

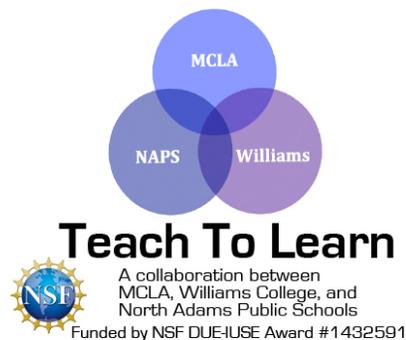
## The Evolution of the T2L Science Curriculum

Over the last four years, the Teach to Learn program created 20 NGSS-aligned science units in grades K-5 during our summer sessions. True to our plan, we piloted the units in North Adams Public Schools, and asked and received feedback from our science fellows and our participating teachers. This feedback served as a starting point for our revisions of the units. During year 2 (Summer of 2015), we revised units from year 1 (Summer/Fall 2014) and created new units to pilot. In year 3, we revised units from years 1 and 2 and created new units of curricula, using the same model for year 4. Our understanding of how to create rich and robust science curriculum grew, so by the summer of 2018, our final summer of curriculum development, we had created five exemplar units and established an exemplar unit template which is available in the T2L Toolkit.

We made a concerted effort to upgrade all the existing units with exemplar components. We were able to do much, but not all. So, as you explore different units, you will notice that some contain all elements of our exemplar units, while others contain only some. The fully realized exemplar units are noted on the cover page. We did revise all 20 units and brought them to a baseline of “exemplar” by including the Lessons-At-A-Glance and Science Talk elements.

Grade 4

# Plant & Animal Anatomy



T2L Curriculum Unit

# Plant and Animal Anatomy

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## Life Science/Grade 4

In this unit students will learn about the structures that allow plants and animals to survive. Additionally, students will discover that plants and animals, including humans, have internal and external structures that serve various functions such as growth, survival, behavior and reproduction.

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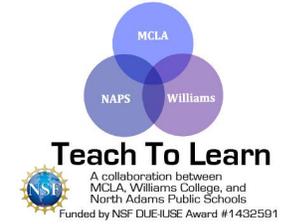
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## UNIT PLAN

Stage 1 Desired Results									
<p><b>4-LS1-1.</b> 1. Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. <b>Clarification Statements:</b> Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds. <b>State Assessment Boundary:</b> State assessment will be limited to macroscopic structures.</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #e0e0e0;"> <th colspan="2" style="text-align: center; padding: 5px;"><i>Meaning</i></th> </tr> </thead> <tbody> <tr> <td style="width: 30%; background-color: #f4a460; padding: 5px;"> <p><b>UNDERSTANDINGS</b>  <i>Students will understand that</i></p> <ul style="list-style-type: none"> <li>Plants and animals (including humans) have both internal and external structures that serve various functions such as growth, survival, behavior and reproduction.</li> </ul> </td> <td style="padding: 5px;"> <p style="text-align: center;"><b>U</b></p> <p><b>ESSENTIAL QUESTIONS</b></p> <p style="text-align: center;"><b>Q</b></p> <p><b>What structures allow plants and animals to survive?</b></p> <p><b>Why are these structures important, and how did they aide in survival?</b></p> </td> </tr> <tr style="background-color: #e0e0e0;"> <th colspan="2" style="text-align: center; padding: 5px;"><i>Student Learning Targets</i></th> </tr> <tr> <td colspan="2" style="padding: 5px;"> <p><i>Students will be able to</i></p> <ol style="list-style-type: none"> <li>1. Classify animals as mammals, birds, reptiles, amphibians, insects, and fish, according to their physical characteristics and behaviors.</li> <li>2. Classify animals as vertebrates or invertebrates.</li> <li>3. Identify the three main purposes of skin.</li> <li>4. Identify the different skin coverings of mammals, reptiles, fish, birds, and amphibians.</li> <li>5. Explain how each type of skin covering helps the animal survive in its environment.</li> <li>6. Identify the different systems that allow movement (skeletal, nervous and muscular).</li> <li>7. Explain how different structures work together to move a body.</li> <li>8. List some of the differences in locomotion between different animals.</li> <li>9. Understand the three parts of the nervous system.</li> <li>10. Explain what the spinal cord does.</li> <li>11. Discuss the different parts of the brain and their functions.</li> <li>12. Define reproduction and identify the two main types of reproduction.</li> <li>13. Explain how mammals, reptiles, fish, birds, and amphibians reproduce.</li> <li>14. Understand the importance of the respiratory system and identify the path of airflow through the system.</li> </ol> </td> </tr> </tbody> </table>	<i>Meaning</i>		<p><b>UNDERSTANDINGS</b>  <i>Students will understand that</i></p> <ul style="list-style-type: none"> <li>Plants and animals (including humans) have both internal and external structures that serve various functions such as growth, survival, behavior and reproduction.</li> </ul>	<p style="text-align: center;"><b>U</b></p> <p><b>ESSENTIAL QUESTIONS</b></p> <p style="text-align: center;"><b>Q</b></p> <p><b>What structures allow plants and animals to survive?</b></p> <p><b>Why are these structures important, and how did they aide in survival?</b></p>	<i>Student Learning Targets</i>		<p><i>Students will be able to</i></p> <ol style="list-style-type: none"> <li>1. Classify animals as mammals, birds, reptiles, amphibians, insects, and fish, according to their physical characteristics and behaviors.</li> <li>2. Classify animals as vertebrates or invertebrates.</li> <li>3. Identify the three main purposes of skin.</li> <li>4. Identify the different skin coverings of mammals, reptiles, fish, birds, and amphibians.</li> <li>5. Explain how each type of skin covering helps the animal survive in its environment.</li> <li>6. Identify the different systems that allow movement (skeletal, nervous and muscular).</li> <li>7. Explain how different structures work together to move a body.</li> <li>8. List some of the differences in locomotion between different animals.</li> <li>9. Understand the three parts of the nervous system.</li> <li>10. Explain what the spinal cord does.</li> <li>11. Discuss the different parts of the brain and their functions.</li> <li>12. Define reproduction and identify the two main types of reproduction.</li> <li>13. Explain how mammals, reptiles, fish, birds, and amphibians reproduce.</li> <li>14. Understand the importance of the respiratory system and identify the path of airflow through the system.</li> </ol>	
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	<ol style="list-style-type: none"> <li>15. Understand the importance of the circulatory system and identify the pathway of blood flow through the system.</li> <li>16. Give examples of how the respiratory and circulatory systems differ in nonhuman animals</li> <li>17. Explain how the body breaks down food.</li> <li>18. Identify the organs of the digestive and excretory systems and explain their functions</li> <li>19. Explain how the body gets rid of waste.</li> <li>20. Identify plant structures and describe their importance to the life of a plant.</li> <li>21. Compare plant and animal structures.</li> <li>22. Write an informative essay using an appropriate diagram to communicate knowledge about plant structures and their functions.</li> <li>23. Identify at least two different interactions between plant and animal structures on Sheep Hill.</li> <li>24. Understand the importance of the environment in plant and animal survival.</li> <li>25. Explain how a changing environment, particularly one affected by humans impacts the survival of plants and animals.</li> <li>26. Explain important internal and external structures within a specific organism.</li> <li>27. Identify some of the complex interactions between different organisms in a habitat.</li> <li>28. Conduct and present independent research to an audience.</li> </ol>
<b>Stage 2 – Evidence</b>	
<b>Evaluative Criteria</b>	<b>Assessment Evidence</b>
<ul style="list-style-type: none"> <li>• Participation</li> <li>• Class activities/projects</li> </ul>	<ol style="list-style-type: none"> <li>1. Participation in class and group conversations</li> <li>2. Participation and completion of class activities</li> <li>3. Exit tickets</li> <li>4. Writing in Science Journals</li> </ol>
<b>Stage 3 – Learning Plan</b>	

***Students may have the following background from previous grade levels that will support their learning in this unit.***

**Grade 1** - Students use information from observations (first-hand and from media) to identify similarities and differences among individual plants or animals of the same kind.

**Grade 2** - Students can develop and use models to compare how plants and animals depend on their surroundings and other living things to meet their needs in the places they live.

**Grade 3** - Students should be able to use simple graphical representations to show that different types of organisms have unique and diverse life cycles. Describe that all organisms have birth, growth, reproduction, and death in common but there are a variety of ways in which these happen.

### **Lesson Overview**

**Lesson 1** - Students will learn about the different classifications of animals and how to determine which category a specific animal belongs to.

**Lesson 2** - Students will learn about the function of the skin and the various skin coverings that animals have. Additionally, students will explain how specific skin coverings help an animal survive in their environment.

