

Red Edition
Grade 3–4
reading level

Purple Edition
Grade 4–5
reading level

Objectives

- Define what a plant is.
- List what plants need to live and grow.
- Explore plant life cycles.
- Describe the structures and functions of seeds.
- Discuss the life cycle of a flowering plant.
- Discuss the life cycle of a conifer.
- Explain what a spore is.
- Compare the life cycles of mosses and ferns.
- List ways new plants can grow from special kinds of stems.
- Describe how new plants grow from cuttings.

Reading Comprehension Skills

Preview the Book ♦ How to Read Diagrams
Compare and Contrast ♦ Main Idea and Details

Skillbuilders are available for this title.

Supporting English Learners

Use Photographs and Other Visuals Develop background knowledge and support the development of new concepts and science vocabulary by using the photographs and other visuals in *Plant Life Cycles*. Point out and name plants and animals in the photos, such as *tomato* (page 4) and *bee* (page 12). Have students repeat after you.

Summary

The Delta Science Content Reader *Plant Life Cycles* first introduces students to plants' essential characteristics. The book then explores the life cycles and reproductive structures of some major types of plants, including flowering plants and conifers, which reproduce with seeds, and mosses and ferns, which reproduce with spores. The book concludes with an overview of ways some plants can reproduce asexually, without seeds or spores.

Science Background

Like all organisms, a plant goes through a series of changes and stages in its life that together comprise its life cycle. The life cycle of most plants begins with a seed. A seed contains both the embryo capable of growing into a new plant and the stored food needed to nourish the new plant. The embryo and food are surrounded by a seed coat that tightly encloses and protects them.

There are two major groups of seed plants. Angiosperms, or flowering plants, develop flowers with male and female structures, which produce sperm cells and egg cells. Pollination occurs when sperm-carrying pollen produced by the male parts is transferred to the female parts. Sperm cells unite with egg cells, fertilizing them to form seeds. A fruit develops around the seed to protect it until it is dispersed to a suitable place to grow.

Nonflowering seed plants are called gymnosperms. Conifers, the most common gymnosperms, develop seeds on cones. Most conifers have male and female cones, which serve similar functions to the male and female parts of flowering plants.

Seedless plants include mosses and ferns. They reproduce with spores, single cells from which new plants can grow. Seedless plants have two distinct stages in their life cycles, each with a very different appearance. In one stage the plant produces spores, and in the other it produces sperm cells and egg cells.



What Is a Plant Life Cycle? (pages 2–5)

Before Reading

Discuss the Cover

Cover Image Discuss the photograph on the cover of *Plant Life Cycles*. Use the information on the inside front cover to support the discussion.

Science Statement Discuss the science statement. Ask: *If something goes in a cycle, what does it do?* (repeats the same steps over and over)

Build Reading Skills (page 2)

Preview the Book Use Build Reading Skills on page 2 to review how to preview the book. Discuss the steps. Then model previewing the words in bold type.

Think Aloud *Why are some words set in bold type? I know that sometimes in science books, science vocabulary is set in bold type. Maybe that's what's happening here. To see if I'm right, I'll look at the Vocabulary box on page 3. The terms organism and reproduce are both Vocabulary words. Are they set in bold type later in the book? Yes, I see them on page 4. I was right: the words in bold type are Vocabulary words.*

Guide students as they finish previewing *Plant Life Cycles*. Focus on nonfiction text features.

- Prompt them to look at the headings, photographs, captions, and diagrams. Ask questions such as *Why do you think that feature is there? How will it help you understand what you read?*
- Prompt them to look at other bold Vocabulary words. Guide the class in looking up a Vocabulary word in the Glossary.

Students can apply the skill in the Reflect on Reading activity on page 5.

K-W-L Chart Have students begin a K-W-L chart. They should add to it after each section.

What I Know	What I Want to Learn	What I Learned
Many plants grow from seeds.	How do seeds form?	

Make a Connection (page 3)

Make a Connection Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about plant life cycles. (Possible answer: The plants will grow taller, grow more leaves, and maybe have flowers.)

