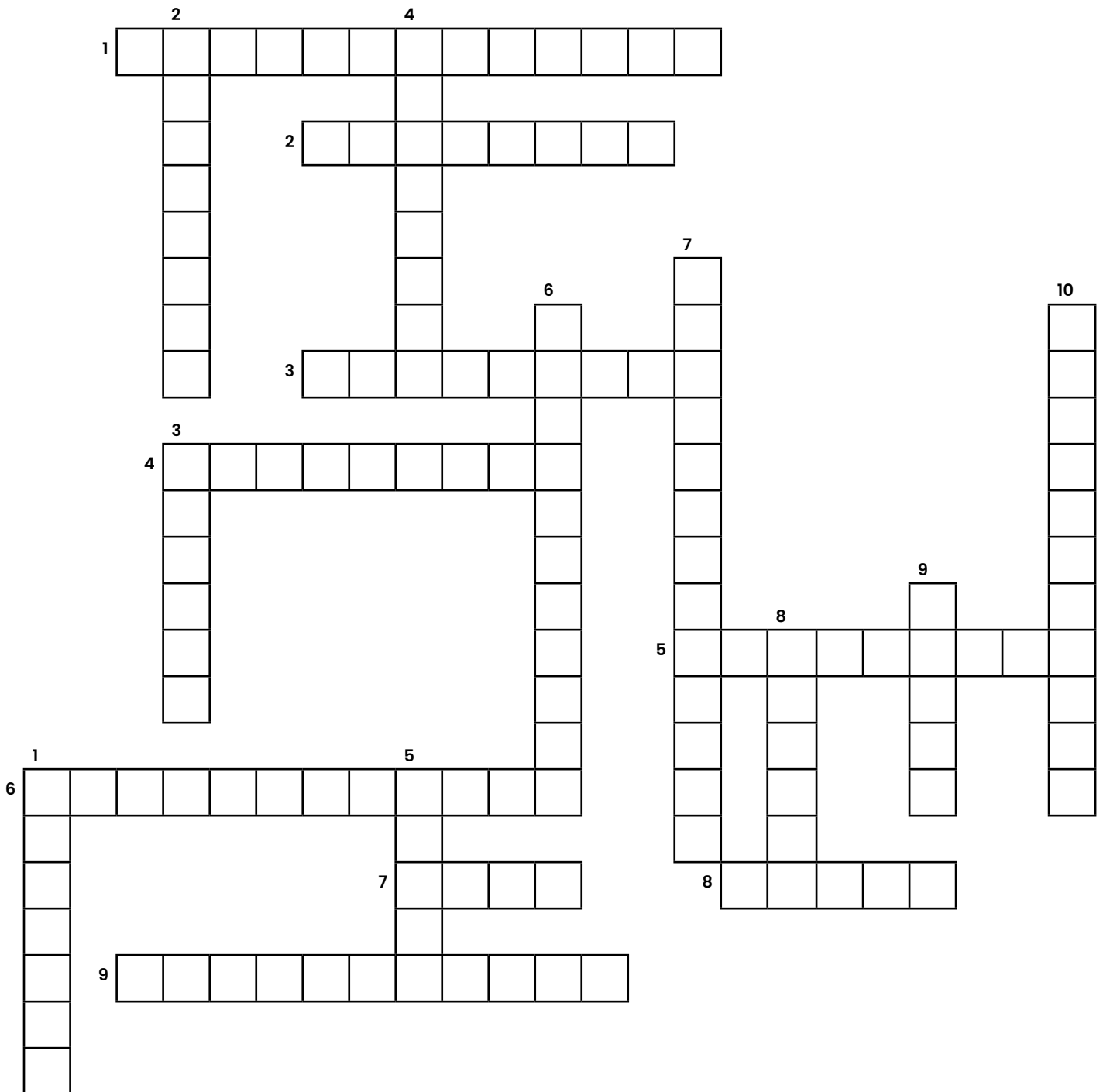
1. scattering or distribution of seeds
2. young plant that has grown from a seed
3. one of the three main parts of a plant embryo; also known as the seed leaf
4. part of the seed that contains the nutrients needed by the embryo to develop into a new plant
5. the series of steps or processes in which 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

Crossword Puzzle: Wildflower Life Cycle

Use the clues and the Word Bank on the previous page to fill in the puzzle.



Crossword Puzzle: Wildflower Life Cycle

Use the clues and the Word Bank on the previous page to fill in the puzzle.

The crossword puzzle grid contains the following words:

- 1** SEED DISPERSAL
- 2** SEEDLING
- 3** COTYLEDON
- 4** ENDOSPERM
- 5** REPRODUCTION
- 6** RADICLE
- 7** SEED
- 8** FRUIT
- 9** POLLINATION
- 10** DICOTYL

Resources

Literary connections

A Seed is Sleepy by Dianna Hutt Aston
Big Yellow Sunflower by Frances Barry
Flip, Float, Fly. Seeds on the Move
by JoAnn Early Macken
From Flower to Fruit by Anne Ophelia Downden
From Seed to Plant by Gail Gibbons
The Garden Next Door by Collin Pine
How a Plant Grows by Bobbie Kalman
Insects and Flowers by Oda Hidetomo
The Life Cycle of a Flower by Molly Aloian
Lily's Pesky Plant by Kirsten Larsen
*The Magic School Bus Plants Seeds:
A Book About How Living Things Grow*
by Joanna Cole
Miss Maple's Seeds by Eliza Wheeler
Mother Earth and Her Children by Sybil Van
Offers and S. Shoen-Smith
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
*Oh Say Can You Seed? Cat in the Hat
Learning Library*
On Meadowview Street by Henry Cole
*The Secret Lives of Plants! (Adventures in
Science)* by Janet Slingerland
Seeds And Seedlings (Nature Close-Up)
by Elaine Pascoe
The Tiny Seed by Eric Carle
We are the Gardeners by Joanna Gaines
What Do Roots Do? by Kathleen V. Kudlinski
What Does the Bunny See? by Linda Sue Park
What Is a Plant? (Science of Living Things)
by Bobbie Kalman

Reference books

Complete Guide to Florida Wildflowers
by Roger Hammer
*Florida Wildflowers in Their Natural
Communities* by Walter Kingsley Taylor
Plant Development (The Green World)
by William G. Hopkins

Websites and other web resources

Biology of Plants (Missouri Botanical Garden)
www.mbgnet.net/bioplants/main.html

Florida Wildflower Foundation
(plant profiles, photos and other resources
on Florida natives)
www.FlaWildflowers.org

Florida's Wildflowers and Butterflies
(Florida Museum of Natural History)
[www.FloridaMuseum.ufl.edu/wildflowers/
wildflower-search](http://www.FloridaMuseum.ufl.edu/wildflowers/wildflower-search)

From Seed to Fruit (PBS LearningMedia)
(interactive resource that guides students
through the stages of a plant's life cycle)
[florida.pbslearningmedia.org/resource/
evscps.sci.life.seed/from-seed-to-fruit/](http://florida.pbslearningmedia.org/resource/evscps.sci.life.seed/from-seed-to-fruit/)

iNaturalist SEEK (image recognition app for
identifying plants and animals)
www.iNaturalist.org/pages/seek_app

Lady Bird Johnson Wildflower Center
(national database; search by state, family
or habitat)
www.Wildflower.org/plants-main