Grade 3: Life Science Module: Unit 1

Lesson Sequence 3: Life Cycles

Lesson Sequence 3: Life Cycles

Overview

Total Time: 3 hours of instruction (divided into three sections)

In this lesson sequence, students use texts, pictures, and videos to construct their own life cycle models of various animals and plants. Students then compare and contrast these models to notice differences and similarities, identify the pattern of life (birth, growth, reproduction, and death) and make predictions.

Lesson Sequence Focusing Question and Big Idea

What patterns are there in different organisms' life cycles?

- *All organisms' life cycles follow a similar pattern of birth, growth, reproduction, and death.*

Long-Term Learning Addressed (Based on NGSS)

Students develop a model to show that plants and animals have unique life cycles but follow the same pattern of birth, growth, reproduction, and death. (Based on NGSS 3-LS1-1)

This lesson sequence explicitly addresses:

Science and Engineering Practices:

- **Developing and Using Models:** Develop and/or use models to describe and/or predict phenomena. *Students work collaboratively to create a life cycle model of a plant and animal. They then use their models to identify patterns across the life cycles of different plants and animals.*

Crosscutting Concepts:

- **Patterns:** Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and designed products. *Students use models to name the differences in unique life cycles and the similarity in the pattern of life of all organisms: birth, growth, reproduction, and death.*

Disciplinary Core Ideas:

- **LS1.B Growth and Development of Organisms:** Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. *Students compare and contrast multiple models to explore the unique life cycles of plants and animals, and use their models to make predictions and determine the importance of reproduction to the continued cycle of life.*

Lesson Sequence Learning Targets

- I can create a model of the life cycle of a plant and animal.
- I can compare and contrast the diverse life cycles of plants and animals to identify a pattern of life.
- I can use a life cycle model to make predictions.

Ongoing Assessment

- Student science notebook: Life Cycle entry
- Plant and Animal Life Cycle models
- Scientists Meeting: Building Understanding
- Exit Ticket: Life Cycle

Agenda

Total Time: 3 hours of instruction

Section 1

1. **Opening**
   A. Reviewing Focusing Question and Learning Targets (10 minutes)
2. **Developing a Model**
   A. Modeling Life Cycle of a Frog (25 minutes)
      —*Optional Extension: Raise Tadpoles*
      —*Optional Extension: Video Study*

Section 2

1. **Obtaining and Communicating Information**
   A. Reading Closely: Animals (30 minutes)
   B. Modeling Life Cycles of Animals (10 minutes)
      —*Optional Extension: Rock, Paper, Scissors Life Cycle Game*

Section 3

1. **Obtaining and Communicating Information**
   A. Obtaining Information about Plants (25 minutes)
   B. Modeling the Life Cycle of Plants (10 minutes)
      — *Optional Extension: Plant Life Cycle Relay Challenge*
      — *Optional Extension: Water lily Study*
      — *Optional Extension: Flower Dissection*
      — *Optional Extension: Fruiting Body and Seed Study*

Section 4

1. **Communicating Information**
   A. Reviewing Learning Targets (10 minutes)
   B. Poster Session: Life Cycles (30 minutes)
   C. Scientists Meeting: Building Understanding (30 minutes)

Teaching Notes

Purpose of lesson sequence and alignment to NGSS standards:

- In this lesson sequence, students learn that plants and animals have unique and diverse life cycles (a Disciplinary Core Idea). Using this understanding, students work as scientists to use their models to identify the pattern of birth, growth, reproduction, and death.
- In Section 1, students are introduced to the idea that organisms grow and develop in life cycles (a Disciplinary Core Idea) through the life cycle of a bullfrog.
- In Section 2, students extend their learning to include the life cycles of other organisms including mammals, birds, insects, fish, amphibians, and reptiles. In expert groups, they use texts to develop life cycle models (a Science and Engineering Practice) of different organisms.
- In Section 3, students develop a model of the life cycle of a flowering plant.
- Finally, in Section 4, students examine the life cycle models from Section 2 and 3 to note the basic pattern (a Crosscutting Concept) of birth, growth, reproduction, and death in all life cycles. They also use the life cycle models to make predictions (a Science and Engineering Practice) about what would happen if there were no more births: Deaths would continue and there would be no more of that type of organism.

