Grade 4: Life Science Module

Lesson Sequence 2: Ecosystems

Lesson Sequence 2: Ecosystems

Overview

Total Time: 2.5 hours of instruction (divided into two sections)

In this lesson sequence, students focus on how the place in which an organism lives can influence how well the organism survives. They become "experts" on an ecosystem and construct a scientific argument about how well the organism can survive in a grassland, tundra, or desert ecosystem.

Lesson Sequence Focusing Question and Big Ideas

How do the characteristics of a habitat influence whether an organism will survive well, survive less well, or die?

- A habitat meets the needs of organisms, such as food, water, shelter and space.
- An organism that has all of its needs met well will survive well or grow and reproduce. Sometimes organisms can have enough of their needs met that they just survive, but don't grow and reproduce. If none of their needs are met, they die.
- Often, organisms have special internal and external structures that allow them to survive well in a particular habitat. Examples: Cacti store water in their trunk in order to survive well in the desert. The snowshoe hare has a thick, white coat of fur to survive the cold tundra.

Long-Term Learning Addressed (Based on NGSS)

Construct and support an argument with evidence to defend the claim that the characteristics of a habitat—such as food and water availability, temperature, and shelter from predators—determine if an animal or plant will survive well, survive less well, or not survive at all. (Based on NGSS 3-LS4-3)

This lesson sequence explicitly addresses:

Science and Engineering Practices:

- **Engaging in Argument from Evidence:** Construct and/or support an argument with evidence, data, and/or a model. *Students construct an argument that an organism will survive well, less well, or not at all in an ecosystem. They use evidence gathered from reading about their assigned ecosystem and assigned organisms to construct an argument using evidence and reasoning.*

Crosscutting Concepts:

- **Systems and Systems Model:** A system can be described in terms of its components and their interactions. *Students are introduced to the concept of systems and begin an anchor chart to chart their learning over the module. They also learn the basic components of an ecosystem and begin to see how organisms interact with the biotic and abiotic features of an ecosystem.*

Disciplinary Core Ideas:

- **LS4.C Adaptation:** For any particular habitat, some kinds of organisms survive well, some survive less well, and some cannot survive at all. *Students study a variety of organisms to determine how well they will survive in a particular habitat.*

Lesson Sequence Learning Targets

- I can make an argument about whether an organism will survive well, will survive less well, or not survive in an ecosystem (desert, tundra, or grassland) based on the organism's needs and the ecosystem's characteristics.
- I can support my argument with evidence and reasoning.

Ongoing Assessment

- Student science notebook: Ecosystems entry
  - Ecosystem Characteristics note-catcher
  - Making a Claim

Agenda

Total Time: 2.5 hours of instruction

Section 1

1. **Opening**
   A. Reviewing Learning Targets (10 minutes)
2. **Obtaining and Communicating Information**
   A. Jigsaw Part I: Reading in Ecosystem Expert Groups (40 minutes)
   B. Jigsaw Part II: Sharing in Ecosystem Expert Groups (20 minutes)

Section 2

1. **Defining a System**
   A. Creating the Concepts Scientists Think About Anchor Chart (20 minutes)
2. **Engaging in Argument**
   A. Collecting Data (35 minutes)
   B. Constructing an Argument: Organisms and Ecosystems (25 minutes)
   Optional Extension: Our Human Habitats

Teaching Notes

Purpose of lesson sequence and alignment with NGSS standards:

- In this lesson sequence, students build background knowledge about an assigned ecosystem and argue whether an organism is adapted (a Disciplinary Core Idea) to survive in a given ecosystem.
- In Section 1, students work in expert groups to build background knowledge of one of three ecosystems: desert, tundra, or grassland ecosystem. They gather evidence for their argument by studying the characteristics of their assigned ecosystem.
- In Section 2, students are introduced to the idea of systems (a Crosscutting Concept) and begin to explore how the components of an ecosystem interact to make it possible for organisms to survive there. Students then are given three organisms to study. They study the needs and characteristics of these specific plants and animals without knowing the ecosystem

in which they live. Students determine which organisms can survive well, survive, or not survive in each ecosystem. Then they construct an argument (a Science and Engineering Practice) supported by evidence to justify their reasoning of how well the organism will live in one of the three ecosystems.

