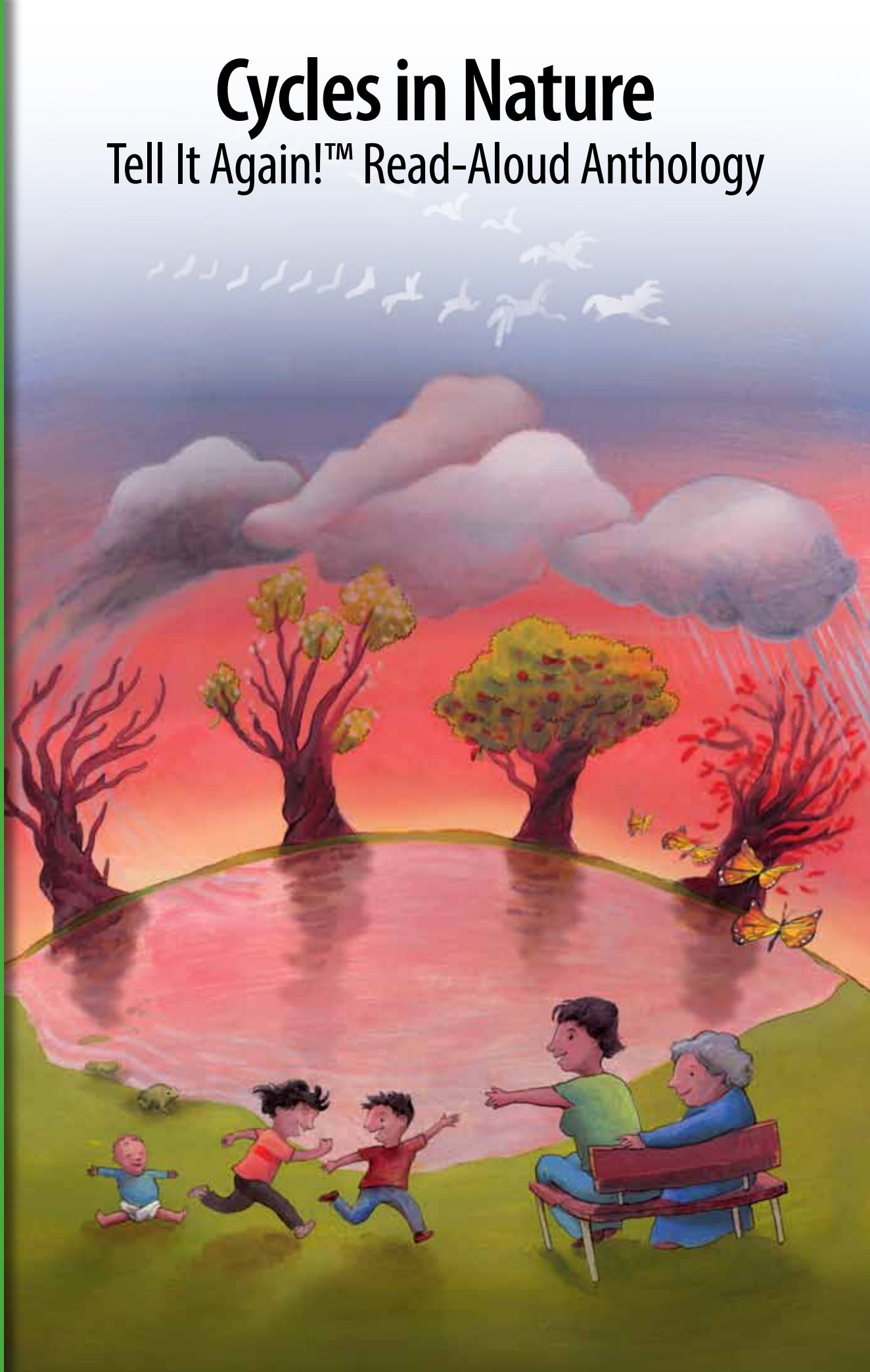
Cycles in Nature

Tell It Again!™ Read-Aloud Anthology



GRADE 2 Core Knowledge Language Arts® • Listening & Learning™ Strand

Core Knowledge®

Cycles in Nature

Tell It Again!™ Read-Aloud Anthology

Listening & Learning™ Strand

GRADE 2

Core Knowledge Language Arts®

Core Knowledge®

Table of Contents

Cycles in Nature

Tell It Again!™ Read-Aloud Anthology

Alignment Chart for Cycles in Nature

The following chart contains core content objectives. It also demonstrates alignment between the Common Core State Standards and corresponding Core Knowledge Language Arts (CKLA) goals.

Alignment Chart for Cycles in Nature	**Lesson**								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Core Content Objectives									
Explain that a cycle is a sequence of events that repeats itself again and again					✓				
Recognize that the rotation of Earth causes daytime and nighttime	✓	✓							
Explain that it takes twenty-four hours for the earth to rotate once on its axis	✓	✓							
Recognize that living things have a life cycle	✓	✓	✓						
Demonstrate familiarity with the poem "Bed in Summer"		✓							
Recognize that Earth orbits the sun		✓							
Explain that it takes one year for Earth to orbit the sun		✓							
Describe the seasonal cycle: spring, summer, autumn, winter		✓	✓	✓	✓	✓	✓	✓	
Identify that the tilt of Earth's axis in relation to the sun causes the seasons		✓	✓						
Explain effects of seasonal changes on plants and animals		✓	✓	✓	✓	✓	✓	✓	
Demonstrate familiarity with the poem "Bee! I'm expecting you!"			✓						
Describe animal processes in spring, summer, autumn, winter			✓						
Define the term *life cycle*				✓	✓	✓	✓	✓	
Identify the stages of the life cycle of a flowering plant (seed to seed)				✓					
Identify the stages of the life cycle of a tree (seed to seed)					✓				
Identify the stages of the life cycle of a chicken (egg to egg)						✓			

Alignment Chart for Cycles in Nature

	Lesson								
	1	2	3	4	5	6	7	8	9
Identify the stages of the life cycle of a frog (egg to egg)							✓		
Explain metamorphosis							✓	✓	
Identify the stages of the life cycle of a butterfly (egg to egg)								✓	
Define the term *water cycle*									✓
Explain that there is a limited amount of water on Earth									✓
Describe evaporation and condensation									✓
Identify forms and importance of precipitation									✓
Describe the formation of clouds									✓
Identify three types of clouds: cirrus, cumulus, and stratus									✓

Reading Standards for Literature: Grade 2

Key Ideas and Details

STD RI.2.1	Ask and answer such questions as *who, what, where, when, why*, and *how* to demonstrate understanding of key details in a text.	
CKLA Goal(s)	Ask and answer questions (e.g., *who, what, where, when, why, how*), orally or in writing, requiring literal recall and understanding of the details and/or facts of a nonfiction/informational read-aloud	✓
	Answer questions that require making interpretations, judgments, or giving opinions about what is heard in a nonfiction/informational read-aloud, including answering why questions that require recognizing cause/effect relationships	✓
STD RI.2.2	Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text.	
CKLA Goal(s)	Identify the main topic of a multi-paragraph nonfiction/informational read-aloud as well as the focus of specific paragraphs within the text	✓

Alignment Chart for Cycles in Nature

		Lesson								
		1	2	3	4	5	6	7	8	9
STD RI.2.3	Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.									
CKLA Goal(s)	Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a nonfiction/ informational read-aloud	✓	✓	✓				✓		
Craft and Structure										
STD RI.2.4	Determine the meaning of words and phrases in a text relevant to a Grade 2 topic or subject area.									
CKLA Goal(s)	Determine the meaning of unknown words and phrases in nonfiction/ informational read-alouds and discussions					✓				
Integration of Knowledge and Ideas										
STD RI.2.7	Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.									
CKLA Goal(s)	Interpret information from diagrams, charts, timelines, graphs, or other organizers associated with a nonfiction/informational read-aloud and explain how these graphics clarify the meaning of the read-aloud	✓	✓							
STD RI.2.9	Compare and contrast the most important points presented by two texts on the same topic.									
CKLA Goal(s)	Compare and contrast (orally or in writing) similarities and differences within a single nonfiction/ informational read-aloud or between two or more nonfiction/informational read-alouds			✓	✓	✓	✓		✓	
Range of Reading and Level of Text Complexity										
STD RI.2.10	By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the Grades 2–3 text complexity band proficiently, with scaffolding as needed at the high end of the range.									
CKLA Goal(s)	Listen to and demonstrate understanding of nonfiction/ informational read-alouds of appropriate complexity for Grades 2–4					✓				

Alignment Chart for Cycles in Nature

		Lesson								
		1	2	3	4	5	6	7	8	9
Writing Standards: Grade 2										
Text Types and Purposes										
STD W.2.2	Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.									
CKLA Goal(s)	Plan and/or draft, and edit an informative/explanatory text that presents information from a nonfiction/informational read-aloud that introduces a topic, uses facts and definitions to develop points, and provides a concluding statement or section							✓		
Production and Distribution of Writing										
STD W.2.5	With guidance and support from adults and peers, focus on a topic and strengthen writing as needed by revising and editing.									
CKLA Goal(s)	With guidance and support from adults and peers, focus on a topic and strengthen writing as needed by revising and editing						✓	✓		
Research to Build and Present Knowledge										
STD W.2.8	Recall information from experiences or gather information from provided sources to answer a question.									
CKLA Goal(s)	With assistance, categorize and organize facts and information within a given domain to answer questions					✓				
Speaking and Listening Standards: Grade 2										
Comprehension and Collaboration										
STD SL.2.1	Participate in collaborative conversations with diverse partners about Grade 2 topics and texts with peers and adults in small and large groups.									
STD SL.2.1a	Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).									
CKLA Goal(s)	Use agreed-upon rules for group discussions, e.g., look at and listen to the speaker, raise hand to speak, take turns, say “excuse me” or “please,” etc.					✓				

Alignment Chart for Cycles in Nature

		Lesson								
		1	2	3	4	5	6	7	8	9
STD SL.2.1b	Build on others' talk in conversations by linking their comments to the remarks of others.									
CKLA Goal(s)	Carry on and participate in a conversation over at least six turns, staying on topic, linking their comments to the remarks of others, with either an adult or another child of the same age					✓				
STD SL.2.1c	Ask for clarification and further explanation as needed about the topics and texts under discussion.									
CKLA Goal(s)	Ask questions to clarify information about the topic in a fiction or nonfiction/informational read-aloud					✓				
STD SL.2.2	Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.									
CKLA Goal(s)	Retell (orally or in writing) important facts and information from a fiction or nonfiction/informational read-aloud					✓				
	Summarize (orally or in writing) text content and/or oral information presented by others						✓			✓
STD SL.2.3	Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.									
CKLA Goal(s)	Ask questions to clarify directions, exercises, classroom routines and/or what a speaker says about a topic to gather additional information, or deepen understanding of a topic or issue			✓	✓			✓		
Presentation of Knowledge and Ideas										
STD SL.2.5	Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.									
CKLA Goal(s)	Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings						✓			✓
STD SL.2.6	Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification. (See Grade 2 Language)									
CKLA Goal(s)	Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification					✓				

Alignment Chart for Cycles in Nature

		Lesson								
		1	2	3	4	5	6	7	8	9
Language Standards: Grade 2										
Vocabulary Acquisition and Use										
STD L.2.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on Grade 2 reading and content, choosing flexibly from an array of strategies.									
STD L.2.5	Demonstrate understanding of word relationships and nuances in word meanings.									
STD L.2.5a	Identify real-life connections between words and their use (e.g., describe foods that are spicy or juicy).									
CKLA Goal(s)	Determine the meaning of unknown and multiple meaning words and phrases in fiction or nonfiction/ informational read-alouds and discussions	✓		✓	✓				✓	
STD L.2.6	Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using adjectives and adverbs to describe (e.g., *When other kids are happy, that makes me happy*).									
CKLA Goal(s)	Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using adjectives and adverbs to describe (e.g., *When other kids are happy, that makes me happy*)					✓				
Additional CKLA Goals										
Prior to listening to a read-aloud, identify orally what students know and have learned about a topic		✓	✓			✓		✓		✓
Identify and express whether they are able to feel the rotation of the earth		✓								
Discuss personal connections to given topics			✓	✓					✓	
Use knowledge of the meaning of individual words to predict the meanings of compound words				✓						
Sequence four to six pictures illustrating events from a nonfiction read-aloud					✓				✓	
Prior to listening to a read-aloud, make a prediction and then compare the actual outcome to the prediction							✓			
Share writing with others							✓	✓		

✓ These goals are addressed in all lessons in this domain. Rather than repeat these goals as lesson objectives throughout the domain, they are designated here as frequently occurring goals.

Introduction to Cycles in Nature

This introduction includes the necessary background information to be used in teaching the *Cycles in Nature* domain. The *Tell It Again! Read-Aloud Anthology* for *Cycles in Nature* contains nine daily lessons, each of which is composed of two distinct parts, so that the lesson may be divided into smaller chunks of time and presented at different intervals during the day. The entire lesson will require a total of sixty minutes.

This domain includes one Pausing Point after Lesson 5. You may wish to pause and spend one to two days reviewing, reinforcing, or extending the material taught prior to the Pausing Point. **You should spend no more than thirteen days total on this domain.**

Week One				
Day 1 #	**Day 2** #	**Day 3** ⑩	**Day 4**	**Day 5** #
Lesson 1A: "The Cycle of Daytime and Nighttime" (40 min.)	Lesson 2A: "The Reasons for Seasons" (40 min.)	Lesson 3A: "Four Seasons in One Year" (40 min.)	Lesson 4A: "The Life Cycle of a Plant" (40 min.)	Lesson 5A: "The Life Cycle of a Tree" (40 min.)
Lesson 1B: Extensions (20 min.)	Lesson 2B: Extensions (20 min.)	Lesson 3B: Extensions (20 min.)	Lesson 4B: Extensions (20 min.)	Lesson 5B: Extensions (20 min.)
60 min.	60 min.	60 min.	60 min.	60 min.

Week Two				
Day 6 ⑩	**Day 7** #	**Day 8** ⑩	**Day 9**	**Day 10** #
Pausing Point (60 min.)	Lesson 6A: "Which came first, the Chicken or the Egg?" (40 min.)	Lesson 7A: "The Life Cycle of a Frog" (40 min.)	Lesson 8A: "The Life Cycle of a Butterfly" (40 min.)	Lesson 9A: "The Water Cycle" (40 min.)
	Lesson 6B: Extensions (20 min.)	Lesson 7B: Extensions (20 min.)	Lesson 8B: Extensions (20 min.)	Lesson 9B: Extensions (20 min.)
60 min.	60 min.	60 min.	60 min.	60 min.

Week One		
Day 11	**Day 12** ⑩#	**Day 13** ⑩
Domain Review (60 min.)	Domain Assessment (60 min.)	Culminating Activities (60 min.)
60 min.	60 min.	60 min.

⑩ Lessons include Student Performance Task Assessments

\# Lessons require advance preparation and/or additional materials; please plan ahead

Domain Components

Along with this Anthology, you will need:

- *Tell It Again! Media Disk* or the *Tell It Again! Flip Book* for *Cycles in Nature*
- *Tell It Again! Image Cards* for *Cycles in Nature*
- *Tell It Again! Supplemental Guide* for *Cycles in Nature*

* The *Tell It Again! Posters* and *Tell It Again! Multiple Meaning Word Posters* for *Cycles in Nature* are located in the back of the *Tell It Again! Flip Book.*

Recommended Resource:

- *Core Knowledge Grade 2 Teacher Handbook,* edited by E.D. Hirsch, Jr. and Souzanne A. Wright (Core Knowledge Foundation, 2005) ISBN 978-1890517748

Why Cycles in Nature Are Important

This domain will introduce your students to the many natural cycles that make life on Earth possible. Your students will increase their knowledge of cycles in nature by learning more about seasonal cycles, and by beginning their study of flowering plants and trees, animal life cycles, and the importance of the water cycle. Students will also learn about the effect seasonal changes have on plants and animals. In addition, throughout this domain, students will gain exposure to poems by renowned authors Emily Dickinson and Robert Louis Stevenson. As students learn that all organisms experience the developmental stages of the life cycle, they will also learn how their growth and development relates to Earth's seasonal cycles and begin to understand how all organisms depend on Earth's limited water supply.

What Students Have Already Learned in Core Knowledge Language Arts During Kindergarten and Grade 1

The following Kindergarten and Grade 1 domains are particularly relevant to the read-alouds your students will hear in *Cycles in Nature*. The background knowledge will greatly enhance your students' understanding of the read-alouds they are about to enjoy:

Plants (Kindergarten)

- Explain that seeds are the beginnings of new plants
- Explain that some plants produce fruit to hold seeds
- Compare and contrast fruits and seeds of different plants
- Explain the basic life cycle of plants
- Describe how bees collect nectar and pollen
- Describe the important role bees play in plant pollination
- Compare and contrast deciduous and evergreen plants
- Sequence the seasonal rhythm of planting, growing, and harvesting

Seasons and Weather (Kindergarten)

- Name the four seasons in cyclical order, as experienced in the United States, and correctly name a few characteristics of each season
- Characterize winter as generally the coldest season, summer as generally the warmest season, and spring and autumn as transitional seasons
- Describe any unique seasonal differences that are characteristic of their own locality (change of color and dropping of leaves in autumn; snow or ice in winter; increased rain and/or flooding in spring; etc.)
- Identify ways in which weather affects daily routines, such as dress, activities, etc.
- Describe daily weather conditions of their own locality in terms of temperature (hot, warm, cool, cold); cloud cover (sunny, cloudy); and precipitation (rain, snow, or sleet)
- Identify the four seasons, and name activities that are associated with those seasons
- Explain why weather prediction is important in their daily lives

Taking Care of the Earth (Kindergarten)

- Compare and contrast fresh water, salt water, and wastewater

- Explain that many living things, including humans, need freshwater to survive, and that there is a limited supply of fresh water on Earth
- Explain why people have a special responsibility to take care of the earth

Astronomy (Grade 1)

- Identify the four phases of the moon—new, crescent, half, full
- State that the moon orbits the earth
- Explain that our solar system includes the sun and the planets that orbit the sun

Animals and Habitats (Grade 1)

- Explain why living things live in habitats to which they are specifically suited
- Classify water habitats as either freshwater or saltwater habitats
- Identify the characteristics of the freshwater habitat
- Explain that salt water covers most of Earth and is found in several oceans

Core Vocabulary for Cycles in Nature

The following list contains all of the core vocabulary words in *Cycles in Nature* in the forms in which they appear in the read-alouds or, in some instances, in the "Introducing the Read-Aloud" section at the beginning of the lesson. Boldfaced words in the list have an associated Word Work activity. The inclusion of the words on this list does not mean that students are immediately expected to be able to use all of these words on their own. However, through repeated exposure throughout the lessons, they should acquire a good understanding of most of these words and begin to use some of them in conversation.

Lesson 1

axis
cycle
rotating
thrive

Lesson 2

equator
hemisphere
revolves
tilt

Lesson 3

absorbed
adapt
migrate
minimum
photosynthesis

Lesson 4

attracted
emerge
pollinators
protective
reproduce

Lesson 5

decomposers
dependent
flexible
germination
mature

Lesson 6

albumen
embryo
fertilize
replenished
yolk

Lesson 7

amphibian
burrow
gills
lungs
metamorphosis

Lesson 8

larva
molt
transparent

Lesson 9

evaporation
condensation
humidity
precipitation

Student Performance Task Assessments

In the *Tell It Again! Read-Aloud Anthology* for *Cycles in Nature,* there are numerous opportunities to assess students' learning. These assessment opportunities range from informal observations, such as *Think Pair Share* and some Extension activities, to more formal written assessments. These Student Performance Task Assessments (SPTA) are identified in the *Tell It Again! Read-Aloud Anthology* with this icon: ⑩. There is also an end-of-domain summative assessment. Use the Tens Conversion Chart located in the Appendix to convert a raw score on each SPTA into a Tens score. On the same page, you will also find the rubric for recording observational Tens scores.

Above and Beyond

In the *Tell It Again! Read-Aloud Anthology* for *Cycles in Nature,* there are numerous opportunities in the lessons and the Pausing Point to challenge students who are ready to attempt activities that are above grade-level. These activities are labeled "Above and Beyond" and are identified with this icon: .

Supplemental Guide

Accompanying the *Tell It Again! Read-Aloud Anthology* is a *Supplemental Guide* designed specifically to assist educators who serve students with limited English oral language skills or students with limited home literary experience, which may include English Language Learners (ELLs) and children with special needs. Teachers whose students would benefit from enhanced oral language practice may opt to use the *Supplemental Guide* as their primary guide in the Listening & Learning Strand. Teachers may also choose to begin a domain by using the *Supplemental Guide* as their primary guide before transitioning to the *Tell It Again! Read-Aloud Anthology,* or may choose individual activities from the *Supplemental Guide* to augment the content covered in the *Tell It Again! Read-Aloud Anthology.*

The *Supplemental Guide* activities that may be particularly relevant to any classroom are the Multiple Meaning Word Activities and accompanying Multiple Meaning Word Posters, which help students determine and clarify different meanings of words; Syntactic Awareness Activities, which call students' attention to sentence structure, word order, and grammar; and Vocabulary Instructional Activities, which place importance on building students' general academic, or Tier 2, vocabulary. These activities afford all students additional opportunities to acquire a richer understanding of the English language. Several of these activities have been included as Extensions in the *Tell It Again! Read-Aloud Anthology.* In addition, several words in the *Tell It Again! Read-Aloud Anthology* are underlined, indicating that they are multiple-meaning words. The accompanying sidebars explain some of the more common alternate meanings of these words. *Supplemental Guide* activities included in the *Tell It Again! Read-Aloud Anthology* are identified with this icon: .

Recommended Resources for Cycles in Nature

The *Tell It Again! Read-Aloud Anthology* includes a number of opportunities in Extensions in the Pausing Point, and in the Culminating Activities for teachers to select trade books from this list to reinforce domain concepts through the use of authentic literature. In addition, teachers should consider other times throughout the day when they might infuse authentic domain-related literature. If you recommend that families read aloud with their child each night, you may wish to suggest that they choose titles from this trade book list to reinforce the domain concepts. You might also consider creating a classroom lending library, allowing students to borrow domain-related books to read at home with their families.

Trade Book List

Seasonal Cycles

1. *Earth Cycles,* by Michael Elsohn Ross (Millbrook Press, 2001) ISBN 978-0761319771
2. *Four Seasons Make a Year,* by Anne Rockwell (Walker & Company, 2004) ISBN 978-0802788832
3. *How Do Birds Find Their Way?,* by Roma Gans (Harper Collins, 1996) ISBN 978-0064451505
4. *The Reasons for Seasons,* by Gail Gibbons (Holiday House, 1995) ISBN 978-0823412389
5. *Red Leaf, Yellow Leaf,* by Lois Ehlert (Harcourt, Inc., 1991) ISBN 978-0152661977
6. *What Makes Day and Night,* by Franklyn Branley (Harper Collins, 1986) ISBN 978-0064450508

Plant and Animal Life Cycles

7. *Butterfly (How Does it Grow?),* by Jinny Johnson (Smart Apple Media, 2010) ISBN 978-1599203522
8. *Frogs (How Does it Grow?),* by Jinny Johnson (Smart Apple Media, 2010) ISBN 978-1599203553

9. *From Caterpillar to Butterfly (Let's-Read-and-Find-Out-Science),* by Deborah Heiligman (Harper Collins Publishers, 1996) ISBN 978-0064451291
10. *From Seed to Plant,* by Gail Gibbons (Holiday House, 1991) ISBN 978-0823410255
11. *From Seed to Sunflower,* by Dr. Gerald Legg (Franklin Watts, 1998) ISBN 978-0531153345
12. *How a Seed Grows,* by Helene J. Jordan (Harper Collins, 2000) ISBN 978-0064451079
13. *The Life Cycle of an Oak Tree,* by Linda Tagliaferro (Capstone Press, 2007) ISBN 978-0736867115
14. *A Log's Life,* by Wendy Pfeffer (Aladdin Paperbacks, 1997) ISBN 978-1416934837
15. *Monarch Butterfly,* by Gail Gibbons (Holiday House, 1995) ISBN 978-0823409099
16. *A Nest Full of Eggs,* by Priscilla Belz Jenkins (Harper Collins, 1995) ISBN 978-0064451277
17. *One Bean,* by Anne Rockwell (Walker Publishing Company, 1998) ISBN 978-0802775726
18. *The Reason for a Flower,* by Ruth Heller (Penguin Putnam Books for Young Readers, 1999) ISBN 978-0698115590

Water Cycle

19. *Down Comes the Rain (Let's-Read-and-Find-Out-Science),* by Franklyn M. Branley (Harper Collins Publishers, 1997) ISBN 978-0064451666
20. *The Snowflake: A Water Cycle Story,* by Neil Waldman (Milbrook Press, 2003) ISBN 978-0761323471
21. *Water (Nature's Cycles)* [Spanish & English], by Dana Meachen Rau (Marshall Cavendish Corporation, 2010) ISBN 978-0761447924
22. *The Water Cycle,* by Helen Frost (Pebble Books, 2000) ISBN 978-0736804097

23. *The Water Cycle,* by Rebecca Olien (Capstone Press, 2005) ISBN 978-0736851824

24. *Water, Water Everywhere,* Mark J. Rauzon and Cynthia Overbeck Bix (Sierra Club Books for Children, 1994) ISBN 978-0871563835

Websites and Other Resources

Student Resources

1. Interactive Earth Rotation
   http://www.bbc.co.uk/schools/scienceclips/ages/9_10/earth_sun_moon.shtml

2. Creature Feature: American Bullfrog
   http://kids.nationalgeographic.com/kids/animals/creaturefeature/american-bullfrog

3. Creature Feature: Penguin
   http://kids.nationalgeographic.com/kids/animals/creaturefeature/adelie-penguin

4. Caterpillar to a Butterfly
   http://www.youtube.com/watch?v=5Tvl6wz7e9M

5. Water Cycle Song
   http://www.youtube.com/watch?v=KQ8KRznrXiA

6. How Water Changes
   http://www.youtube.com/watch?v=oaCUyZw4Tjo

Teacher Resources

1. The Water Cycle
   http://www.sciencekids.co.nz/sciencefacts/weather/thewatercycle.htm

2. *March of the Penguins* DVD, with Morgan Freeman (Warner Bros., 2005) ASIN: B000NJUYHM

The Cycle of Daytime and Nighttime

1

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Recognize that the rotation of Earth causes daytime and nighttime
- ✓ Explain that it takes twenty-four hours for Earth to rotate once on its axis
- ✓ Recognize that living things have a life cycle

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Identify the main topic of "The Cycle of Daytime and Nighttime" (RI.2.2)
- ✓ Describe the connection between the earth's rotation and daytime and nighttime (RI.2.3)
- ✓ Interpret information from a diagram of the earth's rotation using the read-aloud "The Cycle of Daytime and Nighttime" (RI.2.7)
- ✓ Identify new meanings for the word *stage* and apply them accurately (L.2.5a)
- ✓ Prior to listening to "The Cycle of Daytime and Nighttime," identify orally what they know about the differences between daytime and nighttime

- ✓ Identify and express whether they are able to feel the rotation of Earth

Core Vocabulary

axis, *n.* A real or imaginary central line around which an object spins
Example: The axis of Earth is an imaginary line drawn through the North and South Poles.
Variation(s): axes

cycle, *n.* The period of time it takes to complete a sequence of events
Example: The life cycle of a frog includes the egg, the tadpole, and the adult frog.
Variation(s): cycles

rotating, *v.* Turning around a central point
Example: As I pedal my bike, the tires are rotating to keep me moving.
Variation(s): rotate, rotates, rotated

thrive, *v.* When a living thing grows and develops well
Example: With such an abundance of green grass and clover to eat, the sheep will thrive.
Variation(s): thrives, thrived, thriving

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**Domain Introduction**		10
	What Do We Know?		
	Purpose for Listening		
Presenting the Read-Aloud	**The Cycle of Daytime and Nighttime**		15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Thrive		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Multiple Meaning Word Activity: Stage**	Poster 1M (Stage)	20
	Demonstration of Earth's Movements	pencil; globe; flag or pin; flashlight [This exercise requires advance preparation.]	
Take-Home Material	**Family Letter**	Instructional Masters 1B-1, 1B-2	

The Cycle of Daytime and Nighttime

1A

Introducing the Read-Aloud — *10 minutes*

Domain Introduction

Note: Students who have participated in the Core Knowledge Language Arts program in Kindergarten and Grade 1 will already be familiar with certain cycles in nature from the Kindergarten *Plants* domain, the Kindergarten *Seasons and Weather* domain, and the Grade 1 *Astronomy* domain.