How it builds on previous work in the Life Science Module:

- In Lesson Sequences 1 and 2, students questioned and explored the idea of variation within a species, specifically within a sibling group. In this lesson, students learn about the pattern of life through creating and comparing life cycle models of plants and animals. The life cycle drives the process of inheritance as traits are passed through reproduction from parents. This builds on the learning in Lesson Sequences 1 and 2 and sets the stage for learning about inheritance and variation of traits in Lesson Sequences 4 and 5.

How it connects to the CCSS Standards and EL Education's Language Arts Grade 3 Module 2:

- Students use the Poster Session protocol in the Language Arts Grade 3 Module 2.
- Students complete a close read of the life cycle of a frog in Unit 2, Lesson 3 of Language Arts Grade 3 Module 2. As a result, they may be familiar with the circular model of a life cycle based on the pictures from the text as well as the recording sheet. If so, they will not need as much time in Section 1, Developing a Model.
- Students could use pages 24–25 and 32–33 from *Everything You Need to Know about Frogs* (a text used in Language Arts Grade 3 Module 2) to check their bullfrog life cycle.
- The close read in Section 2 provides students with the opportunity to practice reading informational texts (CCSS ELA RI.3.3).
- The Scientists Meeting in Section 4 provides students with the opportunity to practice their speaking and listening skills while collaborating in whole group discussions (CCSS ELA SL.3.1).

Possible student misconceptions:

- Students may think that in complete metamorphosis, there is a "mini" replica of an animal inside the pupa, like a butterfly. In fact, in the pupa, a chemical process takes place that

completely changes the organism from one form (caterpillar) to another form (a butterfly). Ask: "When a caterpillar goes into a pupa (cocoon), what do you think it looks like at every instance? When it comes out of the cocoon, it looks like a butterfly—how do you think that happens?"

- Students may think that during the life cycle, the plant and/or animal dies and is brought to life again. Examples: The seed is dead but is brought to life when planted, or the egg is dead but is brought to life when it hatches. Actually, structures, such as seeds and eggs, are living forms of the organism that are dormant. Under the right conditions, the organisms will grow. Ask: "Can something that is dead come back to life?"

Possible broader connections:

- Connect to other sciences by focusing on other patterns found around us. Examples: the pattern of seasons, day/night, and the moon's phases and how that relates to the patterns of students' lives, like when they go to school, wake up, eat, etc.

Areas where students may need additional support:

- For students who need additional support organizing their ideas in conversation, provide discussion questions from the Scientists Meeting in advance and provide ample processing time.
- If students are not familiar with the Language Arts modules, take more time before the close read to discuss the purpose of and steps involved in a close read.
- Students will closely read a text in this lesson sequence. Some students may benefit from additional support. Consider these options:
  - For students who are overwhelmed by too much print on a page: Consider copying the text so that there is only one paragraph on each page, with an organized space for recording the gist and meanings of the unfamiliar words on that page.
  - For ELLs and students who may need additional support with reading and/or writing: Strategically pair students with a peer model.
  - For students who may need additional support determining the gist: Consider highlighting or underlining key phrases in their individual copy of the text in advance. This will lift the gist up for them.

Down the road:

- Students will use the plant and animal life cycle models they make in this lesson sequence again in Lesson Sequence 4 to make predictions. Ensure that the models are stored safely.
- Students' understanding of life cycles will be more formally assessed in Unit 2 of the Life Science Module.

In advance:

- Read each section and complete the Preparing to Teach: Self-Coaching Guide.
- Preview texts for the Life Cycle expert groups. Then, using the Life Cycle Expert Groups Planning Guide, pre-determine student groups.

- Prepare technology necessary to play the following videos during Obtaining and Communicating Information A:
  - "Wheat Germinating March" (https://www.youtube.com/watch?v=bHcyFm7M3Uc)
  - "From Seed to Flower" (http://www.pbslearningmedia.org/resource/tdc02.sci.life.colt.plantsgrow/from-seed-to-flower/)
  - "Time Lapse Dandelion Flower to Seed Head" (https://www.youtube.com/watch?v=UQ_QqtXoyQw)
  - "Pear Flower to Fruit Swelling Time Lapse Filmed Over 8 Weeks" (https://www.youtube.com/watch?v=zVNsCW6eiiw)
- Review the Poster Session protocol (see Classroom Protocols pack on Curriculum.ELeducation.org).
- Post: Unit 1 guiding question, lesson sequence learning targets, Concepts Scientists Think About anchor chart, Norms of a Scientists Meeting anchor chart, and Scientists Do These Things anchor chart.