**Lesson 3** - Students will learn about the movement of animals and humans. Students will also learn about the muscular system and skeletal system. This lesson will include a movement game and making a model of a hand.

**Lesson 4** - Students will learn about the nervous system through hands on activities and labelling pictures.

**Lesson 5** - Students will learn about animal reproduction and the two main types: live birth and eggs. Students will be able to explain how different animals reproduce.

**Lesson 6** - Students will learn the importance of the circulatory and respiratory systems. They will be able to map the flow of blood

through the circulatory system and the flow of oxygen through the respiratory system. Additionally, they will be able to explain how some non-human animals have different circulatory and respiratory systems.

**Lesson 7** - Students will learn what the body does with food and how it gets rid of waste. They will also be able to identify the parts of the digestive and excretory systems and explain the functions of each part.

**Lesson 8** - Students will learn the functions of plant parts. Students will watch a video, do a reading, and dissect a plant. At the end of the lesson they will write a paragraph stating what they learned. More lessons on plant anatomy will be added in the 2017-2018 school year.

**Lesson 9** - Students will learn about the different survival interactions between plants, animals and humans. We will watch a video about interactions on Sheep Hill, create skits and “interactive webs”.

**Optional Lesson:** - In second grade, students studied habitats; they can revisit this concept in this optional lesson extension. Students will learn about the different species that exist in a specific habitat. Students will choose, research, create and present information on the species they have chosen.

Adapted from Massachusetts Department of Elementary and Secondary Education’s Model Curriculum Unit Template. Originally based on Understanding by Design 2.0 © 2011 Grant Wiggins and Jay McTighe. Used with Permission July 2012

## Lessons At-A-Glance

Lesson	Core Activities	Extensions	Tech Integration	Field Work
1	<ul style="list-style-type: none"> <li>Brain Pop video</li> <li>PowerPoint</li> <li>Animal Card game</li> <li>Animal diagram</li> </ul>	<ul style="list-style-type: none"> <li>20 Questions Animal Game</li> <li>Story Writing: A new Vertebrate</li> </ul>	  	
2	<ul style="list-style-type: none"> <li>Skin and Skin Coverings PowerPoint</li> <li>Animal Outlines</li> <li>Skin Covering Matching Game</li> <li>My Favorite Animal</li> </ul>	<ul style="list-style-type: none"> <li>Bill Nye- "Skin"</li> </ul>	  	
3	<ul style="list-style-type: none"> <li>Locomotion Video</li> <li>Locomotion League Activity</li> <li>Make-A-Hand</li> <li>Locomotion League music video</li> <li>Article Reading Exercise</li> </ul>	<ul style="list-style-type: none"> <li>Build-a-Skeleton</li> <li>Muscular system games</li> <li>Study jams activities</li> </ul>		

4	<ul style="list-style-type: none"> <li>• Nervous System Video</li> <li>• Build a life size outline of nervous system</li> <li>• Nervous system activity</li> </ul>			
5	<ul style="list-style-type: none"> <li>• Reproduction Types PowerPoint</li> <li>• How do birds breathe inside eggs?</li> <li>• Touch a Reptile Egg</li> <li>• Fish Egg Survival Game</li> <li>• Paired text</li> </ul>	<ul style="list-style-type: none"> <li>• Vernal pool trip</li> </ul>	 	
6	<ul style="list-style-type: none"> <li>• Build-A-Lung</li> <li>• Exercise Activity: Respiration</li> <li>• What is Blood?</li> <li>• Circulatory Simulation</li> <li>• Exercise Activity: Circulation</li> </ul>			
7	<ul style="list-style-type: none"> <li>• Digestive System Video</li> <li>• Saltine Experiment</li> <li>• Owl Pellets</li> <li>• Kidney Activity</li> <li>• Poster Presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Digestion Computer Activity</li> <li>• Virtual Owl Pellets</li> <li>• The Magic School Bus "For Lunch"</li> </ul>	 	

8	<ul style="list-style-type: none"> <li>• Bean Bags</li> <li>• Plant and Animal Connection</li> <li>• Plant Dissection</li> </ul>	<ul style="list-style-type: none"> <li>• Cactus Lab</li> <li>• Build-A-Plant</li> </ul>	  	
9	<ul style="list-style-type: none"> <li>• Sheep Hill video</li> <li>• Skits</li> <li>• “Interactive Web”</li> <li>• Paired Texts</li> </ul>	<ul style="list-style-type: none"> <li>• Backyard/ Schoolyard Extension</li> </ul>		
Optional Lesson	<ul style="list-style-type: none"> <li>• Create Habitat in Classroom</li> <li>• Research and create a model of species</li> <li>• Create and present a presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Create a plan to solve a problem in the community</li> </ul>		

## Tiered Vocabulary List

Tier 1	Tier 2	Tier 3
Animals Birds Insect Fish Skin Camouflage Brain Pollution Predator Lungs Blood Food Stem Seeds Roots Leaves Fruit Flowers Survival	Species Classify Characteristics Armor Environment Hypothesis Nerves Survival Model Wastes Nutrients Pollination Fertilization Environment Endangered	Mammal Reptile Amphibian Vertebrate Invertebrate Molt Locomotion Muscular system Skeletal system Nervous system Tendons Joints Spinal cord Motor and sensory nerves Reproduction Metamorphosis Larva Respiration Circulation Pulse Digestive system Excretory system Monoculture Agricultural meadow Obligate host

# Lesson 1: Classifying Animals

## BACKGROUND

### Overview of the Lesson

In this lesson, students will describe their favorite animals and learn how to classify them based on their characteristics. Students will continue to learn about classification through an animal sorting activity. Finally, students will make posters describing and characterizing their favorite animals.

### Focus Standard

**4-LS1-1.** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statements: Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.] [State Assessment Boundary: State assessment will be limited to macroscopic structures.]

### Learning Targets

I can classify animals as mammals, birds, reptiles, amphibians, insects, and fish, according to their physical characteristics and behaviors

I can classify animals as vertebrates or invertebrates

### Assessment

At the end of the lesson have the students answer the following question in their science journal: How do you classify animals?

### Key Vocabulary

**Tier 1:** animals, birds, insect, fish

**Tier 2:** species, classify,

**Tier 3:** mammal, reptile, amphibian, vertebrate, invertebrate

## RESOURCES AND MATERIALS

Quantity	Item	Source
4 sets	Picture Cards of different Animals	Bin
1	Computer/Projector to show video	Classroom Teacher
1 per student	Animal types/classifications handout	Binder
	Brain Pop Jr video: <a href="https://youtu.be/uB1y-BzLKaQ">https://youtu.be/uB1y-BzLKaQ</a>	CMC website
1 per student	Science Journals	Classroom Teacher
1 per student	Plain white paper	Classroom Teacher
	Crayons or Colored Pencils	Classroom Teacher
1 per student	Top-down web and Top-down web Answer Sheet	Binder
	Animal Classification PowerPoint	CMC website
1 per student	A New Vertebrate Prompt	Binder
1 per student	Exit Ticket	Binder

**\*\*Items in bold should be returned for use next year\*\***

## LESSON DETAILS

### Lesson Opening/Activator

Guessing your animal game: Distribute one animal card per student, but tell students that they CANNOT look at their card yet. Each student will hold their card on their forehead with the animal term facing outwards. They will go around asking fellow classmates yes or no questions to try to figure out what animal they have on their head. Examples could include: is my animal brown? Does it live in a tree? Does it fly? Use specific properties in questions, such as color, size, how it moves, what it eats, where it lives, how it grows, etc., to help identify the animal.

Try not to just ask, “Is my animal a bird?” until they actually believe they have a good idea of what animal they have. Generating these questions puts the cognitive load on the student to start thinking about how to describe animals. After students have figured out what animal they have, have everyone sit down and debrief. Ask students, “What were useful questions you asked when trying to figure out what animal you had? What worked, and what didn’t work?”

### During the Lesson

#### 1. Brain Pop Video

Show students the BrainPop Jr video on classifying animals: <https://youtu.be/uB1y-BzLKaQ> This will give the students an overview of how we classify animals. With a document camera or overhead projector, show the students the handout Animal Types/Characteristics. Make copies for each student. (Students should keep these in their Science Journals). Now show the students the Animal Classification PowerPoint to reinforce the concepts in the video.