- In this lesson sequence, students begin working with their ecosystem expert group. In these groups, each student will be responsible for gathering information about one of five characteristics of their ecosystem from the provided text: temperature, precipitation, types of plant, types of animals, and types of shelter. Students may double up on the characteristics if needed. Consider printing the characteristics on slips of paper to be taped into the student science notebooks. Within the ecosystem expert groups, students will share information and capture all the characteristics of an ecosystem on their individual note-catcher. Students will work within this group throughout the Life Science Module and ultimately will create an animal that has the structures to survive well in each student's assigned ecosystem.
- In this lesson sequence, students begin two anchor charts that they will use throughout the Life Science module. The Concepts Scientists Think About anchor chart captures student learning about the Crosscutting Concepts explicitly addressed in the Life Science Module, and the Scientists Do These Things anchor chart captures student learning about the Science and Engineering Practices explicitly addressed in the Life Science Module.

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

- In Lesson Sequence 1, students were introduced to the performance task. In this lesson sequence, they build background knowledge of one of three ecosystems: desert, tundra, or grassland. They will use this learning about ecosystems throughout the Life Science Module as they study the different structures of plants and animals and determine how these structures function within an ecosystem to help an organism survive well.

How it reinforces the CCSS Standards and EL Education's Language Arts Grade 4 Module 2:

- Language Arts Grade 4 Module 2 focuses on defense mechanisms: Being able to escape predators in an ecosystem is an obvious and necessary component of surviving well. These defense mechanisms are an adaptation. Consider referring to the animals that students have studied in the Language Arts module, or other animals they may be familiar with, as more examples of organisms that survive well in a particular ecosystem.
- The Jigsaw in Section 1 and the plant and animal cards in Section 2 provide students with the opportunity to practice reading informational texts (CCSS ELA RI.4.1 and RI.4.3).
- The student's argument in Section 2 provides students with an opportunity to practice argument writing (CCSS ELA W.4.1).

Possible student misconceptions:

- As noted in Lesson Sequence 1, students may not know the difference between habitats and ecosystems. Be clear that a habitat is the natural home of an organism where an organism's needs are met, such as the need for air, food, water, shelter, and space. An *ecosystem* is the interaction of living and non-living things, and the ecosystem often includes many *habitats*, or homes, for a variety of organisms. When scientists talk about a specific organism living in a specific place, they refer to that place as the habitat of the organism and not just the ecosystem. Therefore, when students make their final argument about a specific organism living in an ecosystem, they will use the word *habitat*.

- Students may not understand the difference between *surviving well* and *surviving less well*. Clarify as necessary: An organism that has all its needs met well, will survive well, which means it will grow and reproduce. Sometimes organisms can have enough of their needs met that they just survive, but don't grow and reproduce. If none of an organism's needs are met, it dies. Often, organisms have special structures that allow them to survive well in a particular place. Examples: Cacti store water in their trunk in order to survive well in the desert. The Arctic hare has a thick, white coat of fur to survive the cold tundra.
- Students may believe that animals get to choose or create their own structures to help them survive well. Emphasize that structures are inherited traits that may be influenced by the environment, but are not chosen or willfully created by an organism.

Possible broader connections:

- Systems, sets of different parts working together, are all around us. Even the classroom could be considered a system. Look for opportunities to point out systems, or encourage students to look for systems throughout their day.

Areas where students may need additional support:

- Continue to support students in effectively using their science notebooks. Refer to the Grade 4 Life Science Module Overview for additional information.
- Students may need additional support with reading in their expert groups. Consider how you might scaffold or alter the texts to ensure that all readers comprehend their assigned material.
- As students work to match an organism to the tundra, desert, or grasslands ecosystem, let them know there may be more than one right answer. Some animals and plants live in multiple ecosystems. Ask students to reason why an animal would survive well, survive less well, or die in an ecosystem rather than worrying about getting a correct match.
- Students may struggle with constructing an argument. Depending on the needs of your students, consider building more time than is given in this lesson sequence to instruct students on how to prepare for and make an argument. Consider having students write their ecosystem argument on a separate sheet of paper to collect to use as formative assessment.