Optional extensions:

- *Raise Tadpoles to Frogs:* Bring live tadpoles into your classroom and watch them go through their life cycle. Work with a local wildlife expert to find and raise a native frog species. If you purchase them, they cannot be released into the local habitat.
- *Video Study on Metamorphosis:* Study this excellent video from PBS: (https://ny.pbslearningmedia.org/resource/tdc02.sci.life.cyc.metamorph/metamorphosis-change-of-plans/en/).
- *Rock, Paper, Scissors Life Cycle Game:* Play a modified version of Rock, Paper, Scissors. Directions included in the supporting materials.
- *Plant Life Cycle Relay Challenge:* Race one another to construct a plant life cycle out of leaves, fake flowers, bag of seeds, and fruit. Place items in a bucket for every team. Designate an area where the plant life cycle will be reconstructed. Divide the class into teams and race. Reserve an open space, like a gym or hallway, or plan accordingly based on space requirements (see supporting materials).
- *Water Lily Study*: Grow water lilies or other plants in the classroom and identify life cycle stages.
- *Flower Dissection:* Dissect a flower to learn more about the flower as the reproductive structure of a plant.
- *Fruiting Body and Seed Study:* Study various fruits with seeds to scaffold understanding of the role of the fruiting body and seed in the life cycle. Consider dissecting common fruits found in the grocery store and seed pods collected from plants found outside.

Vocabulary

life cycle: a series of changes an organism goes through in life, including birth, growth, reproduction, and death

cycle: a series of events repeated in the same order

pattern: repeated events or objects; used to find similarities and differences

model limitation: something a model doesn't show

reproduce: when two parents produce offspring

offspring: another name for a plant or animal's baby or young

prediction: what is thought to happen in the future

Materials

General Materials

- ☑ Student science notebook (from Lesson Sequence 1; one per student)
  - — Life Cycle entry (page 10 of student science notebook)
- ☑ Life Cycle Expert Groups Planning Guide (for teacher reference)
- ☑ Pictures of Offspring That Look Different from the Parents (one to display)
- ☑ Bullfrog Life Cycle picture cards (one per expert group)
- ☑ Life Cycle Stories of Animals (one per student based on their expert group)
- ☑ General Plant Life Cycle picture cards (one set per expert group)
- ☑ "Wheat Germinating March" (video; play in its entirety; see Teaching Notes)
- ☑ "From Seed to Flower" (video; play in its entirety; see Teaching Notes)
- ☑ "Time Lapse Dandelion Flower to Seed Head" (video; play in its entirety; see Teaching Notes)
- ☑ "Pear Flower to Fruit Swelling Time Lapse Filmed Over 8 Weeks." (video; play in its entirety; see Teaching Notes)
- ☑ Plant Life Cycle model (answers, for teacher reference)
- ☑ Plant Life Cycle model cards (one set per group)
- ☑ Concepts Scientists Think About anchor chart (begun in Lesson Sequence 2; added to in Section 4; see supporting materials)
- ☑ Norms of a Scientists Meeting anchor chart (begun in Lesson Sequence 1)
- ☑ Unit 1 guiding question (from Lesson Sequence 1; one to display)
- ☑ Scientists Do These Things anchor chart (begun in Lesson Sequence 2: added to in Section 4; see supporting materials)
- ☑ Exit Ticket: Life Cycle (one per student)
- ☑ Rock, Paper, Scissors Life Cycle Game (optional; for teacher reference)
- ☑ Plant Life Cycle Relay Challenge (optional; for teacher reference)

Science-Specific Materials (gathered by the teacher)

- ☑ Materials for Animal Life Cycles (one set per expert group)
  - — Animal Life Cycle model cards
  - — Chart paper
  - — Tape
  - — Marker

Section 1: Opening

A. Review Focusing Question and Learning Targets (10 minutes)

- Invite students to take out their **student science notebooks** and open to the **Life Cycle entry**.
- Focus students on the focusing question for this entry:
  - "What patterns are there in different organisms' life cycles?"
- Direct students' attention to the posted lesson sequence learning targets, and read the first one aloud:

  "I can create a model of the life cycle of a plant and animal."
- Encourage students to record their initial ideas and questions regarding the words and ideas expressed in the focusing question and/or learning target in the notebook. Explain to students that they don't have to know the right answer to this question yet [1].
- Circulate to check for student understanding.
- Ask students to turn and talk to an elbow partner:

  "What are your initial ideas and questions regarding the words and ideas expressed in the focusing question and/or learning target?
- Refocus whole group.
- Direct students' attention back to the learning targets, and underline the phrase *life cycle*.
- Ask [2]:

  "Where have you heard the word cycle before?" (Responses will vary but may include water cycle, season cycle.)
- Explain that a life cycle is the name for the series of changes that all living things go through [3] [4].
- Display the **Pictures of Offspring That Look Different from the Parents**.
- Link the learning from the last few lesson sequences by saying something like: "In the last two lesson sequences you observed a pattern—families and especially siblings look similar to and different from each other. In this lesson sequence, you'll learn why these two organisms look different from their parents. The answer has something to do with the life cycle."

Preparing to Teach: Self-Coaching Guide

1. Will I capture students' question publicly, or in my notebook?
2. I am just looking for misconceptions and getting an understanding of students' background knowledge. What student responses will indicate misconceptions? (See Teaching Notes for suggestions.)
3. How can I use students' ideas to explain the concept of a life cycle?
4. Be sure to leave out "birth, growth, reproduction, and death" from the definition of *life cycle* because students will discover this later in the lesson.

Section 1: Developing a Model

A. Modeling Life Cycle of a Frog (25 minutes)

- Move students into pre-determined Life Cycle expert groups. Refer to the **Life Cycle Expert Groups Planning Guide (for teacher reference)** as necessary.
- Distribute **Bullfrog Life Cycle picture cards** to each group [1].
- Say:

  "Remember, life cycle means the series of changes that living things go through. Think, 'How can we arrange these cards to show the life cycle of a bullfrog?'"
- Tell students they have 3 minutes to:
  - Look at the bullfrog pictures.
  - Arrange the pictures into a logical life cycle.
- Invite groups to begin working. Circulate to support students as they work. Do not give students answers. It is okay if the pictures are not in the correct order or if they are not in a circle [2].
- After 3 minutes, refocus whole group.
- Explain to students that they will now have 2 minutes to silently look at the work of the other expert groups.
- Say:

  "As you walk around, you should ask yourself, 'What do I see that makes sense?' and 'What could I change about our group's lifecycle that would improve it?'"
- Give students 2 minutes to circulate and view other groups' work. Remind students of appropriate behavior for moving around the room as necessary.
- Invite students to return to their seats.
- Give students 2 minutes to work with their group to improve their life cycle based on their observations.
- Call on one or two volunteers to explain how their group revised their life cycle and the reasoning behind it.
- Focus students on the phrase *life cycle* in the learning target again. Say:

  "A cycle is a series of events that repeat over and over again in a predictable order."
- Facilitate a conversation about cycles by posing questions such as [3] [4]:

  "How is the example of a bullfrog's life stages a cycle?" (frogs keep having eggs, growing up, becoming adults that have more eggs, etc.)

  "What are other examples of cycles?" (bicycle, cycle of seasons, water cycle, cycle of days in the week, the moon cycle or phases)

  "What is the best way to show a cycle?" (Cycles are circular.)

  "What might help make the repetition in your life cycle model more clear?" (arrows, labels)
- Invite students to open their student science notebooks to the Life Cycle entry again and put their finger on the section titled "Bullfrog Life Cycle Model."

- Tell students to record the example of the bullfrog life cycle in this section of their student science notebooks. They should use simple drawings, headings, arrows to show it is a cycle. (Headings: egg, tadpole, froglet, adult.)

Preparing to Teach: Self-Coaching Guide

1. How familiar are my students with the life cycle of a frog?
2. How will I record and use my observations about my students' knowledge of life cycles?
3. How can I use student examples to demonstrate the idea that cycles are circular and therefore should be represented by a circular model?
4. Students may or may not use the correct terminology, but they should represent the five stages of egg, tadpole, froglet, adult, and death.