#### 2. Favorite Animals

Have students classify their favorite animal - (exp. A Cow would be a mammal). Ask each student their favorite animal

and write them in their respective categories on the board. Discuss each animal type and each qualifier in the categories. Ask why they believe their animal goes in that category, ask for evidence from the video or from their prior knowledge about classifying animals. Listen to student's reasoning as to where they think the animal belongs. It is not necessary at this point in the unit for students to have a complete understanding of how to categorize animals.

### 3. Sorting Animal Cards

Break students into groups of 4 or 5. Give each group a set of animal cards. Ask the groups to separate the animals into the 7 categories. Give the students ample time to complete this activity, once they are finished be sure to check to see how they did. Go over the answers with the class by asking certain students or groups where one of the animals should be placed. For a visual put them up on the board.

Answers:

- Mammals: bear, rabbit, bat, cheetah
- Fish: clown fish, shark, triggerfish
- Birds: parrot, finch, spoonbill
- Amphibians: newt, frog
- Reptiles: snake, iguana, alligator
- Insects: butterfly, grasshopper
- Arachnids: spider, tick

### 4. Animal Information

Now have the students illustrate an animal (could be their favorite), give them a piece of paper and crayons or colored pencils. Ask the students to label their drawing with the type of animal and their classification. The students should also list a few characteristics (exp. 4 legs, warm-blooded, covering, vertebrate, invertebrate) **[SP 8: Obtaining, evaluating, and communicating information]** Students can share their drawings with the class if time allows.



### 5. Story Writing: A New Vertebrate.

**(This activity should be taught by the classroom teacher in the days following the science lesson. It can also serve as an assessment).** Students will write a fictional story with a beginning, middle and end. Remind students that vertebrates can be classified into five groups: mammals, birds, fish, amphibians and reptiles. Before students begin writing, have them think about the differences between these groups. Now choose one of the five groups of vertebrates. Imagine that you find a vertebrate animal that is unknown to you. Describe the animal that is unknown to you. Describe the animal using what you know about vertebrate groups and be creative! The writing prompt can be found in the binder.

### Lesson Closing

Pass out exit tickets for students to complete individually and look at their responses to check for understanding.

### Assessment

At the end of the lesson have the students answer the following question in their science journal: How do you classify animals?

# Lesson 2: Skin and Body Coverings

## BACKGROUND

### Overview of the Lesson

In this lesson students will learn about the importance of skin and the skin coverings of various animals. Students will review a PowerPoint with pictures and videos of the different types of skin coverings. In small groups they will work to draw and write about the skin covering of an assigned animal. Then, they will play a matching game involving animals, animal categories, and skin coverings.

### Focus Standard

**4-LS1-1.** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statements: Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.] [State Assessment Boundary: State assessment will be limited to macroscopic structures.]

### Learning Targets

I can identify the three main purposes of skin:

- Protect against injury/germs
- Help the animal maintain body temperature by cooling/warming
- Camouflage the animal

I can identify the different skin coverings of mammals, reptiles, fish, birds, and amphibians

I can explain how each type of skin covering helps the animal survive in its environment

## Assessment

During the class presentations and in the Science Journals, check that the students have correctly categorized their animal, identified the correct skin covering, and are able to explain how this skin covering allows the animal to survive in its environment. Additionally, check students' exit ticket answers for understanding.

## WIDA Language Objectives

Dependent on the needs of your ELL students

## Key Vocabulary

**Tier 1:** skin, camouflage

**Tier 2:** characteristics, armor, environment

**Tier 3:** molt

## RESOURCES AND MATERIALS

Quantity	Item	Source
1 per class	Computer/Projector for PowerPoint Presentation	Classroom Teacher
1 per student	Science Journals	Classroom Teacher
1 per class	Skin and Skin Coverings PowerPoint	Thumb drive
1 copy of each animal	Animal Outline Worksheets (10 pages)	Binder
<b>4 sets</b>	<b>Skin Covering Matching Cards</b>	<b>Bin</b>
	Bill Nye the Science Guy "Skin" video	CMC website
	<b>Yarn</b>	<b>Bin</b>
	<b>Feathers</b>	<b>Bin</b>

	<b>Beads</b>	<b>Bin</b>
	<b>Felt</b>	<b>Bin</b>
	<b>Shiny/Smooth paper</b>	<b>Bin</b>
	<b>Scaley paper</b>	<b>Bin</b>
1 per group	Scissors	Classroom Teacher
1 per student	Exit ticket	Binder
1 per group	Glue	Classroom Teacher

**\*\*Items in bold should be returned for use next year\*\***

## LESSON DETAILS

### Lesson Opening/ Activator

Have students copy the following chart into their science journals:

	<b>Mammals</b>	<b>Reptiles</b>	<b>Amphibians</b>
<b>Characteristics</b>			
<b>Examples</b>			

Students will recall information from the previous lesson to fill in the boxes. Allow students to work in groups to fill in their charts, then regroup and have the students share what they wrote.

Next, pose the question, “What’s a characteristic all of these share?” Answer: protective skin/covering. “Why do we have skin?” Have students think of their answer, “pair and share” with the person sitting next to them, and then discuss their

thoughts with the entire class. Construct a mind map of student explanations on the board, asking students to continue building off of their own and others ideas. Refer back to the learning objectives as necessary to ensure students are hitting necessary targets. **[SP 6: Constructing explanations]**

## During the Lesson

### 1. Skin and Skin Coverings PowerPoint

The PowerPoint for this lesson runs through the purpose of skin and the structure and function of skin coverings of various animals. As you go through the PowerPoint, highlight the pictures for each category of animal. YouTube videos are embedded within the presentation and should be accessed when these slides are reached.

\*Note: Open the notes panel on PowerPoint to view notes that correspond with slides.

### 2. Animal Outlines

Students will be divided into 10 groups (at least 2 students should be in each group, so there may be less than 10 groups depending on the size of the class). Pass out 1 animal outline worksheet to each group (if you have less than 10 groups make sure at least 1 animal from each category is used) and set out pom-poms, yarn, feathers, beads, felt, scrapbook paper, scissors, and glue for students to use. In groups, have the students decide which category the animal belongs to and what type of skin covering it has. The students should use the materials provided to create a representation of the skin covering that their animal should have. Then write a few sentences describing what type of skin covering it is, and how this skin covering helps the animal survive in its environment. Ask questions about how the students chose to represent their animal outlines. What does the animal skin feel like? What does it look like? Why did you choose the materials you chose to represent that animal's skin? Once students have finished, give each group the opportunity to share their picture and writing with the class. If students are struggling to provide rationale while creating their models, ask guiding questions such as, "What environment does this animal live in?", "What is the weather like there?". Check in with students before presentation to make sure they have provided thorough understanding/rationale of their skin model.

### 3. Skin Covering Matching Game

Now, divide students into groups of 3-4 and distribute a set of Skin Covering Cards to each group. There are 3 types of cards: animal pictures, categories (mammal, reptile, etc.), and skin covering descriptions. Have students match up three cards that go together (example: picture of an eagle, bird, feathers help keep this animal warm, and give it the ability to fly). Give the groups ample time to match and move around the room to check their matches and help groups that may be struggling.

#### Optional Lesson Extension

Note: This video may be shown any time after the lesson is taught and when the science fellows are not in the classroom. Show students the Bill Nye the Science Guy episode “Skin”, which goes into great depth about the importance of this important organ.

<https://www.youtube.com/watch?v=ZfuGGekfsdE&index=7&list=PLsAWD8mKKE96t6PdJjnLC5v07fWSx8lBe>

#### Lesson Closing

**My Favorite Animal:** Have the students return back to their “Favorite Animal” drawings from the Science Journal from Lesson 1. Ask them to revise any information that they had put in at the beginning of Lesson 1. Now, students should be able to correctly classify the animal, identify the type of skin covering it has, and how this skin covering helps the animal survive in its environment. If time permits, let some students share what they wrote.

#### Exit Tickets

Pass out exit tickets for students to complete individually and look at their responses to check for understanding.



## Assessment

During the class presentations and in the Science Journals, check that the students have correctly categorized their animal, identified the correct skin covering, and are able to explain how this skin covering allows the animal to survive in its environment. Additionally, check students' exit ticket answers for understanding.

# Lesson 3: Locomotion League — Movement

## BACKGROUND

### Overview of the Lesson

In this lesson students learn about the locomotion of bodies, and the structures that help them move. Students will watch video and make a model hand to understand how muscles pull on bones to move fingers, as well as how joints function. Part of this lesson has been adapted from Muscle Science Projects for Elementary at: <http://www.hometrainingtools.com/a/muscles-science-projects-for-elementary>

### Focus Standard

**4-LS1-1.** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statements: Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.] [State Assessment Boundary: State assessment will be limited to macroscopic structures.]