Down the road:

- In the final performance task in Lesson Sequence 11, students will design an animal that can survive well in the ecosystem that they are assigned. They will also construct an argument as the summative assessment. Use the student argument in this lessons sequence as baseline data as you prepare to teach students to effectively construct an argument throughout the Grade 4 Life Science Module.
- This lesson sequence emphasizes the concept of systems because students will be expected to look for systems throughout the Grade 4 Life Science Module.
- Students will return to the Concepts Scientists Think About anchor chart and the Scientists Do These Things anchor chart throughout the module. The Concepts Scientists Think About anchor chart helps reinforce the Crosscutting Concepts, or core ideas and patterns of thinking, that scientists use. These concepts include thinking about cause and effect, as well as looking at systems. The Scientists Do These Things anchor chart tracks the Science and Engineering Practices explicitly taught within this module. These practices include designing and using models, engaging in argument, and planning and carrying out investigations.

- In Lesson Sequence 11, students complete a summative assessment on constructing an argument. Use the ecosystem argument that students create in this lesson sequence to guide your instruction and determine the best way to support student mastery of crafting scientific arguments. Throughout all lesson sequences in the Life Science Module, students will be working to gather evidence to use in their final argument. And in both Lesson Sequences 6 and 8, they will have specific opportunities to practice constructing arguments.
- The plant and animal cards have scientific terms that students will use throughout the Life Science Module. Consider creating a Word Wall of the scientific terms found on the cards. The cards also indicate some academic vocabulary (underlined). Consider giving students time to discuss the meaning of those words.
- Continue to care for the grass and radish plants seeded in preparation for the Life Science Module. The plants will be used in Lesson Sequence 8. See Grade 4 Life Science Module Overview.
- In the next lesson sequence, students will work in stations. See the Lesson Sequence 3 materials lists to know what to prepare.
- In Lesson Sequence 3, students will work with live invertebrates. See Grade 4 Life Science Module Overview for more information on using living organisms in the classroom.

In advance:

- Read each section and complete the Preparing to Teach: Self-Coaching Guide.
- Assign students to three evenly distributed ecosystem expert groups: Grassland, Tundra, or Desert. Each group will need five students. (Duplicate groups according to class size.) Within each group, assign students one of the five characteristics.
- In Section 2, reconfigure the students into triads for the "Collecting Data" step. Intentionally form triads so each consists of one student from each of the tundra, desert, and grassland groups. Students will represent their ecosystem as the three students try to determine the ecosystem in which the plants and animals live.
- Review the Jigsaw protocol (see the Classroom Protocols pack on Curriculum.ELeducation.org).
- Prepare:
  - Plant and animal cards (see supporting materials). Consider making at least three sets since students will use the animal cards again in Lesson Sequences 6 and 11, and need multiple sets. Consider printing the cards in color and laminating them. To print in color, click the URL under each picture.
  - Create the Concepts Scientists Think About anchor chart and the Scientists Do These Things anchor chart.
  - Post: Lesson sequence learning targets, Life Science Module guiding question, Concepts Scientists Think About anchor chart, Scientists Do These Things anchor chart.

Optional extensions:

Our Human Habitat. Invite students to construct an argument about humans being able to survive well in an assigned ecosystem. Pose the question: "How do we meet our needs? How is it similar to or different from the animals studied in the lesson?"

Vocabulary

habitat: the natural home of an organism where its needs for food, water, shelter, and space are met
surviving well: being able to grow and reproduce
surviving less well: being able to survive
ecosystem: the living and non-living things that make up an environment
grassland: a large, open area of land covered mainly by grass
desert: a dry or arid land area with very little rainfall and sparse plant life
tundra: a land area that is very cold and has a short growing season with very little rainfall and sparse plant life
characteristics: a description of a person, place, or thing
organism: a living thing, including plants and animals
system: a set of parts that work together
claim: a statement or conclusion that answers the original question
evidence: scientific data, including observations, that support the claim
evaluation of evidence: process of deciding whether or not the data is good enough to support the claim
reasoning using evidence: explaining how the evidence or data support the claim

Grassland text
prairie, steppe, savannah: other names for a grassland
resilient: able to recover quickly
root system: a group of roots that anchor the plant in the soil and absorb water and nutrients
pollinators: animals that carry pollen from one flower to another
average: a math term; the amount calculated by adding several quantities and then dividing this amount by the number of quantities.
temperate grassland: have a warmer season than most grasslands
dormant season: a season when the plants don't grow