Section 2: Obtaining and Communicating Information

A. Reading Closely: Animals (30 minutes)

- Distribute **Life Cycle Stories of Animals** to students according to their Life Cycle expert groups [(1)].
- Remind students of some of the close reading practices they follow in their Language Arts lessons [(2)]:
  - Read small chunks of the text slowly and think about the gist.
  - Talk with my partner or group about the text.
  - Circle or underline words I don't know.
  - Write notes or answer questions about the text.
- Tell students they will have the opportunity to independently read the text now. Remind them to stop after each paragraph during this first read and jot the gist of that paragraph and any unfamiliar vocabulary in their notebook. Review and model finding the gist as necessary.
- Ask students to begin reading. Circulate and support them as they read and determine the gist [(3)].
- After 7 minutes, ask students to turn and talk to an elbow partner:

  "What gist notes or vocabulary words did you write down? What similarities and differences are there between our notes?"
- After 5 minutes, refocus whole class. Point out to students that their job is to learn everything they can about the life cycles of animals.
- Ask students to open up their student science notebooks to the Life Cycle entry and find the Animal Life Cycle graphic organizer [(4)].
- Tell students they are going to read the text again. This time, they should read closely for details to add to the Animal Life Cycle graphic organizer. They need to determine every stage of the life cycle of their assigned animal and be able to describe what happens to the animal at that stage, just like in the bullfrog life cycle they created.
- Consider doing a brief guided practice, as necessary.
- Ask students to begin reading and taking notes. Circulate to support students as needed.

Preparing to Teach: Self-Coaching Guide

1. How can I assign text according to reading abilities?
2. How familiar are my students with the close reading protocol from the Language Arts lessons?
3. What students may struggle with this reading? How can I support them?
4. How much practice do my students have with graphic organizers? What might I use from the bullfrog life cycle exercise to model? (Example: If I was reading about the bullfrog froglet, I would write "froglet" under the 'Name of the life cycle stage' on the table. Then, to answer the question "what happens at that stage?" I would write "grows legs, grows lungs, loses its gills, and crawls onto land.")

B. Modeling Life Cycles of Animals (10 minutes)

- Refocus whole group.
- Distribute the **Animal Life Cycle model cards**, **chart paper**, and **tape** to each Life Cycle expert group [(1)].
- Tell students that they will use the information in the Animal Life Cycle graphic organizer and the bullfrog life cycle model in the student science notebook to create a model of their assigned animal type's life cycle using the Animal Life Cycle model cards [(2)].
- Post directions for the activity on the board and read them with students. Answer clarifying questions:
  1. With your group, use your Animal Life Cycle graphic organizer to determine the order of the Animal Life Cycle model cards.
  2. Create a life cycle model by placing your model cards on the chart paper in a circle (like the bullfrog life cycle model).
  3. Raise your hands when you think you have arranged the model cards in the correct order of the life cycle.
- After approving the order of a group's model cards, give the group a **marker** and provide the following directions:
  1. Use the tape to secure the model cards to your chart paper.
  2. Add a title to your life cycle (mammal, fish, reptile, amphibian, incomplete metamorphosis, etc.)
  3. Label each stage.
  4. Draw arrows connecting each stage.
- When finished, display students' animal life cycles in the classroom.

Preparing to Teach: Self-Coaching Guide

1. How can I quickly and efficiently distribute the materials?
2. Which group may need extra assistance? How can I support those students?

Section 3: Obtaining and Communicating Information

A. Obtaining Information about Plants (25 minutes)

- Be sure students are in their Life Cycle expert groups.
- Direct students' attention to the posted learning targets and read the first one aloud:

  "I can create a model of the life cycle of a plant and animal."
- Say:

  "You have worked hard to learn the life cycle of animals, but now we are going to focus on making a model of the life cycle of plants."
- Distribute **General Plant Life Cycle picture cards** to expert groups.
- Tell students that plants are living things and therefore have a life cycle just like animals. Plants also have specific parts or *structures* to help them in each part of their life cycle. Plant structures are things like stems, roots, flowers, fruits, and seeds.
- Tell students they have pictures of the different structures of different types of plants.
- Invite students to work with their group to sort the picture cards into a general plant life cycle circle [1].
- Circulate to check for student understanding. Notice how students are arranging plant structures. It's okay that students don't have the "right" order. They will revisit the cycle two more times.
- Refocus whole group, and tell students they will return to their picture cards as they learn about plant parts and a flowering plant's life cycle.
- Tell students they will now watch several videos to see a plant go through its life cycle. Explain that each video is a time-lapse video, which means it shows what happens to a plant over a long period of time in only a couple of minutes. The first video shows the beginning of the life cycle.
- Play "**Wheat germinating March.**"
- After viewing the video, ask students to turn and talk with an elbow partner:

  "What structure does the life cycle start with?" (seed)

  "What happens to the seed?" (sprouted and began to grow)

  "What structures do you see after the seed sprouts?" (stem and leaves)

  "What seeds are you familiar with?" (Answers will vary.)
- Tell students they will now see what happens next in the life cycle of a plant.
- Play "**From Seed to Flower.**"
- After viewing the video, ask:

  "When a plant is growing, what is happening to it?" (gets leaves, a thicker stem, taller)

  "What happened at the end of the video?" (The plant produced a flower.)
- Point out that flowers can look very different from other flowers. Invite students to look for the flowers in their General Plant Life Cycle picture cards.
- Ask expert groups to revisit their general plant life cycle. This time, they should use the information they learned to re-sort the plant structures.