### Learning Targets

- I can identify the different systems that allow movement (skeletal, nervous and muscular)
- I can explain how different structures work together to move a body
- I can list some of the differences in locomotion between different animals

## Assessment

Ask students to look back at their answer to the question, how do our bodies move? Was it accurate? How has their understanding of locomotion changed? What are the systems that aid our bodies in movement? What are some different ways other animals move? Why do animals move? Students will be assessed by checking the answers they have written to these questions in their science journals. Additionally, you can check students' exit ticket answers to check for understanding.

## Key Vocabulary

**Tier 2:** muscular system, skeletal system, nervous system, hypothesis

**Tier 3:** locomotion, tendons, joints

## RESOURCES AND MATERIALS

Quantity	Item	Source
1 per student	Science Journal	Classroom Teacher
1 per student	Scissors	Classroom Teacher
1	<a href="https://www.youtube.com/watch?v=j918PoWWaB0">https://www.youtube.com/watch?v=j918PoWWaB0</a> <a href="https://www.youtube.com/watch?v=Xf7adknGGck">https://www.youtube.com/watch?v=Xf7adknGGck</a>	CMC website
1 per student	Glue sticks	Classroom Teacher
<b>4 sets</b>	<b>Locomotion League Cards and Answers (laminated)</b>	<b>Bin</b>
1	Bucket with students' names	Classroom Teacher
<b>1 for teacher</b>	<b>Pre-made hand model</b>	<b>Bin</b>
<b>1 per student</b>	<b>Cardstock or thin cardboard</b>	<b>Bin</b>
1 per student	Pen	Classroom Teacher
<b>3 balls of yarn/string</b>	<b>Thin String</b>	<b>Bin</b>
<b>1</b>	<b>Tape</b>	<b>Bin</b>

1 per student	Article: “Move Your Muscles!” <a href="https://www.readworks.org/article/Move-Your-Muscles!/6b4042b3-d433-43c9-bbf5-d51cc958735c#!articleTab:content/">https://www.readworks.org/article/Move-Your-Muscles!/6b4042b3-d433-43c9-bbf5-d51cc958735c#!articleTab:content/</a>	Binder
1 per student	Article Questions Worksheet <a href="https://www.readworks.org/article/Move-Your-Muscles!/6b4042b3-d433-43c9-bbf5-d51cc958735c#!articleTab:questionsets/">https://www.readworks.org/article/Move-Your-Muscles!/6b4042b3-d433-43c9-bbf5-d51cc958735c#!articleTab:questionsets/</a>	Binder
1 per student	Exit Ticket	Binder

**\*\*items in bold should be returned for use next year\*\***

## LESSON DETAILS

### Lesson Opening/ Activator

**Human Knot:** Break students up into two groups - each group should have an even number of people, if needed, have science fellow join. Have each group stand in a relatively close circle. Instruct students to reach their right hand across the circle and hold hands with someone on the other side. Do the same with the left hand, so that everyone is holding hands with two different people. Now state the objective: to untangle yourselves so that the group is standing in a circle holding the hands of the person to their right and left. Take a step back and let students start to figure it out and instruct each other. Can provide some guiding hints or questions as you see fit, but will be very specific to how each group is working. Helpful questions could be “What happens if person X moves this way?” Students will unlikely be able to completely untangle in allotted time, so let activity go on for 5-10 minutes (depending on engagement).

After everyone sits down, debrief activity to get students thinking about how they moved and worked together. “How did you get your body to move? What went through you mind as you had to move X way? You took a few steps, or moved over this



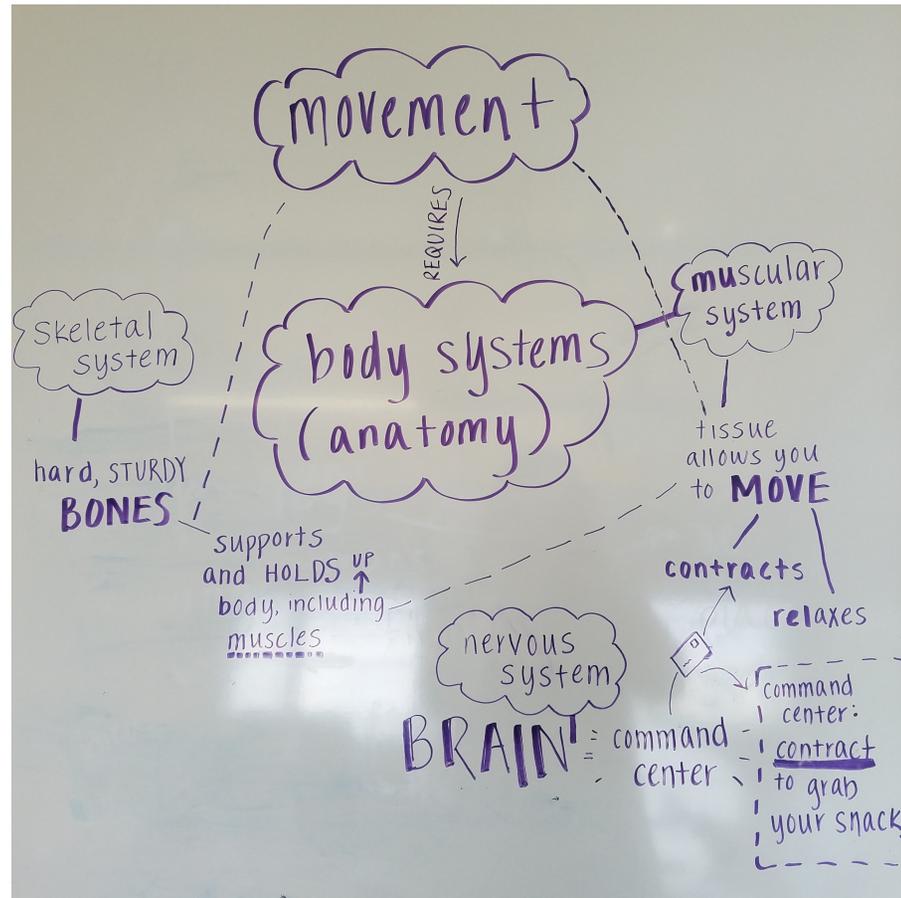
person, but HOW? How did you communicate with each other?” Introduce concept that there are different systems involved in movement, and they all work together (similarly to how you all worked together to try to untangle yourselves). There are different kinds of communication and ways to tell the different parts of your body to move.

**[SP 6: Constructing Explanations].**

Introduce the word “locomotion”, which is a more complicated word to describe movement. Ask students what they think of when they hear this word – what comes to mind? Let students know that while we will be focus on human structures, we will briefly describe how different animals move as well. Show students the following video:

<https://www.youtube.com/watch?v=j918PoWWaB0>. The video is very short and explains movement very fast, so it may be a good idea to show the video a few times.

Construct a student-led mind map on the board, writing ANATOMY and MOVEMENT on opposite sides of the board to guide students’ thinking. An example is provided on the following page.



## During the Lesson

### Locomotion League Activity

1. Split the students into groups of 4 to 6. Each student will receive a copy of the Locomotion League cards (pictures and functions). Students will work together in a group to match the picture cards to the appropriate function card. Emphasize that groups must work together to complete the activity, much like the skeletal, muscular, and nervous system have to work together to move the body. The teachers or Science Fellows should check over the matches before students glue the picture and function cards together.
2. Have students return to their desks and stand up behind their desks. Draw a Locomotion League card, and ask one student to identify either the system or structure on the front of the card. If the student fails to answer correctly or completely, the student must follow the action listed on the card. If the student answers correctly, then the entire class must perform the action. It is important that students make connections between the action listed and the body part on the card. You can play this game for as long as you feel is appropriate. Remind students that they can use their cards to play during recess or at home as a good way to review locomotion.

### Make-A-Hand Activity

1. This activity will help students understand how muscles in our hands pull our bones to help move our fingers. State the objective of developing a model of how fingers move via muscle and bone movement/communication. Instruct students to brainstorm in pairs how they think our fingers move. Each student should roughly sketch a model of the process in their science journals, and should be able to explain why they think the process works as it does. Ask for a few pairs to share with the group. **[SP 2: Developing and Using Models]**.
2. The teacher or a Science Fellow may want to model the process so students can observe someone else create the hand model, or they could show the class the pre-made example in the bin. Each student will have a piece of cardstock or cardboard on which they will trace their hand. Using scissors, they will cut out the hand.