Tell students that when something repeats, or happens over and over again in the same order, it is called a cycle. Discuss with students that there are cycles happening all around them, all of the time. In all cycles, there is a starting point. Things in a cycle always come back to the starting point before starting over again.

Have students share some examples of events they have learned about that repeat, or occur over and over again in the same order, such as the days of the week or even the cycle of school years! Cycles are series of events that repeat again and again in the same order.

Ask students if they can feel the earth moving. Tell them that even though they cannot feel the earth moving, it is moving very quickly in two different ways. Lead students in a discussion about what they remember about the two ways that Earth moves from the Grade 1 *Astronomy* domain: Earth rotates, or spins around, its axis; Earth also orbits, or moves in a path around, the sun. Tell students that they are going to learn over the next few lessons how these two types of movement are directly related to the cycle of daytime and nighttime as well as to the cycle of the four seasons.

What Do We Know?

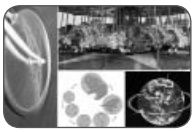
There are several different kinds of cycles that occur in nature. Explain to students that some of nature's cycles repeat quickly,

whereas other cycles take longer to repeat. Some cycles take place every day and night! Discuss with students what they experience when it is daytime and when it is nighttime. Have them use their five senses to describe the differences between daytime and nighttime.

Purpose for Listening

Tell students to listen carefully to identify the main topic of "The Cycle of Daytime and Nighttime," as well as learn why intense, or strong, sunlight is so important to life on Earth.

Presenting the Read-Aloud — **15** *minutes*



The Cycle of Daytime and Nighttime

Show image 1A-1: Things that go round and round

A cycle is like a circle that goes around and around. Just like there are circular objects that go around and around, there are also many natural cycles that occur on Earth that happen again and again, too. A **cycle** is a sequence of events that repeats itself again and again. Just like you can pick any part of the circle to be the starting point, we choose one part of each natural cycle to be our starting point. This makes it easier to talk about all of the parts of the cycle. The most important thing to remember is that cycles always come back to the chosen starting point before starting over again.[1]

1 Stand up and face the blackboard. Spin around in a circle until you come back to facing the blackboard. You've just come back to your starting point!

Show image 1A-2: Living things and their young

All living things are part of a cycle of life that keeps going around and around. What does this mean? It means that almost all living things are born, grow, reproduce (or make babies), and eventually die. The reproduction of living things is one way that life continues on Earth. A life cycle includes each stage that a living thing goes through from birth to adult.[2] You will hear a lot more about life cycles later in this domain. First, there are other cycles in nature that make life on Earth possible, too.

2 Here, the word *stage* means a particular time in the growth of something. The word *stage* can also have other meanings, such as a raised platform on which people dance, sing, and act.

Show image 1A-3: Spinning

Earth spins around and around, a never-ending cycle that shapes everything we do here on Earth.[3] As Earth turns around, part of it faces the sun and part of it faces away from the sun.[4] Can you guess what cycle happens when our part of Earth faces the sun and then rotates to face away from the sun? Did you guess the cycle of daytime and nighttime?

The cycle of daytime and nighttime is the result of our planet **rotating,** or spinning, around on an imaginary line called an **axis**. What's an axis? Well, imagine a spinning basketball turning around

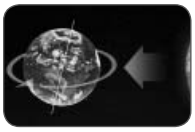
3 The earth is constantly moving. Can we feel the earth moving?

4 Remember, the sun is a giant star that provides light, heat, and energy for the earth.

and around. Then try to picture an imaginary line running through the basketball, from the bottom to the top. That imaginary line is what we call an axis.[5] Earth's axis passes through the North and South Poles. It takes twenty-four hours for Earth to rotate, or spin, one time on its axis.[6]

5 [Point to the axis in the image.] Try to imagine an invisible line running through our body from head to foot—a central line, or axis, around which we can spin.

6 Describe one thing that people usually do during the daytime, and one thing that people usually do at nighttime.



Show image 1A-4: Earth rotating on its axis

Rotation is the movement of Earth on its axis. This controls the cycle of daytime and nighttime. Earth takes twenty-four hours to turn, or rotate, back to the position from which it started. Rotation takes us from daytime to nighttime, and back to the very beginning of daytime again, before the cycle starts over.

As Earth rotates, light from the sun falls on one half of Earth. We call this daytime. The other half of Earth is in darkness, and we call this nighttime. As Earth continues to rotate, the part of Earth that had sunlight moves into darkness, and the part that had darkness moves into the sunlight. This is a never-ending cycle of daytime and nighttime.

Show image 1A-5: Sunrise

The cycle of daytime and nighttime begins with sunrise in the early morning. Sunlight hits our planet and moves across Earth from east to west.[7] When we see the sun rising in the east in the morning and setting in the west in the evening, it is because of the earth rotating, or spinning. For people on Earth, it makes sense to say that the sun rises in the morning. Each morning at dawn, the sun appears in the eastern sky on the horizon. The horizon is the line we see in the distance where the ground meets the sky. At dawn, some people say, "Look! The sun is coming up!"[8] This first appearance of the sun above the eastern horizon is called sunrise.

7 [Show students which way east and west are in your classroom.]

8 Is the sun really moving? (No! The earth is moving, but to us it looks like the sun is moving.)

Show image 1A-6: Sunset

Over the course of the day, the sun appears to move across the sky, gradually following its path from east to west. In the evening, the sun sets in the west. Ever so slowly, it gets lower in the sky and disappears below the horizon. That's when people say, "The sun is going down."[9] This disappearance of the sun below the western horizon is called sunset.

9 Is the sun really going down? Why can't we see it anymore?

Based on what we can see from where we live on Earth, it seems sensible to say that the sun moves across the sky each day—rising, or moving up, in the east; and setting, or sinking down, in the west. But that's not actually true. It is the daily rotation, or spin, of the earth that makes the sun appear to rise and set each day.[10]

10 Have you seen a sunset recently? How would you describe it?

Show image 1A-7: Children sleeping and children waking up

This daily rotation explains why there is always daytime and nighttime on Earth. As it spins, certain parts of Earth's surface face the sun, receiving its heat and light. When it is light on one side of Earth, it is dark on the other side. So, if it is daytime where you are right now, then on the other side of the earth it is nighttime, and the children there are sound asleep. And, when you are nestled in your bed tonight, children on the other side of the planet will be waking up to a bright new day.[11]

11 [Show students where they live on a globe.] Is it day or night right now where we live? [Show students a location on the other side of the globe.] Is it day or night right now on the other side of the world?

How does the cycle of daytime and nighttime affect living things on Earth? The sun is extremely important to life on Earth. All plants, animals, and people rely on the sun in order to **thrive,** or grow well. The sun's energy gives life to plants, which in turn nourish animals and people.[12] The sun's heat keeps the surface of Earth warm enough for plants and animals to survive. In the next few lessons, we will learn all about how the sun affects living things throughout the four seasons.

12 When you nourish something, you provide it with what it needs to grow.

Discussing the Read-Aloud **15** *minutes*

Comprehension Questions **10** *minutes*

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Evaluative* What is the main topic of the read-aloud? (The main topic of the read-aloud is the cycle of daytime and nighttime.)
2. *Literal* What is a cycle? (A cycle is a sequence of events that happens over and over again.)
3. *Literal* What causes daytime and nighttime? (Rotation of Earth causes daytime and nighttime.)
4. *Inferential* How does the rotation of Earth cause daytime and nighttime? (During rotation, the earth spins on its axis. The part of Earth that faces the sun changes during rotation, giving some parts of Earth daytime and some parts of Earth nighttime.)
5. *Inferential* In terms of light, what is the difference between daytime and nighttime? (The sun shines on a particular half of the earth during the daytime, but there is darkness on that half at nighttime.)

[Please model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

6. *Evaluative* *Think Pair Share:* How would life on Earth be different if Earth did not rotate? (Answers may vary.)

7. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Thrive

5 *minutes*

1. In the read-aloud you heard, "All plants, animals, and people rely on the sun in order to tend to *thrive,* or grow well."
2. Say the word *thrive* with me.
3. *Thrive* means to grow and develop.
4. When a living thing receives the things it needs to grow and develop, it will thrive.
5. Can you think of specific living things that might thrive in the summertime? Try to use the word *thrive* when you talk about them. What are the things that enable them to thrive? [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "_____ thrive when . . . "]
6. What's the word we've been talking about? What part of speech is the word *thrive*? How do you know that it is an action word?

Use a *Drawing/Writing* activity for follow-up. Directions: Draw a picture of a plant, animal, or person, including the things they need to thrive and grow well. You might include the sun, water, food, and a place to live. Write a sentence describing your picture, discussing what your living thing needs in order to thrive. Use the word *thrive* in your sentence.

Complete Remainder of the Lesson Later in the Day

The Cycle of Daytime and Nighttime

1B

Extensions

***20** minutes*

Multiple Meaning Word Activity: Stage

Associated Phrase

1. [Show Poster 1M (Stage).] In the read-aloud you heard, "A life cycle includes each *stage* that a living thing goes through from birth to adult." [Have students hold up one or two fingers to indicate which image on the poster shows this meaning.]
2. *Stage* can also mean something else. *Stage* also means a raised platform on which people sing, dance, and act. [Have students hold up one or two fingers to indicate which image on the poster shows this meaning.]
3. [Point to the image of *stage* that shows a theater stage.] With your partner, talk about what you think of when you see this kind of stage. I will call on a few partners to share what they came up with. Try to answer in complete sentences. (When I see this kind of stage, I think of going to see a play with my grandma, acting in the school play, etc.)
4. [Point to the image of *stage* that shows times in the growth or development of something.] With your partner, talk about what you think of when you see this kind of stage. I will call on a few partners to share what they came up with. Try to answer in complete sentences. (When I see this kind of stage, I think of babies growing into adults, times in someone's life, etc.)

Demonstration of Earth's Movements

Rotation: Day and Night

Show students a globe, pointing out the United States and the state in which you live. Point to the tips of the globe's axis and ask: "Who remembers the name of the imaginary central line around which the earth spins, or rotates?" (axis) Spin the globe

counterclockwise if you are looking down at the North Pole to demonstrate this rotation. Remind students that the earth's axis is tilted and always points in the same direction. Ask: "Who remembers which cycle is caused by the rotation of the earth on its axis?" (daytime and nighttime)

Using a flag or pin, mark the approximate location of your town on the globe. Ask: "Who can tell me the name of the imaginary line that goes around the center of the globe and divides the earth into two equal halves?" (the equator) Ask: "Do we live north or south of the equator?" (north)

Darken the room. Ask a volunteer to point the flashlight at the globe while you hold it steady. Tell students that the flashlight represents the sun, and remind them that the globe represents planet Earth. Explain that when the marked area is directly in the path of the sun, it is daytime in your town. Explain that when it is daytime in your town, it is nighttime on the opposite side of the globe or Earth. Point to the area on the globe directly opposite your town. Have students observe that when it is daytime in your town, this area is in shadow. Then slowly spin the globe counterclockwise until that area is directly in the flashlight's beam. Ask students if they can guess whether it is daytime or nighttime in your town when the sun is shining on the opposite side of the globe. Now continue slowly spinning the globe counterclockwise until the flag or pin is once again directly in the beam of light. Remind students that when the earth spins all the way around one time, one whole day—or twenty-four hours—has passed on the earth. Ask: "So the rotation of the earth on its axis causes which cycle?" (daytime and nighttime)

You may wish to use the globe to show students on the globe the position of Earth during sunrise and sunset. As you turn the globe, point to the place on the globe where it moves from the shadow (nighttime) into the light (daytime), relative to their city or town, and tell students that this is sunrise. Point to the place on the globe where it moves from the light (daytime) into the shadow (nighttime). Ask students what we call this time of day. (sunset)

Take-Home Material

Family Letter

Send home Instructional Masters 1B-1 and 1B-2.

The Reasons for Seasons 2

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Recognize that the rotation of Earth causes daytime and nighttime
- ✓ Explain that it takes twenty-four hours for Earth to rotate once on its axis
- ✓ Recognize that living things have a life cycle
- ✓ Recognize that Earth orbits the sun
- ✓ Explain that it takes one year for Earth to orbit the sun
- ✓ Describe the seasonal cycle: spring, summer, autumn, winter
- ✓ Identify that the tilt of Earth's axis in relation to the sun causes the seasons
- ✓ Explain effects of seasonal changes on plants and animals
- ✓ Demonstrate familiarity with the poem "Bed in Summer"

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Identify the main topic of "The Reasons for Seasons" (RI.2.2)
- ✓ Describe the connection between the tilt of the earth as it orbits the sun and the seasons (RI.2.3)

- ✓ With assistance, create and interpret a chart on characteristics of seasons, and connect it to information learned in "The Reasons for Seasons" (RI.2.7)
- ✓ Prior to listening to "The Reasons for Seasons," identify orally what they know and have learned about the rotation of the earth
- ✓ Discuss personal responses to seasonal activities they participate in, and connect those to the seasons

Core Vocabulary

equator, *n.* An imaginary line that divides Earth into the Northern and Southern Hemispheres
Example: The Galapagos Islands are on the equator near Ecuador.
Variation(s): none

hemisphere, *n.* Half of Earth as divided north and south by the equator or east and west by the Prime Meridian.
Example: We live in the Northern Hemisphere because we are north of the equator.
Variation(s): hemispheres

revolves, *v.* Moves in a circular path or orbit around an object
Example: Earth revolves around the sun.
Variation(s): revolve, revolved, revolving

tilt, *v.* To slant or place at an angle
Example: Jonah had to tilt the cookie jar to reach the crumbs at the bottom.
Variation(s): tilts, tilted, tilting

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**		10
	Essential Background Information or Terms		
	Seasons Chart	chart paper, chalkboard, or whiteboard [This exercise requires advance preparation.]	
	Purpose for Listening		
Presenting the Read-Aloud	**The Reasons for Seasons**	globe	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Tilt		5
 **Complete Remainder of the Lesson Later in the Day**			
Extensions	**"Bed in Summer" by Robert Louis Stevenson**		20
	The Sun and the Seasons	Seasons Chart; Image Cards 1–4; Cycles Posters 1, 2	
	Demonstration of Earth's Movements		

The Reasons for Seasons 2A

Introducing the Read-Aloud *10 minutes*

What Have We Already Learned?

Review with students that a cycle is a sequence of events that repeats again and again. Daytime and nighttime happen over and over again, so they are events that repeat again and again in a cycle. In fact, daytime and nighttime make up one of the most important cycles in nature. Daytime and nighttime give living things just the right amount of time to be active and time to rest. Remind students that it takes twenty-four hours, or one whole day and one whole night, for Earth to rotate once on its axis. Daytime happens when the part of Earth you live on faces the sun; nighttime happens when the part of Earth you live on faces away from the sun.

Essential Background Information or Terms

Earth moves in two ways. The first way, rotation, causes daytime and nighttime. Have students demonstrate rotation. For this activity, one student should stand in the center and be the sun. You may wish to create a "sun hat" for this student to wear! The other students can be little Earths. For rotation, have students stand up and turn themselves around in a circle. When students face the sun, they should say, "Daytime!" When their backs are to the sun, they should say, "Nighttime!" Reinforce to students that the sun does not move during the cycle of daytime and nighttime; instead, the earth is rotating, or spinning.

The second way that Earth moves is called revolution. The earth moves, or revolves, in an almost circular path around the sun. Earth makes one revolution, or orbit, around the sun about every 365 days, or every year.

Seasons Chart

Review the four seasons with students. Have students identify the four seasons depicted on the cover illustration. Discuss with students the names and characteristics of the four seasons. Create the following chart on chart paper, a chalkboard, or a whiteboard. Be sure to save it for later use during the extension activity.

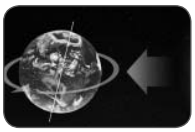
	Spring	Summer	Autumn (or Fall)	Winter
Date Season Begins in the Northern Hemisphere				
Amount of Sunshine				
Temperature in the Northern Hemisphere				
Plants				
Animals				
People's Activities/Clothing				

Tell students that they might already know some information in this chart, and that they will learn the rest during the read-aloud today. Begin to fill in the chart with what students already know about the seasons from prior grades. Students should listen carefully to the read-aloud so they can complete the chart during the Extension activity.

Purpose for Listening

Tell students to listen carefully to hear about the main topic of the read-aloud: how the tilt of the earth affects the amount of sunshine we receive as it orbits the sun. Tell students they are going to hear more about how the tilted earth orbits the sun to cause the seasons.

Presenting the Read-Aloud **15** *minutes*



The Reasons for Seasons

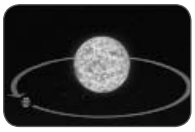
Show image 2A-1: Earth rotating on its axis

Right now, Earth is moving! Even though you cannot feel it, Earth is always moving in space in two ways. The first way the earth moves is called rotation. Rotation is the movement of Earth around its axis. This controls the cycle of daytime and nighttime. The Earth takes twenty-four hours to turn, or rotate, once on its axis. The earth rotates in a counterclockwise direction from daytime to nighttime and back to daytime again.[1] During rotation, the part of Earth that is facing the sun changes. When it is daytime where you are, that means that the part of the earth on which you are standing is facing the sun. Sunlight hits our planet and moves across it from east to west. This is why we see the sun rising in the east and setting in the west.[2] Sunset eventually occurs when certain parts of Earth turn, or rotate, away from the sun, and nighttime begins. This cycle continues over and over again.[3]

1 Counterclockwise means to move in the opposite direction from the hands on a clock. [Demonstrate counterclockwise for students.]

2 [Show students which way is east and which way is west in your classroom.]

3 Stand up and turn or rotate one time moving in a counterclockwise direction. Your full rotation models the earth's rotation as it completes one full twenty-four hour cycle.



Show image 2A-2: Diagram of Earth revolving around the sun

The second way the earth moves is called revolution. Earth **revolves,** or orbits, around the sun in an almost circular path. Therefore, as you live on Earth, you are traveling around the sun, too. It takes Earth 365¼ days—or one year—to complete one revolution, or orbit. You might be wondering about the ¼ of a day. This ¼ explains why we have a leap year every four years. During a leap year, we add on one additional day to the calendar to catch it up to Earth's orbit around the sun.[4]

4 Four quarters equal one whole, or one whole number, just like four quarters equal one dollar.

Earth is tilted as it orbits the sun. **Tilt,** or slant, your head to one side. The earth remains at this same angle and points in the same direction throughout its entire orbit. Now let's find out more about how Earth's tilt causes the seasonal cycle.

Show image 2A-3: Orange cut into halves and Earth cut into hemispheres

Earth is divided into **hemispheres**, or halves. Just like an orange can be cut in half either through the center from side to side or from the top to the bottom, Earth can also be divided two different ways. Our planet is divided in half into the northern and southern hemispheres by an imaginary line on its surface called the **equator.** The equator is the same distance from the North Pole as it is from the South Pole. The United States, where we live, is located in the Northern Hemisphere. Earth can also be divided into two halves called the eastern and western hemispheres. These hemispheres are divided by the Prime Meridian, an imaginary line used to split Earth into eastern and western halves. [5]

5 [Locate the equator, the North Pole, the South Pole, and the Prime Meridian on the globe for students.]

Show image 2A-4: Northern summer

When the Northern Hemisphere is tilted toward the sun during Earth's revolution around the sun, it receives more intense light from the sun at a more direct angle. [6] During this time it is summer in the Northern Hemisphere. Around June 21 each year, the sun reaches its highest point overhead in the Northern Hemisphere. This is called the summer solstice and is referred to as the longest day of the year. That means that there is daylight for a longer period of time on that day than on any other day of the year.

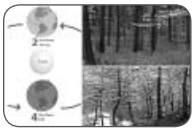
6 [Shine a light on the tilted globe to demonstrate the more direct angle of intense sunlight.]

People in the Southern Hemisphere are experiencing winter while people in the Northern Hemisphere are experiencing summer. On June 21 in the Southern Hemisphere, that part of Earth is tilted away from the sun, with the sun at a low angle in the sky. The sunlight is not as strong or as intense, and there is less of it, so that part of Earth receives less light and less energy than the Northern Hemisphere. June 21 is the winter solstice, or shortest day of the year, in the Southern Hemisphere. It is the opposite of the Northern Hemisphere. [7]

7 North and south are opposites, just like summer and winter are opposites.

Show image 2A-5: Northern winter

As Earth revolves around the sun, the seasons begin to change depending on which hemisphere is tilted most directly toward the sun. This depends on where Earth is on its revolution, or orbit, around the sun. One revolution takes one year, and each hemisphere is tilted directly in the sun for part of the year. Six months after the longest day in the Northern Hemisphere, the shortest day occurs. The winter solstice in the Northern Hemisphere is on December 21. This is, of course, the longest day of the year, or summer solstice, in the Southern Hemisphere. They are opposites!



Show image 2A-6: Northern spring and fall

When Earth is halfway between the two solstices, both hemispheres receive the same amount of sunlight. This means that the hours of daylight and of darkness are the same in each hemisphere. The days that are equal are called equinoxes. The spring equinox occurs at the beginning of spring on March 21. The autumn equinox occurs at the beginning of autumn on September 21.

The cycle of one complete orbit or revolution of Earth around the sun marks or measures one year. Living things respond to the changes in sunlight and warmth throughout the four seasons of the year. With increased sunlight and warmth during spring and summer, many living things tend to grow well. Animals are born and plants grow. With decreased sunlight during autumn and winter, some plants are ready to be harvested, whereas others die. Some become dormant—or become inactive, and stop growing and making new leaves for the winter—and wait for the sunlight to return. You will see that most trees do this in the fall and winter. Some animals, to avoid the winter chill, hibernate or migrate. When animals migrate, they move to warmer environments. [8]

8 Think of two words that describe each season.

Show image 2A-7: Light hitting Earth

Not every part of Earth experiences seasons, though. Different areas of Earth have different types of weather. This is partly because of the shape and tilt of our planet. This means that different parts of Earth receive different amounts of sunlight and warmth. The area around the equator receives the greatest amount of direct intense sunlight, so some of the warmest parts of Earth are located in that part of the planet. The North and South Poles are at opposite ends of our planet and they receive the least direct sunlight. In fact, although they are so far apart, they have the same kind of weather as each other. It is always cold in the North and South Poles, and both places are usually covered with ice.

Show image 2A-8: Four seasons

In the next lesson you will learn more about the cycle involving the four seasons and how each season brings with it an ever-changing landscape. Which season is your favorite?

Discussing the Read-Aloud **15** *minutes*

Comprehension Questions **10** *minutes*

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Evaluative* What is the main topic of the read-aloud? (The main topic of the read-aloud is how the tilt of the earth orbiting the sun causes the seasons.)
2. *Literal* Name the four seasons in order. (Spring, summer, autumn, and winter repeat again and again in the same order.)
3. *Literal* How long does it take Earth to orbit or revolve around the sun? (It takes Earth one year to revolve around the sun.)

4. *Literal* The equator divides Earth into which two hemispheres? (The equator divides Earth into the Northern and Southern Hemispheres.)

5. *Inferential* The first day of summer is called the summer solstice. What is special about this particular day? (It is the day with the greatest number of daylight hours during the year.) The first day of winter is called the winter solstice. What is special about this particular day? (It is the day with the least number of daylight hours during the year.)

6. *Inferential* What do the first day of spring and the first day of autumn have in common? (On both of these days, or equinoxes, there is an equal amount of daylight and darkness over the entire Earth.)

7. *Inferential* How are plants and animals affected by the seasonal cycle? (With more sunshine and food in spring and summer, plants and animals thrive. In autumn, as the weather cools, many plants are harvested. As winter approaches, some plants die or become inactive, while some animals hibernate or migrate.)

8. *Literal* Does the part of the earth near the equator experience seasons? (No, this part of the earth receives the most amount of intense sunshine. It is always warm.)

9. *Literal* Do the North and South poles experience seasons? (No, they do not. They are on the opposite ends of our planet, are almost always cold, and often covered with ice.)

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a couple of questions. I will give you a minute to think about the questions, and then I will ask you to turn to your neighbor and discuss the questions. Finally, I will call on several of you to share what you discussed with your partner.

10. *Evaluative* *Think Pair Share:* What activities have you participated in during a particular season? Would it be possible to do these activities during a different season? Why or why not? (Answers may vary.)

11. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Tilt

5 *minutes*

1. In the read-aloud you heard, "*Tilt* . . . your head to one side. "
2. Say the word *tilt* with me.
3. *Tilt* means to slant or place at an angle.
4. Andrea will have to tilt her water bucket so that every drop can spill out onto her plants.
5. When do you tilt your head? First, tilt your head to the left and then to the right. Try to use the word *tilt* when you talk about it. Why might you tilt your head? [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "I tilt my head when . . . "]
6. What's the word we've been talking about? What part of speech is the word *tilt*? How do you know that it is an action word?

Use a *Discussion* activity for follow-up. Directions: Describe other objects that you tilt when you use them. Be sure to begin your responses with "An object we tilt is . . . "

Complete Remainder of the Lesson Later in the Day

The Reasons for Seasons 2B

Extensions — *20 minutes*

"Bed in Summer" by Robert Louis Stevenson

Show image 2B-1: Bed in Summer

Tell students that you are now going to read a poem titled "Bed in Summer," by Robert Louis Stevenson. Tell them to listen carefully to find out how this poem relates to the tilt of the earth and to what they have learned about the seasonal cycle.

Bed in Summer
by Robert Louis Stevenson

In winter I get up at night
And dress by yellow candle-light.
In summer, quite the other way,
I have to go to bed by day.

I have to go to bed and see
The birds still hopping on the tree,
Or hear the grown-up people's feet
Still going past me in the street.

And does it not seem hard to you,
When all the sky is clear and blue,
And I should like so much to play,
To have to go to bed by day?

Discuss with students how the tilt of the earth changes the amount of sunlight we get in each season. Do we get more sunlight in the summer or in the winter? You may wish to ask the following questions:

- Why does Robert Louis Stevenson say, "In winter I get up at night"?

- Why does he say, “In summer, quite the other way, I have to go to bed by day”?
- How does the poet feel about going to bed in summer?
- Have you ever gone to bed while it was still light outside? If yes, was it easy or hard to fall asleep?
- Does your family let you stay up later during the summer, or do you have to go to bed during daylight hours like the poet did?

Share with students that this poem was written in the 1800s, when people did not have electricity like we do today. Explain that when it became dark at night (earlier in seasons other than summer), people could not do as many things with just the light of candles, and so they often went to bed earlier.

The Sun and the Seasons

Continue the class Seasons Chart you started in the lesson introduction. Ask students if they can add any new information they learned from the read-aloud about each season in each of the categories. You may wish to use Image Cards 1–4 and Cycles Posters 1 and 2. You may also wish to use the following chart as a guide:

	Spring	Summer	Autumn (or Fall)	Winter
Date Season Begins in the Northern Hemisphere	Spring Equinox; on March 21	Summer Solstice; on June 21	Autumn Equinox; on September 21	Winter Solstice; on December 21
Amount of Sunshine	Roughly the same number of daylight and dark hours	More daylight hours than dark hours; it stays light out later.	Roughly the same number of daylight and dark hours	Fewer daylight hours than dark hours; it gets dark earlier.
Temperature in the Northern Hemisphere	Warmer	Hotter	Cooler	Colder
Plants	Trees grow new leaves; flowers start to bloom; crops are planted.	Plants and crops grow as they absorb more sunlight.	Leaves change color and begin to fall; farmers harvest crops.	Leaves have fallen from deciduous trees; many plants die.
Animals	Birds return and animals wake up; many animals have babies.	Animals raise their babies.	Many birds migrate; many animals prepare for winter by collecting food.	Many animals hibernate or migrate; there are not as many birds.
People Activities/Clothing	Starting a garden; flying kites; etc.	More time outdoors; lighter clothing; swimming; picnics; etc.	Back to school; harvesting crops; etc.	More time indoors; heavier clothing; ice skating; skiing; etc.