- Circulate and check for understanding. Consider asking:

  "What did you see in the video that made you think that?"

  "Why did you put that plant part there?"
- After 5 minutes, refocus whole group.
- Play "**Time Lapse Dandelion Flower to Seed Head."**
- After viewing the video, ask:

  What happens after a dandelion flowers? (It creates a seed head.)

  What will the seeds become? (a new dandelion)

  What happens to dandelion flowers when the wind blows? (They blow away.)
- Play "**Pear Flower to Fruit Swelling Time Lapse Filmed Over 8 Weeks"** [(2)] [(3)].
- Pause video at 0:32 and help students understand the importance of pollinators. Draw students' attention to the bugs that are crawling around the flowers. Ask:

  "What are the bugs doing?" (pollinating the flower)
- After viewing the video, ask:

  "What happens after a pear tree flowers and is pollinated?" (It creates a fruit. Be sure students understand it cannot make seeds unless it is pollinated.)

  "What does fruit have inside it?" (seeds)

  "How is a pear tree and a dandelion plant similar?" (They both flower and then produce seeds.)

  Can you think of other plants that create something edible to hold their seeds? (Responses will vary but may include tomatoes, peppers, apples.)
- Explain that some plants have things to hold their seeds that aren't edible, like a magnolia. Call students' attention to card 2 of the General Plant Life Cycle picture cards. Point out the magnolia seedpod. Ask:

  "Whether the seed is in a seed pod, like a magnolia or a fruit like the cherry, or ready to be blown in the wind like the dandelion, what will the seeds become?" (a new plant)

  "What did we call it when an animal produced an offspring that would grow into a new organism?" (reproducing)

  "Does reproduction come near the beginning, middle, or end of the life cycle?" (near the end)
- Ask expert groups to revisit their general plant life cycle. This time, they should use the information they learned to re-sort the plant structures.
- Circulate and check for understanding. Consider asking:

  "What did you see in the video that made you think that plant part goes there?"
- Allow time for students to sort the plant parts into a cycle. Remind students that a cycle is represented in a circular way.
- Allow time for students to sort the plant parts into a cycle. Remind students that a cycle is represented in a circular way.

- Circulate to check for understanding. Look for students to have structures sorted correctly and have them in the correct order (seeds, growing plant, flower, fruiting body with seeds, dead plant). Refer to **Plant Life Cycle model (answers, for teacher reference)** as needed.
- Keep students' general plant life cycle models accessible at their workspace so they can refer to them as they create a plant life cycle model of specific plants later in the lesson sequence.

Preparing to Teach: Self-Coaching Guide

1. What experience do my students have with the parts of a plant? While observing them during this activity, I can determine if they need more instruction around the parts of a plant and may revise the lesson accordingly.
2. What do my students already know about pollinators?
3. How familiar are my students with pears? Would bringing in a pear fruit be helpful?

B. Modeling the Life Cycle of Plants (10 minutes)

- Give students specific positive feedback on their perseverance in creating a general plant life cycle.
- Distribute **Plant Life Cycle model cards**, chart paper, and tape to each Life Cycle expert group [(1)].
- Tell students that they will use the information from the plant life cycle sort that they just created as a model of the life cycle of their assigned plant type using the Plant Life Cycle model cards they just received [(2)].
- Post directions for the activity on the board and read them with students. Answer clarifying questions:
  1. With your group, use your general plant life cycle model to determine the order of the Plant Life Cycle model cards.
  2. Create a life cycle model by placing the model cards on the chart paper in a circle (like the bullfrog life cycle model).
  3. Raise your hands when you think you have arranged the model cards in the correct order of the life cycle.
- After approving the order of a group's model cards, give the group a marker and provide the following directions:
  1. Use the tape to secure the model cards to your chart paper.
  2. Label each stage.
  3. Draw arrows connecting each stage.
- When finished, display students' plant life cycles in the classroom.