Find Out About Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

Vocabulary Read the Vocabulary words aloud. Explain to students that they will see these words in bold in this section. Start a word web on the board with *life cycle* in the center. Have students add information to the web as they read.

During Reading

About Plants (page 4)

- Hold up a classroom plant, or have students imagine a potted plant. Ask: *What might happen if I put this plant in a dark closet? Explain.* (It might die because it wouldn't get light, and plants need light to live and grow.)

✓ **Checkpoint** (page 4) (air, water, light, space, nutrients)

About Plant Life Cycles (page 5)

- Help students further understand the word *cycle*. Ask: *What do the wheels on a bicycle do when you ride it?* (circle round and round) Point out that similarly, a plant's life cycle circles around as each plant grows, develops, and reproduces.
- Discuss the diagram of the oak tree life cycle. Ask: *How does the life cycle of the oak tree return, or circle, back to its beginning?* (The tree starts as an acorn, and adult trees make more acorns.) *Why does the young oak tree look a lot like the adult tree?* (because of heredity)
- Emphasize that all living things have life cycles. As a familiar example, you may wish to list stages in the human life cycle, including infancy, childhood, adolescence, and adulthood.

✓ **Checkpoint** (page 5) (Most plants begin with a seed. The seed grows and develops into a seedling. The seedling grows and develops into a young plant. The young plant grows and develops into an adult plant that can reproduce.)

After Reading

Reflect on Reading (page 5) Before students complete the activity, point to various book features and have them explain how they relate to the text. (Possible answer: The oak tree life cycle diagram and caption made it easier to understand the text about how a seed grows into a plant.)

Apply Science Concepts (page 5) This activity applies a concept from Find Out About on page 3. Consider looking for plants around school as a class. When partners share their drawings, have them discuss what stage in its life cycle they think each plant is in.

How Do Plants Grow From Seeds? (pages 6–15)

Before Reading

Build Reading Skills (page 6)

How to Read Diagrams Use Build Reading Skills on page 6 to review how to read diagrams. Discuss the tips. Discuss with students that arrows, numbers, keys, legends, symbols, and color coding can be important features of diagrams. Then model reading the diagram of a seed on page 8.

Think Aloud *First, I read the title. The title is “Parts of a Seed.” Next, I read the labels “seed coat,” “embryo,” and “stored food.” These must be the parts of a seed. I will look for an explanation of what these parts do when I read.*

Guide students as they practice reading the life cycle diagrams on pages 13 and 15. Students can apply the skill in the Reflect on Reading activity on page 15.

Make a Connection (page 7)

Make a Connection Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about how plants grow from seeds. (Possible answer: I think plants might grow seeds inside them.)

Find Out About Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

Vocabulary Read the Vocabulary words aloud. Explain to students that they will see these words in bold in this section. Start a Venn diagram on the board. Label one circle *Angiosperms* and the other *Gymnosperms*. Label the space where the circles overlap *Both*. Have students add information about each type of plant as they read.

During Reading

About Seeds (page 8)

- The terms for flowering and nonflowering plants have Greek origins. *Angiosperm* means “covered seed,” so named because angiosperm seeds are covered with a fruit. *Gymnosperm* means “naked seed.” Gymnosperm seeds are not protected by a surrounding fruit.
- Ask: *What are some ways plants disperse seeds?* (exploding pods, water, wind, animals)
- Ask: *Why might a seed that had been buried in the ground for years germinate only after a heavy rainstorm?* (Possible answer: Before that, it might not have had the right amount of water.)

✓ **Checkpoint** (page 10) (embryo, stored food, seed coat)

Flowering Plants (page 11)

- Ask: *Which part of a flower makes eggs?* (pistil) *Which part makes sperm?* (stamen)
- Point out that while petals are often the most noticeable parts of a flower, they do not play a direct role in making seeds. They do, however, attract animals such as bees that help pollinate the plant.
- Ask: *What two things must happen for a flower to make seeds?* (pollination and fertilization) *Which one of these things happens when sperm joins with eggs?* (fertilization)
- Ask: *What fruits have you found seeds in?* (Possible answers: apples, oranges, peaches, tomatoes) *How do you think the fruits protect the seeds?* (Possible answer: with their tough skin or tough flesh)

✓ **Checkpoint** (page 13) (Flowers make seeds to help a plant reproduce. For a flower to make seeds, first, pollen carrying sperm must get to the female part of the flower. Second, sperm must join with eggs, fertilizing them. A fertilized egg forms an embryo, which grows into a seed. If a seed germinates, the life cycle of a new plant begins.)