3. Students will also cut yarn about the same length of the cardboard hand or slightly longer. Using a small piece of tape, attach one string to the top of the thumb. Attach a second piece of string at the middle of the thumb (where the middle joint would be located) and a third at the bottom of the thumb, where the finger and the palm connect.
4. Repeat this process with the other four fingers, making sure to leave enough string to hold onto and be sure to use a good piece of tape to secure all the pieces of string.
5. As students finish up their “hands”, open the class for discussion and answer questions the students may have. What happens if you tug on a string closer to the fingertip? What if you pull closer to palm of the hand? What does this tell us about how our muscles and bones work? What systems are replicated in this simulation? (The skeletal and muscular system) What system is missing? (The nervous system).
6. Have students return to their original model/rough sketch in their journals, and take 5-10 minutes to revise the model with the new information they have gathered through actually constructing the model.

## Lesson Closing

1. Show the “Animal Locomotion” music video: <https://www.youtube.com/watch?v=Xf7adknGGck>
2. Discuss how different animals use muscles differently than humans, and how the activities we did today built on our background knowledge of animal locomotion.
3. **Reading Exercise:** Note: this activity can be led by the classroom teacher when the science fellows are not present. In this exercise, students will read the article “Move Your Muscles!” (<https://www.readworks.org/article/Move-Your-Muscles!/6b4042b3-d433-43c9-bbf5-d51cc958735c#!articleTab:content/>) in pairs. As they are reading the article, they should ask themselves, “What new information did I learn from this article?” and “What information did I learn from the lesson that is mentioned in the article?” They can jot down their answers in their Science Journal. After reading the



article, have the students work on the article questions (<https://www.readworks.org/article/Move-Your-Muscles!/6b4042b3-d433-43c9-bbf5-d51cc958735c#!articleTab:questionsets/>) with their partners. Go over the answer as a class.

## Exit Tickets

Pass out exit tickets for students to complete individually and look at their responses to check for understanding

## Assessment

Ask students to look back at their answer to the question, how do our bodies move? Was it accurate? How has their understanding of locomotion changed? What are the systems that aid our bodies in movement? What are some different ways other animals move? Why do animals move? Students will be assessed by checking the answers they have written to these questions in their science journals. Additionally, you can check students' exit ticket answers to check for understanding.

## Optional Lesson Extensions

1. Tech Integration: Have students build a skeleton and test their knowledge of the skeletal system  
[http://www.abcya.com/skeletal\\_system.htm](http://www.abcya.com/skeletal_system.htm)
2. For more interactive activities, see the links below:
  - a. <http://www.anatomyarcade.com/games/gamesMuscular.html>
  - b. [http://www.scholastic.com/teachers/activity/human-body-14-studyjams-interactive-science-activities?eml=Teachers/smd/20131030/Facebook///TeachersPage/Teachers/1500/study\\_jams\\_body/](http://www.scholastic.com/teachers/activity/human-body-14-studyjams-interactive-science-activities?eml=Teachers/smd/20131030/Facebook///TeachersPage/Teachers/1500/study_jams_body/)

# Lesson 4: Brain and Nervous System

## BACKGROUND

### Overview of the Lesson

In this lesson, students will learn about the nervous system and the brain. Students will watch a video outlining the parts and functions of the nervous system. Students will then make their own human outline and label the brain & nervous system.

### Focus Standard

**4-LS1-1.** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statements: Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.] [State Assessment Boundary: State assessment will be limited to macroscopic structures.]

### Learning Targets

I can understand the three parts of the nervous system

I can explain what the spinal cord does

I can discuss the different parts of the brain and their functions

### Assessment

Students will be assessed on participation in class discussions and activities. Check students' exit ticket answers for understanding.

## WIDA Language Objectives

Dependent on the needs of your ELL students

## Key Vocabulary

**Tier 1:** brain

**Tier 2:** nerves

**Tier 3:** spinal cord, nervous system, motor and sensory nerves

## RESOURCES AND MATERIALS

Quantity	Item	Source
	Nervous System Video: <a href="https://www.youtube.com/watch?v=dah-4mtAnsQ">https://www.youtube.com/watch?v=dah-4mtAnsQ</a>	CMC website
	Computer/Projector to show video	Classroom Teacher
1 per student	"The Nervous System" Video Worksheet	Binder
1 per student	Science Journals	Classroom Teacher
1 per student	Nervous System Data Collection Sheet	Binder
<b>1</b>	<b>Timer</b>	<b>Bin</b>
	Markers	Classroom Teacher
<b>2 balls</b>	<b>Different colors yarn</b>	<b>Bin</b>
	Construction paper	Classroom Teacher
1	Large paper to trace a student	Classroom Teacher
	Crayons	Classroom Teacher
1 per student	Body Outline	Binder
1 per student	Exit Ticket	Binder

**\*\*Items in bold should be returned for use next year\*\***

## LESSON DETAILS

### Lesson Opening/ Activator

Review the muscular system and skeletal system with the students. Decide the best way to review based on your students -- you could construct a mind map, review key terms and definitions, clarify any remaining questions that they have, do a simple popcorn-style review game, and so on. Tell students that today they will be learning about the system in their body called the “Control Center” which is also known as the nervous system. Ask students if they play video games, now ask, what is the role of the controller when you are playing video games? A video game controller is comparable to the nervous system in our bodies. **ASK HOW.** The ‘X’ button is used to jump, in many games. Our brain tells our body to jump -- it sends nerve impulses to our legs telling them to bend and jump. Can you think of any other examples that might fit into this comparison?

### During the Lesson

#### 1. Nervous System Video

Have students watch the short video on the Nervous System: <https://www.youtube.com/watch?v=dah-4mtAnsQ>. While watching the video, students will fill in the blanks for the “Nervous System Video Worksheet.” Replay the video if necessary. After, discuss the answers as a class, reviewing the information. Some information may include: Couldn’t think, walk, yell without nervous system; the nervous system is made up of brain, spinal cord, and all the nerves in your body; the parts of the brain include the: cerebrum-lets you think speak and move; cerebellum-controls coordination and balance; thalamus- controls your tongue, eyes, ears, & skin; brain stem-helps you with breathing, digestion, and your heartbeat; spinal cord is the highway that messages travel to brain and back again; nerves let you feel sensation (hot/cold).

Extra Question to consider with the students:

Q: Why is the cerebrum larger in humans than in other animals? A: Humans have more developed, advanced thinking abilities as well as speak languages.

## 2. Full Body Diagram

Get a large piece of paper and a pen or pencil for tracing. Now choose a student to be traced and a student to do the tracing. While this is happening, discuss the experience of touch. How do we know when we are touched if we do not see it happen? Have a student draw the brain and spinal cord in the full body tracing. Then you can have different students add yarn and labels to the model. Use one color of yarn for the motor nerves and another color for sensory nerves. Add arrows showing the direction the messages travel. After the full body diagram is finished you can have the students fill in their own small scale version their individual handouts.

## 3. Nerve Impulses Activity

Imagine that you and an adult are using the stove to cook something. While you're helping out, you accidentally touch the hot surface of the stove and your nerves send a message saying "HOT!". Your brain quickly processes the information and responds with the message, "Danger. Move your hand. You might get burned." You pull your arm back quickly and move away from the stove. Crisis averted. All of this happens in less than two seconds. In fact, messages from your body can zip to your brain at a speed of 200 mph. Your nervous system is the communications center for your body. Your brain is the central control panel. Here, billions of neurons receive electrical impulses from nerves in your body. The nerves can alert your brain to danger or pain. We are going to model how the nervous system communicates this message from the spinal cord to the brain.



For these 2 activities you will need a timer and the data sheets. The class should be in a circle or a line. Please stand up and hold the ankle of the person next to you. We will form a long UNBROKEN chain of people. You will be holding on until I tell you “GO!” and start the timer.

The person at the start will squeeze the ankle of the person next to them, once your ankle gets squeezed you should squeeze the ankle of the person next to you. This will happen until you get to the end of the line. Please note how long it takes on your activity sheet. Now please hold the shoulder of the person next to you. We will again form a long UNBROKEN chain of people. You will be holding on until I tell you “GO!” and start the timer. The person at START will SQUEEZE the shoulder of the person next to them, once your shoulder gets squeezed you should squeeze the shoulder of the person next to you. This will happen until you get to the end of the line. Again, please note of how long it takes on your activity sheet!

After completing the activities on the sheet have students engage in a discussion. What did they notice? Why do they think this is happening?

### **Lesson Closing:**

Have students put their body worksheet and data sheet in their science journal. In their science journals, students should write 5 facts they have learned about the Nervous System. Students can share their facts with the class after all students have a chance to do the writing exercise. If students are stuck, go back to the information recalled after the video.