Tundra text
precipitation: rain, snow, sleet, and hail
Arctic tundra: a tundra found in the Arctic
topsoil: layer of soil on the surface of the ground
Alpine tundra: a tundra found at the tops of mountains
unpredictable: unable to predict
permafrost: a thick layer of soil that is frozen most of the year
clusters: groups
migrate: moving from place to place
hibernate: to sleep for a long period of time
insulates: to protect from losing heat
habitat: the natural home of an organism where its needs for food, water, shelter, and space are met
taproot: the root of a plant that grows directly down

Desert text
precipitation: rain, snow, sleet, and hail
adaptations: a structure that aids in survival

Materials

General Materials

- ☑ Student science notebook (from Lesson Sequence 1; one per student)
  - — Ecosystem entry (page 6 of student science notebook)
- ☑ Researching the Grassland Ecosystem (one per student in Grassland expert group)
- ☑ Researching the Tundra Ecosystem (one per student in Tundra expert group)
- ☑ Researching the Desert Ecosystem (one per student in Desert expert group)
- ☑ Life Science Module guiding question (from Lesson Sequence 1; one to display)
- ☑ Concepts Scientists Think About anchor chart (new, teacher-created; added to by students in Section 2; see Teaching Notes)
- ☑ Animal cards (two per triad)
- ☑ Plant cards (one per triad)
- ☑ Needs of the Organism Checklist (one per student)
- ☑ Scientists Do These Things anchor chart (new, teacher-created; added to by students in Section 2; see Teaching Notes)
- ☑ Model Argument: The Snowshoe Hare and the Tundra (one to display)

Science-Specific Materials

- ☑ Object to represent a system (pencil, clothes pin, bicycle, etc.)

Section 1: Opening

A. Reviewing Learning Targets (10 minutes)

- Direct students' attention to the posted lesson sequence learning targets [1].
- Read them aloud as students following along, reading silently in their heads:

  "I can make an argument about whether an organism will survive well, will survive less well, or not survive in an ecosystem (desert, tundra, or grassland) based on the organism's needs and the ecosystem's characteristics."

  "I can support my argument with evidence and reasoning."
- Invite students to take out their **student science notebook** and open it to the **Ecosystem entry**.
- Ask students to respond to the learning targets and the focusing question in their science notebooks in the "Opening" section [2].
  - — "How do the characteristics of a habitat influence whether an organism will survive well, survive less well, or die?"
- Clarify terms:
  - — *Habitat*: The home of an organism where its needs (such as the need for water, shelter, space, or food) are met. The ecosystems that students studied in Lesson Sequence 1 have many different habitats in them, but those habitats mostly share similar characteristics. Example: Most of the habitats in a desert ecosystem are hot and dry and have little water available for the plants and animals that live there.

  - *Surviving well*: Being able to grow and reproduce.
  - *Surviving less well*: Being able to survive but not grow enough or reproduce.
- Invite students to record these definitions in the Ecosystem entry of their student science notebook.
- Ask [3] [4] [5] [6]:

  "What are examples of animals that survive in one place well, but would not be able to survive in another place so well?" (springbok, armadillo, polar bear)

  "Why do some animals survive well in some places but not others?"(Use specific animal examples from student responses or organisms that students are familiar with from the Language Arts module to model thinking.)

  "What do you already know about the ecosystems from your Google Earth tour in Lesson Sequence 1?" (Responses will vary. Possible responses include: The tundra is cold, the desert is hot and dry, the grasslands don't have a lot of trees.)

  "What other characteristics of an ecosystem do we need to know about to decide if an animal will survive well; survive less well; or die in a desert, grassland, or tundra?" (temperature, precipitation or water availability, types of plants (for food), types of animals (for food), types of animal shelters)
- Introduce the ecosystem expert group task. Say something like:

  "You will now use a text to become an expert about one of three ecosystems: desert, tundra, or grassland."

  "You will learn about the characteristics of your ecosystem—like how much it rains, how hot or cold it is, and the types of plants and animals that live in the ecosystem and typical animal shelters in the system."

  "In your ecosystem expert group, each person will focus on one characteristic of the ecosystem at first."

  "You will share your learning so everyone learns about all the characteristics of the ecosystem."

  "Then you will argue how those characteristics affect the survival of an organism."