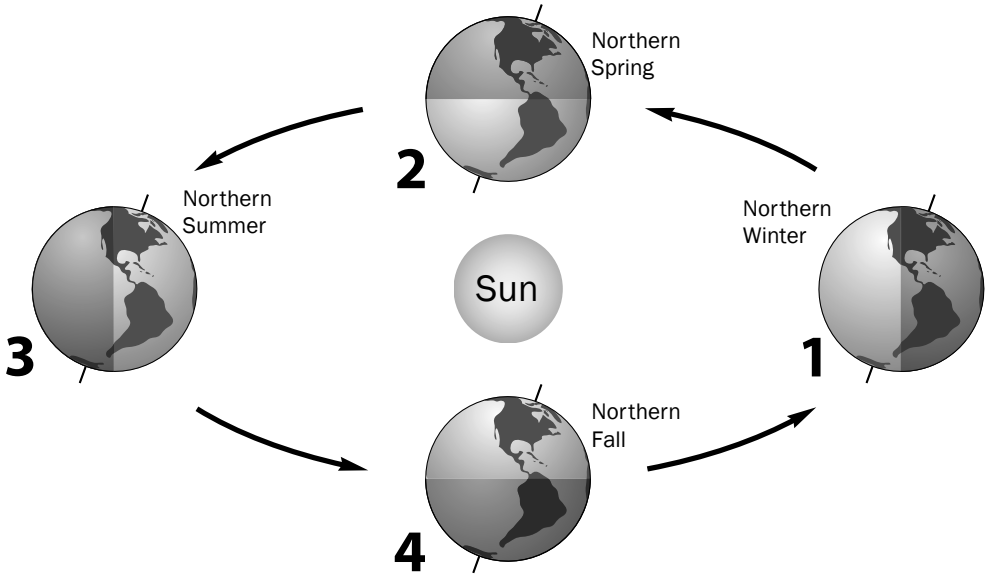
Demonstration of Earth's Movements

Revolution/Orbit and Tilt: One Year/Four Seasons

Place a large hoop on the floor, and tell students that you will now pretend that the large hoop is the sun. Explain that the sun is much larger than the earth—much larger than the difference between the large hoop and the globe. Remind students that the earth does not just rotate, or spin in place on its axis; it also travels around, or orbits, the sun at the same time. Walk counterclockwise around the large hoop while holding and rotating the globe counterclockwise. Be sure to keep the tilt of the globe facing in the same direction, i.e., toward the same wall or corner of the room. Remind students that it takes one year for the earth to orbit, or travel all the way around, the sun.

Remind students that the axis of the earth is not straight up and down. Point to the tips of the globe's axis and ask: "Who remembers the word that means slanted, or placed at an angle?" (tilted) Remind students that the axis of the earth is always tilted in the same direction. Have students finish the following sentence: The tilt of the earth in relation to the sun causes the _____ (seasonal cycle or four seasons)

If you haven't done so already, using a flag or pin, mark the approximate location of your town on the globe, and ask: "Do we live north or south of the equator?" (north) Tell students that you are going to show them how the orbit of the tilted earth causes the seasons where they live.



Darken the room. Ask a volunteer to stand in the middle of the large hoop and point the flashlight at the globe while you hold it steady in Position 1. (Northern Winter) Tell students the flashlight and large hoop represent the sun. Say: "When the North Pole is tilted away from the sun, the northern half of the earth does not receive as much direct sunlight; we have fewer daylight hours. When our daylight hours decrease, the temperatures become colder. Which season is it when we have fewer daylight hours and colder temperatures?" (winter) Rotate the globe one time. Say: "This is the first day of winter."

Note: You may wish to explain that even though you will stop several times during this demonstration to explain something, the earth never stops moving as it rotates on its axis and orbits around the sun.

Ask another volunteer to stand in the middle of the large hoop and point the flashlight at the globe, turning and keeping the light on the globe while you revolve counterclockwise a quarter of the way around and stop at Position 2. (Northern Spring) Rotate the globe one time and say, "The tilted earth has continued to orbit the sun, and it is now the first day of spring. Both poles receive light, and the daylight hours begin to increase. When daylight hours increase, the temperatures become warmer. Which season follows winter when we begin to have more daylight hours and warmer temperatures?" (spring) Ask another volunteer to stand in the middle of the large hoop and point the flashlight at the globe, turning and keeping the light on the globe while you revolve counterclockwise a quarter of the way around and stop at Position 3. (Northern Summer) Rotate the globe one time and say: "The tilted earth has continued to orbit the sun, and now it is the first day of summer. The North Pole is tilted toward the sun, and the northern half of the earth receives more direct sunlight. When daylight hours increase, the temperatures become hotter. Which season follows spring when we have more daylight hours and hotter temperatures?" (summer)

Ask another volunteer to stand in the middle of the large hoop and point the flashlight at the globe, turning and keeping the light on the globe while you revolve counterclockwise another quarter of the way around and stop at Position 4. (Northern Fall) Rotate the globe one time and say: "The tilted earth has continued to orbit

the sun, and it is now the first day of fall. Once again both poles receive light. The amount of daylight begins to decrease. When daylight hours decrease, the temperatures become cooler. Which season follows summer when we begin to have fewer daylight hours and cooler temperatures?" (autumn or fall)

Ask another volunteer to stand in the middle of the large hoop and point the flashlight at the globe, turning and keeping the light on the globe while you revolve counterclockwise another quarter of the way around and stop back at Position 1. (Northern Winter) Say: "So how much time has passed now that Earth has orbited the sun one time? (one year) What season follows fall and begins another seasonal cycle?" (winter)

Four Seasons in One Year 3

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Recognize that living things have a life cycle
- ✓ Describe the seasonal cycle: spring, summer, autumn, winter
- ✓ Identify that the tilt of Earth's axis in relation to the sun causes the seasons
- ✓ Explain effects of seasonal changes on plants and animals
- ✓ Describe animal processes in spring, summer, autumn, winter
- ✓ Demonstrate familiarity with the poem "Bee! I'm expecting you!"

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Identify the main topic in "Four Seasons in One Year" (RI.2.2)
- ✓ Describe the connection between the tilt of the earth as it orbits the sun and the seasons (RI.2.3)
- ✓ Compare and contrast the amount of sunlight the Northern Hemisphere receives during the summer with the amount of sunlight the Northern Hemisphere receives during the winter and the effects of both on plant and animal life (RI.2.9)

- ✓ Ask and answer *why* questions orally to gather information or deepen understanding of the information contained in "Four Seasons in One Year" (SL.2.3)
- ✓ Identify new meanings for the word *buds,* and apply them accurately (L.2.5a)
- ✓ Use knowledge of the meaning of individual words to predict the meanings of compound words
- ✓ Discuss personal connections to the length of shadows at different times of the day and the rotation of the earth

Core Vocabulary

absorbed, *v.* Something that has been taken in and soaked up
Example: Sunlight and water are absorbed by plants.
Variation(s): absorb, absorbs, absorbing

adapt, *v.* To adjust or change to better suit one's environment
Example: Many foxes that normally live in the wild have learned to adapt to a city environment.
Variation(s): adapts, adapting, adapted

migrate, *v.* To move from one area to another based on the seasons
Example: The flocks of wild geese prepare to migrate south before the first snow of each winter.
Variation(s): migrates, migrated, migrating

minimum, *n.* The least amount possible
Example: Bake the cookies for a minimum of ten minutes; otherwise, they might be too soft inside.
Variation(s): none

photosynthesis, *n.* the process in green plants that uses light to turn water and air into food when the plant is exposed to sunlight
Example: Plants use photosynthesis to make their own food.
Variation(s): none

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	globe; Seasons Chart	10
	Personal Connections		
	Purpose for Listening		
Presenting the Read-Aloud	**Four Seasons in One Year**	compass (optional)	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Adapt		5
 **Complete Remainder of the Lesson Later in the Day**			
Extensions	**"Bee! I'm expecting you!" by Emily Dickinson**		20
	Multiple Meaning Word Activity: Buds	Poster 2M (Buds)	
	Syntactic Awareness Activity		

Four Seasons in One Year 3A

Introducing the Read-Aloud *10 minutes*

What Have We Already Learned?

Review with students the cycles of Earth's two movements that they have learned about in previous lessons. Have students demonstrate rotation, the movement of Earth that causes daytime and nighttime. For this activity, one student should stand in the center and be the sun. You may wish to create a "sun hat" for this student to wear! The other students can be little Earths. For rotation, have students stand up and turn themselves around in a circle. When students face the sun, they should say, "Daytime!" When their backs are to the sun, they should say, "Nighttime!" Ask students how long it takes Earth to make one rotation.

The second way that Earth moves is called revolution. Revolution is the action of moving around something in a path that is similar to a circle. Earth makes one revolution around the sun about every 365 days, or every year. Have students demonstrate the revolution of Earth around the sun. Have another student stand in the center and be the sun. The other students can be little Earths, stand up, and walk around the sun. Students should tilt their heads to one side as they walk around the sun to demonstrate the earth's tilt that causes seasons. Ask students how long it takes the earth to make one revolution.

Have students identify the names and characteristics of the four seasons. Use the Seasons Chart from the previous lesson to review. Now, review with students that a hemisphere is a half of the earth, and that they live in the Northern Hemisphere.

Personal Connections

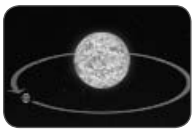
Ask students if they have ever noticed how the length of their shadow changes at different times of the day. Ask them if they have noticed that their midday shadow is shorter than their

morning shadow. Have students discuss why that might be, and link the differences in shadow lengths to the earth turning away from the sun throughout the day.

Purpose for Listening

Tell students to listen carefully to find out the main topic of today's read-aloud: the causes of the seasons and the characteristics of each season. In particular, pay attention to the effect intense sunlight has on all living things.

Presenting the Read-Aloud — **15** *minutes*



Four Seasons in One Year

Show image 3A-1: Earth revolving around the sun[1]

Do you know why many plants grow more rapidly during the summer and more slowly, or not at all, during the winter? Or why some animals migrate, whereas others hibernate?[2]

Only certain parts of our planet have seasons. This is because of the shape and tilt of Earth. The region around the equator receives the greatest amount of direct, intense sunlight. This region of Earth is called a tropical region because it is almost always hot and humid.[3] The North and South Poles receive the least amount of direct sunlight. They are the polar regions of Earth. Generally, they remain cold and dry. In recent years, however, as Earth's overall climate has changed and has become warmer, the polar regions are warming up too, and some of the ice caps in this region have been melting.[4] The region between the poles, on either side of the equator, is called the temperate region. In this region of the world, where we live, most places experience all four seasons of the year.[5]

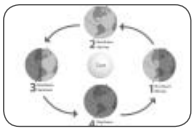
1 [Refer students to the image.] How long does it take for the earth to complete one full orbit around the sun? (It takes the earth 365¼ days, or one year, to complete one full orbit around the sun.)

2 When an animal migrates, it leaves to spend winter in a warmer place. When an animal hibernates, it finds a special place to rest until spring.

3 [Locate the equator and tropical regions on the globe for students.]

4 [Locate the North Pole, South Pole, and polar regions on the globe for students.]

5 [Locate the temperate regions and the United States on the globe for students.]



Show image 3A-2: Four seasons in Northern Hemisphere

Remember, during the time of year when the Northern Hemisphere is tilted toward the sun, this part of our world receives more daylight and more intense sunlight. This means it is summertime in the Northern Hemisphere. At the same time, the Southern Hemisphere is tilted away from the sun, so it is winter there.[6] That's why, as Earth revolves around the sun, and is tilted on an axis, the seasons change. Now let's discover more information about each specific season.

As each year passes in the temperate region of the world, changes occur in the weather. These weather cycles have been divided up into what we call the seasons. Each season brings with it incredible changes in the world around us.

6 [Have students locate the Northern Hemisphere and Southern Hemisphere on the globe. Remind them that we live in the Northern Hemisphere.]

Show image 3A-3: Spring

In spring, daylight hours increase and the sunlight becomes much stronger. With warmer weather, more rain begins to fall. With increased light, warmth, and rain, plants begin to grow again. Seeds resting in the soil begin to take root. The warmth from the sun and the rainfall enables plant seeds to germinate, or begin to grow into plants.

You have probably heard the saying "April showers bring May flowers."[7] New plants emerge, and plants that have been inactive for the winter become active and start growing again. As buds and leaves form, water **absorbed,** or taken in, by the plant travels up the stem to the leaves.[8] Plants use water and sunlight to make their own food, as well as oxygen for us to breathe. This process is called **photosynthesis.** It is during springtime that this great burst of life and energy occurs.[9]

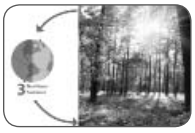
7 We learned this saying in the *Seasons and Weather* domain in Kindergarten.

8 Here, the word *buds* means small parts that grow on trees and develop into flowers. The word *buds* also means friends.

9 Name some flowers that we typically see in spring.

Springtime also sees the return of animals that had migrated, or moved to warmer places during the wintertime. It is also the time when some animals wake up from their winter hibernation. Spring is when many animals give birth to their young. Animals give birth either by bearing live young or by laying eggs. Animals that give birth to live young have nourished their young inside their bodies.[10] Animals that hatch from eggs have been nourished by a yolk within the egg.

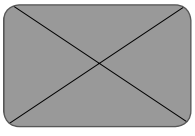
10 What do we call animals that give birth to live young? (Animals that give birth to live young are called *mammals*.)



Show image 3A-4: Summer

Because the Northern Hemisphere receives more intense sunlight from the sun at a more direct angle in the summer, temperatures are usually at their highest during these months. With the increase of light and heat in the summer, plants grow big and strong. Young animals are born and grow strong during this fruitful time, as well.[11]

11 What kinds of baby animals do we often see in spring and summer?



Show image 3A-5: Autumn

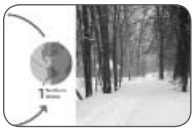
As the earth revolves, and summer turns to autumn, both the temperature and the environment begin to change again. In autumn, while it is still warm, light from the sun is not as intense, and the growth and development of plants and animals begins to slow down.

In many places in the Northern Hemisphere, autumn is a time to harvest the crops that have grown and ripened beneath the summer sun. Grass crops are harvested, and grapes are picked from the vines. Fruits such as apples, pears, and pumpkins are ready to be eaten. As the amount of daylight lessens, and the temperature continues to drop, the leaves of many trees change color. During this time in many parts of the Northern Hemisphere, a world of copper, bronze, red, and orange leaves is a sight to behold.

Leaves change color in autumn because deciduous trees receive less sunshine than they need to produce food, and photosynthesis stops. When photosynthesis stops, these leaves begin to die and fall off. [12] Therefore, deciduous trees are trees that have leaves that change color and fall off. [13]

12 The word *deciduous* comes from the Latin word *decidere,* meaning to fall down, or fall off.

13 What other kinds of trees are there? (evergreen)



Show image 3A-6: Northern winter

When winter arrives, it means that this part of Earth is now tilted away from the sun and temperatures and sunlight are at a **minimum**. [14] It also means that summer has arrived in the Southern Hemisphere. Because conditions are less favorable for living things in winter, growth and development slows down, and even stops.

14 Minimum is the smallest amount possible.

During winter, deciduous trees rely on the food they previously produced and converted into energy. This food supply is stored in their roots. During winter, deciduous trees, as well as many other plants, enter a dormant state.

Show image 3A-7: Animals in winter

In winter, some animals whose food source is affected by the change in climate **migrate,** or leave for warmer places. These animals sense the change in daylight and temperature and begin their annual migration. Migration is part of a yearly cycle of changes. Some birds, for example, travel long distances to their winter homes. They prepare for their migration by eating lots of food they can store as energy to use on their journey. Mammals such as caribou and elk migrate across vast expanses of land, and even fish migrate in winter in search of warmth and food.

Like many plants that lay dormant in winter, there are animals that hibernate. Hibernation is a kind of deep sleep. Like the deciduous trees, animals that hibernate rely on the food they have stored in their bodies to get them through the winter months. [15]

15 Can you name some animals that hibernate and some animals that migrate?

There are also animals that stay in their natural habitat through the colder months and survive as best they can. Animals such as foxes, deer, and rabbits search for food on the frozen land. Some build snug homes to keep out the cold. They have learned to **adapt,** or adjust, to their ever-changing environment. People adapt, too. They prepare for the cold months ahead by wearing warmer clothes and even changing the foods they eat. How do you prepare for autumn and winter?

Show image 3A-8: Spring again

We are all part of this never-ending cycle. When spring returns, the cycle of growth will begin all over again and new life will appear on the earth.

Discussing the Read-Aloud ***15** minutes*

Comprehension Questions **10** *minutes*

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Evaluative* What is the main topic of today's read-aloud? (The main topic of today's read-aloud is the seasonal cycle.)
2. *Inferential* Why do plants grow more rapidly during the summertime than during other seasons? (Plants grow more rapidly in summertime than during other seasons because it is the warmest time of the year and there is more intense sunlight.)

3. *Inferential* Why do only some parts of our planet have seasons? (Only some parts of our planet have seasons because of the shape and tilt of the earth. The region around the equator is always hot and humid and does not have seasons.)

4. *Literal* If it is summer in the Northern Hemisphere, what season is it in the Southern Hemisphere? (If it is summer in the Northern Hemisphere, it is winter in the Southern Hemisphere.)

5. *Inferential* Why do some animals migrate south in the fall and return north in the spring? (Some animals migrate south in the fall to escape the cold of winter.)

6. *Literal* In which season do most animals give birth to their young? (Most animals give birth to their young in the spring.)

7. *Literal* In which season are many crops harvested? (Many crops are harvested in autumn.)

8. *Inferential* Why do some trees shed their leaves? (Deciduous trees shed their leaves in the autumn and use stored energy during the cold winter months. They go into a dormant, or inactive, state until spring arrives and it becomes warmer.)

9. *Evaluative* How do people adapt to winter and summer? (Answers may vary.)

[Please model the *Question? Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

10. *Evaluative* *Why? Pair Share:* Asking questions after a read-aloud is one way to see how much everyone has learned. Think of a question you can ask your neighbor about the read-aloud that starts with the word *why.* For example, you could ask, "Why is there more sunlight in the summer?" Turn to your neighbor and ask your *why* question. Listen to your neighbor's response. Then your neighbor will ask a new *why* question, and you will get a chance to respond. I will call on several of you to share your questions with the class.

11. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Adapt

5 *minutes*

1. In the read-aloud you heard, "[Animals] have learned to *adapt* . . . to their ever-changing environment."
2. Say the word *adapt* with me.
3. The word *adapt* means to change or adjust to make it easier to live in one's environment.
4. Foxes have learned to adapt to a suburban environment.
5. Can you think of other things in nature that adapt? Try to use the word *adapt* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "People _____ to the changing climate . . . "]
6. What's the word we've been talking about? What part of speech is the word *adapt*? How do you know that it is an action word?

Use a *Discussion* activity for follow-up. Directions: Talk to your partner about how you have adapted to second grade. What are the differences between first grade and second grade? How might you adapt next year in third grade?

Complete Remainder of the Lesson Later in the Day

Four Seasons in One Year 3B

Extensions — *20 minutes*

"Bee! I'm expecting you!" by Emily Dickinson

Show image 3B-1: Bee

Tell students that you are going to read a poem by Emily Dickinson entitled "Bee! I'm expecting you!" Discuss with students the meaning of *expecting*. When you are expecting someone, you are waiting for them to arrive, or come. Tell students that the following poem is written in the form of a letter. Tell students that the title of the poem tells them that the letter is written to a bee. Review with students that they met a honeybee named Polly in the *Plants* domain in Kindergarten.

Bee! I'm expecting you!
by Emily Dickinson

Bee! I'm expecting you!
Was saying Yesterday
To Somebody you know
That you were due—

The Frogs got Home last Week—
Are settled, and at work—
Birds, mostly back—
The Clover warm and thick—

You'll get my Letter by
The Seventeenth; Reply
Or better, be with me—
Yours, Fly.

Ask students who is speaking in the poem. Ask: "Why is the fly expecting the bee? What season is coming?" (spring) Help students make the connection between the word *expecting* and the repeating aspect of the seasonal cycle.

Multiple Meaning Word Activity: Buds

Associated Phrase

1. [Show Poster 2M (Buds).] In the read-aloud you heard, "As *buds* and leaves form, water absorbed . . . by the plant travels up the stem to the leaves." [Have students hold up one, two, or three fingers to indicate which image on the poster shows this meaning.]
2. *Buds* can also mean something else. *Buds* also means the small spots on your tongue that you use to taste. [Have students hold up one, two, or three fingers to indicate which image on the poster shows this meaning.]
3. *Buds* can also mean something else. *Buds* also means your friends or pals. [Have students hold up one, two, or three fingers to indicate which image on the poster shows this meaning.]
4. [Point to the buds that shows taste buds.] With your partner, talk about what you think of when you see this kind of buds. I will call on a few partners to share what they came up with. Try to answer in complete sentences. (When I see this kind of buds, I think of licking an ice cream cone, tasting something spicy, etc.)
5. [Point to the buds that shows friends or pals.] With your partner, talk about what you think of when you see this kind of buds. I will call on a few partners to share what they came up with. Try to answer in complete sentences. (When I see this kind of buds, I think of playing with friends after school, etc.)
6. [Point to the buds that shows tiny flowers on tree branches.] With your partner, talk about what you think of when you see this kind of buds. I will call on a few partners to share what they came up with. Try to answer in complete sentences. (When I see this kind of buds, I think of springtime, etc.)

Syntactic Awareness Activity: Compound Words

The purpose of these syntactic activities is to help students understand the direct connection between grammatical structures and the meaning of text. These syntactic activities should be used in conjunction with the complex text presented in the read-alouds.

Note: There may be variations in the sentences created by your class. Allow for these variations, and restate students' sentences so that they are grammatical.

1. Two words can be added together to form a new word, called a compound word. If you know the meaning of the two words, you will most likely be able to tell the meaning of the new compound word.
2. We already know lots of compound words. Listen carefully to see if you can tell which two words make up each compound word:
   - Bedtime = bed + time (Time to go to bed!)
   - Notebook = note + book (A book in which you write notes!)
   - Bathroom = bath + room (A room where you take a bath!)
3. When we know the meaning of the individual words, we can more easily predict the meaning of compound words.
4. In the read-aloud you heard, "Springtime also sees the return of animals that had migrated . . . to warmer places during the wintertime."
5. *Springtime* is one compound word in this sentence. Which two words do you hear? (*spring* and *time*)
6. What is spring? (the season with flowers)
7. What is time? (when you do something)
8. Use what you know about these two words to predict the meaning of *springtime*: The time when it is spring!
9. *Wintertime* is one compound word in this sentence. Which two words do you hear? (*winter* and *time*)
10. What is winter? (the coldest season)

11. What is time? (when you do something)
12. Talk to your partner about what *wintertime* might mean.
13. Now you try! Draw a picture of a compound word, as well as pictures of the individual words that make up the compound word: *sunlight, firefly, flashlight, moonlight, grasshopper,* etc. Last, write a sentence about your compound word on the back of your paper. Share your drawing and writing with a partner or small group.

The Life Cycle of a Plant 4

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Describe the seasonal cycle: spring, summer, autumn, winter
- ✓ Explain effects of seasonal changes on plants and animals
- ✓ Define the term *life cycle*
- ✓ Identify the stages of the life cycle of a flowering plant (seed to seed)

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Identify the main topic of "The Life Cycle of a Plant" (RI.2.2)
- ✓ Compare and contrast the amount of sunlight and temperatures during summer and winter and the effects of both on plant and animal life (RI.2.9)
- ✓ Ask and answer *what* questions orally to gather information or deepen understanding of the information contained in "The Life Cycle of a Plant" (SL.2.3)
- ✓ Identify new meanings for the word *bats,* and apply them accurately (L.2.5a)
- ✓ Sequence four to six pictures illustrating the life cycle of a sunflower

Core Vocabulary

attracted, *v.* To make someone or something interested in someone or something else
Example: The bright, colorful signs attracted customers to the bake sale.
Variation(s): attract, attracts, attracting

emerge, *v.* To come out into view; to become visible
Example: At the beginning of spring, bears emerge from their long winter hibernation.
Variation(s): emerges, emerged, emerging

pollinators, *n.* Something that carries pollen to a plant to enable pollination to occur
Example: Insects are perhaps our planet's most important pollinators; we need them so that we can have beautiful flowers and plants to eat.
Variation(s): pollinate, pollinating, pollination

protective, *adj.* Intended to protect or shelter something or someone
Example: Many nuts have a protective outer layer called a shell.
Variation(s): none

reproduce, *v.* To make babies or new plants
Example: Plants need pollen from other plants in order to reproduce, or make seeds for new plants.
Variation(s): reproduces, reproduced, reproducing

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	Image Cards 1–4	10
	Purpose for Listening		
Presenting the Read-Aloud	**The Life Cycle of a Plant**		15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Protective		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Vocabulary Instructional Activity: Process**		20
	Sequencing the Life Cycle of a Plant	Instructional Master 4B-1; glue or tape; drawing tools	

The Life Cycle of a Plant

4A

Introducing the Read-Aloud — *10 minutes*

What Have We Already Learned?

Remind students that during the last few lessons they learned about the seasonal cycle. Have students identify characteristics of the four seasons, including which plants and animals they see most often during each season. Show students Image Cards 1–4 to help guide the students' discussions and to help them formulate answers. You may wish to have students sequence Image Cards 1–4. Tell students that in today's lesson they are going to learn about another cycle in nature.

Purpose for Listening

Remind students that each of the four seasons has different characteristic temperatures and amounts of sunlight. Plants and animals are affected by the temperatures and sunlight in each season. Ask students to listen carefully to today's read-aloud to find out about the main topic: the life cycle of a flowering plant.

Presenting the Read-Aloud — **15** *minutes*

The Life Cycle of a Plant

Show image 4A-1: New plant life

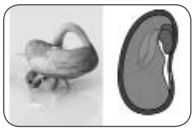
All living things pass through stages from birth to adult called a life cycle. For many living things, the cycle of life follows the four seasons of the year.[1] For some living things, the cycle of life is short and is completed in just days, months, or a single year. For other living things, the cycle of life continues for many, many years.[2]

1 Name the four seasons in order.

2 Some living things have longer life spans than others. Some flies only live for a few days, but people can live to be over one hundred years old!

Show image 4A-2: Flowering plants

Today you will learn about the life cycle of a flowering plant. Just think about all the flowering plants you see in the parks, yards, gardens, fields, and meadows. Our world is awash with colorful, vibrant flowering plants. How do these plants grow and **reproduce,** or make seeds for new plants? Let's find out.



Show image 4A-3: Germination

A flowering plant begins its life cycle as a seed. Seeds need special conditions to germinate, or begin to grow. Spring provides seeds with the right conditions to grow. Therefore, the life cycle of a flowering plant begins in spring.

In spring, there is more sunlight and temperatures are warmer.[3] Seeds need just the right amount of light from the sun, nutrients from the soil, and water in order to grow. Once the seed germinates, or sprouts, it grows and develops into a young plant with roots, a stem, and leaves.[4] The first leaves unfold to allow photosynthesis to begin. Photosynthesis is the process by which plants make their own food, as well as oxygen. Plants use sunlight and water to make food in the form of glucose, a type of sugar.

3 Why is there more sunlight and warmth in spring? (Temperatures begin to increase in spring because wherever this season is occurring, that part of earth is now facing the sun and receiving more sunlight.)

4 Roots, stem, and leaves are the three main parts of a young plant.

Show image 4A-4: Interior of flower

In the warmth of spring and summer, plants continue to grow. The young plant is called a seedling. Gradually, a plant's stem will grow taller and true leaves will **emerge**.[5] Once the plant matures, or become an adult plant, flowers appear.