Preparing to Teach: Self-Coaching Guide

1. How will I quickly and efficiently distribute the Plant Life Cycle model cards?
2. Is there a specific group of students I should work with during this time?

Section 4: Communicating Information

A. Reviewing Learning Targets (10 minutes)

- Direct students' attention to the posted lesson sequence learning targets, and read the second two aloud:

  "I can compare and contrast the diverse life cycles of plants and animals to identify a pattern of life."

  "I can use a life cycle model to make predictions."

- Invite students to open their student science notebooks to the Life Cycle entry and put their finger on the "Learning Targets #2" section.
- Tell students to record initial ideas about the learning targets in this section.
- Explain to students that now that they have created life cycle models of multiple animals and plants, they will use these models to identify a pattern across life cycles and make predictions. Say:

  "First, we are going to focus on using the models to find patterns in life cycles" [1].

- Direct students' attention to the **Concepts Scientists Think About anchor chart** and lead a discussion on patterns, posing questions such as [2]:

  "What are examples of patterns that you've seen before?" (patterns in math, on clothing like polka dots or stripes, or the pattern they observed in Lesson Sequence 2)

- Use student examples and ask:

  "Knowing that these (examples from students) are patterns, how would you define a pattern?"

- Read the definition of a *pattern* from the Concepts Scientists Think About anchor chart:
  - "A pattern is a repeated event or object. Finding patterns help us see similarities and differences and make predictions."
- Ask [3]:

  "Do you think you will be looking for a repeated event (or something that is happening) or a repeated object in the life cycles?" (Students do not have to name this yet but should name that they will be looking for a repeated event.)

  "Have you noticed any patterns in the life cycles yet?" (Responses will vary but may include: everything dies.)

- Explain that all organisms have a cycle or a pattern of life, and students will be identifying the pattern by looking at all the life cycle models they made in order to determine what event is similar or repeating in every single one even though they are different in lots of ways too.

Preparing to Teach: Self-Coaching Guide

1. How well did my students understand the concept of patterns in Lesson Sequence 2?
2. What do I expect students to say? (Responses may vary, but they have probably looked for patterns in math, or on clothing—like polka dots or stripes.)

3. My students may say that they are looking for a repeated object, such as an egg or a seed. If they say this, what can I ask to steer them toward an event? (Consider—there are eggs on some of the animal models but not all. Are there eggs on the plant models? A repeated object would have to be on all the models.)

B. Poster Session: Life Cycles (30 minutes)

- Direct students' attention to the posted Animal and Plant Life Cycle models created in Sections 2 and 3.
- Invite students to open their student science notebooks to the Life Cycle entry and find the Patterns of Life Cycles chart.
- Tell students they will now be participating in the Poster Session protocol. Remind them that they participated in this protocol in the last lesson sequence. Refer to the Classroom Protocols pack on Curriculum.ELeducation.org for the full version of the protocol [(1)].
- Tell students that they will be walking around the room and studying the life cycles twice, once to find differences in organisms and once to find a pattern of similarities between the life cycles of all organisms. Point out to students that they should record their observations in the "differences" column on the Patterns of Life Cycles chart.
- Allow 7 minutes for students to quietly visit life cycle models and record differences in the table.
- Ask students to return to their seats.
- Tell students that now they will circulate a second time, but this time they will look for a pattern, or something that is similar to every life cycle. While they are looking, they should be asking themselves: "What event(s) is happening in every single life cycle?"
- Allow 10 minutes for students to quietly visit life cycle models and record similarities in the "similarities" column on the Patterns of Life Cycles chart [(2)].
- Ask students to return to their seats.
- Ask students to turn and talk with an elbow partner:

  "What did you write in your Patterns of Life Cycles chart?" (The pattern of birth, growth, reproduction, and death happens in this order in all life cycles.)
- Ask students to share out, capturing the pattern they name on the Concepts Scientists Think About anchor chart: "All life cycles have the pattern of birth, growth, reproduction, and death. [(3)]"
- Clarify that *reproduction* is when two parents make offspring and that *offspring* is another name for a plant or animal's "baby."
- Tell students to write the pattern for a life cycle in their notebook in the General Pattern of Life Cycle section.