Preparing to Teach: Self-Coaching Guide

1. What new or important vocabulary do I want to highlight from the learning targets?
2. What do I predict students will respond to in these learning targets?
3. Remember that at this point I do not need students to say the right answers. I want to collect information about what they already know and ensure they can use scientific reasoning.
4. What kinds of examples do I predict my students will come up with? How will I use those examples to demonstrate the thinking that some animals are better adapted to survive well in specific ecosystems than others? For example: "Look at this snowshoe hare and this desert. Would this animal be able to survive in this ecosystem?"
5. How will I use those examples to stimulate student thinking about the characteristics of an ecosystem? For example: "What would we have to know about the desert to answer this question? What would we have to know about the hare?"

6. If after some questioning, students don't name the characteristics of the ecosystem, I will name them. (temperature, precipitation or water availability, types of plants, types of animals, types of animal shelters)

Section 1: Obtaining and Communicating Information

A. Jigsaw Part I: Reading in Ecosystem Expert Groups (40 minutes)

- Assign students to their pre-determined ecosystem expert groups: Grassland, Tundra, or Desert [(1)].
- Within each group, assign each of the five members one specific characteristic of that ecosystem (see Teaching Notes).
- Focus students' attention on the Ecosystem entry in their student science notebooks. Ask them to put their finger on the Ecosystem Characteristics note-catcher in the "Obtaining Information" section.
- Invite students to record their assigned ecosystem and the characteristic for which they are responsible in the space provided.
- Distribute materials for each of the three expert groups: **Researching the Grassland Ecosystem**, **Researching the Tundra Ecosystem**, and **Researching the Desert Ecosystem**.
- Ask students to follow along as you read the first section, entitled "Photographic Evidence" aloud. (That section is the same for every text).
- Post directions for the jigsaw on the board and read them with students. Answer clarifying questions [(2)]:

1. (5 minutes) Study some pictures of the ecosystem and record your findings.
2. (5 minutes) Share initial observations about <u>all</u> of the characteristics of the ecosystem with one member of your group.
3. (10 minutes) Read your expert group text for gist.
4. (15 minutes) Reread your expert group text, focusing on your assigned characteristic of the ecosystem (temperature, precipitation or water availability, types of plants, types of animals, or types of animal shelters) and take notes on the Ecosystem Characteristics note-catcher.

- Ask students to begin the jigsaw. Circulate to clarify and check for understanding [(3)].

Preparing to Teach: Self-Coaching Guide

1. Knowing that students will be working with assigned peers for the remainder of the module as they design their animals together, how will I assign groups?
2. Do my students know the terms *biotic* (living) and *abiotic* (non-living)?
3. How can I support students who find gaining information from text challenging? Which students might benefit from hearing the text read aloud?

B. Jigsaw Part II: Sharing in Ecosystem Expert Groups (20 minutes)

- Refocus students whole group.
- Give them specific positive feedback on their ability to read their texts independently and record their findings.
- Tell students that now they will share the information about their assigned characteristic with their ecosystem expert group.
- Post directions for the jigsaw share on the board and read them with students. Answer clarifying questions:

1. Number your group members 1–5.
2. Group member 1 shares the information he/she recorded in his/her Ecosystem Characteristics note-catcher. The other group members record this information in the corresponding box on the note-catcher.
3. Repeat Step 2 for group members 2–5.

- Circulate to support students as they share in their expert groups (1).

Preparing to Teach: Self-Coaching Guide

1. Would it be helpful for me to work with one group in particular?

Section 2: Defining a System

A. Creating the Concepts Scientists Think About Anchor Chart (20 minutes)

- Direct students' attention to the **Life Science Module guiding question**.
  - "How do the internal and external structures of plants or animals function together as a system to help them survive well in a given habitat?"
- Remind students that they have learned a lot about a specific ecosystem. So now they have some ideas about the given habitats in those ecosystems. The word they will focus on now is system. Tell students that in order to answer the module guiding question, they will have to understand what a system is.
- Generate student background knowledge by asking (1):

  "Where have you heard the word system before?" (Responses will vary.)

- Direct students' attention to the **Concepts Scientists Think About anchor chart**. Refer to the definition of *system* written on the anchor chart.
- Ask students to record the definition in their Ecosystem entry under the "Systems" section in their student science notebook.
- Using an **object to represent a system**, lead students to name the different parts of a system (2).

  "What are the different parts?"

  "How do the parts work together?"

  "What job does the object do?"

  "Could any part of the object do that job by itself?"