5 The word *emerge* means to become visible, or able to be seen.

In order for a flowering plant to reproduce, or produce seeds that will make new flowering plants, it must be pollinated. Pollination is when pollen from one flower mixes with the pollen of another flower so that the plant can make seeds.

But how is pollen transferred from one place to another? In other words, how does pollination occur? Flowering plants need **pollinators** to help them with pollination. Pollinators are insects, birds, and other animals that are **attracted** to the shape, fragrance, or color of a flower. Without pollinators, most flowering plants would not produce seeds and fruit.[6]

6 Remember, plants need pollen from other plants in order to make seeds. Pollinators carry pollen from flower to flower.

Show image 4A-5: Insect pollinators

There are many types of pollinators, such as birds and small mammals, but insects are the number-one pollinators of flowering plants. The flowers of a flowering plant are designed to attract various pollinators, especially insects. The shape, fragrance, and color of the flower, as well as the sweet-tasting nectar contained within the flower itself, attract many different kinds of insects. As insects move from flower to flower, the sticky substance called pollen clings to their bodies and is transferred, not only within a flower, but from flower to flower.[7]

7 Honeybees, bumblebees, ants, moths, beetles, and flies are just some of the insect pollinators.

Honeybees are the most common pollinators. They carry out more pollination than any other insect. Some scientists think that bees are attracted to bright blue and violet-colored flowers, whereas butterflies like fragrant yellow, pink, red, and orange flowers. Butterflies also like wide petals so that they can settle on them while they drink the sweet nectar.

Show image 4A-6: Mammal and bird pollinators

Birds are important pollinators, too, especially of wildflowers. For example, hummingbirds have perfectly designed beaks that can reach the nectar inside long, tubular-shaped flowers.[8] There are more than 2,000 different kinds of birds in the world that feed on nectar. Birds have a poor sense of smell and help to pollinate unscented flowering plants because they are attracted by the color and shape of the flowers.

8 [Point out the shape of each bird's beak in the image. Show students a tube in your classroom for reference.]

A variety of small mammals pollinate flowering plants. Mice, shrews, and rats—even tree-dwelling animals such as lemurs and small monkeys—can help to transfer pollen. People also help the pollination process. Often, when people are working in their flower gardens, the sticky pollen is accidently carried from flower to flower.

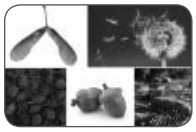
For some plants, pollination does not just occur during the daytime. Some scented flowers attract nighttime pollinators such as bats and moths.[9]

9 Here, the word *bats* means a small, furry animal with wings. The word *bats* also means to hit a baseball.

Although ninety percent of flowering plants are pollinated by animals, especially insects, the wind and even water can play a part, too. Pollen is carried by the wind. Flowering plants that live in water, such as lilies, can be pollinated as the water carries the pollen from one plant to another.

Once pollen has been transferred and reaches the new plant, the flower produces seeds. The next part of the process is called seed dispersal. This is the process of carrying the seeds away from the parent plant so that the flowering plant life cycle can begin all over again.[10]

10 Most seeds are dispersed in late summer and fall.



Show image 4A-7: Seed dispersal

Just like pollination, there are various ways that seeds can be dispersed, or spread apart in different directions. Many flowering plant seeds are carried away from the parent plant by the wind. As the wind blows, the seeds are carried up into the air. Some flowering plants have pods, or capsules, that explode, sending

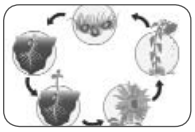
forth a burst of tiny seeds into the air. Other flowering plants drop their seeds into rivers and streams, and the seeds are carried along to their new home. [11]

11 Why might it be important for seeds to be dispersed, or spread apart from each other?

Sometimes animals carry seeds from place to place without knowing it. Some seeds contained within a **protective** casing can attach themselves to the fur of passing animals. [12] The protective casing will eventually fall off the animal and rest in the soil, ready to begin the life cycle process.

12 This protective layer keeps the seed safe.

Some seeds are contained within a fruit that animals like to eat. Animals either spit the seeds out, or they eat them, and the seeds reach the earth in the animal droppings that are left behind. Once on the ground, they rest in the soil until the germination process can begin again the following spring.



Show image 4A-8: Seed to seed

All of this is happening around us in spring, summer, and early autumn. The potential for new life is being created as flowering plants are pollinated and seeds are dispersed. Across the world, the life cycle of flowering plants is renewed, or happens again, each year.

Discussing the Read-Aloud ***15** minutes*

Comprehension Questions **10** *minutes*

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Evaluative* What is the main topic of the read-aloud? (The main topic of the read-aloud is the life cycle of a flowering plant.)
2. *Literal* What is the first stage of the life cycle of a flowering plant? (The first stage of the life cycle of a flowering plant is as a seed.)

3. *Inferential* What happens after a seed is planted? (Once the seed has germinated, it grows and develops into a young plant with roots, a stem, and leaves.)

4. *Inferential* Which one of the four seasons is the best time for planting seeds? (spring) Why? (In spring there is more sunlight and there are warmer temperatures, as well as enough water. These conditions allow seeds to germinate.)

5. *Inferential* How do flowering plants attract pollinators? (Flowering plants use their fragrance, shape, and color to attract pollinators.)

6. *Inferential* How does a hummingbird's beak help it to pollinate flowers? (A hummingbird's beak is perfectly designed to reach nectar inside long, tubular-shaped flowers and therefore helps to pollinate them.)

7. *Literal* Besides animals, what other ways can plants be pollinated? (The wind and water can help to pollinate plants.) How? (Pollen is carried by the wind. Flowering plants that live in water can have their pollen carried from flower to flower by the water.)

8. *Literal* Name three kinds of seed dispersal, or ways seeds are spread in different directions. (Three kinds of seed dispersal are animals, the wind, and water.)

[Please model the *Question? Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

9. *Evaluative* *What? Pair Share:* Asking questions after a read-aloud is one way to see how much everyone has learned. Think of a question you can ask your neighbor about the read-aloud that starts with the word *what.* For example, you could ask, "What are the three main parts of a young plant?" Turn to your neighbor and ask your *what* question. Listen to your neighbor's response. Then your neighbor will ask a new *what* question, and you will get a chance to respond. I will call on several of you to share your questions with the class.

10. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Protective *5 minutes*

1. In the read-aloud you heard, "Some seeds contained within a *protective* casing can attach themselves to the fur of passing animals."
2. Say the word *protective* with me.
3. *Protective* means something that is intended to shelter or keep something or someone safe.
4. An umbrella is a *protective* cover or shelter from the rain.
5. Can you think of other items that are designed to be *protective* or provide a means of protection? Try to use the word *protective* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "A _____ is protective because it . . . "]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: I am going to read several sentences. If what I describe is something that is protective, say, "That is protective." If what I describe is something that is not protective, say, "That is not protective." Remember to answer in complete sentences.

1. using bug spray to keep mosquitoes away (That is protective.)
2. wearing a helmet when you ride your bike (That is protective.)
3. eating pizza (That is not protective.)
4. using an umbrella when it rains (That is protective.)
5. climbing a tree (That is not protective.)
6. wearing shin pads when you play soccer (That is protective.)

Complete Remainder of the Lesson Later in the Day

The Life Cycle of a Plant

4B

Extensions — *20 minutes*

Vocabulary Instructional Activity: Process

1. In the read-aloud you heard, "Photosynthesis is the *process* by which plants make their own food, as well as oxygen."
2. Say the word *process* with me.
3. The word *process* means a series of actions that create something.
4. The writing process includes the steps you take to write a paragraph, using the words *first, next,* and *then*.
5. Can you think of the steps of other processes? Try to use the word *process* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "The steps of the _____ process are . . . "]
6. What's the word we've been talking about?

Use a *Discussion* activity for follow-up. Directions: Tell your partner about the process of getting ready for school in the morning. Mention at least three steps in the process as you talk to your partner.

Sequencing the Life Cycle of a Plant (Instructional Master 4B-1)

Have students cut out each of the images of the sunflower plant. Next, have them put the images in the correct order of the life cycle of the sunflower plant. Students should then glue or tape the images in the correct sequence onto a separate sheet of paper.

Have students describe the life cycle of a sunflower plant to their partners, using their pictures as a guide.

The Life Cycle of a Tree 5

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Describe the seasonal cycle: spring, summer, autumn, winter
- ✓ Explain effects of seasonal changes on plants and animals
- ✓ Define the term *life cycle*
- ✓ Identify the stages of the life cycle of a tree (seed to seed)

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Identify the main topic of "The Life Cycle of a Tree" (RI.2.2)
- ✓ Compare and contrast the life cycle of a sunflower and the life cycle of a tree (RI.2.9)
- ✓ With assistance, categorize and organize facts and information in order to complete a Venn diagram comparing and contrasting the life cycles of sunflowers and trees (W.2.8)
- ✓ Prior to listening to "The Life Cycle of a Tree," identify orally what they know and have learned about the life cycle of a plant

Core Vocabulary

decomposers, *n.* Various life forms and organisms that help dead matter to break down and decay
Example: Worms are common decomposers, helping to make the soil rich in nutrients.
Variation*(s):* decomposer

dependent, *adj.* Requiring something or someone's support
Example: Most nations are dependent upon oil.
Variation(s): none

flexible, *adj.* Able to bend and move easily
Example: We can touch our toes to see how flexible we are.
Variation(s): none

germination, *n.* The process in which a plant begins to grow or sprout
Example: The pea seeds planted in clear, plastic cups began the germination process near the warm, sunny window.
Variation(s): none

mature, *adj.* Fully grown
Example: Mature apple trees produce apples we can pick in the fall.
Variation(s): maturer, maturest

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	Image Cards 5–9; sequenced cycles from Instructional Master 4B-1	10
	Purpose for Listening		
Presenting the Read-Aloud	**The Life Cycle of a Tree**		15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Germination		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Venn Diagram**	Instructional Master 5B-1; sequenced cycles from Instructional Master 4B-1; chart paper, chalkboard, or whiteboard	20
	Flowering Apple Tree	Cycles Poster 3 (Life Cycle of a Tree)	
	Family Letter	Instructional 5B-2	*

The Life Cycle of a Tree

5A

Introducing the Read-Aloud

***10** minutes*

What Have We Already Learned?

Review with students that a cycle is a sequence of events that repeats itself again and again. A life cycle includes the stages of a living thing's life, from seed to adult. Remind students that a plant's life cycle begins with a seed. Have students identify the stages of the life cycle of a plant, using image 4A-8. (seed, sprout/germination, seedling, adult flower, seed dispersal) Show students Image Cards 5–9 to help guide their discussion and to help them formulate answers. You may also wish to have students refer back to their sequenced plant life cycles from the Extension in Lesson 4.

Purpose for Listening

Have students listen carefully to learn how a tree's life cycle may be similar to or different from that of a plant. Tell students to listen carefully to the main topic of the read-aloud, the life cycle of a tree.

Presenting the Read-Aloud — **15** *minutes*

The Life Cycle of a Tree

Show image 5A-1: Trees

There are certain things on Earth that make life possible. We need water to live, just as we need the air that we breathe. Have you ever thought about where the air that you breathe comes from? The air that you breathe is totally **dependent** on, or supported by, the existence of trees. Without trees, humans could not live on Earth.

There are thousands of different kinds of trees in the world. There are towering Sequoia trees and tiny dwarf willows. There are noble oak trees and scented pines. They all help to make life possible on this planet.

Show image 5A-2: Tree taking in carbon dioxide and emitting oxygen

Trees provide us with many things and perform tasks that you might not even be aware of. For example, trees provide us with oxygen to breathe. Trees also take in carbon dioxide through their leaves. Carbon dioxide is a greenhouse gas, meaning that if too much of it builds up in Earth's atmosphere, our planet will heat up. Therefore, trees help to manage Earth's climate and keep it livable for us. Tree roots help to fight soil erosion and flooding by holding the soil together and absorbing water from the soil.[1] Finally, we use trees, or the wood that comes from trees, all over the world for all kinds of things. Can you think of three things that the wood from trees is used for?[2]

1 Tree roots help stop the soil from wearing away over time.

2 [Pause for student responses.]

Show image 5A-3: Tree parts

Let's review the different parts of a tree.[3] Do you remember what the main stem of a tree is called? The main stem of a tree is called the trunk. All the branches of the tree grow out of the trunk. Tree leaves grow on the branches. The roots hold the tree in the ground. They not only hold the tree in the ground, they help to feed the tree, too. Roots absorb water and nutrients from the

3 We learned all about tree parts in the *Plants* domain in Kindergarten.

ground.[4] The water and nutrients travel up from the roots through the trunk and into the branches. Do you know why leaves are such an important part of a tree? Leaves are important because they enable the tree to produce food.[5] Another important part of the tree is the outside layer called the bark. The bark protects the tree from outside forces such as heat, cold, insects, and bacteria.[6]

4 *Absorb* means to take in, just like a sponge absorbs water.

5 Tree leaves produce food through photosynthesis, just like the leaves of flowering plants.

6 Bacteria are very small living things that often cause disease.

Show image 5A-4: Tree seeds

Trees follow the same life cycle as other plants. Just like that of a flower, a tree's life cycle begins with a seed. Tree seeds can be as large as tennis balls, or as tiny as freckles. They come in various shapes and sizes, too. They can be flat, smooth, bumpy, long, or thin. Tree seeds have three main parts. They are the embryo, or egg; the stored food inside the egg, which enables the seed to grow and change; and the seed coat, which eventually falls off.

Most seeds are carried away from the parent tree that produced them. Do you remember how seeds are dispersed, or spread apart? They are dispersed in various ways. They are carried by animals, people, wind, and water. Wherever they land, they rest in the soil until germination begins.

Germination is when a seed begins to grow, or sprout. Certain conditions are required for germination to happen. We have learned that in the temperate parts of the world, the seasons affect the life cycle of living things, especially plants. Therefore, when there is enough warmth and direct sunlight, as well as water from rain, the seed splits open and germination begins. This usually occurs in spring when there is sufficient warmth and rain.[7]

7 This is why April (rain) showers do indeed bring May flowers!

Show image 5A-5: Close-up of germinated tree seed

Once germination begins, the seed produces roots that search for groundwater.[8] As they find water, the roots hold fast in the ground and a stem grows up towards the sunlight. Tiny seed leaves open and use the sun and water to make food. The seed has become a seedling, or young plant. Seedlings need just the right amount of water, warmth, and sunshine to grow. With the

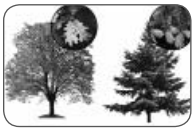
8 The word *groundwater* is a compound word made of the word *ground* and the word *water*. It means water that is underground.

right conditions, seedlings develop into young trees with roots, a trunk, branches, and leaves. Young trees are called saplings.

Show image 5A-6: Tree sapling

Tree saplings are much smaller than **mature** trees, or adult trees. Usually, trees are called saplings when they are between three and fifteen years of age. A tree sapling's bark is smooth, and its trunk is **flexible**—meaning it can bend more easily than a mature tree can.[9] Once a tree is considered mature, it may flower and produce fruits, nuts, or cones. Some trees simply produce seeds.

9 When something is flexible, it means it can bend or move quite easily. Stand up and bend to touch your toes to see how flexible you are.



Show image 5A-7: Deciduous and evergreen trees

There are two types of trees: deciduous and evergreen. Deciduous trees shed their leaves.[10] Deciduous trees tend to have wide, flat leaves, whereas evergreen tree leaves tend to be narrow and thin like needles. During the cold winter months, deciduous trees shed their leaves and become inactive for the winter, much like hibernating animals do during the wintertime. In fact, this is what keeps them alive during the coldest part of the year.

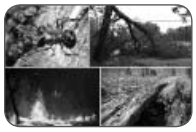
10 What are some names of deciduous trees? (maple, oak, birch, etc.)

To prepare for this time of rest, deciduous trees stop using their leaves to make food, and instead they shed these leaves. Then, during the cold winter months, they save their energy until spring returns. In the spring, they will use their energy to produce new leaves.

Evergreen trees, on the other hand, shed and reproduce their leaves throughout the year, so there are always green leaves on evergreen trees all year long.[11] The cones of evergreen trees are its flowers. Unlike deciduous trees, evergreen trees do not shed all of their leaves at the end of fall. Instead, they use their leaves to make food all winter.

11 What are some names of evergreen trees? (spruce, pine, fir, etc.)

How long does it take for a tree to grow to its full size? Well, this depends on a number of things. Different kinds of trees grow at different speeds. In tropical parts of the world, where there is constant intense sunshine and rainfall, a tree can reach maturity, or become an adult, in thirty years. In colder regions of the world it can take a hundred years or more.



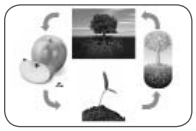
Show image 5A-8: Tree destruction

The length of a tree's life depends on many things. It will always depend on the tree having enough sunshine and water, but other factors can affect its growth and lifespan, too. The condition of the soil in which the tree is growing, and diseases such as insect infestations and bacteria, can alter the natural lifespan of a tree.[12] Accidents such as fires and natural disasters such as hurricanes and floods can have an effect too. Also, people cut trees down so that they can be used to make a variety of products.

12 An infestation occurs when a large number of something harmful enters an area.

When a tree lives for a long time and then dies, it is not totally at the end of its journey. **Decomposers**, like earthworms, bacteria, and fungi, take over the dead tree.[13] Through the decomposition process, they help to slowly break down the tree into a rich nutrient that feeds the soil and enables new tree seeds to grow.

13 Fungi are living things such as molds, mushrooms, and yeasts that live on dead or decaying things.



Show image 5A-9: Life Cycle of an Apple Tree

And there you have it, the life cycle of a tree.

Discussing the Read-Aloud — *15 minutes*

Comprehension Questions — *10 minutes*

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Evaluative* What is the main topic of the read-aloud? (The main topic of the read-aloud is the life cycle of a tree.)
2. *Literal* What are several things that make trees an important part of life on earth? (Trees provide us with oxygen; trees help to clean up the soil by absorbing or changing harmful chemicals; trees take in carbon dioxide and therefore help to manage Earth's climate; trees help to fight soil erosion; trees are used in the manufacture of many things; etc.)

3. *Literal* What are the stages of a tree's life cycle? (The stages of a tree's life cycle are seed, germination, sapling, and adult.) With what does a tree's life cycle begin? (A tree's life cycle begins with a seed.)

4. *Literal* When does a tree's seed germinate or sprout? (A tree's seed germinates during the spring when the temperatures are warmer and the amount of daylight is greater.)

5. *Literal* When does a tree begin to produce flowers and fruits? (A tree begins to produce flowers and fruits when it has reached maturity or the adult stage.)

6. *Evaluative* What is the difference between deciduous trees and evergreen trees? (The leaves of deciduous trees change color and fall off in the autumn. Evergreen trees shed and make new leaves all the time.)

7. *Literal* What are the different ways that seeds are dispersed or spread apart that help ensure that a tree's life cycle repeats every year? (The tree's seeds are scattered away from the parent tree by animals, people, wind, and water.

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

8. *Evaluative* *Think Pair Share:* Would it be easier for you to observe the complete life cycle of a sunflower plant or a tree? Why? (It would be easier to observe the shorter life cycle of a sunflower plant; many trees have a longer life cycle than people.)

9. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Germination *5 minutes*

1. In the read-aloud you heard, "*Germination* is when a seed begins to grow, or sprout."
2. Say the word *germination* with me.
3. *Germination* is the process that causes a seed to begin to grow and develop into a plant.
4. The germination of the seeds we planted began at the same time and covered our garden with tiny green leaves.
5. Have you ever watched a seed germinate? What happened to the seed? Did it change or grow new parts? Try to use the word *germination* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "You can tell when germination is happening because . . . "]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: I will read two choices about what happens to seeds during the germination process. You will choose the correct answer. Be sure to use the word *germination* in your answer.

1. Does germination happen to the seed or to the adult plant in the life cycle of a flowering plant? (Seed germination happens to the seed of a flowering plant.)
2. Does seed germination happen in the spring or in the winter? (The germination process usually takes place in the spring, when the ground has thawed and the air is warm.)
3. Are water and sunlight, or rocks and grass, necessary to the germination process? (Water and sunlight are necessary for germination to occur.)

Complete Remainder of the Lesson Later in the Day

The Life Cycle of a Tree

5B

Extensions — *20 minutes*

Venn Diagram (Instructional Master 5B-1)

Discuss with students what is needed for the life cycle of a sunflower plant to begin, and remind them that some plants have a short life cycle whereas others have a very long life cycle. Tell students that they are now going to compare and contrast the life cycle of a tree with the life cycle of a sunflower plant. Remind students that *compare* means to tell how things are alike, and *contrast* means to tell how things are different. Explain that comparing and contrasting helps us to learn more about things.

Copy Instructional Master 5B-1 onto chart paper, a chalkboard, or a whiteboard. Tell students that together you are going to compare and contrast the life cycle of the sunflower plant with the life cycle of a tree. You will be writing the characteristics that only the sunflower plant life cycle has in the circle with that label and the characteristics that only the tree life cycle has in the circle with that label. In the overlapping middle section, write the characteristics that both of these plants' life cycles have in common.

Guide students in a discussion of the similarities and differences of the two life cycles. (You may wish to have them reference the activity from the Lesson 4 Extension.)

Above and Beyond: You may wish to have students use Instructional Master 5B-1 to complete this diagram on their own.

Flowering Apple Tree

Tell students that an example of a flowering tree is the apple tree. Show students Cycles Poster 3 (Life Cycle of a Tree), and have them identify each stage of the apple tree's life cycle. You may wish to display the poster on your classroom wall to reference throughout the domain.

Take-Home Material

Family Letter

Send home Instructional Master 5B-2.

Pausing Point

PP

Note to Teacher

You should pause here and spend one day reviewing, reinforcing, or extending the material taught thus far.

You may have students do any combination of the activities listed below, but it is highly recommended you use the Mid-Domain Student Performance Task Assessment to assess students' knowledge of cycles in nature. The other activities may be done in any order. You may also choose to do an activity with the whole class or with a small group of students who would benefit from the particular activity.

Core Content Objectives Up to This Pausing Point

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Recognize that the rotation of Earth causes day and night
- ✓ Explain that it takes twenty-four hours for Earth to rotate once on its axis
- ✓ Recognize that living things have a life cycle
- ✓ Recognize that Earth orbits the sun
- ✓ Explain that it takes one year for Earth to orbit the sun
- ✓ Describe the seasonal cycle: spring, summer, autumn, winter
- ✓ Identify that the tilt of Earth's axis in relation to the sun causes the seasons
- ✓ Explain effects of seasonal changes on plants and animals
- ✓ Describe animal processes in spring, summer, autumn, winter
- ✓ Describe plant processes in spring, summer, autumn, winter

- ✓ Define the term *life cycle*
- ✓ Identify the stages of the life cycle of a flowering plant (seed to seed)
- ✓ Identify the stages of the life cycle of a tree (seed to seed)
- ✓ Demonstrate familiarity with the poem "Bed in Summer"
- ✓ Demonstrate familiarity with the poem "Bee! I'm expecting you!"

Student Performance Task Assessment

⑩ Sequencing the Life Cycle of a Plant (Instructional Master PP-1)

Have students cut out each of the images of the sunflower plant and put them in the correct order of the life cycle of the sunflower plant. Students should then glue the pictures in the correct sequence onto a separate sheet of paper.

Have students write sentences describing the life cycle of a sunflower on the back of their paper.

Activities

Image Card Review

Materials: Image Cards 1–9

In your hand, hold Image Cards 1–9 fanned out like a deck of cards. Ask a student to choose a card but to not show it to anyone else in the class. The student must then perform an action or give a clue about the picture s/he is holding. For example, for a sprouting seed, a student may pretend to be very small and gradually grow taller. The rest of the class will guess what is being described. Proceed to another card when the correct answer has been given.

Sequence Review

Materials: Cycles Posters 1–3; Image Cards 1–9

Use Cycles Posters 1–3 and Image Cards 1–9 to review with students the seasonal cycle, the flowering plant life cycle, and the life cycle of a tree. Have students explain and sequence each stage of the cycles. Remind students that trees have a sapling stage in their life cycle, unlike the life cycle of a plant.

Domain-Related Trade Book or Student Choice

Materials: Trade book

Read a trade book to review a particular cycle. Refer to the list in the Introduction. You may also choose to have the students select a read-aloud to be heard again.

Class Book: Plant Life Cycle Encyclopedia

Materials: Drawing paper, drawing tools

Tell students they are going to make a class book to help them remember what they have learned in this domain about the life cycle of a flowering plant and a tree. Have students brainstorm important information about how seasonal cycles affect these plants. Have each student choose one idea to draw a picture of, and ask him or her to write a caption for the picture. Bind the pages to make a class book to put in the class library for students to read again and again.

Riddles for Core Content

Ask students riddles such as the following to review core content:

- I am a sequence of events that repeats over and over again in the same order. What am I called? (a cycle)
- I am an imaginary central line running through the North and South Poles around which planet Earth rotates. What am I? (an axis)
- I am a word that describes the movement of the earth around the sun over the course of one year. Which word am I? (orbit or revolve)
- I am a word that describes how the earth's axis is on a slant or at an angle and am the reason we have a change in seasons. Which word am I? (tilt or tilted)
- I am a word that describes what a seed does when it starts to grow. Which word am I? (germinates)
- I am a young plant with a stem, roots, and leaves; I am grown from a seed. What am I? (a seedling)

- I am a young tree that is taller than most of your parents or caregivers. What am I? (a sapling)
- We have the important job of helping to carry pollen from one flower to another so an adult plant can reproduce, or make more of its own kind. What are we? (pollinators—insects, birds, small mammals, water, the wind, etc.)

Compare/Contrast

Materials: Chart paper, chalkboard, or whiteboard

Tell students that there are many things to compare and contrast in the read-alouds they have heard so far. Remind students that *compare* means to tell how things are similar, and *contrast* means to tell how things are different. Have students choose a topic from the following list to compare/contrast on a chart. You may do this individually or as a class.

- Earth's rotation and Earth's orbit
- the four seasons
- a sunflower plant and a tree

You may wish to extend this activity by using the chart as a prewriting tool and ask students to write two paragraphs, one describing similarities and the other describing differences.

Key Vocabulary Brainstorming

Materials: Chart paper, chalkboard, or whiteboard

Give students a key domain concept or vocabulary word such as *cycle.* Have them brainstorm everything that comes to mind when they hear the word, such as *repeats, four seasons,* etc. Record their responses on chart paper, a chalkboard, or whiteboard for reference.

Writing Prompts

Students may be given an additional writing prompt such as the following:

- Flowers are important to the life cycle of some plants because . . .

- The four seasons of the year are considered parts of a cycle because . . .
- My favorite season is _____ because . . .

Using a Map

Materials: World map or globe

On a world map or globe, review the location of the equator and the North and South Poles. Have students talk about the amount of sunlight in these locations and how Earth's tilt is the cause of this.

Seed Observation

Materials: Dried lima beans; small containers; small plastic knife (optional); drawing paper, drawing tools

Have students place several dried lima bean seeds in small, water-filled containers to soak overnight. The next day, split the seed halves of the bean apart using your fingers or a small plastic knife. Give each student or group of students the seed halves, and have them observe the plant embryos inside. Ask students why the plant embryos are important to the life cycle of a plant. Have students draw a picture of the plant embryo and write a caption about how baby plants germinate from a bean seed embryo.

Seed Samples

Materials: Variety of fresh and/or dried foods and spices (e.g., sunflower seeds, pomegranates, pumpkin seeds)

Note: Be sure to follow your school's policy regarding food distribution and allergies.

Display the variety of foods on a table for students to investigate some seeds and plants that humans use for food. Have students examine each item and give examples of how they think humans may use each of these foods. For example, sunflower seeds can be used to grow new sunflower plants, but they are also a food that people can eat.

Which Came First, the Chicken or the Egg?