### **Exit Tickets**

Pass out exit tickets for students to complete individually and check their responses for understanding of lesson objectives.

### **Assessment**

Students will be assessed on participation in class discussions and activities. Check students’ exit ticket answers for understanding.

# Lesson 5: Reproduction

## BACKGROUND

### Overview of the Lesson

In this lesson students will learn the definition of reproduction and the way different animals reproduce. The class will take part in an activity to learn how baby birds breathe inside their shells. Students will have an opportunity to touch and look at different types of eggs shells. **NOTE: Activity 2 & 3 requires setup from the classroom teacher. Activity 2 requires an egg to be place in water with food dye 2-3 hours prior to class. Activity 3 requires that the day prior to the lesson being taught, an egg is placed in vinegar.** In small groups, students will play a card game to discover why fish lay so many eggs. Finally, they will complete a paired text activity with passages about eggs. Lesson 5 Vocabulary should be taught by the classroom teacher, prior to the lesson.

### Focus Standard

**4-LS1-1.** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statements: Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.] [State Assessment Boundary: State assessment will be limited to macroscopic structures.]

### Learning Targets

I can define reproduction

I can identify the 2 main types of reproduction in animals:

- Live birth
- Eggs

## Assessment

Students will be assessed on participation in class discussions and activities as well as the accuracy of their answers to the paired text questions, remember to check students' exit ticket answers to check for understanding.

## Key Vocabulary

**Tier 1:** pollution, predator

**Tier 2:** survival

**Tier 3:** reproduction, metamorphosis, larva

## RESOURCES AND MATERIALS

Quantity	Item	Source
1	Computer/Projector for PowerPoint Presentation	Classroom Teacher
1 per student	Science Journals	Classroom Teacher
1	Reproduction Types PowerPoint	Thumb drive
<b>3</b>	<b>Plastic cups</b>	<b>Bin</b>
<b>1 container</b>	<b>Vinegar</b>	<b>Bin</b>
Half dozen eggs	Chicken Eggs	Contact Sue Beauchamp 5 days prior to lesson
<b>1 set</b>	<b>Measuring cups</b>	<b>Bin</b>
<b>1 set</b>	<b>Measuring spoons</b>	<b>Bin</b>
<b>1 medium sized bowl</b>	<b>Plastic bowl</b>	<b>Bin</b>
¼ tsp	Blue food coloring	Bin
1/4 tsp	Dishwasher detergent	Bin
<b>1</b>	<b>Spoon</b>	<b>Bin</b>
<b>1 set</b>	<b>Fish Action Cards (Laminated and Cut)</b>	<b>Bin</b>
1 per student	"Eggs, Eggs, Eggs" Reading	Binder

1 per student	"The Egg Challenge" Reading	Binder
1 per student	Paired Text Questions Worksheet	Binder
1 per student	Exit ticket	Binder

**\*\*Items in bold should be returned for use next year\*\***

## LESSON DETAILS

### Lesson Opening/ Activator

At the start of the class, have the teacher hold up an egg. Ask the class if they know what it is and what eggs are. Explain to the class that for birds and reptiles' eggs hold their babies until they hatch. Then say that today's lesson will be about the two types of reproduction: live birth and eggs. Ask the students what they know about reproduction and allow them to ask any questions they might have, make sure to add a concrete conversation about live birth versus eggs as stated in the learning objectives.

### During the Lesson

#### 1. Reproduction Types PowerPoint

The PowerPoint for this lesson runs through the definition and the types of reproduction for various animals. YouTube videos and activities are embedded within the presentation and should be used when these slides are reached

**\*Note: Open the notes panel on PowerPoint to view notes that correspond with slides.**

#### 2. How do Birds Breathe Inside Eggs?

**Note: This activity requires the eggs to soak for about 2-3 hours. Setup should be done at least an hour before the lesson.**

Gage students' prior knowledge. Ask questions and have students make predictions in their science journals about what will happen during and after the investigation. To see how birds breathe inside of their eggs we will mix 1.5 cups of water, ¼ tsp dishwasher detergent, and ¼ tsp blue food coloring in a bowl. Then submerge 3 eggs in the solution for one hour. After the hour is up remove the eggs from the water using a spoon. Crack the eggs into a cup and save the shells to

observe. Did any of the dye manage to get inside of the egg? (You should be able to see tiny dots of blue in the shell.) The coloring entered the egg through the thousands of tiny pores in the shell. This is how oxygen is able to get to the baby bird, and how carbon dioxide is able to get out **[SP 2: Developing and using models]**. Have students record their observations in their science journals.

Adapted from: <http://www.scientificamerican.com/article/bring-science-home-chick-breathe-inside-shell/>

### 3. Touch a “Reptile” Egg

**Note: This activity requires teacher set up the day prior to the lesson.**

One day in advance of the lesson, place one chicken egg into a plastic cup and submerge in vinegar. This vinegar will dissolve the eggshell, result in a soft, leathery shell. During the activity pass around a normal chicken egg in a plastic cup and the vinegar egg. Allow the students to carefully touch the eggs. The normal egg has a hard shell similar to an egg from a crocodile or tortoise. The vinegar egg has a soft leathery shell like turtles and snakes. Have students compare and contrast the eggs and record their observations in their science journals. Ask: “What’s important about these differences?” Answer: Eggs laid by snakes generally have leathery shells which often adhere to one another. Eggs laid by other types of amphibians have hard, leathery shells to protect them from physical force and extreme dryness.

### 4. Fish Egg Survival Game

Have the entire class stand up from their seats. Explain to them that for this game each of them will represent a fish egg. The students will be encouraged to walk around the room. The teacher will pass out one fish egg action card to each student at random. Ask some of the students to sit down showing that some of the eggs were lost. At a determined time of the game, maybe 5-10 minutes in, ask the class how many eggs/students are still standing. Ask the students what they think this game shows. If no one guesses correctly, tell them that this game should be connected to the concept that fish lay many eggs. Fish lay many eggs for the product of their reproduction to survive as best as possible.



### **Optional Lesson Extension**

Take the class to a vernal pool or small pond near your school. Try to observe and identify amphibians in their various stages (eggs, tadpoles, frogs). The class can also take a field trip to Sheep Hill to observe frog eggs and tadpoles.

### **Lesson Closing**

**Paired Texts:** Note: This activity can be led by the classroom teacher when the science fellows are not present.

In this exercise, students will read two passages that discuss similar topics. Students will compare and contrast the texts and then complete the Paired Text Questions worksheet, which tests for comprehension [**SP 8: Obtaining, evaluating, and communicating information**]. The texts for this lesson are “Eggs, Eggs, Eggs” and “The Egg Challenge” (located in the binder).

### **Exit Tickets**

Pass out exit tickets for students to complete individually and check their responses to check for understanding

### **Assessment**

Students will be assessed on participation in class discussions and activities as well as the accuracy of their answers to the paired text questions, remember to check students’ exit ticket answers to check for understanding.

# Lesson 6: Respiration and Circulation

## BACKGROUND

### Overview of the Lesson

In this lesson students will watch a video about the respiratory system and will work in groups to create a model of lungs. Students will then perform an experiment to see how exercise affects respiration. Students will watch a video and complete an anchor chart about the components of blood. Students will also learn about the circulatory system, create a classroom simulation of circulation, and perform an exercise activity. Lesson 6 Vocabulary should be taught by the classroom teacher, prior to the lesson. **This lesson will take longer than the allotted time. The classroom teacher and the Science Fellows should pick which activities they will teach together. Other activities should be taught by the classroom teacher when the Science Fellows are not present.**

### Focus Standard

**4-LS1-1.** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statements: Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.] [State Assessment Boundary: State assessment will be limited to macroscopic structures.]

### Learning Targets

- I can understand the importance of the respiratory system and identify the pathway of airflow through the system
- I can understand the importance of the circulatory system and identify the pathway of blood flow through the system
- I can give examples of how the respiratory and circulatory systems differ in nonhuman animals

## Assessment

Review student answers in their science journal and check students' exit ticket for understanding.