- Ask students to work with an elbow partner:

  "Identify another system and consider all the ways the different parts of the system work together. Record your ideas in your Ecosystem entry under the "Systems" section."

- Circulate to check for student understanding and stimulate thinking [(3)].
- After 5 minutes, ask for volunteers to share out. Capture students examples on the Concepts Scientists Think About anchor chart.
- Point out that the word *ecosystem* is made up of the words *eco-* and *system*. *Eco-* means of the environment. An ecosystem is the different parts of the environment working together.
- Post the following questions and ask students to record their thinking in the Ecosystem entry in the "Systems" section [(4)]:

  "What are the different parts of the ecosystem you studied?" (temperature, precipitation, types of animals, types of plants, types of animal shelters)

  "How do these parts work together to create the ecosystem?"

- Ask students to record their thinking in their student science notebook Ecosystem entry in the "Systems" section.
- After 5 minutes, invite students to share their ideas with an elbow partner.
- Cold call pairs to share out. As students share, capture their ideas on the Concepts Scientists Think About anchor chart. As you record, indicate how the parts work together as a system and explain that if one part was removed, the system would not work as well.
- After a few minutes, tell students they will keep thinking about systems throughout the Life Science Module and their understanding will grow and change. Now they are going to turn their attention to thinking about the way that organisms interact with the different parts of an ecosystem in order to survive.

Preparing to Teach: Self-Coaching Guide

1. What systems are students familiar with? (solar system, gaming system, human body systems like muscular, circulatory, skeletal systems, etc.)
2. What other objects are students familiar with that I could use to demonstrate a system?
3. What kinds of questions can I ask to stimulate student thinking about systems?
4. When checking for student understanding, what questions could I ask? (For example, if students find this task challenging, ask them to think of the body parts that work together to jump, eat, wave, etc.)

   Note: The parts of an ecosystem are complex. An entry point for students may be just thinking about how the biotic parts, such as the plants and animals, work together. The animals eat the plants, the animals use the plants as shelter, the animals eat other animals, the plants use animals to spread their seeds, etc. Plants and animals also use abiotic features, such as the water available, to grow. Remember, you are only introducing this concept at this point. Students will have an opportunity to work with systems throughout the module.

Section 2: Engaging in Argument

A. Collecting Data (35 minutes)

- Arrange students into pre-determined triads. Each triad should have a representative from the Desert, Tundra, and Grasslands expert groups.
- Remind students of the lesson sequence learning targets:

  "I can make an argument about whether an organism will survive well, will survive less well, or not survive in an ecosystem (desert, tundra, or grassland) based on the organism's needs and the ecosystem's characteristics."

  "I can support my argument with evidence and reasoning."
- Explain that students are going to argue how well an organism can survive in an ecosystem. They will support their argument with evidence. Explain that they already have some evidence they will need for their argument (from their ecosystem expert group work).
- Ask students to put their finger on the evidence they collected about the characteristics of their ecosystem in their science notebook. (Students should point to the Ecosystem Characteristic note-catcher.)
- Invite students to briefly share the characteristics of their ecosystem with their triad.
- After 10 minutes, refocus the whole class.
- Distribute two **animal cards**, one **plant card**, and one **Needs of the Organism Checklist** to each student.
- Tell students they will gather data or evidence about what different organisms need to live in an ecosystem. Post the following directions on the board and read them with students. Answer clarifying questions [(1)] [(2)]:

1. Read your plant card to determine its needs.
2. Record your findings on your Needs of the Organism Checklist. Do not complete the final two rows of the checklist.
3. Repeat Steps 1–2 with your animal cards.

- Model how to complete the above steps using the Needs of the Organism Checklist and the Snowshoe Hare animal card [(3)].
- Tell students they will argue with reason later in the lesson sequence why they think a given organism will survive well, less well, or die in their ecosystem.
- Invite students to begin working, and circulate to support them as needed.
- After 15 minutes, refocus the whole class.
- Model how to complete the last row on the Needs of the Organism Checklist using the Snowshoe Hare animal card and the characteristics of the tundra. Think aloud, saying something like [(3)]:

  "I see from the Ecosystem Characteristics note-catcher that the tundra is very cold and snowy. I also see that there are a lot of woody plants."

  "I see from the animal card that the hare needs plants to eat and it has teeth to chew woody plants. It needs shelter, but it has white fur to blend in with the snow and thick fur to keep it warm, so a snowy place would be a good place to hide."