6

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Describe the seasonal cycle: spring, summer, autumn, winter
- ✓ Explain effects of seasonal changes on plants and animals
- ✓ Define the term *life cycle*
- ✓ Identify the stages of the life cycle of a chicken (egg to egg)

Language Arts Objectives

The following language arts objectives are addresed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart in the Introduction for additional standards addressed in all lessons in this domain. Students will:

- ✓ Identify the main topic of "Which Came First, the Chicken or the Egg?" (RI.2.2)
- ✓ Compare and contrast images of a chicken and a tyrannosaurus rex (RI.2.9)
- ✓ Compare and contrast the life cycle of a plant and the life cycle of a chicken (RI.2.9)
- ✓ With guidance and support from adults and peers, focus on information presented in "Which Came First, the Chicken or the Egg?" and strengthen writing as needed by revising and editing (W.2.5)
- ✓ Summarize in writing the content of "Which Came First, the Chicken or the Egg?" (SL.2.2)

- ✓ Add drawings to a summary of the information contained in "Which Came First, the Chicken or the Egg?" to clarify ideas, thoughts, and feelings (SL.2.5)
- ✓ Prior to listening to "Which Came First, the Chicken or the Egg?", orally predict whether the chicken or the egg came first, and then compare the actual outcomes to predictions
- ✓ Share writing with others

Core Vocabulary

albumen, *n.* The white part inside an egg
Example: The albumen, or egg white, is the part of the egg used in some recipes, such as angel food cake.
Variation(s): none

embryo, *n.* An unborn or unhatched animal or person
Example: A developing embryo must receive nutrients and oxygen from its mother.
Variation(s): embryos

fertilize, *v.* To make an egg able to grow and develop into a baby
Example: The flowers must be fertilized with pollen from other flowers in order to produce seeds.
Variation(s): fertilizes, fertilized, fertilizing

replenished, *v.* Replaced or refilled
Example: The cookie jar was empty, so Mom replenished the contents.
Variation(s): replenish, replenishes, replenishing

yolk, *n.* The yellow, internal part of a hen's egg
Example: Tina dropped an egg on the floor, and the yellow yolk spilled out.
Variation(s): yolks

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	Image Cards 5–9; Cycles Posters 2, 3	10
	Making Predictions About the Read-Aloud		
	Purpose for Listening		
Presenting the Read-Aloud	**Which Came First, the Chicken or the Egg?**		15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Replenished		5
 **Complete Remainder of the Lesson Later in the Day**			
Extensions	**A Chicken's Life Cycle: Egg to Egg**	Image Cards 10–12; Cycles Poster 4 (Life Cycle of a Chicken); fresh egg; clear glass jar	20
	Interactive Illustrations	drawing paper, drawing tools	

Which Came First, the Chicken or the Egg?

6A

Introducing the Read-Aloud — *10 minutes*

What Have We Already Learned?

Review with students that a cycle is a sequence of events that repeats itself again and again. In the previous lesson, students learned that the stages in the life cycles of flowering plants and trees are both from seed to seed. The life cycles begin with seeds and end with the plants and trees producing new seeds.

Show students Image Cards 5–9, and have them identify and sequence the stages of a flowering plant's life cycle. You may wish to ask the following questions:

- Which Image Card shows the first stage of the life cycle? (seeds in Image Card 5)
- Which stage of the life cycle do Image Cards 6 and 7 show? (germination/seedling)
- Image Card 8 shows a mature flowering plant. When a plant reaches maturity, it flowers and produces fruit. This will start the life cycle over again, once seeds are dispersed as in Image Card 9.

You may also wish to reference Cycles Poster 2 (Flowering Plant Life Cycle) and Poster 3 (Life Cycle of a Tree).

Review with students how the seasonal cycle affects the life cycle of deciduous trees. Tell students that they have now learned about the seasonal cycle, the life cycle of a flowering plant, and the life cycle of a tree. Ask students what all of these things have in common. Remind them that all living things—plants, animals, and even people—journey through differing stages from birth to adult called a *life cycle*. Explain to students that they are going to continue learning about the life cycle as experienced by a very familiar bird.

Making Predictions About the Read-Aloud

Ask students to think about the title of the read-aloud to predict whether the chicken or the egg comes first.

Purpose for Listening

Tell students to listen carefully to find out whether or not their predictions are correct and to learn all about the main topic of today's read-aloud: the life cycle of a chicken.

Presenting the Read-Aloud **15** *minutes*

Which came first, the Chicken or the Egg?

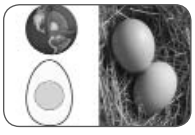
Show image 6A-1: Chicken and Tyrannosaurus Rex

A chicken is a type of bird. Did you know that there are more chickens in our world than any other type of bird? In fact there are more chickens on Earth than people. Scientists believe that chickens are the closest living relative of the Tyrannosaurus Rex, one of the largest dinosaurs that ever lived. Can you see why? [1]

1 [Have students compare and contrast the images in 6A-1.]

Like all birds, chickens have feathers and wings, and they lay eggs. Chickens can fly, but not very far. Have you ever heard the question, "Which came first, the chicken or the egg?" Listen carefully to this lesson on the life cycle of a chicken, and you'll see why that question is so difficult to answer!

All living things go through a sequence of stages from birth to adult called a life cycle. The life cycles of plants and trees begin with seeds; the life cycles of chickens begin with eggs!



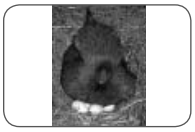
Show image 6A-2: Egg

Have you ever cracked an egg open? The outer layer that you crack is called the eggshell. Eggshells can be many different colors, including white, light brown, speckled, pale blue, or even green. Inside the shell, the egg consists of a yellow **yolk**, which is made mostly of fat, and a white part, called the **albumen**. [2]

2 [Point to image 6A-2.] Many people compare the layers of the earth to the layers of an egg. How are they similar? How are they different?

Do you know what a female chicken is called? A female chicken is called a hen. Do you know what a male chicken is called? A male chicken is called a rooster. Hens lay eggs. Not all eggs become baby chickens, or chicks. In order to produce chicks, a rooster must **fertilize** the eggs before the hen lays them. [3] Eggs that are not fertilized do not become baby chickens. They are sent to stores so that people can buy them and eat them.

3 Fertilization is similar to pollination: just like flowers need pollen from another flower in order to make seeds, hens need roosters in order for their eggs to become baby chickens, or chicks.



Show image 6A-3: Hen sitting on eggs

As soon as a hen lays her fertilized eggs, she will begin to care for them. The hen will sit on the eggs and even turn the eggs to make sure that the eggs stay warm. The eggs need to stay warm for twenty-one days in order to develop into chicks.[4] Let's find out what happens inside the egg during this time!

4 Twenty-one days is three weeks.

Show image 6A-4: Diagram of developing chicken embryo

Inside the fertilized egg, great changes are happening. A tiny **embryo** is developing inside the egg.[5] The embryo needs food, water, and oxygen to grow and develop. Within forty-eight hours of fertilization, tiny, red blood vessels spread out from the embryo to the yolk and to the inside of the shell. Directly under the shell are two membranes, or air sacs, containing oxygen. As the embryo develops and grows into a chick, it uses this oxygen. This supply of oxygen is **replenished,** or replaced, as oxygen passes through the shell of the egg. How does oxygen pass through the shell of an egg? If you look at an eggshell under a magnifying glass, you will see that it has tiny holes called pores that allow oxygen in, and carbon dioxide out.[6]

5 An *embryo* is an animal in the early stages of life before it is born or has hatched.

6 Humans have millions of pores. Pores are the openings on our skin out of which hair grows.

The parts of the egg inside the shell contain all the food the growing embryo needs to develop into a fully formed chick. The yellow yolk provides the food necessary for the embryo to grow big and strong. The white of the egg, or albumen, surrounds the yolk and provides the growing embryo with more food and water.

The first part to develop is the chick's nervous system. Then the brain starts to form, and then the heart starts to beat. After five days, the wings and the legs begin to develop. After seven days, the embryo is fully formed but is quite tiny. Around the tenth day, feathers begin to develop and the growth of the fully formed embryo into a chick accelerates, or speeds up.[7]

7 Look at the image. What is the difference between Day 8 and Day 20 in terms of the chick's development?

As the chick grows, it uses up its food supply. After twenty days inside the egg, the chick pierces, or makes a hole in, the air sac and begins to breathe air with its own lungs for the first time. This means that the chick is ready to hatch out of the egg. The chick begins to chirp to let its mother know that it will soon be in the

outside world. On the twenty-first day, the chick uses its egg tooth to chip a circle around the inside of the shell. It pushes against the sides of the egg with its body to break open the shell.

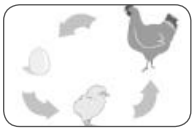
➡ **Show image 6A-5: Newly hatched chicks**

When the chick first emerges, it is tired from the effort of breaking out of its shell. It is also wet. Before long, however, the feathers dry out and become lovely and fluffy. [8]

8 Have you ever seen newborn chicks? Where did you see them?

The mother hen, having cared for her eggs, continues to care for her chicks. She will shelter them under her wings to keep them warm and dry. Chicks know instinctively how to scratch around in the dirt for food. [9] For the first two weeks, the chicks stay close to their mother.

9 Chicks know how to scratch around for food without being taught to do so.



➡ **Show image 6A-6: Chicken life cycle diagram**

Chicks grow quickly in the first months of their lives. When a female is about six months old, she will start to lay eggs. These first eggs will be quite small, though. Interestingly, females are called pullets, not hens, until they are one year old. Roosters are able to fertilize eggs at a similar age.

And so the life cycle begins all over again. A rooster fertilizes eggs before a hen lays them. The hen will care for the fertilized eggs and keep them warm. After twenty-one days, the eggs will hatch and new chicks will emerge.

Now that you know more about the life cycle of a chicken, which do you think came first—the chicken or the egg?

Discussing the Read-Aloud **15** *minutes*

Comprehension Questions **10** *minutes*

1. *Evaluative* Were your predictions correct about whether the chicken or the egg comes first? Why or why not? (Answers may vary.)
2. *Evaluative* What is the main topic of the read-aloud? (The main topic of the read-aloud is the life cycle of a chicken.)

3. *Literal* How does the life cycle of a chicken begin? (The life cycle of a chicken begins as an egg.)

4. *Literal* What three parts make up an egg? (The three parts that make up an egg are the shell, the albumen, and the yolk.)

5. *Inferential* Do all eggs develop into baby chicks or go through a complete life cycle? (No, an egg must be fertilized by a rooster to produce baby chicks.)

6. *Inferential* How does the mother hen help her chicks grow inside the eggs? (The mother hen covers the eggs with her body to keep them warm; she turns the eggs over so that they are warm on all sides.)

7. *Literal* What does a growing chick use for food before it hatches? (A growing chick uses the yolk and the albumen as a source of food before it hatches.)

8. *Literal* What does a baby chick do to break out of its shell when it hatches? (A baby chick uses its egg tooth to chip a circle around the inside of the shell; it pushes against the sides of the egg with its body to break open the shell.)

9. *Literal* What are the three stages of the life cycle of a chicken? (The three stages of the life cycle of a chicken are the egg, the chick, and the adult.)

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a couple of questions. I will give you a minute to think about the questions, and then I will ask you to turn to your neighbor and discuss the questions. Finally, I will call on several of you to share what you discussed with your partner.

10. *Evaluative* *Think Pair Share:* How is the life cycle of a chick similar to the life cycle of a flowering plant? How is it different? (Answers may vary.)

11. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Replenished *5 minutes*

1. In the read-aloud you heard, "This supply of oxygen is *replenished,* or replaced, as oxygen passes through the shell of the egg."
2. Say the word *replenished* with me.
3. The word *replenished* means to replace, restore, or refill.
4. The refrigerator was almost empty and the groceries needed to be replenished.
5. Can you think of items that need to be replenished? Try to use the word *replenished* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: " . . . needs to be replenished.]
6. What's the word we've been talking about? What part of speech is the word *replenished*? How do you know that it is an action word?

Use a *Making Choices* activity for follow-up. Directions: I am going to read a list of several things to you. If what I read describes something that can be replenished, say, "That can be replenished." If what I read describes something that cannot be replenished, say, "That cannot be replenished." Remember to answer in complete sentences.

1. an almost empty glass of water (That can be replenished.)
2. an almost empty gas tank (That can be replenished.)
3. snacks for school (That can be replenished.)
4. a bubble when it has burst (That cannot be replenished.)
5. the flavor in a piece of gum after you have chewed it (That cannot be replenished.)

Complete Remainder of the Lesson Later in the Day

Which Came First, the Chicken or the Egg?

6B

Extensions

***20** minutes*

A Chicken's Life Cycle: Egg to Egg

Crack open a fresh egg into a clear glass jar. Have students identify the parts of the egg. Discuss with students why this egg did not become a chick. Emphasize that if the egg is not fertilized by a rooster, it can never grow into a baby chick.

Show students Image Cards 10–12 and have them explain and sequence the chicken's life cycle. You may wish to show students Cycles Poster 4 (Life Cycle of a Chicken) and have them once again identify the three stages of the chicken's life cycle. You may wish to display this Poster on the classroom wall to reference throughout the domain.

Interactive Illustrations

Explain to students that they will all get to be authors and illustrators in the next activity. Give each student a sheet of paper folded in half. On one half of the paper, have each student write a sentence about the life cycle of a chicken from egg to egg. Pair them with a partner. Ask them to read their sentence aloud to their partner and then trade papers. Using the second section on their partner's paper, have each student draw a picture that goes with his or her partner's sentence. Then have students hand the paper back to the original author. Encourage the author to add descriptive words to his or her original sentence using carets, and hand the papers back to the illustrators to draw more details into the illustration.

Allow several students to share their drawings and sentences. Have them discuss how their partners' illustrations differed from the pictures they had imagined in their heads when they wrote their sentences. As the students discuss the illustrations, remember to repeat and expand upon each response using richer and more complex language, including, if possible, any domain-related vocabulary.

The Life Cycle of a Frog

7

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Describe the seasonal cycle: spring, summer, autumn, winter
- ✓ Explain effects of seasonal changes on plants and animals
- ✓ Define the term *life cycle*
- ✓ Identify the stages of the life cycle of a frog (egg to egg)
- ✓ Explain metamorphosis

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Identify the main topic of "The Life Cycle of a Frog" (RI.2.2)
- ✓ Write an informational paragraph explaining the stages of the life cycle of a frog (W.2.2)
- ✓ With guidance and support from adults and peers, focus on information presented in "The Life Cycle of a Frog" and strengthen writing as needed by revising and editing (W.2.5)
- ✓ Ask and answer *what* questions orally to gather information or deepen understanding of the information contained in "The Life Cycle of a Frog" (SL.2.3)

- ✓ Prior to listening to "The Life Cycle of a Frog," identify orally what they know and have learned about the life cycles of plants, trees, and chickens
- ✓ Share writing with others

Core Vocabulary

amphibian, *n.* An animal that can live on both land and water
Example: My pet frog is an amphibian, so I have water and land in his tank.
Variation(s): amphibians

burrow, *v.* To make a hole or passage into or under something
Example: My dog loves to burrow under the blankets on my bed.
Variation(s): burrows, burrowed, burrowing

gills, *n.* The parts of an aquatic animal used to breathe underwater
Example: The fish's gills open to take in water.
Variation(s): gill

lungs, *n.* A pair of breathing organs located within the rib cage that remove carbon dioxide from and bring oxygen to the blood
Example: Sometimes if you run too hard in the cold weather, it can make your lungs hurt.
Variation(s): lung

metamorphosis, *n.* The process by which some young animals change physical form as they become adults
Example: After the young insect goes though its metamorphosis to become an adult insect, it looks nothing like it once did.
Variation(s): metamorphoses

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	Image Cards 10–12; Cycle Poster 4 (Life Cycle of a Chicken)	10
	Purpose for Listening		
Presenting the Read-Aloud	**The Life Cycle of a Frog**	dime	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Burrow		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Writing an Explanatory/ Informational Paragraph**	Instructional Master 7B-1; Cycles Poster 5 (Life Cycle of a Frog); chart paper, chalkboard, or whiteboard	20

The Life Cycle of a Frog

7A

Introducing the Read-Aloud — *10 minutes*

What Have We Already Learned?

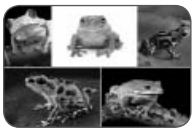
Review with students that a life cycle includes the stages a living thing goes through from birth to adult. Ask students about the life cycles they have learned about so far. Plants and trees begin their life cycles as seeds. Chickens begin their life cycles as eggs.

Have students retell the life cycle of a chicken. You may wish to prompt responses by using Image Cards 10–12. You may also wish to have students sequence Image Cards 10–12 using Cycles Poster 4 (Life Cycle of a Chicken).

Purpose for Listening

Tell students that today they are going to hear about the life cycle of a frog. Explain that a frog undergoes a transformation in its life cycle. A transformation is a major change in the way something looks. Tell students to listen and watch carefully to learn all about this transformation during the main topic of today's read-aloud: the life cycle of a frog.

Presenting the Read-Aloud — **15** *minutes*



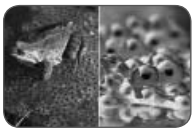
The Life Cycle of a Frog

Show image 7A-1: Frogs [1]

Did you know that there are thousands of different kinds of frogs in the world? Frogs don't all look alike either. Frogs can be all different sizes and colors. The smallest frog in the world was recently discovered in Papua New Guinea. It is smaller than a dime! [2] The largest frog in the world is the Goliath frog from Africa. It can grow up to three feet long and weigh seven pounds. [3]

Frogs live on every continent in the world except Antarctica. Why do you think they don't live in Antarctica? Frogs don't live in Antarctica because it is too cold, although there is a frog that lives just inside the Arctic Circle. Do you know what a group of frogs is called? A group of frogs is called an army. Okay, now that you know some cool facts about frogs, let's find out about their life cycles.

Just like a chicken, a frog's life cycle includes birth, growth, reproduction, and death. The reproduction stage creates new life so that the cycle repeats over and over again.



Show image 7A-2: Frogspawn

Have you ever stood at the edge of a pond or stream in the spring and spotted a jelly-like substance floating in the water? If so, you have seen the first stage of a frog's life cycle. The first stage of a frog's life cycle is the egg. That jelly-like substance is frogspawn, which is hundreds of soft, jelly-like eggs. In the center of each egg is a tiny black dot. Each black dot is a tiny embryo that will become a tadpole soon. [4] A developing young frog is called an embryo at the early stages and a tadpole at the later stages.

The mother frog lays her eggs in water in spring, when the cold winter months are over and the water is warm enough for her eggs to survive. The mother frog lays hundreds of eggs at one time.

1 What sound do frogs make? (Frogs make croaking sounds, like *ribbet*.)

2 [Show students a dime for reference.]

3 [Have students describe the frogs in the image.]

4 [Have students describe the image.]

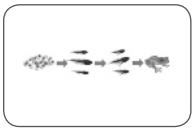
Female frogs lay hundreds of eggs at one time because not all of the eggs survive. Unlike hens, frogs do not usually stay with their eggs, so fish, birds, and water insects are more likely to eat some of the eggs. Some of the eggs will survive and eventually develop into tadpoles.

Show image 7A-3: Tadpoles

Just as a developing chick is nourished by the yolk of an egg as it grows, a developing frog is also nourished by yolk-like material in the egg. Within a few days or weeks of its development, depending on the type of frog, the embryo develops into a tadpole with a head and tail. Soon after that, when its **gills** are formed, it is ready to hatch out of the egg. Gills allow the tadpole to breathe underwater. Fish have gills, too.[5]

5 People cannot breathe underwater because people do not have gills. Instead, we hold our breath when we go underwater.

Once it hatches, a tadpole lives in water. A tadpole has a long, flat tail which it uses to swim. Its gills allow it to get oxygen from the water. Tadpoles swim about in search of food. Although they still feed from the leftovers of the eggs, they also search for small, green, water plants. Tadpoles grow very quickly, especially in warm water.



Show image 7A-4: Tadpole metamorphosis

After some time, the tadpole begins its transformation into a frog. When a living thing undergoes a huge change in shape, this process is called **metamorphosis**.[6] Tadpoles change quite dramatically from fish-like creatures with gills, into four-legged land creatures with **lungs**.[7] Let's find out more about this remarkable transformation.

6 You will hear a great deal about this word in the next lesson, "The Life Cycle of a Butterfly."

7 Frogs can breathe air because they have lungs, just like people. Lungs are the body parts that we use to breathe air.

After the appearance of the head and the tail, the tadpole grows back legs. Gradually, lungs develop inside its body, and its gills begin to disappear inside its body. Because it has lungs, the tadpole can now breathe air. Next, front legs begin to grow. As a tadpole's legs grow, its tail gets smaller. The tadpole uses its tail and its legs to swim through the water. It also begins to use its legs to climb onto plants in the water.

Gradually, the tadpole's legs grow longer, and its tail disappears completely. At this stage, the tadpole is a young frog that can leave its watery home and use its lungs to breathe. For many types of frogs, all of this has happened in about twelve weeks. At this stage of its development, the young frog is about an inch long.[8] Very young frogs are often called froglets.

8 That's roughly the size of your thumb.

Young frogs leave the pond to find other tasty treats to eat on land. They do not go too far away from their watery home, though. On land they search for small insects, worms, and slugs. They catch their food with their long, sticky tongues. They have to be very careful though, as lots of animals, such as snakes, lizards, and birds, eat young frogs.

Show image 7A-5: Frog skin

Do you know what you call an animal that can live in water and on land? An animal that can live in water and on land is called an **amphibian**. Frogs are amphibians.

Although frogs spend a lot of time on land, they stay fairly close to water. Frogs need to keep their skin damp.[9] Instead of drinking water, they absorb it through their skin. Frogs breathe through their skin when they are in water, but they breathe through their lungs when they are on land. They also seek out water when they want to cool down. If water is not nearby, they sit in the shade. They sit in the sun when they want to warm up.[10] In the winter, many frogs hibernate. Often they **burrow,** or dig a hole in mud at the bottom of ponds. If they can't find a pond, they seek out a damp place, such as a pile of logs, in which to spend the winter.

9 or somewhat wet

10 How do you heat up and cool down?

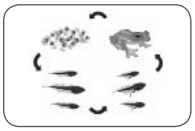
Show image 7A-6: Frog camouflage

The young frog has to survive until it is two or three years old to become a parent. To live that long, frogs have various survival techniques.[11] Their skin is often the color of their natural habitat. This helps them to blend into the background and avoid hungry predators. This is a form of camouflage. Frogs can hop quickly out of reach. They are also excellent swimmers. They can jump

11 A technique is a way of doing something using special knowledge or skill.

into the nearest pond or river to avoid danger. Some frogs have poisonous skin to protect them from predators. All frogs have large, bulging eyes. This helps them to more easily find their own food and avoid becoming dinner for some other creature.

When a frog is between two and three years old, it will return to the pond where it was born. At this stage, the frog is now considered an adult. In spring, male frogs croak loudly to let the females know that they are ready to mate. As with chickens, the eggs must be fertilized by a male frog or else they will not develop into baby frogs.



Show image 7A-7: Frog Life Cycle

And so the life cycle begins all over again. Each spring, a jelly-like substance appears in ponds and rivers. It is frogspawn, or hundreds of small eggs containing tiny embryos. In time, many will hatch into tadpoles. And a little while later, these tadpoles will turn into frogs that will live for seven years or more. It is amazing that frogs change their appearance so dramatically throughout their life cycle, from egg to tadpole to adult. Next, we will learn about the incredible transformation in another creature's life cycle. Stay tuned!

Discussing the Read-Aloud **15** *minutes*

Comprehension Questions **10** *minutes*

1. *Evaluative* What is the main topic of the read-aloud? (The main topic of the read-aloud is the life cycle of a frog.)
2. *Literal* What is the first stage of a frog's life cycle? (The first stage of a frog's life cycle is the egg.)
3. *Literal* What hatches from the egg? (A tadpole hatches from the egg.)
4. *Inferential* How do tadpoles breathe underwater? (Tadpoles, like fish, have gills so that they can breathe underwater.)
5. *Inferential* How do tadpoles prepare for the cold of winter? (Tadpoles burrow under the mud at the bottom of the pond and hibernate.)

6. *Literal* When is a tadpole finally a young frog? (A tadpole is a young frog when its tail disappears completely and it breathes on land with lungs.)

7. *Literal* What is it called when a living thing undergoes a huge change in shape and appearance, like the frog does from tadpole to adult frog? (It is called metamorphosis.)

8. *Literal* In which season do adult female frogs lay their eggs so that the life cycle can begin again? (Adult female frogs lay their eggs in the spring.)

9. *Literal* What are the stages of the frog's life cycle? (The three stages of the frog's life cycle are egg, tadpole, froglet, and adult frog.)

[Please continue to model the *Question? Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

10. *Evaluative* ***What? Pair Share:*** Asking questions after a read-aloud is one way to see how much everyone has learned. Think of a question you can ask your neighbor about the read-aloud that starts with the word *what.* For example, you could ask, "What did you learn about in today's read-aloud?" Turn to your neighbor and ask your *what* question. Listen to your neighbor's response. Then your neighbor will ask a new *what* question, and you will get a chance to respond. I will call on several of you to share your questions with the class.

11. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Burrow *5 minutes*

1. In the read-aloud you heard, "In the winter, many frogs hibernate. Often they *burrow,* or dig a hole in mud at the bottom of ponds."
2. Say the word *burrow* with me.
3. *Burrow* means to make a hole into or under something.
4. Some animals use their front legs to push dirt aside so they can burrow deeper into the ground.
5. Has there ever been a time when you tried to burrow into something or when you saw an animal burrow into something? Try to use the word *burrow* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "Once, I saw my dog burrow into . . . "]
6. What's the word we've been talking about? What part of speech is the word *burrow*? How do you know that it is an action word?

Use a *Discussion* activity for follow-up. Directions: Share with your partner why you think it is important for creatures to burrow when they hibernate. Be sure to begin your responses with "It is important for creatures to burrow because . . . "

Complete Remainder of the Lesson Later in the Day

The Life Cycle of a Frog

7 B

Extensions — *20 minutes*

Writing an Explanatory/Informational Paragraph (Instructional Master 7B-1)

Show students Cycles Poster 5 (Life Cycle of a Frog) and have them identify each stage of the life cycle of the frog. You may wish to display this poster on the classroom wall to reference throughout the domain.

Tell students that they are going to write a paragraph to explain the stages of the life cycle of a frog as going from "egg to egg." Tell students that a paragraph that explains something or tells how to do something in a particular order is called an explanatory or informational paragraph. Have students use the information heard in the read-aloud and the images on Cycles Poster 5 to review the stages of a frog's life cycle. Encourage them to describe each stage, and to include any domain-related vocabulary. You may wish to model this planning step of the writing process on chart paper, a chalkboard, or a whiteboard, using the following as a guide:

- Egg—laid in the spring in the pond by the female adult frog
- Tadpole—hatches from the egg in the spring with a tail and no legs; eats and grows in the summer and fall; goes through metamorphosis
- Froglet—has four legs, breathes with lungs, and starts to lose its tail
- Adult—has lungs and legs (and no tail); spends time on land and in the pond; eats and hides in the fall as it prepares for winter; hibernates by burrowing at the bottom of the pond in winter; emerges from hibernation in the spring; female lays eggs in the pond to begin the life cycle again

Note: Please read aloud the labels on each box on Instructional Master 7B-1 to students. Students are not expected to decode these labels.

Give each student a copy of Instructional Master 7B-1. Tell students they are now going to write a draft of their paragraphs, including introductory and concluding sentences. Tell students that an introductory sentence tells the reader what the paragraph is about. For example, "There are four important stages in the life cycle of a frog." A concluding sentence concludes, or finishes, the paragraph. For example, "These four stages describe the life cycle of a frog." Remind students to use capital letters at the beginning of their sentences and the correct punctuation at the end. Allow students to share their paragraphs with a partner or with the class to determine if their explanations of the life cycle of the frog are clear and in the correct sequence. If time allows, you may wish to have students complete the editing step of the writing process.