## Key Vocabulary

**Tier 1:** lungs, blood

**Tier 2:** model

**Tier 3:** Respiration, circulation, pulse

## RESOURCES AND MATERIALS

Quantity	Item	Source
1 per student	Science Journal	Classroom Teacher
1	Computer/Projector for YouTube videos	Classroom Teacher
	YouTube Videos: Respiratory System, What is Blood?, Fish Have Gills, Amphibians Breathe Through Skin	CMC Website
<b>5</b>	<b>Plastic bottles with bottoms cut off (may be 20oz-2L)</b>	<b>Bin</b>
15	Straws	Bin
<b>10</b>	<b>Elastic bands</b>	<b>Bin</b>
10	Rubber gloves	Bin
<b>1 large container</b>	<b>Play dough</b>	<b>Bin</b>
	Scissors	Classroom Teacher
<b>1 per student</b>	<b>Circulation name tags</b>	<b>Bin</b>
<b>1</b>	<b>Oxygenated blood cutouts</b>	<b>Bin</b>
<b>2</b>	<b>Deoxygenated blood cutout</b>	<b>Bin</b>

1	Chart Paper	Classroom Teacher
1	Heart Chambers Poster	Binder
1 per student	Exit Ticket	Binder

**\*\*Items in bold should be returned for use next year\*\***

## LESSON DETAILS

### Lesson Opening/ Activator

Post the following question on the board: What happens to air after animals breathe in? Ask students to work in partners to brainstorm answers. Once students have had a chance to think of ideas, have the class come up with a list of possible answers to the question. One option is to leave the list on the board until the end of the lesson so that students may look back and correct or add information as they learn about the respiratory and circulatory systems.

### During the Lesson

- 1. Build-A-Lung** (Visuals and directions of how to build the lung model can be found here: <http://www.science-sparks.com/2012/04/13/breathing-making-a-fake-lung/>)

Watch the following video:

<https://www.youtube.com/watch?v=Cyf8RnIPtWU&list=PLsAWD8mKKE96t6PdJnLC5v07fWSx8lBe&index=12>

In this activity students will be making a model to simulate how our lungs inflate with the help of our diaphragm. Divide students into 4 groups. Each group will get a plastic bottle, a straw, 2 rubber bands, 2 rubber gloves (these are being used to replace the balloons which you see used in the video), and a small amount of play dough. Have each group take 5 minutes to brainstorm how they think the model may look, can each roughly sketch or describe in their science journals. Make sure to emphasize and ask students to explain *why* they expect their model to work the way it does (either in discussion or a few sentences in science journal).

Next, move on to the actual construction. The classroom teacher and science fellows may choose to also make a model as a demonstration for the class. Follow the directions in the link above to make the lung model. Once students have completed their models have them gently pull down on the glove to show our diaphragms contracting. When this happens, what happens to our lungs (the glove inside the bottle)? It inflates! When our diaphragm contracts, the space in our chest gets larger and air enters our lungs to fill the space.

Take a few minutes to have each student return to their original brainstorm of the model and revise. Ask: How has your understanding of how air moves throughout our body changed? **[SP 2: Developing and Using Models]**

**2. What is Blood?**

Watch this video: [https://www.youtube.com/watch?v=oMNN7dzqg\\_o](https://www.youtube.com/watch?v=oMNN7dzqg_o) . This will give students an idea of what is circulating through our blood vessels. After the video, make an anchor chart about the components of blood with your class. This can be done on chart paper and hung on the wall in your classroom. A sample chart is shown below.

<b>What is our blood made of?</b>		
<b>Part</b>	<b>What it looks like</b>	<b>What it does</b>
Red Blood Cells		Carries oxygen
White Blood Cells		Fights infection
Platelets		Helps your blood clot
Plasma		Contains nutrients

### 3. Circulation Simulation

#### Perspective taking activator:

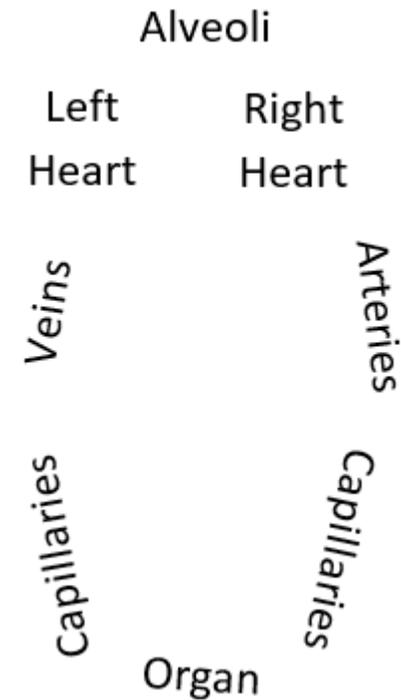
- a. Ask students to put their hand on their hearts, like they do when they say the pledge of allegiance. Then ask them which side of their body their heart is on. The correct answer is left, that is where they should feel their heart beating. Have students pair up with the student sitting closest to them, sitting face to face, and allow them to play 'the mirror game' for a couple minutes (tell the student that one person leads by moving their arms and head around, while the other copies their movements in a mirrored way, and then they can switch). Tell students to freeze after a couple minutes and remember the position that both they and their partner were in. Instruct students to write down a description of their position, (you could provide guiding questions that lead students to write in terms of left and right limbs or direction e.g. my left arm was up and my head was tilted to the right), and the corresponding position of their partner, (e.g. her left arm was up and her head was tilted to the right), and then share their answers with their partner. How are they different? Ask pairs to share with the class how their answers compared, same or different. If some pairs had the same answers while others had opposite ones, ask the class why that might be so.
  
- b. Introduce the concept that left and right are *relative* terms, they change depending on the point of view. This is important because we said that our hearts are on the left side of our bodies, but when we look at another person, their heart is on our *right*. This is the perspective from which scientists have agreed we determine the left and right side of bodily organs, by looking at the human body with its face towards you. By agreeing on this perspective, scientists avoid confusion, such as the mismatches we saw with the mirror activity.

### **Circulation Simulation activity**

In this activity the class will be performing a simulation of the circulatory system, as the classroom teacher and science fellows narrate the cycle.

- From the class, select 1 left side of the heart, 1 right side of the heart, 1 alveoli, and 1 organ. The rest of the class should be divided among arteries, veins, and capillaries. Have each student wear a name tag that corresponds with their role.
  
- The 2 sides of the hearts and the alveoli should stand at the front of the room. Arteries should form a line in front of the right side of the heart and veins should form a line in front of the left side of the heart. The organ will stand behind the 2 lines and capillaries will connect the lines with the organ. See the image below for a diagram of student positions.
  
- Start out with the left side of the heart and the organ each holding blue circles, labeled deoxygenated blood, and the alveoli holding the red circle, labeled oxygenated blood.
  
- The left side of the heart begins the process by pumping its deoxygenated blood to the alveoli.
  
- In the alveoli, gas exchange occurs and the deoxygenated blood is replaced with oxygenated blood (switch blue circles with red ones). The oxygenated blood is sent to the right heart.
  
- It then travels through the arteries (passing the cutout down the line) to the capillaries. The capillaries then carry the oxygenated blood to the organ.

- 
- The organ is using the oxygen in the blood to function so it trades the oxygenated blood for deoxygenated blood. It then sends the deoxygenated blood through the capillaries, down the veins, and back to the left side of the heart.



Repeat this at least one more time and allow the students to narrate the process.

#### 4. Exercise Activity: Circulation

In the first part of this activity, we will be looking at our respiration rate. Have students listen to their breathing. Note the speed, depth, and sound of respiration. The speed can be noted by breaths/minute, the depth can be described as long, medium, or short, and the sound of respiration can be purely descriptive, when providing students with these ways of

measuring, ask them which measurements concern quantities, and which measurements concern non-numerical description, or quality. Note that these are important ways scientists distinguish between types of measurements. Next have the students jog in place for 1 minute. Again note the speed, depth, and sound of respiration. In their Science Journal, respond to the following questions. How does our breathing change when we exercise? Why does this happen? Once students have had time to answer the questions, share responses as a class.

For the next part of the activity we will be looking at our heart rate. Have students record their pulse for 1 minute by touching the area on their neck under their chin near their throat, and write this value into their science journals. Next we will jog in place for 1 minute. Then we will record our pulse for 1 minute and write this value in our journals. Have students answer the following questions. How did exercise change your pulse? Why does this happen? Once students have had time to answer the questions, share responses as a class. **[SP 4: Analyzing and Interpreting Data]**

## Lesson Closing

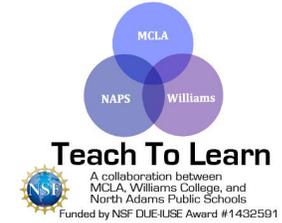
### How Are Some Animals Different?

Tell students that we will be concluding the lesson by talking about how some animals have different respiratory and circulatory systems. Watch the following 2 videos:

<https://www.youtube.com/watch?v=sXjQhSrgPBU&list=PLsAWD8mKKE96t6PdJjnLC5v07fWSx8lBe&index=10>

<https://www.youtube.com/watch?v=RLVxl3KlxEc&index=9&list=PLsAWD8mKKE96t6PdJjnLC5v07fWSx8lBe>

Ask students: “How do some animals breathe differently?” (Appropriate answers include: Fish don’t have lungs, instead they take in oxygen by letting water flow over their gills. Amphibians have lungs but they also take in oxygen through the pores in their skin. They must stay moist to keep their pores open).