  "Therefore, I think the snowshoe hare will survive well in the tundra, so I am going to write, 'Yes, I think it would survive well' in the 'Animal #1 column."

- Remind students that in order for an organism to survive well, it must have all of its needs met. Invite students to work with one another to decide if the organisms on their cards would survive well, survive less well, or die in the three ecosystems.
- Circulate to clarify and provide support [4].
- Invite students to share out any organisms they had trouble trying to determine survival and any surprises. Affirm that it is okay if there is more than one match.

Preparing to Teach: Self-Coaching Guide

1. How familiar are my students with using charts? How can I further support students as they collect data in their student science notebooks about the characteristics of an ecosystem and the needs of their assigned organism?
2. Explain *habitat*. Consider this definition:

   "In ecosystems, such as the desert, tundra, and grasslands, animals and plants make their homes there. We call the home a habitat. In a habitat, animals and plants have needs that must be met, like the need for food, water, shelter, and space."
3. Would my students benefit from having an additional model?
4. What questions can I ask to help students identify the needs of the organisms?

B. Constructing an Argument: Organisms and Ecosystems (25 minutes)

- Tell students they now will choose one of the animals or plants from their (animal and plant) cards to create a scientific argument about. They will argue whether that organism will survive well, survive less well, or die in the tundra, desert, or grassland ecosystem [1].
- Direct students' attention to the **Scientists Do These Things anchor chart** to define the different parts of an argument for students. Point out that there are two parts to an argument: preparing for the argument and making the argument. First, a scientist prepares to make an argument [2]:
  - Pose the question: "Will this organism survive well, survive less well, or die in a given ecosystem?"
  - Identify evidence: Evidence is scientific data (characteristics of the ecosystem and characteristics of organisms) that answers the question.
  - Evaluate the evidence: The process of deciding if the data is accurate and relevant to support the claim.
- Explain that after a scientist has thought all about the evidence, he or she is then ready to make the argument:
  - Make a claim: A *claim* is a statement or conclusion that answers the original question.
  - Using evidence and scientific reasoning to support and further explain the claim.
  - Explain why the evidence is sufficient and relevant.
- Assure students they will get lots of practice constructing an argument. They will practice constructing an argument right now [3].
- Display **Model Argument: The Snowshoe Hare and the Tundra**.
- Read aloud the "Preparing for the argument" section of the model argument.
- Ask students to turn and talk with an elbow partner about how the writer of this model completed the steps for preparing to make an argument.

- Invite a few students to share out.
- Point out that students have already started this step. When they collected data about the needs of the organism and the characteristics of the ecosystem, they were gathering evidence. Now they will evaluate whether or not they have enough evidence to claim that the organism will survive well, survive, or die in a given ecosystem.
- Tell students to look for their strongest evidence and then choose a plant or an animal from their Needs of an Organism Checklist with which they will make an argument. They don't have to argue that an organism will survive well—they can make an argument that an organism will die in an ecosystem if there is strong evidence for that.
- Ask students to turn and talk with an elbow partner about which organism they chose.
- Read the "Making the Argument" section of Model Argument: The Snowshoe Hare and the Tundra.
- Ask students to turn and talk with a partner about how the writer of the model completed the steps to making an argument.
- Tell students they will now construct an argument on their own [4].
- Ask students to open up their student science notebook Ecosystem entry, and to use the "Engaging in Argument" section to support them as they write their argument about an animal or plant of their choice.
- Ask students to share their arguments as time permits.

Preparing to Teach: Self-Coaching Guide

1. How can I explain the difference between a scientific argument and an argument that students make socially? Remember in an argument, students must do the following:
   - Preparing for the argument:
     - Pose the question.
     - Identify evidence that answers the question.
     - Evaluate whether or not that evidence is sufficient to support the claim. "Is this good evidence?"
   - Making the argument:
     - Make a claim.
     - Use the evidence and scientific reasoning to support the claim.
     - Explain why the evidence is sufficient and relevant.
2. How familiar will students be with constructing an argument? How might I use the Scientists Do These Things anchor chart to introduce or review the steps to constructing an argument and the vocabulary used to describe each step?
3. What support might my students need beyond what is offered in the lesson and the student science notebook to construct an argument?
4. If time is short, consider having one or two students make an oral argument and decide as a class if they completed the steps to making an argument.

Notes