The Life Cycle of a Butterfly

8

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Describe the seasonal cycle: spring, summer, autumn, winter
- ✓ Explain effects of seasonal changes on plants and animals
- ✓ Define the term *life cycle*
- ✓ Identify the stages of the life cycle of a butterfly (egg to egg)
- ✓ Explain metamorphosis

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart in the Introduction for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Identify the main topic of "The Life Cycle of a Butterfly" (RI.2.2)
- ✓ Compare and contrast the life cycle of a chicken to the life cycle of a frog (RI.2.9)
- ✓ Identify new meanings for the word *round* and apply them accurately (L.2.5a)
- ✓ Make and describe a personal connection to how outgrowing one's clothes resembles a caterpillar molting its skin.
- ✓ Sequence four to six pictures illustrating the life cycle of a butterfly

Core Vocabulary

larva, *n.* The early form of an insect that is not completely developed
Example: A larva must go through many stages of growth before becoming an adult insect.
Variation(s): larvae

molt, *v.* To shed an outer layer
Example: When it comes time for my pet snake to molt, he sheds all of his scales at once.
Variation(s): molts, molted, molting

transparent, *adj.* Clear; able to see through
Example: Judy planted her seeds in a large, transparent, plastic cup so she could watch the roots develop beneath the soil.
Variation(s): none

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	Image Cards 10–16	10
	Purpose for Listening		
Presenting the Read-Aloud	**Life Cycle of a Butterfly**	U.S. map; ruler	15
Discussing the Read-Aloud	**Comprehension Questions**	Cycles Poster 6 (Life Cycle of a Butterfly)	10
	Word Work: Transparent		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Sequencing the Life Cycle of a Butterfly**	Instructional Master 8B-1; Cycles Poster 6; drawing paper, drawing tools; glue or tape; scissors	20

The Life Cycle of a Butterfly

8A

Introducing the Read-Aloud — *10 minutes*

What Have We Already Learned?

Review with students that a cycle is a sequence of events that repeats itself again and again. A life cycle includes all the stages a living thing goes through from birth to adult. Discuss with students how the seasonal cycle affects the life cycles of living things: most new life occurs in the spring, when there is more sunlight and temperatures are warmer.

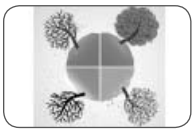
Remind students that when a living thing becomes an adult, it is then able to reproduce, or make more of its own kind, to begin the life cycle again. In the case of plants and trees, remind students that we can describe their life cycles as going from "seed to seed." Remind students that as they have discovered with chickens and frogs, animals also journey through stages from egg to adult called a life cycle.

Have students use Image Cards 10–16 to help them compare and contrast the life cycle of a chicken and a frog. How do the life cycles of chickens and frogs begin?

Purpose for Listening

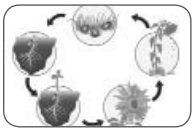
Explain to students that they are going to continue learning about another life cycle—the life cycle of a butterfly. Tell students to listen for the main topic in today's read-aloud: the changes that occur in the butterfly's life cycle from egg to adult butterfly. Tell them to listen carefully for the word *metamorphosis* and its role in the life cycle of this animal.

Presenting the Read-Aloud — *15 minutes*

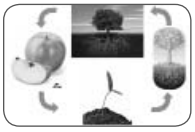


The Life Cycle of a Butterfly

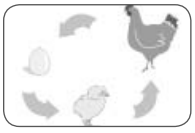
Show image 8A-1: Seasonal Cycle



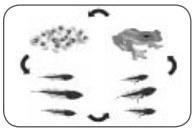
Show image 8A-2: Plant Life Cycle



Show image 8A-3: Tree Life Cycle



Show image 8A-4: Chicken Life Cycle



Show image 8A-5: Frog Life Cycle

You have already learned about five cycles![1] You have learned about the seasonal cycle, the life cycle of a flowering plant, the life cycle of a tree, the life cycle of a chicken, and the life cycle of a frog. Today you will learn about the life cycle of a butterfly. A butterfly's life cycle is somewhat different because it goes through a stage called metamorphosis. Metamorphosis is a process in which a living thing changes or transforms from one shape into another. This means that it literally changes its entire appearance. Let's hear more about the extraordinary life cycle of those beautiful creatures called butterflies.[2]

1 [Use images 8A-1 through 8A-5 to help students review these cycles.]

2 At what time of the year do we see butterflies? (We usually see butterflies during spring and summer. If it is warm enough we might see them in early fall too.)

Show image 8A-6: Butterflies

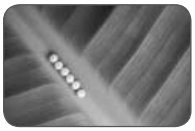
Did you know that there are about 25,000 different kinds of butterflies in the world? Butterflies vary in size from about one-eighth of an inch, to almost twelve inches in size.[3] The largest butterfly in the world is the Queen Alexandra Birdwing. Its wingspan is twelve inches wide! It lives in the rainforests of Papua New Guinea. The smallest butterfly is the Western Pygmy Blue from Africa.

3 [Use a ruler to show students these lengths.]

Incredibly, butterflies can only fly when their bodies are warm enough. The butterfly's body temperature must be 85°F for them to take to the air.[4] When they do, the fastest butterflies can fly at 12 mph. They cannot move at all if their body temperature drops below 55°F.[5] Well, now that you know some interesting facts about butterflies, it's time to find out about their life cycle.

4 85° F is the temperature on a warm, summer day.

5 55° F is the temperature on a chilly day.



Show image 8A-7: Butterfly eggs

A butterfly begins its life as an egg that has been produced by its mother. Butterfly eggs can be round or oval.[6] There are even some that are cylindrical in shape.[7] The shape of the egg often depends on the kind of butterfly that laid the egg.

6 Here, the word *round* refers to the shape of the eggs. The word *round* also can mean to go or pass around something.

7 [Show students something that is cylinder-shaped in your classroom for reference.]

Female butterflies lay their eggs on the leaves of plants. They do this so that when their young hatch, there is food right there for them to eat. They choose these leaves carefully, selecting only the leaves that their young will eat. Depending on the kind of butterfly, it can take from six days to twenty days for the eggs to hatch.

Show image 8A-8: Butterfly larva

Can you guess what hatches out of a butterfly egg? Well, it isn't a butterfly. It is actually a tiny caterpillar, also called a **larva**. A caterpillar is a small creature that moves by squeezing its muscles. It squeezes its muscles starting at the back end of its body and moving up to its head. This movement pushes the caterpillar forward.[8]

8 Let's try to move like caterpillars!

A caterpillar also uses its muscles to eat. The caterpillar's job is to eat as much as it can. A caterpillar eats the egg that sheltered it. Then it begins to eat the leaf on which it was born. The tiny caterpillar keeps on eating, devouring all the leaves around it. Caterpillars don't sleep, so they eat during the day and at nighttime, too. They grow very quickly.

Because caterpillars grow so quickly, they outgrow their skin. This means that because their skin does not grow with them the way yours does, they **molt**, or shed, their outer skin to reveal new skin underneath. They do this repeatedly until they are fully grown. Some caterpillars even eat their own old skin![9]

9 What happens when you outgrow your clothes?

A caterpillar is usually fully grown somewhere between nine and twenty days. At this stage, the caterpillar will leave its food supply and go in search of a safe, leafy place to enter into the next stage of its life cycle. Once in this safe place, it attaches itself to a twig or small branch by making a silk pad on the bottom of the branch or twig. The caterpillar then hooks itself onto the silk pad.

Show image 8A-9: Pupa in chrysalis

In the next stage, the caterpillar forms a protective outer casing called a pupa, or chrysalis. The formation of the chrysalis is the final stage of molting, or shedding outer skin. When it molts for the final time, the new skin becomes the outer shell of the chrysalis.

Inside the chrysalis something incredible happens. The caterpillar transforms from one thing into another in the process called metamorphosis.

Show image 8A-10: Newly hatched butterfly

Think about what a caterpillar looks like when it is fully grown, just before metamorphosis. It is small and round. When it emerges from the chrysalis, it is no longer a caterpillar but a delicate, beautifully colored butterfly with wings. The caterpillar's body has completely changed. (For some butterflies it is sometimes possible to tell when the butterfly is fully transformed and ready to emerge because its chrysalis becomes **transparent,** or see-through.) The butterfly does not look anything like the small, round-bodied creature it used to be. Instead of mouthparts that chew, the butterfly has a straw-like tube that can suck nectar from sweet-tasting flowers. It has antennae. This metamorphosis takes between ten to fourteen days to complete.

At first, the butterfly's wings are very delicate. They are quite soft and are folded up, not yet ready to carry the butterfly up into the air. It will take several hours before the butterfly is ready to take to the sky. During this time, a fluid is being pumped all around the butterfly's body, especially into the wings. When the butterfly is ready to fly, it is also ready to find a mate.

Show image 8A-11: Butterfly body parts

Butterflies use their eyes to find a mate. Male butterflies send out special scents to attract female butterflies. Male butterflies fertilize the eggs of female butterflies. The life cycle begins all over again as female butterflies search for the right places to lay their eggs.

Amazingly, female butterflies use their feet to find the best place to lay their eggs. The butterfly "tastes" various leaves using her feet to find just the right home for her young. She knows that when her eggs hatch, they will need an instant food supply.

Show image 8A-12: Migration

Did you know that butterflies do not live for a very long time? Many butterflies live for just about one month. There are even some that live for just a matter of days. However, there are a few, such as the Monarch butterfly, that can live for almost a year and in the fall migrate thousands of miles. [10]

10 What does the word *migrate* mean again?

Show image 8A-13: Butterfly Life Cycle

During their lifetime, butterflies help to pollinate our flowering plants. Because they are cold-blooded and like only warm weather, we only see them in the late spring and summer. But when we do, they are a beautiful sight to see in our gardens and parks. Perhaps now that you know all about the life cycle of a butterfly, when you next see one, you will appreciate them even more.

Discussing the Read-Aloud **15** *minutes*

Comprehension Questions **10** *minutes*

1. *Evaluative* What is the main topic of the read-aloud? (The main topic of the read-aloud is the life cycle of a butterfly.)
2. *Literal* How does a butterfly begin its life? (A butterfly begins its life as an egg.)
3. *Literal* What hatches out of the egg? (A caterpillar or larva hatches out of the egg.)

4. *Literal* Caterpillars grow so quickly that they outgrow their skin. What does a caterpillar do with the skin it outgrows? (A caterpillar will molt or shed the skin it outgrows.)

5. *Literal* What is the next stage called when the caterpillar forms a protective case? (When a caterpillar forms a protective case, this is called the chrysalis or pupa stage.)

6. *Literal* What comes out of the chrysalis or pupa? (An adult butterfly comes out of the chrysalis or pupa.)

7. *Evaluative* [You may wish to have students refer to Cycles Poster 6 as they answer the following question.] What are the four stages in the life cycle of a butterfly? (The four stages in the life cycle of a butterfly are egg, larva/caterpillar, chrysalis/pupa, and adult).

8. *Evaluative* After metamorphosis, does the adult animal look like it did when it was younger? (After metamorphosis, the adult does not look like it did when it was younger.)

9. *Inferential* Why do some butterflies migrate? (For those butterflies that live longer, they cannot stay in cold, wet conditions. When temperatures fall below 55˚F, they cannot move. If it is very cold, they will die, and so in order to survive, they must migrate.)

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

10. *Evaluative* *Think Pair Share:* The life cycle of a flowering plant could be described as going from seed to seed, and the life cycles of a frog and a chicken, from egg to egg. How would you describe the life cycle of a butterfly? (Using that example, the life cycle of a butterfly could be described as going from egg to egg. When the adult butterfly lays an egg, the life cycle begins. The larva/caterpillar hatches from the egg; the larva/caterpillar molts several times as it grows; the chrysalis/pupa forms; and finally the chrysalis/pupa splits open so the adult butterfly can emerge. The adult butterfly is then able to reproduce, and the female lays eggs on a leaf to begin the life cycle again.)

11. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Transparent *5 minutes*

1. In the read-aloud you heard, "For some butterflies it is sometimes possible to tell when the butterfly is fully transformed and ready to emerge because its chrysalis becomes *transparent,* or see-through."
2. Say the word *transparent* with me.
3. *Transparent* means see-through.
4. Mike's water bottle is transparent, so he is able to see how much water he has left.
5. What are things you have seen that are transparent? Try to use the word *transparent* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "_____ is transparent."]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: I am going to name several things. If what I name is transparent, say, "_____ is transparent." If what I name is not transparent, say, "_____ is not transparent." Remember to answer in complete sentences.

1. a window (A window is transparent.)
2. a brown paper bag (A brown paper bag is not transparent.)
3. a classroom pet tank (A classroom pet tank is transparent.)
4. a book (A book is not transparent.)
5. the lenses in a pair of glasses (The lenses in a pair of glasses are transparent.)
6. clear plastic wrap (Clear plastic wrap is transparent.)

Complete Remainder of the Lesson Later in the Day

The Life Cycle of a Butterfly

8B

Extensions

***20** minutes*

Sequencing the Life Cycle of a Butterfly (Instructional Master 8B-1)

Review the term *metamorphosis* with students. Help them understand that metamorphosis is the process by which some young animals change physical form completely as they become adults. Give each student a copy of Instructional Master 8B-1 and a large piece of drawing paper. Tell students that the worksheet has pictures of the different stages of the life cycle of a butterfly.

Have students color and cut out the pictures. Next, have them think about what is happening in each picture. Students should then arrange the pictures in their correct order to show the proper sequence of metamorphosis. Once the pictures have been sequenced, have students glue or tape the pictures onto drawing paper. As students complete this activity, have them work with a partner to retell the stages of the life cycle of a butterfly while referring to their sequenced pictures. Have students write sentences that describe the pictures and retell the metamorphosis of a butterfly.

You may also wish to show students Cycles Poster 6 (Life Cycle of a Butterfly) and have them once again identify the four stages of the butterfly's life and metamorphosis. You may wish to display the Poster on the classroom wall to reference throughout the domain.

The Water Cycle

9

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Define the term *water cycle*
- ✓ Explain that there is a limited amount of water on Earth
- ✓ Describe evaporation and condensation
- ✓ Identify forms and importance of precipitation
- ✓ Describe the formation of clouds
- ✓ Identify three types of clouds: cirrus, cumulus, and stratus

Language Arts Objectives

The following language arts objectives are addresed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Identify the main topic of the "The Water Cycle" (RI.2.2)
- ✓ Summarize in writing observations of the indoor water cycle (SL.2.2)
- ✓ Add drawings to a summary of observations of the indoor water cycle (SL.2.5)
- ✓ Prior to listening to "The Water Cycle," orally identify information they know and have learned about the life cycles of plants, trees, chickens, frogs, and butterflies

Core Vocabulary

evaporation, n. The process by which a liquid changes into a gas
Example: We had to add water to our swimming pool because of the evaporation of some of the water.
Variation(s): none

condensation, n. The process by which a gas changes into a liquid
Example: It is difficult to see out of the car window when there is condensation.
Variation(s): none

humidity, n. The amount of moisture or water vapor in the air
Example: There is high humidity in the world's tropical rainforests.
Variation(s): none

precipitation, n. Water that falls from the sky as rain, snow, sleet, or hail
Example: We are planning to have a picnic because there is no chance of precipitation today.
Variation(s): none

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	Cycles Posters 1–6	10
	What Do We Know?		
	Essential Background Information or Terms	water; two differently shaped, clear containers	
	Purpose for Listening		
Presenting the Read-Aloud	**The Water Cycle**		15
Discussing the Read-Aloud	**Comprehension Questions**	Cycles Poster 7 (Water Cycle)	10
	Word Work: Precipitation		5
 **Complete Remainder of the Lesson Later in the Day**			
Extensions	**A Water Cycle Song**	Cycles Poster 7	20
	Water Cycle Observations	clear plastic cup; clear plastic bag; marker; tape; water [This exercise requires advance preparation.]	

The Water Cycle

9A

Introducing the Read-Aloud *10 minutes*

What Have We Already Learned?

Ask students to explain what a cycle is. Next, ask them to describe the cycles they have learned about: seasonal, plant, tree, chicken, frog, and butterfly. You may wish to show students Cycles Posters 1–6 as a review of these cycles.

What Do We Know?

Ask students what comes to mind when they hear the word *water.* Have students share what they know about water. You may prompt discussion with the following questions:

- Where can you find water?
- Is there more water or land on the surface of the earth?
- How do you use water?
- What other living things need water besides people?
- Why did ancient civilizations develop around water?
- Why is it important to conserve water?
- When is water a liquid, a solid, or a gas?

Essential Background Information or Terms

Explain to students that all things on Earth can be described as being solid, liquid, or gas. Explain that if something is a solid, it keeps its shape. Tell students that if you pick up a book and hand it to someone else, it will still keep its same shape. It keeps its shape because the book is a solid.

Explain that if something is a liquid, it can be poured. It doesn't keep its shape, but takes on the shape of its container. Show students two differently shaped, clear containers. Have students watch as you pour water from one container to another. Tell

students that water is a liquid because it takes the shape of whatever container it is in.

Explain that if something is a gas, it is often hard to see. Explain that the air around us is a gas. It is not solid because it does not keep its shape, and it is not liquid because it cannot be poured.

Explain that heat can change things from solids to liquids to gases. Tell students that an ice cube is the solid form of water. When heated, an ice cube can melt and become water. When we boil water, it heats up and becomes water vapor, which is a gas.

Purpose for Listening

Explain that the water on Earth goes through a cycle as well, and that this is called the water cycle. Tell students to listen carefully to learn about the main topic of the read-aloud—the water cycle—and to find out how important the water cycle is to our planet.

Presenting the Read-Aloud **15** *minutes*

The Water Cycle

Show image 9A-1: Water

Every day, all around you, an extraordinary natural cycle is happening. It is called the water cycle. Most of the water that has ever existed on our planet is still here and is being moved from one place to another. It moves from the oceans and land to the sky above us, and it moves from one part of the world to another. It has done this for millions and millions of years. The rain that falls on you has been recycled many, many times over many millions of years.

Show image 9A-2: Water states

Water is the main source of life. More than two-thirds of Earth's surface is covered with water. That's a good thing, because all living things need water to survive. Approximately ninety-seven percent of the water on Earth is in the oceans. [1] The rest is in lakes, rivers, streams, ponds, beneath the ground, or in its frozen state in the form of glaciers and polar ice. There is also water that you cannot see in the air around you, called water vapor. Therefore, water not only moves from place to place, but it can exist in three states of matter. It can be a liquid, a solid, and a gas. [2] Oceans and rivers contain water in liquid form, glaciers and the ice you put in drinks contain water in frozen, solid form, and the air contains water as a gas called water vapor.

1 That means most of Earth's water is found in the oceans.

2 [Refer back to the review on solids, liquids, and gases in the "Introducing the Read-Aloud" section.]

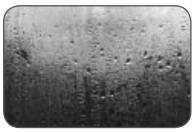
Show image 9A-3: Evaporation, condensation, precipitation

The water cycle has three main phases: evaporation, condensation, and precipitation. Water changes its form based on the temperature, and whether it is being heated or cooled. In the winter, when it is cold, many people experience days in which snow falls from the sky. The snow covers the land, and icicles hang down from the roofs of houses. But then, as spring arrives and the weather becomes warmer, the snow and ice melt into puddles. The puddles slowly disappear as the warm sunshine causes the water to evaporate. Through the process of

evaporation, the warmth of the sun changes liquid water into a gas known as water vapor. Water vapor is carried up into the air. The hotter it is, the more quickly evaporation happens.[3]

3 This also happens when you boil water.

Now let's follow that water vapor as it rises up, higher and higher into the sky. As it rises up, it is blown about by the wind, and it moves through the air, or atmosphere. In other words, water vapor may be carried by the wind far away from the place where it was once a puddle.



Show image 9A-4: Condensation

Water vapor in the air far below the clouds is called **humidity**. When there is a lot of water in the air, we say it is humid. At different times of the year, there are different amounts of water in the air. Warm air can hold more water vapor than cold air. That is why on a hot summer's day, if there is a lot of moisture in the air, you will often hear people talk about the humidity.

Water vapor high in the atmosphere forms clouds as it becomes water droplets. The wind carries the water vapor higher and higher into the atmosphere where the temperatures are much cooler. As the vapor cools, it changes back from a gas into water droplets, which form clouds.

When water changes from a gas into a liquid, this process is called **condensation**. Because cold air cannot hold as much water vapor as hot air, condensation happens high up in the sky, or atmosphere. Condensation causes clouds to form. In other words, water vapor becomes water droplets.

Show image 9A-5: Dark clouds

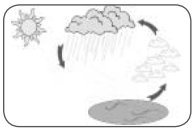
As the tiny water droplets are blown about by the wind, they crash into each other. They join together to form larger water droplets. As this bumping and crashing of water droplets continues, clouds are formed. Eventually, when water droplets in clouds become too large and too heavy, they fall back down to the ground.[4] Depending on the temperature high up in the atmosphere, the water droplets either fall as rain, sleet, snow, or hail. When water droplets fall to the ground, regardless of what they look like, this is called **precipitation**.

4 The darker the cloud, the more rain or snow will probably fall.

Show image 9A-6: Types of precipitation

So down comes the rain, or snow, or hail, or sleet. It waters the earth and falls into the oceans, lakes, rivers, streams, and ponds. Some of the precipitation seeps into the ground, too. This groundwater nourishes plants. It also provides a source of fresh drinking water. Many people have wells that access the underground water supply. [5]

5 How do you think people get the water that is stored under the ground?



Show image 9A-7: Water Cycle

Once precipitation occurs, the process starts all over again. Water on Earth evaporates and rises up into the atmosphere as water vapor. As it cools or condenses, clouds form once again.

Show image 9A-8: Types of clouds

Clouds are much more than fun shapes in the sky. Without clouds, there would be no precipitation, such as snow, sleet, hail, or rain. Without precipitation, nothing could live or grow on Earth. Clouds also provide a kind of shelter or protection from the sun. Without clouds it would be very, very hot during the day and extremely cold at night. This would make it difficult for living things to survive. Clouds help control the temperature on our planet. Scientists group clouds according to their shape and height in the sky.

Show image 9A-9: Cirrus clouds

Cirrus clouds form at very high altitudes in the atmosphere. [6] They are wispy, almost feather-like in appearance, and are usually a sign of good weather. These clouds can be up to four miles above the ground. The temperature is very cold that high up in the atmosphere and so cirrus clouds are made largely of ice crystals.

6 The word *cirrus* means "curl of hair" in Latin. Can you see why cirrus clouds have this name?

Show image 9A-10: Cumulus clouds

Cumulus clouds gather in the sky on nice, sunny days. [7] Cumulus clouds appear lower down in the sky, although they are still about two miles above the ground. Cumulus clouds are round and fluffy-looking. Some people think they look like cotton. They

7 The word *cumulus* means "heap" in Latin. Can you see why cumulus clouds have this name?

are a sign that the weather is going to get colder. However, when cumulus clouds get larger and darker, this can mean that there will be a thunderstorm.

Show image 9A-11: Stratus clouds

The appearance of stratus clouds means that you will probably need an umbrella because it is going to rain.[8] They are usually gray, and they can cover the whole sky and block the sun. Stratus clouds form lower down in the atmosphere.

The temperature affects whether the clouds contain ice crystals or water droplets. The clouds that are high up, in the colder reaches of Earth's atmosphere, are made up of sparkling ice crystals. The clouds that are lower down, where it is warmer, are made up of tiny water droplets.

The next time you look up at the clouds, think about the amazing water cycle!

8 The word *stratus* means "layer" in Latin. Can you see why stratus clouds have this name?

Discussing the Read-Aloud — *15 minutes*

Comprehension Questions — *10 minutes*

Note: You may wish to show students Cycles Poster 7 (Water Cycle) as a guide for some questions. This poster will be referenced again in the extension.

1. *Evaluative* What is the main topic of the read-aloud? (The main topic of the read-aloud is the water cycle.)
2. *Literal* Is the earth covered mostly by land or by water? (The earth is covered mostly by water.)
3. *Inferential* What do we call the process when water from oceans, rivers, and puddles changes to a gas and moves into the air? (When water from oceans, rivers, and puddles changes to gas, we call this process evaporation.) What causes evaporation? (The heat from the sun causes evaporation.) Can we *usually* see evaporation or water vapor? (No, we cannot usually see evaporation.)

4. *Literal* What do we call the process when water vapor turns back into a liquid or water droplets because of cooling? (When water vapor turns back into a liquid or water droplets, we call this process condensation.)

5. *Literal* Water can be a solid, a liquid, or a gas. What do we call water when it is a gas? (When water is a gas, it is called water vapor.)

6. *Inferential* Why are the processes of evaporation, condensation, and precipitation considered a cycle? (They are considered a cycle because they happen again and again in the same order.) What is the name of this cycle? (This cycle is called the water cycle.)

7. *Inferential* How do clouds fit into the water cycle? (Clouds are a key part of the water cycle. They form because of condensation; they release precipitation, which rises as a vapor to eventually form more clouds.)

8. *Inferential* When clouds get heavy with water as condensation, what do we call water that then falls from the sky as rain, snow, sleet, or hail? (We call this precipitation.) Which type of precipitation is a liquid? (Rain is a liquid.) Which types or precipitation are solids? (Snow, sleet, and hail are solid forms of precipitation.)

9. *Literal* Where does precipitation go after it falls from the clouds? (After it falls, precipitation goes into the ground or back into oceans, rivers, and streams.)

10. *Literal* Does the earth make new water, or does the same water go through the water cycle again and again? (The same water cycles again and again.)

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

11. *Evaluative* ***Think Pair Share:*** Why is precipitation important? (Answers may vary, but should include that precipitation replenishes the earth's water supply.)

12. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Precipitation *5 minutes*

1. In the read-aloud you heard, "When water droplets fall to the ground, regardless of what they look like, this is called *precipitation*."
2. Say the word *precipitation* with me.
3. Precipitation is water that falls from the sky in the form of rain, snow, sleet, or hail.
4. The farmer had to water his garden because there had been no precipitation for a month.
5. What is your favorite and/or least favorite kind of precipitation? Be sure to explain why. Try to use the word *precipitation* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "My favorite kind of precipitation is . . . "]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: I will name two things. You will choose the one that is a type of precipitation. Be sure to begin your response with "_____ is a type of precipitation."

1. clouds or rain (Rain is a type of precipitation.)
2. sleet or water vapor (Sleet is a type of precipitation.)
3. snow or humidity (Snow is a type of precipitation.)
4. an ocean or hail (Hail is a type of precipitation.)

Complete Remainder of the Lesson Later in the Day

The Water Cycle

9B

Extensions — *20 minutes*

A Water Cycle Song

Display Cycles Poster 7 to reference in this activity and throughout this domain. Teach students the following song and accompanying movements about the water cycle. The song is sung to the tune of "She'll Be Comin' 'Round the Mountain."

Water travels in a cycle; yes, it does. [Move arm in a circular motion in front of the body.]

Water travels in a cycle; yes, it does. [Move arm in a circular motion in front of the body.]

It goes up as evaporation, [Move arms and hands, palms up, upward.]

Forms clouds as condensation, [With raised arms, form a cloud with the hands.]

Then falls down as precipitation; yes, it does. [Show rain falling with the hands and arms moving downward.]

Water Cycle Observations

Set up a miniature, indoor water cycle for students to observe. Pour a small amount of water into a small, clear, plastic cup. Tell students that this represents water that is found on the earth in a lake or puddle. Mark the level of the water by using a marker to draw a line on the cup. Carefully place the cup of water in a clear, plastic bag. Seal the bag. If your classroom has a window, tape the bag to the window. If not, tape the bag to a warm wall. Ask the students to predict what will happen.

Observe the bag each day until students are able to see that some of the water has evaporated, condensed on the sides of the bag,

and fallen to the bottom of the bag as precipitation. Have students describe what they see using the words *evaporated/evaporation, condensation,* and *precipitation.* Ask students to draw and write about their observations.

You may also make and discuss water cycle observations on days when clouds are visible in the sky or when precipitation is falling.

Domain Review

DR

Note to Teacher

You should spend one day reviewing and reinforcing the material in this domain. You may have students do any combination of the activities provided, in either whole group or small group settings.