Conifers (page 14)

- Discuss the photograph of male and female cones on page 14. Ask: *Which kind of cone is smaller? (male cone)*
 - Remind students that seeds of a flowering plant form from ovules inside a flower. Ask: *Where do the seeds of a conifer form? (on the female cone)*
 - Guide students to compare each step in the life cycle diagram for a conifer on page 15 with the corresponding step in the diagram for a flowering plant on page 13. Discuss how the two life cycles are alike and different.
- ✓ **Checkpoint** (page 15) (Male cones make sperm cells, and female cones make egg cells. Wind pollinates the female cones. Fertilization happens and a fertilized egg forms an embryo, which develops in a seed on the female cone. Seeds are dispersed, and if a seed germinates, the life cycle of a new plant begins.)

After Reading

Reflect on Reading (page 15) Assist students in including all parts of the flower in their diagrams. (Sentences should include the following information: Pistil: female part, makes eggs; Stamen: male part, makes sperm found in pollen; Ovules: store eggs, form seeds; Ovary: bottom part of pistil, stores ovules, becomes fruit; Petals: colorful parts around pistil and stamens; Sepals: green, leaf-like parts around petals, protect flower before it opens)

Apply Science Concepts (page 15) This activity applies a concept from Find Out About on page 7. Help students conduct their research. Encourage them to look for seeds from both flowering and nonflowering plants. Tell them to consider the shapes of the seeds and their environments when discussing how they might be dispersed.

How Do Plants Grow From Spores? (pages 16–19)

Before Reading

Build Reading Skills (page 16)

Compare and Contrast Use Build Reading Skills on

page 16 to review how to compare and contrast. Discuss the tips. Then use the information on page 18 to model comparing and contrasting seeds and spores.

Think Aloud *We already learned a lot about seeds. On page 18, I read that some plants make spores instead of seeds. How are seeds and spores alike? Both help a plant reproduce. How are they different? A seed forms when a male cell and a female cell join. But a spore is one cell. It does not need to join with another cell to make a new plant.*

Students can apply the skill in the Reflect on Reading activity on page 19.

Make a Connection (page 17)

Make a Connection Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about plants that grow from spores. (Answers will vary depending on students' familiarity with spores.)

Find Out About Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

Vocabulary Read the Vocabulary word aloud. Explain to students that they will see this word in bold in this section. Start a word web on the board with *spore* in the center. Have students add information to the web as they read.

During Reading

About Spores (page 18)

- Ask: *In which stage of the moss life cycle does the moss plant make spores? (the stage when it is tall, thin stalks)*
- Discuss the diagram of the life cycle of a fern on page 19. Ask: *What kind of cells grow to form the leafy stage of the fern's life cycle? (sperm cells and egg cells) What kind of cells grow to form the heart-shaped stage? (spores)*
- Ask students if they have seen any mosses or ferns near school. Tell students that mosses and ferns usually grow in damp, shady places, such as near streams or ponds. They also often grow on the northern sides of roofs, buildings, and so on.

✓ **Checkpoint** (page 19) (A spore is one cell from which a new plant can grow.)

After Reading

Reflect on Reading (page 19) (Possible answer: Mosses: form spores in pods on stalks; Ferns: make spores in cases on undersides of their leaves; Both: have two main stages—in one stage, make spores, in second stage, make male and female cells)

Apply Science Concepts (page 19) This activity applies a concept from Find Out About on page 17. If possible, take a classroom trip to look for mosses and ferns. If students do the activity at home, instruct them to ask a parent or guardian to accompany them.