Preparing to Teach: Self-Coaching Guide

1. How familiar are my students with the Poster Session protocol?
2. As I circulate, I'm also looking for a few students that I'll ask to share out.
3. My students will likely name birth, growth, reproduction, and death in their own words. Now is the time to give them the correct terminology. I can write the correct word and their word in parenthesis on the anchor chart.

C. Scientists Meeting: Building Understanding (30 minutes)

- Ask students to bring their science notebooks and gather for a Scientists Meeting [1].
- Direct students' attention to the **Norms of a Scientists Meeting anchor chart**. Using a total participation technique, invite responses from the group:

  "What are the norms of a Scientists Meeting?" (take turns talking, build on one another's ideas, disagree respectfully, ask questions to clarify information)
- Remind students that a Scientists Meeting is a conversation where they speak to one another as scientists and not just to the teacher [2].
- Tell students the goal of this meeting is to build understanding about the *Unit 1 guiding* **question**. Direct students to the posted guiding question:
  - "Why does an organism look the way it does, and why does it matter?"
- Invite students to open their student science notebook to the Life Cycle entry and find the General Pattern of a Life Cycle.
- Display the Pictures of Offspring That Look Different from the Parents.
- Ask:

  "Do you think these offspring look like their parents right now?" (no)

  "Do you think they will look similar to but a little different from their parents when they complete their life cycle? Why or why not?" (Yes. When they are in the adult stage, they will look like their adult parents.)

  "Why do you think understanding life cycles is important to being able to answer the guiding question?" (Responses will vary but may include: Animals look different in different stages of the life cycle. Students may begin to say that animals get their traits from their parents through reproduction.)
- Direct students' attention to the posted **Scientists Do These Things anchor chart** and focus the class on the "modeling" column. Explain that they have created models of the life cycle, and this act of creating models is something that scientists do all the time.
- Read the definition of a model:
  - "A model can be a drawing or diagram, physical replica, or a simulation. A model has limitations because it is used to study one part of a system or object while not paying attention to other parts."
- To build students' understanding about how the life cycles are models according to the definition, consider asking questions such as [3]:

  "What kind of model is each of our plant and animal life cycles?" (diagram)

  "What do our models show and help us understand?" (Responses will vary but may include: how the life cycles compare to each other.)

  "What pattern do you see among all the organisms?" (organisms' life cycles and the pattern of birth, growth, reproduction, and death)

  "How does the model you helped create show the pattern of life cycle? What part of your model is birth? Growth? Reproduction? Death?" (Responses will vary. Give all expert groups a chance to explain.)

- Encourage students to listen to and respond to one another's ideas. Consider using or prompting students to use the following:

  "Can someone paraphrase what Student A said?"

  "Who thinks something similar to Student A?

  "Who thinks something different from Student A?"

  "Can you add to what Student A said?"

- If conflicting information arises, help students challenge each other's ideas respectfully:

  "Why do you think you have different conclusions than Student A?"

  "With what in Student A's explanation do you disagree? On what points do you agree? What evidence do you have to support those ideas?"

- Tell students that models also help people make predictions. A *prediction* is saying what we think might happen. Ask students to use their models to make predictions, posing questions such as:

  "What would happen if the organism stopped reproducing and having offspring (seeds, eggs, or live young)?" (A new life cycle would not begin and the species would eventually die.)

  "What other predictions can you make using the life cycle models?"

- Tell students a model also has limitations or something the model doesn't show.
- Ask students to name some limitations, posing questions such as:

  "What limitations do our models have?" (It doesn't show all organisms.)

  "What don't they show about the life and death of organisms?" (Some organisms die before they reach all the stages of the life cycle.)

  "Do all organisms reach every stage every time? Does our model show that they do?" (No, they don't and yes, our model does.)

  "Do our life cycles show that a new life cycle starts with the new offspring? Why is that important to understand life cycle?" (No, they don't. Because the life cycle keeps going in new organisms.)

- Focus students' attention on the Scientists Do These Things anchor chart and add "life cycle model" to the modeling column.
- Invite students to return to their seats.
- Distribute the **Exit Ticket: Life Cycle** and read the directions aloud.
- Invite students to complete the exit ticket.
- Collect the exit tickets to use as a formative assessment.

Preparing to Teach: Self-Coaching Guide

1. How well did my students keep the norms of a Scientists Meeting in the previous lessons?
2. How can I encourage them to talk with each other more than with me?
3. At this point I will make sure my students name birth, growth, reproduction, and death.