Core Content Objectives Addressed in This Domain

Students will:

- ✓ Explain that a cycle is a sequence of events that repeats itself again and again
- ✓ Recognize that the rotation of Earth causes daytime and nighttime
- ✓ Explain that it takes twenty-four hours for Earth to rotate once on its axis
- ✓ Recognize that living things have a life cycle
- ✓ Recognize that Earth orbits the sun
- ✓ Explain that it takes one year for Earth to orbit the sun
- ✓ Describe the seasonal cycle: spring, summer, autumn (fall), winter
- ✓ Identify that the tilt of Earth's axis in relation to the sun causes the seasons
- ✓ Explain effects of seasonal changes on plants and animals
- ✓ Describe animal processes in spring, summer, autumn (fall), winter
- ✓ Describe plant processes in spring, summer, autumn (fall), winter
- ✓ Define the term *life cycle*
- ✓ Identify the stages of the life cycle of a flowering plant (seed to seed)

- ✓ Identify the stages of the life cycle of a tree (seed to seed)
- ✓ Demonstrate familiarity with the poem “Bed in Summer”
- ✓ Demonstrate familiarity with the poem “Bee! I’m expecting you!”
- ✓ Identify the stages of the life cycle of a chicken (egg to egg)
- ✓ Identify the stages of the life cycle of a frog (egg to egg)
- ✓ Identify the stages of the life cycle of a butterfly (egg to egg)
- ✓ Explain metamorphosis
- ✓ Define the term *water cycle*
- ✓ Explain that there is a limited amount of water on Earth
- ✓ Describe evaporation and condensation
- ✓ Identify forms and importance of precipitation
- ✓ Describe the formation of clouds
- ✓ Identify three types of clouds: cirrus, cumulus, and stratus

Review Activities

Image Card Review

Materials: Image Cards 1–26

In your hand, hold Image Cards 1–26 fanned out like a deck of cards. Ask each student to pick one card. (If you have more than twenty-six students, you may need to pair up a few students.) Ask students to work together to sort themselves into groups according to the card they have and the cycle to which it belongs. Then have each group explain their particular cycle to the class.

Life Story

Materials: Drawing paper, drawing tools

Have students pretend they are one of the creatures they heard about from the previous read-alouds. Have each student write their creature’s life story, making sure to include the stages of its life cycle.

Life Cycles Review

Materials: Cycles Posters 4–6; Image Cards 10–20

Use Image Cards 10–20 and Cycles Posters 4–6 to review with students the life cycle of a chicken, frog, and butterfly. Have students explain and/or sequence the stages of the cycles.

Domain-Related Trade Book or Student Choice

Materials: Trade book

Read a trade book to review a particular cycle; refer to the books listed in the Introduction. You may also choose to have students select a read-aloud to be heard again.

Class Book: Animal Life Cycle Encyclopedia

Materials: Drawing paper, drawing tools

Tell the class or a group of students that they are going to make a class book to help them remember what they have learned in this domain. Have students brainstorm important information about how seasonal cycles affect the life cycles of animals they have heard about, and describe the animals' life cycles. Have each student choose one idea to draw a picture of, and ask him or her to write a caption for the picture. Bind the pages to make a class book to put in the class library for students to read again and again.

Riddles for Core Content

Ask students riddles such as the following to review core content:

- I am the reason we have seasons. What am I? (Earth's tilt)
- I am the area on Earth that receives the greatest amount of direct, intense sunlight. What am I? (equator)
- I am the process in which a plant begins to grow and sprout. What am I? (germination)
- I am the process by which some young animals develop and *drastically* change as they become adults. What am I? (metamorphosis)

- I am the larva that hatches from the egg of an adult female frog. What am I? (tadpole)
- I am the process by which a liquid changes into a gas. What am I? (evaporation)
- I am the process by which a gas changes into a liquid. What am I? (condensation)
- I am the water that falls from the sky as rain, snow, sleet, or hail. What am I? (precipitation)
- We are the three main types of clouds. What are we? (cirrus, cumulus, and stratus)

Compare/Contrast

Materials: Chart paper, chalkboard, or whiteboard

Tell students that there are many things to compare and contrast in the read-alouds they have heard. Remind students that *compare* means to tell how things are similar, and *contrast* means to tell how things are different. Have students choose a topic from the following list to compare/contrast on a chart. You may do this individually or as a class.

- the seasons
- the life cycle of a frog and a butterfly
- the three forms of water
- evaporation, condensation, and precipitation
- three types of clouds

You may wish to extend this activity by using the chart as a prewriting tool and have students write two paragraphs, one describing similarities and the other describing differences.

Key Vocabulary Brainstorming

Materials: Chart paper, chalkboard, or whiteboard

Give the students a key domain concept or vocabulary word such as *water cycle.* Have them brainstorm everything that comes to mind when they hear the word, such as *repeats, evaporation,*

condensation, precipitation, etc. Record their responses on chart paper, a chalkboard, or a whiteboard for reference.

Writing Prompts

Students may be given an additional writing prompt such as the following:

- Tadpoles and adult frogs breathe in different ways because . . .
- The changing seasons affect our lives because . . .
- The shape of a cloud is important because . . .
- I observe the water cycle when . . .
- The most interesting thing I learned about cycles is . . .

Seasons Poem

Read the poem "Bee! I'm expecting you!" by Emily Dickinson from Lesson 3 to students. See if students can recite the poem on their own after practicing with you a few times. You may wish to have students write their own poems about the seasons.

Cycles in Nature Research

Materials: Recommended trade books; online and library resources

Have students research questions they may have about the topics discussed in this domain. You may also wish to have students expand their knowledge about related topics; for example, students may wish to research the life cycle of other plants and/or animals.

Domain Assessment

DA

This domain assessment evaluates each student's retention of domain and academic vocabulary words and core content targeted in *Cycles in Nature*. The results should guide review and remediation the following day.

There are three parts to this assessment. You may choose to do the parts in more than one sitting if you feel this is more appropriate for your students. Part I (vocabulary assessment) is divided into two sections: the first assesses domain-related vocabulary, and the second assesses academic vocabulary. Parts II and III of the assessment address the core content targeted in *Cycles in Nature*.

Part I (Instructional Master DA-1)

Directions: I am going to say a sentence using a word you have heard in the read-alouds and in this domain. If I use the word correctly in my sentence, circle the smiling face. If I do not use the word correctly in my sentence, circle the frowning face. I will say each sentence two times. Let's do number one together.

1. **Cycle:** A life cycle includes the events a living thing goes through from birth to adult. (smiling face)
2. **Rotating:** It is Earth rotating, or spinning, around its axis, that causes daytime and nighttime. (smiling face)
3. **Hemisphere:** A hemisphere is half of the earth. (smiling face)
4. **Equator:** The equator is the coldest part of the earth. (frowning face)
5. **Precipitation:** Wind is a form of precipitation. (frowning face)
6. **Germination:** Seeds need warmth from the sun, nutrients from the soil, and water for germination to happen. (smiling face)
7. **Seasons:** The four seasons are spring, summer, autumn, and winter. (smiling face)

8. **Humidity:** Humidity is the dryness in the air. (frowning face)
9. **Metamorphosis:** Butterflies go through metamorphosis when they change their appearance completely from caterpillar to butterfly. (smiling face)
10. **Decomposers:** Decomposers help to feed chicks before they hatch. (frowning face)

Directions: Now I am going to read more sentences using other words you have heard and practiced. If I use the word correctly in my sentence, circle the smiling face. If I do not use the word correctly in my sentence, circle the frowning face. I will say each sentence two times.

11. **Protective:** Chickens are protective of their chicks and keep them safe. (smiling face)
12. **Transparent:** When something is see-through, it is transparent. (smiling face)
13. **Burrow:** Birds burrow when they fly south for the winter. (frowning face)
14. **Replenished:** Drinking water after exercise makes me feel replenished. (smiling face)
15. **Thrive:** Plants thrive when they are sick. (frowning face)

Part II (Instructional Master DA-2)

Directions: Let's read the names in each row together. I will read a sentence about one of the animal life cycles you have learned about. You will circle the name of the animal whose life cycle I am describing.

1. This animal changes from a fish-like larva with gills, called a tadpole, to a four-legged adult with lungs. (frog)
2. This animal hatches from an egg as a larva in the form of a caterpillar. (butterfly)
3. This animal hatches from an egg that has a shell, a yolk, and albumen. (chicken)
4. This animal goes through stages of metamorphosis from tadpole to adult. (frog)

5. This animal changes from a larva to a pupa to an adult insect with a head, body, and wings. (butterfly)

Part III (Instructional Master DA-3)

Directions: I am going to read several sentences about the cycles in nature you have recently learned about. If I use the sentence is correct, circle the smiling face. If the sentence is not correct, circle the frowning face. I will say each sentence two times.

1. The tilt of the Earth's axis in relation to the moon causes the four seasons. (frowning face)
2. The region of the world called the equator receives the most direct, intense sunlight. (smiling face)
3. A tree's life cycle begins as a sapling. (frowning face)
4. All animals migrate in the summer. (frowning face)
5. Many frogs burrow into mud in the bottom of ponds and spend the winter there. (smiling face)
6. Most of Earth's surface is covered by water. (smiling face)
7. Water can exist in three forms: solid, liquid, and gas. (smiling face)
8. There is an endless supply of water on Earth. (frowning face)
9. The three stages of the water cycle are evaporation, condensation, and precipitation. (smiling face)
10. The seasonal cycle includes the following seasons: winter, spring, winter, spring. (frowning face)

Culminating Activities

CA

Note to Teacher

Please use this final day to address class results of the Domain Assessment. Based on the results of the Domain Assessment and students' Tens scores, you may wish to use this class time to provide remediation opportunities that target specific areas of weakness for individual students, small groups, or the whole class.

Alternatively, you may also choose to use this class time to extend or enrich students' experience with domain knowledge. A number of enrichment activities are provided below in order to provide students with opportunities to enliven their experiences with domain concepts.

Remediation

You may choose to regroup students according to particular areas of weakness, as indicated from Domain Assessment results and students' Tens scores.

Remediation opportunities include:

- targeting Review Activities
- revisiting lesson Extensions
- rereading and discussing select read-alouds
- reading the corresponding lesson in the *Supplemental Guide*, if available

Enrichment

Student Choice

Have students select a read-aloud to be heard again, or a trade book from the list in the Introduction to hear for the first time.

Life Story

Materials: Drawing paper, drawing tools

Have students pretend they are one of the creatures they heard about from the previous read-alouds. Have each student write their creature's life story, making sure to include the stages of its life cycle.

Class Book: Animal Life Cycle Encyclopedia

Materials: Drawing paper, drawing tools

Tell the class or a group of students that they are going to make a class book to help them remember what they have learned in this domain. Have students brainstorm important information about how seasonal cycles affect the life cycles of animals they have heard about, and describe the animals' life cycles. Have each student choose one idea to draw a picture of, and ask him or her to write a caption for the picture. Bind the pages to make a class book to put in the class library for students to read again and again.

Compare/Contrast

Materials: Chart paper, chalkboard, or whiteboard

Tell students that there are many things to compare and contrast in the read-alouds they have heard. Remind students that *compare* means to tell how things are similar, and *contrast* means to tell how things are different. Have students choose a topic from the following list to compare/contrast on a chart. You may do this individually or as a class.

- the seasons
- the life cycle of a frog and a butterfly
- the three forms of water
- evaporation, condensation, and precipitation
- three types of clouds

You may wish to extend this activity by using the chart as a prewriting tool and have students write two paragraphs, one describing similarities and the other describing differences.

Guest Speakers

Invite a local meteorologist from the community to visit and talk to students about his/her work and how s/he studies the weather. You may wish to share ahead of time the specific aspects of clouds and the water cycle that you are covering in this domain.

You are a Meteorologist

Materials: Drawing paper, drawing tools

Have students pretend they are meteorologists. If your classroom has a window, give each student an opportunity to observe what types of clouds and/or precipitation are in the sky. If possible, select a day when the students can go outside. You may wish to divide students into pairs or groups. Have students draw the types of clouds and/or precipitation they see and write a caption naming and/or describing them. You may also wish to have students view the sky on different days so they are able to observe different clouds and/or precipitation. As students share their weather reports with the class, remember to repeat and expand upon their vocabulary using richer and more complex language, including, if possible, any domain-related vocabulary.

Writing Prompts

Students may be given an additional writing prompt such as the following:

- Tadpoles and adult frogs breathe in different ways because . . .
- The changing seasons affect our lives because
- The shape of a cloud is important because . . .
- I observe the water cycle when . . .
- The most interesting thing I learned about cycles is . . .

Observing the Life Cycle: Frog

Materials: Tadpoles; aquarium with a tight-fitting cover; rocks; branches; drawing paper, drawing tools

Note: Collect tadpoles from a local body of water or order a native species of frog that can be released back into your area. If uncertain, check a field guide on amphibians for frogs native to your region. If using tadpoles collected locally, it is best to release the froglets back to the body of water or area they were collected from.

Prepare the aquarium tank with untreated water, placing in it the rocks and branches you have collected. Make sure that the branches protrude above the surface of the water for the frogs to climb on as they develop. Have students observe and examine the tadpoles' metamorphosis into adult frogs. Ask students to describe the stages they see as the tadpoles develop. Have them draw these stages on drawing paper and write a caption for each stage of metamorphosis.

Observing the Life Cycle: Butterfly

Materials: Caterpillars; fresh leaves; glass jar with a metal lid; hammer; nail; drawing paper, drawing tools

Note: Collect caterpillars from your local area or order a native species of butterfly that can be released back into your area. If uncertain, check a field guide on insects for butterflies native to your region.

Option 1: Research instructions on how to raise a monarch butterfly.

Option 2: Order a caterpillar kit for a species that is native to your region. Company sources can be found by searching the Internet or by checking with your local school district for information.

Refer to the set of instructions that came with your purchased butterfly kit. Have students observe and examine the caterpillars' metamorphosis into a butterfly. Ask students to describe the stages they see as the caterpillars develop. Have them draw these stages on drawing paper and write a caption for each stage of metamorphosis.

Water: The Essence of All Life

Materials: Clear plastic tubs or cartons; ruler

Have students measure and record rainfall.

Clouds: Sky Watching

Materials: Paper, pencils

Have students observe, draw, and label the clouds they see in the sky.

Cycles in Nature Research

Materials: Recommended trade books; online and library resources

Have students research questions they may have about the topics discussed in this domain. You may also wish to have students expand their knowledge about related topics; for example, students may wish to research the life cycle of other plants and/or animals.

Water Cycle Paper Chains

Materials: Cycles Poster 7 (Water Cycle); colored paper; scissors; tape

Have students create paper chains to represent the water cycle. They can use light blue paper to represent rain, dark blue paper to represent groundwater, green paper to represent plants, yellow paper to represent the sun, and white paper to represent clouds and water vapor. Have students use Poster 7 (Water Cycle) as a reference.

For Teacher Reference Only:

Copies of *Tell It Again! Workbook*

1B-1

Dear Family Member,

During the next several days, your child will learn about cycles and explore some of the different types of cycles that occur in nature. Your child will be introduced to the reasons why we have four seasons on planet Earth, and to the different seasonal changes that affect the life cycles of plants and trees. Below are some suggestions for activities that you may do at home to reinforce what your child is learning about cycles in nature.

1. Personal Connections

Share with your child your favorite season and the different experiences from your own childhood connected with seasonal changes. Emphasize the changes observed in plants and animals. Ask your child what favorite memories s/he has of a particular season shared with you and your family.

2. Draw and Write

Have your child draw and/or write what s/he has learned about seasonal cycles and the life cycles of plants. Ask questions to help your child use the vocabulary learned at school.

3. Words to Use

Below is a list of some of the words that your child will be learning about and using. Try to use these words as they come up in everyday speech with your child.

- *revolve*—It takes one year for Earth to revolve around the sun.
- *hibernation*—Some animals have longer periods of winter hibernation than others.
- *cycles*—Planet Earth has many cycles, such as day and night, the seasons, and life cycles of plants.

4. Read Aloud Each Day

Set aside time to read aloud to your child every day. The local library has many books on cycles in nature. A list of books and other resources relevant to this topic is attached to this letter.

Be sure to let your child know how much you enjoy hearing about what s/he has been learning at school.

1B-2

Recommended Resources for Cycles in Nature

Trade Book List

Seasonal Cycles

1. *Earth Cycles,* by Michael Elsohn Ross (Millbrook Press, 2001) ISBN 978-0761319771
2. *Four Seasons Make a Year,* by Anne Rockwell (Walker & Company, 2004) ISBN 978-0802788832
3. *How Do Birds Find Their Way?,* by Roma Gans (Harper Collins, 1996) ISBN 978-0064451505
4. *The Reasons for Seasons,* by Gail Gibbons (Holiday House, 1995) ISBN 978-0823412389
5. *Red Leaf, Yellow Leaf,* by Lois Ehlert (Harcourt, Inc., 1991) ISBN 978-0152661977
6. *What Makes Day and Night,* by Franklyn Branley (Harper Collins, 1986) ISBN 978-0064450508

Plant and Animal Life Cycles

7. *Butterfly (How Does it Grow?),* by Jinny Johnson (Smart Apple Media, 2010) ISBN 978-1599203522
8. *Frogs (How Does it Grow?),* by Jinny Johnson (Smart Apple Media, 2010) ISBN 978-1599203553
9. *From Caterpillar to Butterfly (Let's-Read-and-Find-Out-Science),* by Deborah Heiligman (Harper Collins Publishers, 1996) ISBN 978-0064451291
10. *From Seed to Plant,* by Gail Gibbons (Holiday House, 1991) ISBN 978-0823410255
11. *From Seed to Sunflower,* by Dr. Gerald Legg (Franklin Watts, 1998) ISBN 978-0531153345
12. *How a Seed Grows,* by Helene J. Jordan (Harper Collins, 2000) ISBN 978-0064451079

13. *The Life Cycle of an Oak Tree,* by Linda Tagliaferro (Capstone Press, 2007) ISBN 978-0736867115
14. *A Log's Life,* by Wendy Pfeffer (Aladdin Paperbacks, 1997) ISBN 978-1416934837
15. *Monarch Butterfly,* by Gail Gibbons (Holiday House, 1995) ISBN 978-0823409099
16. *A Nest Full of Eggs,* by Priscilla Belz Jenkins (Harper Collins, 1995) ISBN 978-0064451277
17. *One Bean,* by Anne Rockwell (Walker Publishing Company, 1998) ISBN 978-0802775726
18. *The Reason for a Flower,* by Ruth Heller (Penguin Putnam Books for Young Readers, 1999) ISBN 978-0698115590

Water Cycle

19. *Down Comes the Rain (Let's-Read-and-Find-Out-Science),* by Franklyn M. Branley (Harper Collins Publishers, 1997) ISBN 978-0064451666
20. *The Snowflake: A Water Cycle Story,* by Neil Waldman (Milbrook Press, 2003) ISBN 978-0761323471
21. *Water (Nature's Cycles)* [Spanish & English], by Dana Meachen Rau (Marshall Cavendish Corporation, 2010) ISBN 978-0761447924
22. *The Water Cycle,* by Helen Frost (Pebble Books, 2000) ISBN 978-0736804097
23. *The Water Cycle,* by Rebecca Olien (Capstone Press, 2005) ISBN 978-0736851824
24. *Water, Water Everywhere,* Mark J. Rauzon and Cynthia Overbeck Bix (Sierra Club Books for Children, 1994) ISBN 978-0871563835

Websites and Other Resources

Student Resources

1. Interactive Earth Rotation
   http://www.bbc.co.uk/schools/scienceclips/ages/9_10/earth_sun_moon.shtml
2. Creature Feature: American Bullfrog
   http://kids.nationalgeographic.com/kids/animals/creaturefeature/american-bullfrog
3. Creature Feature: Penguin
   http://kids.nationalgeographic.com/kids/animals/creaturefeature/adelie-penguin
4. Caterpillar to a Butterfly
   http://www.youtube.com/watch?v=5Tvl6wz7e9M
5. Water Cycle Song
   http://www.youtube.com/watch?v=KQ8KRznrXiA
6. How Water Changes
   http://www.youtube.com/watch?v=oaCUyZw4Tjo

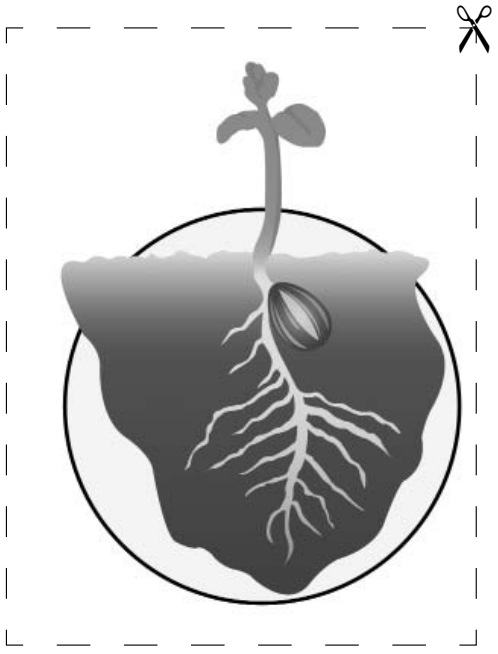
Family Resources

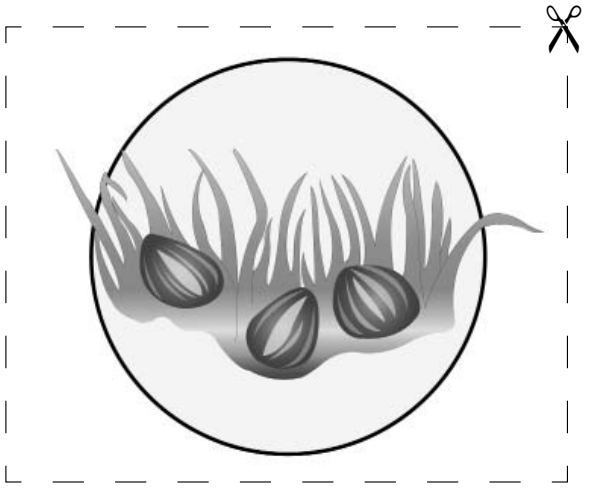
1. The Water Cycle
   http://www.sciencekids.co.nz/sciencefacts/weather/thewatercycle.htm
2. *March of the Penguins* DVD, with Morgan Freeman (Warner Bros., 2005) ASIN: B000NJUYHM

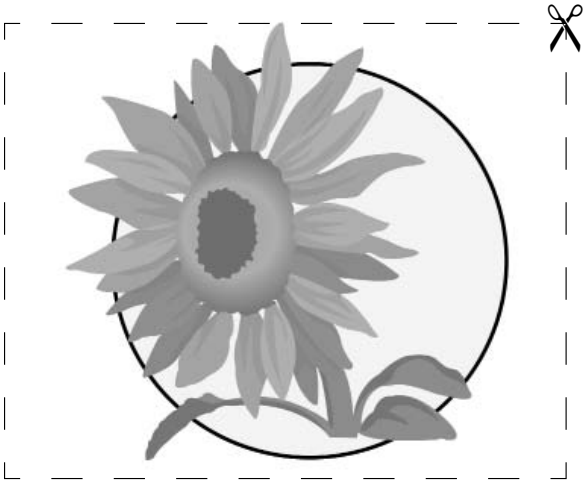
4B-1

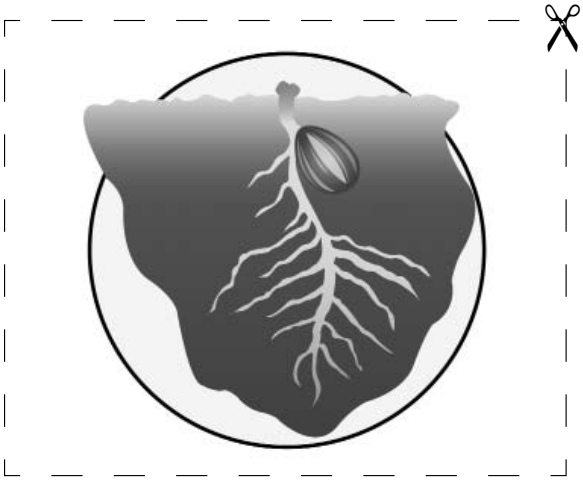
Name _____

Directions: Cut out the pictures of the plant at various stages. Sequence the pictures, starting with the beginning of the plant life cycle. Then, glue or tape the pictures in the correct order onto a separate sheet of paper.





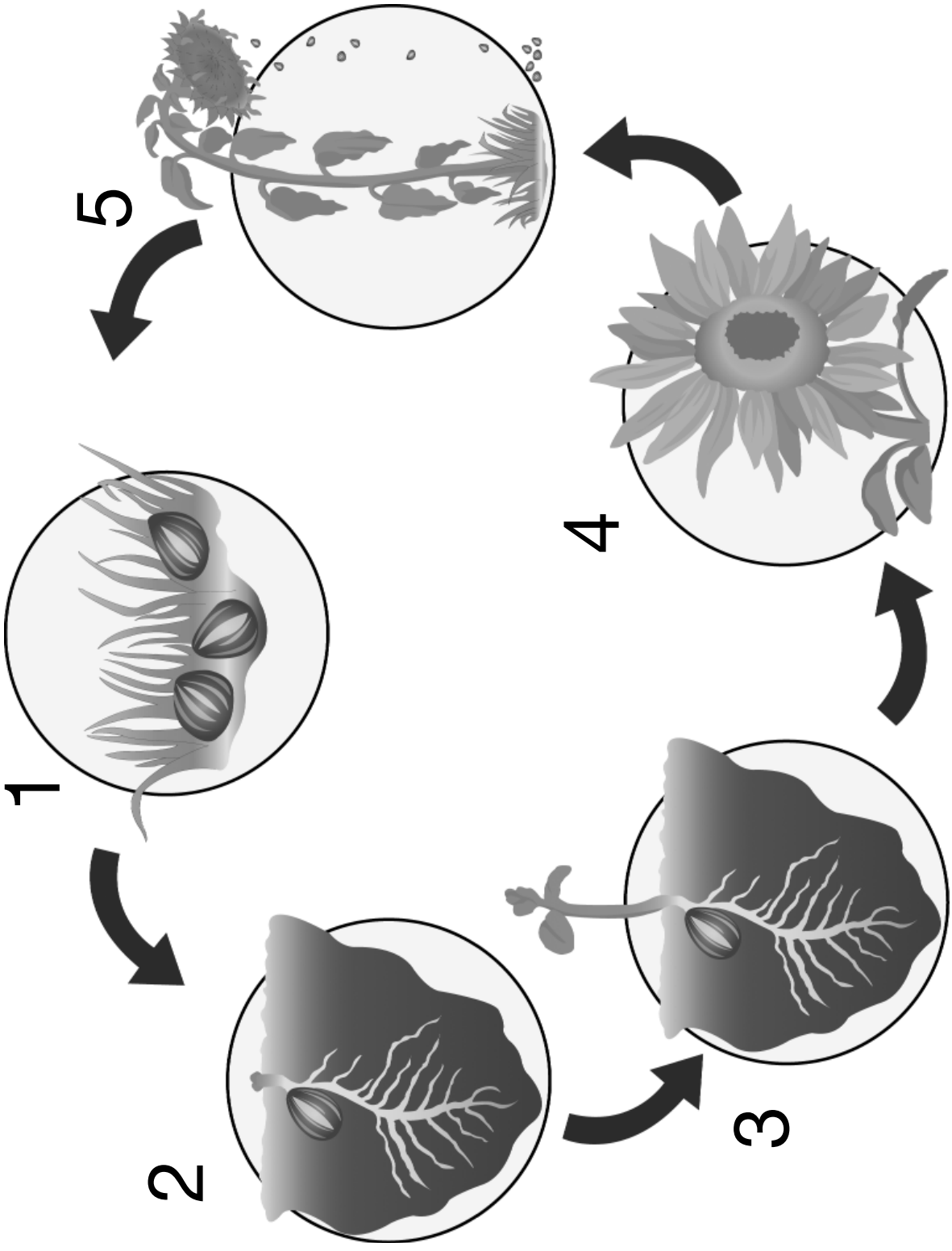




4B-1

Name **Answer Key**

Directions: Cut out the pictures of the plant at various stages. Sequence the pictures, starting with the beginning of the plant life cycle. Then, glue or tape the pictures in the correct order onto a separate sheet of paper.



5B-1

Name _____

Directions: Write some characteristics that only the flowering plant life cycle has in the circle with its name. Write some characteristics that only the tree life cycle has in the circle with its name. In the overlapping middle section, write the characteristics that both of these plant life cycles have in common.