What Other Ways Can Plants Reproduce? (pages 20–23)

Before Reading

Build Reading Skills (page 20)

Main Idea and Details Use Build Reading Skills on page 20 to review main idea and details. Discuss the tips. Then model identifying the main idea and details in the second paragraph on page 23.

Think Aloud *This paragraph is about cuttings. To find the main idea, I ask myself, What is this paragraph mostly about? I think the main idea is that a cutting is a piece of a plant that can grow into a new plant. I wonder what details support this main idea.*

Guide students to identify details about cuttings. Students can apply the skill in the Reflect on Reading activity on page 23.

Make a Connection (page 21)

Make a Connection Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about other ways that plants can reproduce. (Possible answer: I think some plants can reproduce from bulbs like those in the picture. My family grows tulips, daffodils, and crocuses in our garden from bulbs.)

Find Out About Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

During Reading

- Discuss the photograph of bulbs on pages 20–21. Explain that when a bulb grows larger, it grows smaller bulbs on its sides. These small bulbs make new plants.
 - Ask: *What do bulbs and tubers have in common?* (They are special kinds of underground stems. New plants can grow from them.)
 - Discuss that bulbs, tubers, runners, and other special kinds of stems contain large amounts of stored food, which allows new plants to develop much more rapidly than plants growing from seeds can.
 - Explain that the offspring of asexual reproduction have exactly the same heredity as the parents—that is, exactly the same kinds of flowers, fruits, and other traits. Ask: *Why might gardeners and farmers want to reproduce plants this way?* (Possible answer: They can make many more of a plant that grows fruits or flowers they like.)
- ✓ **Checkpoint** (page 23) (from a special kind of stem, such as a bulb, tuber, or runner; from a cutting of a piece of a plant; by grafting a piece of one plant to another plant)

After Reading

Reflect on Reading (page 23) (Possible answers: Main idea: Some new plants can grow from a part of one parent plant. Details: A bulb is a kind of underground stem. Daffodils and tulips grow from bulbs. New roots and shoots form at certain places along a runner to make new plants. A cutting is a piece of a plant that can grow into a new plant.)

Apply Science Concepts (page 23) This activity applies concepts from Find Out About on page 21. Have students review the methods and types of plants that can be used to grow a garden without planting any seeds. If time allows, encourage them to conduct research into other plants that can be grown in a garden with these methods.

 **Continued on last page**

Name: _____

Date: _____

Test: Plant Life Cycles

Part A: Vocabulary

embryo	germinate	heredity	life cycle
ovary	pollination	reproduce	spore

Choose the correct vocabulary word for each sentence. Write the word on the line.

1. Adult organisms can _____, or make more of their own kind.
2. A moss plant has two main stages in its _____.
3. A young plant grows to look like the parent because of _____.
4. Inside a seed is a tiny _____, a new plant in its earliest stage.
5. To _____, a seed needs the right amount of water.
6. After fertilization, the _____ becomes a fruit.
7. Bees help with the _____ of many plants.
8. A new moss plant can grow from a moss _____ without joining with another cell.

Part B: Science Concepts

Mark the best answer to each question.

9. A seedling is left alone near a window for a month. It sprouts leaves that grow quickly, then wither and die. Which of its needs was not met?

(A) air	(C) pollen
(B) water	(D) light
10. Which type of plant forms seeds inside flowers?

(A) angiosperms	(C) gymnosperms
(B) conifers	(D) mosses

Test: Plant Life Cycles (continued)

11. Before a conifer seed can germinate, it must _____.

- (A) be fertilized by a spore
- (B) disperse from a fruit
- (C) burst from a pod
- (D) fall from a cone

12. A plant called silverweed reproduces by growing long, thin stems. New plants can grow from the stems. What is this kind of stem called?

- (A) cutting
- (B) bulb
- (C) runner
- (D) tuber

Write the answer.