Flowering Plant Life Cycle

Tree Life Cycle

5B-2

Dear Family Member,

I hope your child has enjoyed learning about cycles in nature, specifically the seasonal cycle and the life cycles of flowering plants and trees. Over the next several days, s/he will learn about the life cycle of a chicken, frog, and butterfly. In addition, s/he will be introduced to another cycle: the water cycle. Below are some suggestions for activities that you may do at home to reinforce what your child is learning about cycles in nature.

1. Animal Life Cycle Picture Hunt

If you have old magazines around your house, have your child page through them and find pictures of animals to cut out. Your child will learn the stages of the life cycle of the chicken (egg, chick, adult), frog (egg, tadpole/larva, adult), and butterfly (egg, caterpillar/larva, chrysalis/pupa, adult). See if your child can identify which stage of the life cycle s/he observes in each picture.

2. Draw and Write

Have your child draw and/or write about the stages of the water cycle: evaporation, condensation, and precipitation. S/he may also wish to share the water cycle song learned at school. Ask questions to help your child use the vocabulary learned at school.

3. What Season Am I?

Have your child use adjectives in full sentence questions to pose questions such as:

I am the time of year when cold, white snow falls from the sky, and the chilling wind blows. What season am I?

4. Personal Connections

Ask your child about the types of precipitation: rain, snow, sleet, and hail. Share with your child your favorite type of precipitation and/or a special childhood memory related to it. Ask your child about a favorite memory s/he has related to a particular type of precipitation. Ask your child why precipitation is important.

5. Cloud Gazing

Set aside a period of time during the day to view different cloud formations with your child. Ask your child to name the different cloud formations and to explain how s/he is able to determine these by their shape: cirrus (wispy, feathery clouds high in the sky), cumulus (round, puffy clouds), and stratus (layered grey clouds that can cover the whole

sky and usually bring rain). Talk about the kind of weather that different types of clouds indicate.

6. Words to Use

Below is a list of some of the words that your child will be learning about and using. Try to use these words as they come up in everyday speech with your child.

- *metamorphosis*—The drastic set of changes that a tadpole completes to become an adult frog is an example of metamorphosis.
- *water cycle*—Earth's water cycle involves three stages: evaporation, condensation, and precipitation.
- *evaporation*—We had to refill our swimming pool because of the evaporation of some of the water.
- *humidity*—There is high humidity in the tropical rainforests.

7. Read Aloud Each Day

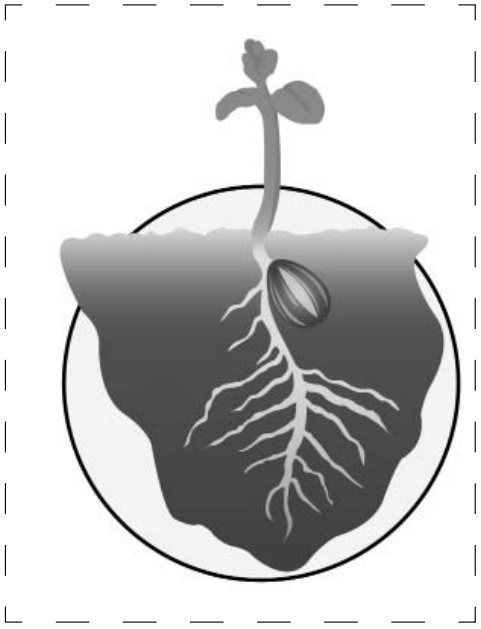
Set aside time to read with your child every day. Please refer to the list of books and other resources sent home with the previous family letter, recommending resources related to cycles in nature.

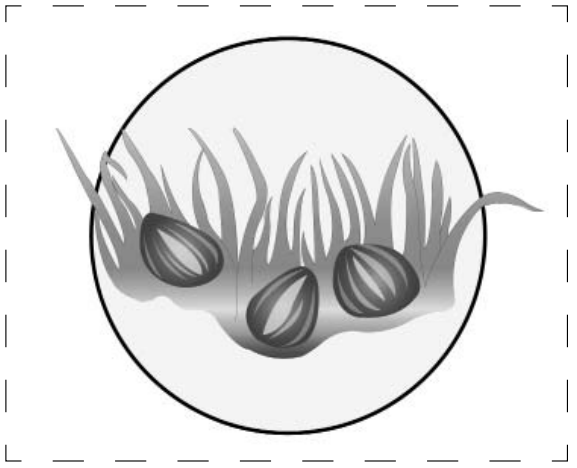
Be sure to let your child know how much you enjoy hearing about what s/he has been learning at school.

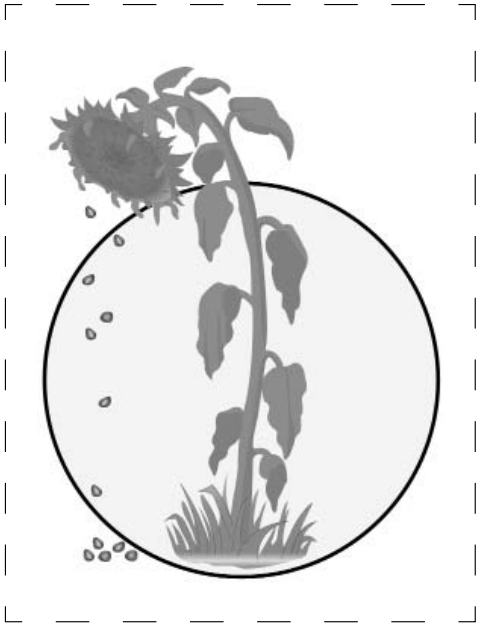
PP-1

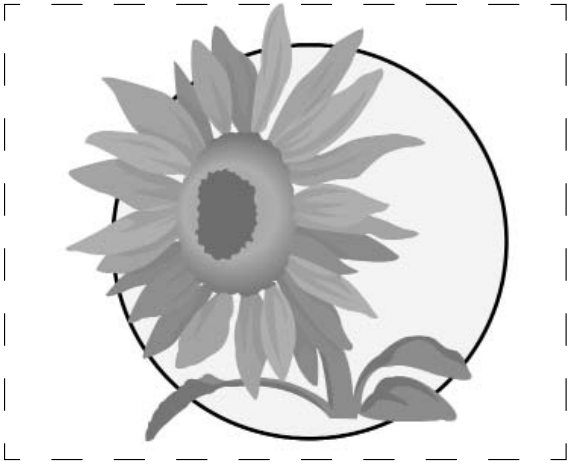
Name _____

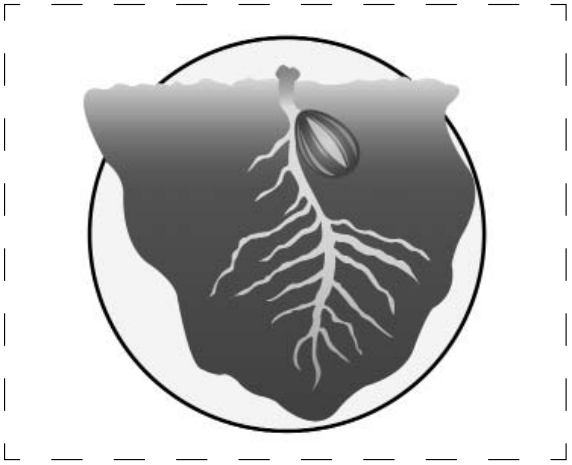
Directions: Cut out the pictures of the plant at various stages. Sequence the pictures, starting with the seed. Then, glue or tape the pictures in the correct order onto a seperate sheet of paper. Write sentences describing the life cycle of a sunflower on the back of the paper.











7B-1

Name _____

Directions: Write one complete sentence in the first rectangle to introduce your paragraph. Write one complete sentence in the next three rectangles to explain the stages of the life cycle of a frog. Write one complete sentence in the last rectangle to conclude, or finish, your paragraph.

Introductory Sentence:

Explanatory Sentence #1:

Explanatory Sentence #2:

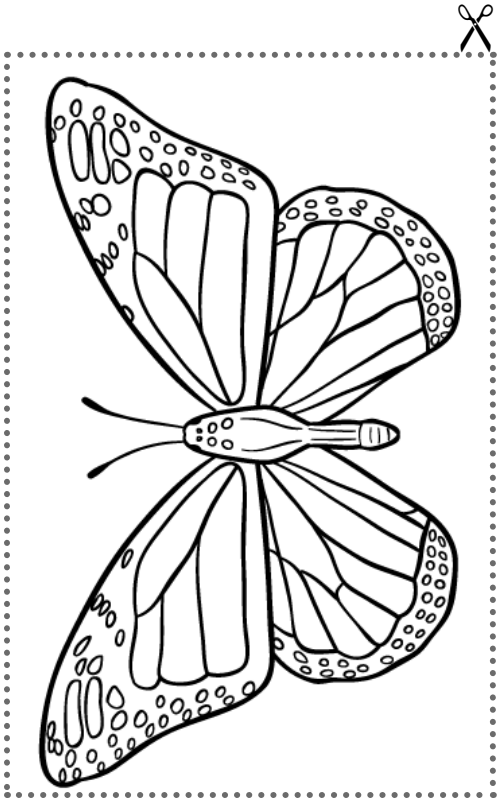
Explanatory Sentence #3:

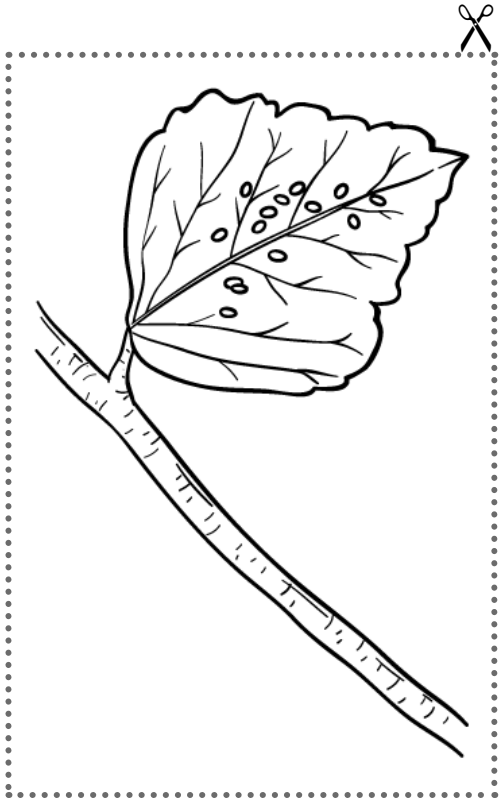
Concluding Sentence:

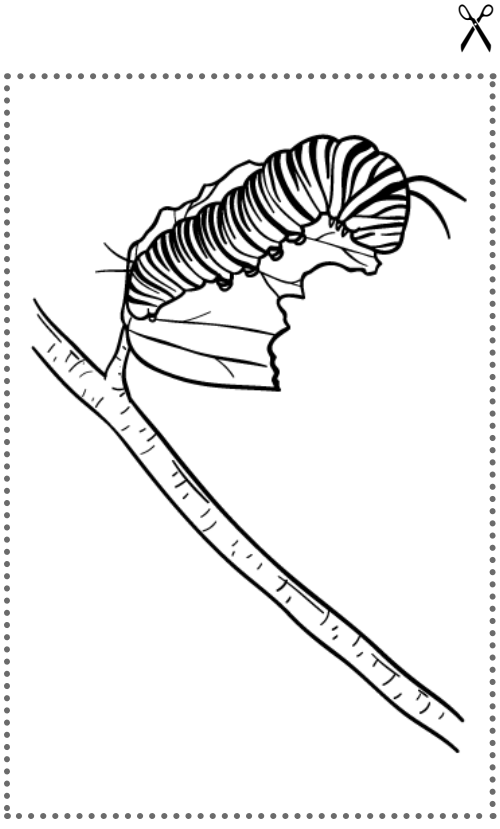
8B-1

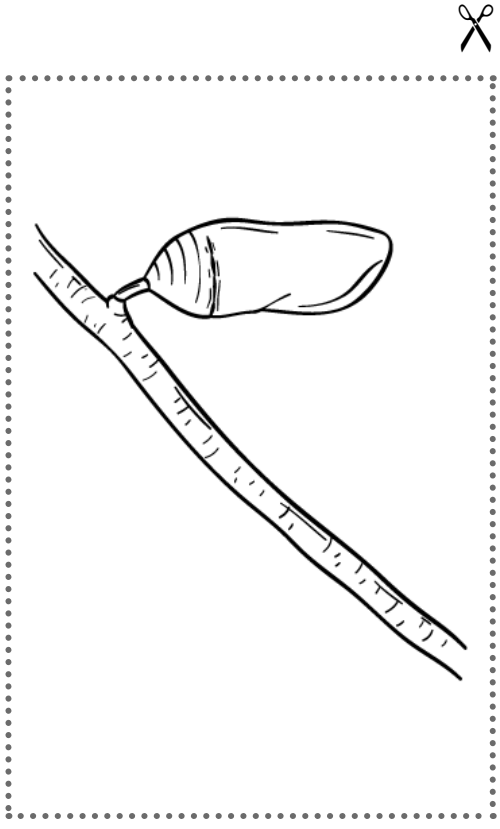
Name _____

Directions: Color and cut out the pictures showing the different stages of metamorphosis for a monarch butterfly, and then sequence them in the correct order. Glue or tape the pictures onto drawing paper. Work with a partner to retell the stages of metamorphosis.





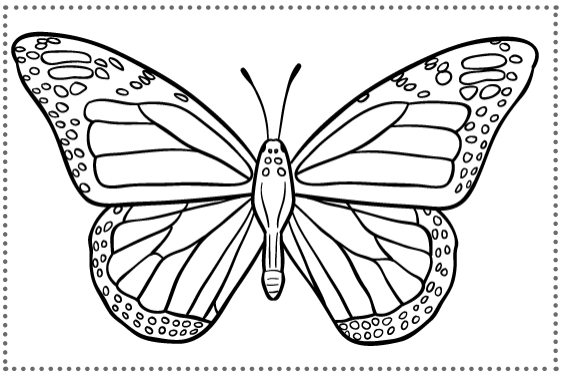




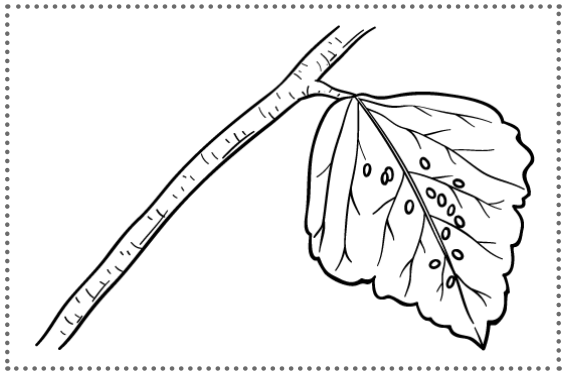
8B-1

Name _____

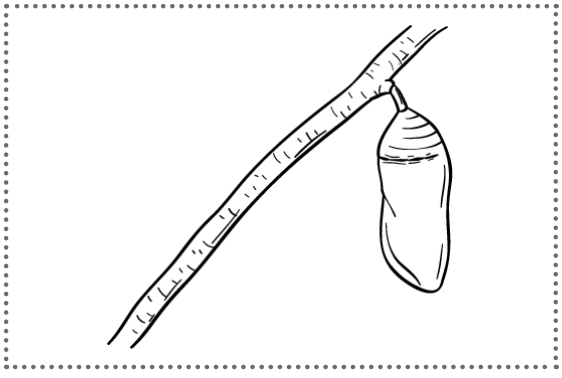
Directions: Color and cut out the pictures showing the different stages of metamorphosis for a monarch butterfly, and then sequence them in the correct order. Glue or tape the pictures onto drawing paper. Work with a partner to retell the stages of metamorphosis.



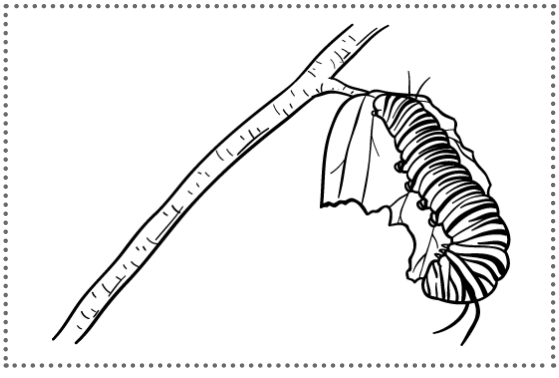
Adult



Egg



Chrysalis



Larva

DA-1

Name _____

Directions: Listen carefully to the words and sentences read by your teacher. If the sentence uses the word correctly, circle the smiling face. If the sentence does not use the word correctly, circle the frowning face.

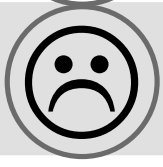
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

11.		
12.		
13.		
14.		
15.		

DA-1

Name **Answer Key**

Directions: Listen carefully to the words and sentences read by your teacher. If the sentence uses the word correctly, circle the smiling face. If the sentence does not use the word correctly, circle the frowning face.

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10.  

11.  

12.  

13.  

14.  

15.  

DA-2

Name _____

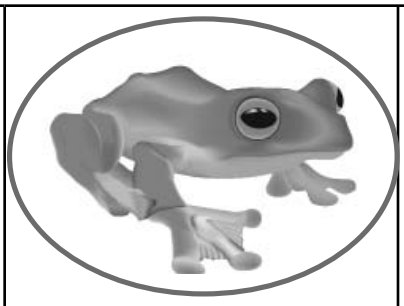
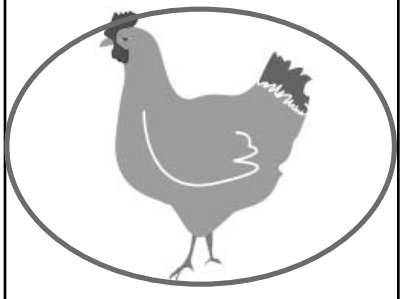
Directions: Listen to the sentence read by the teacher. Circle the animal whose life cycle is being described.

1.			
2.			
3.			
4.			
5.			

DA-2

Name **Answer Key**

Directions: Listen to the sentence read by the teacher. Circle the animal whose life cycle is being described.

1.			
2.			
3.			
4.			
5.			

DA-3

Name _____

Directions: Listen to the sentence read by the teacher. Circle the smiling face if the sentence is correct. Circle the frowning face if the sentence is not correct.

1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

DA-3

Name **Answer Key**

Directions: Listen to the sentence read by the teacher. Circle the smiling face if the sentence is correct. Circle the frowning face if the sentence is not correct.

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10.  

Tens Recording Chart

Use this grid to record Tens scores. Refer to the Tens Conversion Chart that follows.

Name							

Tens Conversion Chart

Number Correct

Number of Questions	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	10																			
2	0	5	10																		
3	0	3	7	10																	
4	0	3	5	8	10																
5	0	2	4	6	8	10															
6	0	2	3	5	7	8	10														
7	0	1	3	4	6	7	9	10													
8	0	1	3	4	5	6	8	9	10												
9	0	1	2	3	4	6	7	8	9	10											
10	0	1	2	3	4	5	6	7	8	9	10										
11	0	1	2	3	4	5	5	6	7	8	9	10									
12	0	1	2	3	3	4	5	6	7	8	8	9	10								
13	0	1	2	2	3	4	5	5	6	7	8	8	9	10							
14	0	1	1	2	3	4	4	5	6	6	7	8	9	9	10						
15	0	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10					
16	0	1	1	2	3	3	4	4	5	6	6	7	8	8	9	9	10				
17	0	1	1	2	2	3	4	4	5	6	6	7	7	8	8	9	9	10			
18	0	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10		
19	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	
20	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10

Simply find the number of correct answers the student produced along the top of the chart and the number of total questions on the worksheet or activity along the left side. Then find the cell where the column and the row converge. This indicates the Tens score. By using the Tens Conversion Chart, you can easily convert any raw score, from 0 to 20, into a Tens score.

Please note that the Tens Conversion Chart was created to be used with assessments that have a defined number of items (such as written assessments). However, teachers are encouraged to use the Tens system to record informal observations as well. Observational Tens scores are based on your observations during class. It is suggested that you use the following basic rubric for recording observational Tens scores.

9–10	Student appears to have excellent understanding
7–8	Student appears to have good understanding
5–6	Student appears to have basic understanding
3–4	Student appears to be having difficulty understanding
1–2	Student appears to be having great difficulty understanding
0	Student appears to have no understanding/does not participate

Core Knowledge Language Arts

Series Editor-in-Chief
E. D. Hirsch, Jr.

President
Linda Bevilacqua

Editorial Staff
Carolyn Gosse, Senior Editor - Preschool
Khara Turnbull, Materials Development Manager
Michelle L. Warner, Senior Editor - Listening & Learning

Mick Anderson
Robin Blackshire
Maggie Buchanan
Paula Coyner
Sue Fulton
Sara Hunt
Erin Kist
Robin Luecke
Rosie McCormick
Cynthia Peng
Liz Pettit
Ellen Sadler
Deborah Samley
Diane Auger Smith
Sarah Zelinke

Design and Graphics Staff
Scott Ritchie, Creative Director

Kim Berrall
Michael Donegan
Liza Greene
Matt Leech
Bridget Moriarty
Lauren Pack

Consulting Project Management Services
ScribeConcepts.com

Additional Consulting Services
Ang Blanchette
Dorrit Green
Carolyn Pinkerton

Acknowledgments

These materials are the result of the work, advice, and encouragement of numerous individuals over many years. Some of those singled out here already know the depth of our gratitude; others may be surprised to find themselves thanked publicly for help they gave quietly and generously for the sake of the enterprise alone. To helpers named and unnamed we are deeply grateful.

Contributors to Earlier Versions of these Materials

Susan B. Albaugh, Kazuko Ashizawa, Nancy Braier, Kathryn M. Cummings, Michelle De Groot, Diana Espinal, Mary E. Forbes, Michael L. Ford, Ted Hirsch, Danielle Knecht, James K. Lee, Diane Henry Leipzig, Martha G. Mack, Liana Mahoney, Isabel McLean, Steve Morrison, Juliane K. Munson, Elizabeth B. Rasmussen, Laura Tortorelli, Rachael L. Shaw, Sivan B. Sherman, Miriam E. Vidaver, Catherine S. Whittington, Jeannette A. Williams

We would like to extend special recognition to Program Directors Matthew Davis and Souzanne Wright who were instrumental to the early development of this program.

Schools

We are truly grateful to the teachers, students, and administrators of the following schools for their willingness to field test these materials and for their invaluable advice: Capitol View Elementary, Challenge Foundation Academy (IN), Community Academy Public Charter School, Lake Lure Classical Academy, Lepanto Elementary School, New Holland Core Knowledge Academy, Paramount School of Excellence, Pioneer Challenge Foundation Academy, New York City PS 26R (The Carteret School), PS 30X (Wilton School), PS 50X (Clara Barton School), PS 96Q, PS 102X (Joseph O. Loretan), PS 104Q (The Bays Water), PS 214K (Michael Friedsam), PS 223Q (Lyndon B. Johnson School), PS 308K (Clara Cardwell), PS 333Q (Goldie Maple Academy), Sequoyah Elementary School, South Shore Charter Public School, Spartanburg Charter School, Steed Elementary School, Thomas Jefferson Classical Academy, Three Oaks Elementary, West Manor Elementary.

And a special thanks to the CKLA Pilot Coordinators Anita Henderson, Yasmin Lugo-Hernandez, and Susan Smith, whose suggestions and day-to-day support to teachers using these materials in their classrooms was critical.

Core Knowledge®

Credits

Every effort has been taken to trace and acknowledge copyrights. The editors tender their apologies for any accidental infringement where copyright has proved untraceable. They would be pleased to insert the appropriate acknowledgment in any subsequent edition of this publication. Trademarks and trade names are shown in this publication for illustrative purposes only and are the property of their respective owners. The references to trademarks and trade names given herein do not affect their validity.

The Word Work exercises are based on the work of Beck, McKeown, and Kucan in Bringing Words to Life *(The Guilford Press, 2002).*

All photographs are used under license from Shutterstock, Inc. unless otherwise noted.

Expert Reviewer

Margaret S. Saha

Writers

Rosie McCormick

Illustrators and Image Sources

Cover: Steve Morrison; Title Page: Steve Morrison; Domain Icon: Core Knowledge Staff; Take-Home Icon: Core Knowledge Staff; 1A-1 (top left): Shutterstock; 1A-1 (top right): Shutterstock; 1A-1 (bottom left): Core Knowledge Staff; 1A-1 (bottom right): Shutterstock; 1A-2: Shutterstock; 1A-3: Shutterstock; 1A-4: Shutterstock; 1A-5: Shutterstock; 1A-6: Shutterstock; 1A-7: Shutterstock; 2A-1: Shutterstock; 2A-2: Shutterstock; 2A-3: Shutterstock; 2A-4: Shutterstock; 2A-5 : Shutterstock; 2A-6: Shutterstock; 2A-7: Shutterstock; 2A-8: Shutterstock; 2B-1: Shutterstock; 3A-1: Shutterstock; 3A-2: Shutterstock; 3A-3: Shutterstock; 3A-4: Shutterstock; 3A-5: Shutterstock; 3A-6 : Shutterstock; 3A-7: Shutterstock; 3A-8: Shutterstock; 3B-1: Shutterstock; 4A-1: Shutterstock; 4A-2: Shutterstock; 4A-3 (left): Shutterstock; 4A-3 (right): Core Knowledge Staff; 4A-4: Shutterstock; 4A-5: Shutterstock; 4A-6: Shutterstock; 4A-7: Shutterstock; 4A-8: Core Knowledge Staff; 5A-1: Shutterstock; 5A-2: Shutterstock; 5A-3: Shutterstock; 5A-4: Shutterstock; 5A-5: Shutterstock; 5A-6: Shutterstock; 5A-7: Shutterstock; 5A-8: Shutterstock; 5A-9: Shutterstock; 6A-1: Shutterstock; 6A-2 (top left): Shutterstock; 6A-2 (bottom left): Core Knowledge Staff; 6A-2 (right): Shutterstock; 6A-3: Shutterstock; 6A-4: Core Knowledge Staff; 6A-5: Shutterstock; 6A-6: Core Knowledge Staff; 7A-1: Shutterstock; 7A-2: Shutterstock; 7A-3: Shutterstock; 7A-4: Shutterstock; 7A-5: Shutterstock; 7A-6: Shutterstock; 7A-7: Shutterstock; 8A-1: Shutterstock; 8A-2: Core Knowledge Staff; 8A-3: Shutterstock; 8A-4: Core Knowledge Staff; 8A-5: Shutterstock; 8A-6: Shutterstock; 8A-7: Shutterstock; 8A-8: Shutterstock; 8A-9 (left): Shutterstock; 8A-9 (right): Core Knowledge Staff; 8A-10: Shutterstock; 8A-11: Shutterstock; 8A-12: Shutterstock; 8A-13: Shutterstock; 9A-1: Shutterstock; 9A-2: Shutterstock; 9A-3: Shutterstock; 9A-4: Shutterstock; 9A-5: Shutterstock; 9A-6: Shutterstock; 9A-7: Core Knowledge Staff; 9A-8: Shutterstock; 9A-9: Shutterstock; 9A-10: Shutterstock; 9A-11: Shutterstock; 35: Shutterstock; 4B-1: Shutterstock; 4B-1 (Answer Key): Shutterstock; PP-1: Shutterstock; DA-2 (butterfly): Shutterstock; DA-2 (frog): Shutterstock; DA-2 (hen): Core Knowledge Staff; DA-2 (butterfly) (Answer Key): Shutterstock; DA-2 (frog) (Answer Key): Shutterstock; DA-2 (hen) (Answer Key): Core Knowledge Staff

Regarding the Shutterstock items listed above, please note: No person or entity shall falsely represent, expressly or by way of reasonable implication, that the content herein was created by that person or entity, or any person other than the copyright holder(s) of that content.

Cycles in Nature

Tell It Again!™ Read-Aloud Anthology

Listening & Learning™ Strand

GRADE 2

The Core Knowledge Foundation
www.coreknowledge.org