13. Why is it important for seeds to be moved away from the parent plant? Tell some ways seeds can be dispersed.

14. Label each part of the flower with the correct word from the word box.

ovary	petal	pistil	stamen
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A: _____

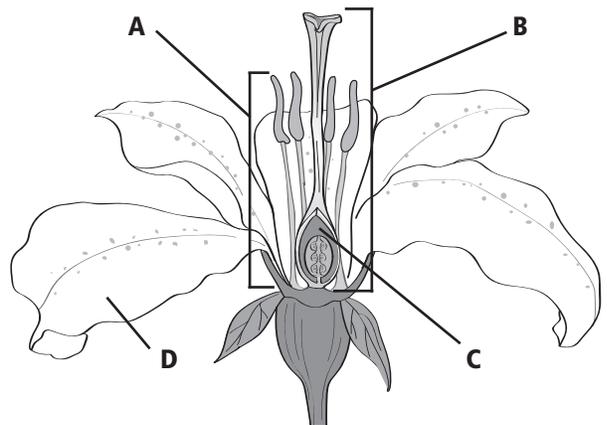
(male flower part)

B: _____

(female flower part)

C: _____

D: _____



15. Describe the life cycle of a fern.

Let's Review

(inside back cover)

Have students complete their K-W-L charts before answering these questions. Possible answers are shown.

- 1. Cover Connection** (I have learned that different plants go through different stages in their life cycles. The life cycle of most plants begins with a seed. After a seed germinates, it can grow and develop into an adult plant that can reproduce. When a plant reproduces, the life cycle begins again. Other kinds of plants reproduce with spores instead of seeds. Some new plants can also grow from a part of one parent plant.)
- 2.** (First, its seed coat splits open. Then, a tiny root grows down into the soil. Next, a tiny shoot grows up toward the sunlight. Soon, the first leaves form on the stem above the ground. The new plant is now a seedling.)
- 3.** (In one stage, the plant makes spores. In the other stage, the plant makes male and female cells.)
- 4.** (I could take a special kind of stem, such as a bulb, tuber, or runner. I could also take a cutting.)
- 5. How to Read Diagrams** (Students should be able to identify major stages in the diagram—germination, pollination, fertilization, dispersal—as well as specific steps. Students should be able to explain how one step leads to another.)
- 6. Write** (Students' riddles should make clear what type of plant they are writing about, such as a flowering plant, a conifer, a fern, or a moss plant.)

Try It! Provide a spot to allow a potato to sprout. A cardboard box will work if you wish to keep students out of classroom cabinets. You may also cut the potato into pieces. As long as each piece has an eye, or small natural dent, it can sprout a new plant. Students should observe the potato sprouting after a week or two.

Science at Home Have students do this activity at home with a family member. Students should be able to identify examples of plant structures. They should be able to explain that flowers and cones make seeds, fruits are formed from ovaries to cover and protect seeds, and seeds are what can grow into new plants.

Answers to Test

(Teacher's Guide pages 6–7)

1. reproduce 2. life cycle 3. heredity 4. embryo 5. germinate 6. ovary 7. pollination 8. spore 9. B 10. A 11. D 12. C 13. It is important for seeds to be moved away from the parent plant because they might not grow well there. The parent plant may block the sunlight or take in most of the water. Seeds can be dispersed by exploding pods, water, wind, or animals. 14. A: stamen; B: pistil; C: ovary; D: petal 15. A leafy fern makes spores in cases on the undersides of its leaves. The spores fall to the ground. They grow into tiny heart-shaped plants. The heart-shaped plants make sperm and egg cells. These cells join. The fertilized eggs grow into new leafy ferns.

ADDITIONAL ASSESSMENT OPPORTUNITIES Use the Checkpoints, Reflect on Reading, and Apply Science Concepts features and Let's Review questions as additional assessment opportunities.

Delta Science Content Readers are 24-page nonfiction student books with informative, engaging text and full-color photos and illustrations. The readers present key science content and vocabulary found on state tests, present key reading skills and strategies useful for reading informational text, support and extend the experiences and content of hands-on activities, promote scientific inquiry, and serve as a home-school link. They are available in two editions: Red Edition for Grades 3–4 and Purple Edition for Grades 4–5.

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Plant Life Cycles
Teacher's Guide
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This teacher's guide is available online at

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