Put the Heart Chamber Poster on an overhead while explaining how animals differ in their heart structure. The heart is divided into chambers. Humans and all other mammals have a 4 chambered heart. Other animals have hearts with different numbers of chambers. Reptiles have 3 chambers, birds have 4, fish have 2, and amphibians have 3. How efficient the heart needs to be depends on the organism's lifestyle. Ask if the students have any questions.

### **Exit Tickets**

Pass out exit tickets for students to complete individually and look at their responses to check for understanding.

### **Assessment**

Review student answers in their science journal and check students' exit ticket for understanding.

# Lesson 7: Digestive System and Excretory System

## BACKGROUND

### Overview of the Lesson

In this lesson, students will watch a video on the digestive system and then perform an experiment to discover the role saliva plays in the digestive system. Then students will learn about owl digestion and dissect owl pellets. Next students will watch a video on the excretory system and build a model of a kidney. Finally, students will work in groups to research a digestive or excretory organ and will make posters that they will present to the class. **Note: this lesson may take 2 class periods. Feel free to space the activities over multiple days to meet your class needs.**

### Focus Standard

**4-LS1-1.** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statements: Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.] [State Assessment Boundary: State assessment will be limited to macroscopic structures.]

### Learning Targets

I can explain how the body breaks down food

I can identify the organs of the digestive and excretory systems and explain their functions

I can explain how the body gets rid of waste

## Assessment

Listen to class discussion following the digestive system video, saltine experiment, owl pellets, and kidney activity to see if the students are engaged and giving accurate, thoughtful answers to discussion questions. Carefully listen to student presentations to see that they have done thorough research on their assigned organ. Finally, check students' exit tickets for understanding.

## WIDA Language Objectives

Dependent on the needs of your ELL students

## Key Vocabulary

**Tier 1:** food

**Tier 2:** wastes, nutrients

**Tier 3:** digestive system, excretory system

## RESOURCES AND MATERIALS

Quantity	Item	Source
1 per student	Science Journals	Classroom Teacher
1	Computer/Projector to show YouTube videos	Classroom Teacher
1	Magic School Bus (For Lunch Episode) <a href="https://vimeo.com/168181557">https://vimeo.com/168181557</a>	Thumb drive

	YouTube videos <a href="https://www.youtube.com/watch?v=2_7Q1xQ-NWU">https://www.youtube.com/watch?v=2_7Q1xQ-NWU</a> <a href="https://www.youtube.com/watch?v=0Swcik07kGE&amp;index=18&amp;list=PLsAWD8mKKE96t6PdJjnLC5v07fWSx8lBe">https://www.youtube.com/watch?v=0Swcik07kGE&amp;index=18&amp;list=PLsAWD8mKKE96t6PdJjnLC5v07fWSx8lBe</a> <a href="https://www.youtube.com/watch?v=fWqyr5QZnVI&amp;index=15&amp;list=PLsAWD8mKKE96t6PdJjnLC5v07fWSx8lBe">https://www.youtube.com/watch?v=fWqyr5QZnVI&amp;index=15&amp;list=PLsAWD8mKKE96t6PdJjnLC5v07fWSx8lBe</a>	CMC Website
1 box	Saltine Crackers	Bin
1 per student	Owl pellets	Bin
<b>2 per student</b>	<b>Toothpicks</b>	<b>Bin</b>
<b>1 piece per student</b>	<b>Black paper</b>	<b>Bin</b>
<b>5-10</b>	<b>Magnifying glasses</b>	<b>Bin</b>
1 per student	Owl Pellet Identification Chart	Binder
6	Poster paper	Classroom Teacher
	Markers or crayons	Classroom Teacher
1 group or 1 per student	iPads or laptops	Classroom Teacher
2 per group (16)	Clear plastic cups	Bin
1 per group (8)	Coffee filters	Bin
	Sand	Bin
<b>1 container</b>	<b>Red food coloring</b>	<b>Bin</b>
1 per group	Plastic spoon	Bin
1 per student	Exit Ticket	Binder
Optional	The Magic School Bus "For Lunch"	CMC Website

**\*\*Items in bold should be returned for use next year\*\***

## LESSON DETAILS

### Lesson Opening/ Activator

Put the following question on the board: “What does our body do with the food we eat?” Have students write their answers in their science journals.

### During the Lesson

#### 1. Digestive System Video

Show the video about the digestive system.

<https://www.youtube.com/watch?v=0Swcik07kGE&index=18&list=PLsAWD8mKKE96t6PdJjnLC5v07FWSx8lBe> After the video ask the class for volunteers to identify a body part involved in digestion and to explain its function. Make sure the following parts are mentioned: mouth, esophagus, stomach, small intestine, large intestine. INSTEAD: during the video, the teacher should pause at each mention of an organ and its job. Then they can write the name of the organ and what it does on the board for the students to copy down.

#### 2. Saltine Experiment

Tell students we are now going to do a demonstration to see how digestion works in our own bodies. Pass out 2 saltine crackers to each student and tell them not to eat them until instructed to. Have the students put one cracker in their mouth and chew and swallow it like they normally would. Tell students to note the texture of the cracker as they are chewing. have students predict what they think will happen when they just leave the cracker in their mouth and don't chew it. Have the students place the second cracker in their mouths but instruct them not to chew it, just to let it sit for 1 minute. After a minute have them chew and swallow the cracker. How was the texture of the cracker different after letting it sit? Why do you think this happened? Explain to students that the saliva in their mouth helps to break the cracker down. That's why it was much softer and easier to chew the second time.

### 3. Owl Pellets

Show the following video about owl pellets:

<https://www.youtube.com/watch?v=fWqyr5QZnVI&index=15&list=PLsAWD8mKKE96t6PdJjnLC5v07fWSx8lBe> Next Science Fellows and/or the Classroom Teacher will demonstrate how to dissect an owl pellet by placing one on a piece of black paper and using a toothpick to pick it apart. Give students their own owl pellet, toothpicks and black paper so they can begin their dissection. Students will each have an Owl Pellet Identification Chart to help them identify what bones students may find in their owl pellets. Have students record their findings in their Science Journals and then share with the class what they found.

**[If there are time constraints, end the lesson here and continue the rest of the activities at another time.]**

### 4. Kidney activity

Watch the following video about the kidney: [https://www.youtube.com/watch?v=2\\_7Q1xQ-NWU](https://www.youtube.com/watch?v=2_7Q1xQ-NWU)

Before demonstration and construction of model begin, have students get in their groups and brainstorm how a model of a kidney might work. Can write a few sentences in their science journals explaining the model they think should work, and *rationale* behind why they anticipate the model working that way. Take a few minutes for some groups to share their group brainstorm with the rest of the class.

After brainstorm, classroom Teacher/Science fellows will perform the following kidney demonstration while students follow along, with each group making their own kidney. Each group will need 2 clear plastic cups, 1 coffee filter, a small amount of sand, a plastic spoon, and a few drops of food coloring. Fill 1 of the plastic cups with water. Add a few scoops of sand using the spoon. Then add 2 drops of red food coloring and mix with the plastic spoon. Ask students what they think each component of the experiment is representative of in the human body. Then, answer: The red liquid represents our blood and the sand is the waste found in our blood. Students should make predictions about the experiment and illustrate their observations in their science journals. Use an elastic band to hold the coffee filter to the cup and have a

student SLOWLY and CAREFULLY pour the blood and sand mixture through. **[SP 2: Developing and Using Models]** Ask students, what did the coffee filter do to the mixture? (It filtered out the sand, which is the waste, and it let the blood through.) In this model, the coffee filter is like the kidneys. It filters sand from the water just like our kidneys filter wastes from our blood. (Adapted from [http://www.ehow.com/how\\_8034005\\_experiment-filters-explain-kidney-works.html](http://www.ehow.com/how_8034005_experiment-filters-explain-kidney-works.html))

Take a few minutes after activity to have students revisit their original brainstorming sessions/models - how would you revise your original model? Can either have students take time to reflect individually in their journals, or more informally in a group discussion.

## 5. Poster Presentations

Divide students into 6 groups and assign each group one of the following parts: mouth, esophagus, stomach, small intestine, large intestine, kidneys. Give each group a piece of chart paper, markers or crayons, and iPads or laptops. Students should find information on their organ and then create a poster that includes facts and a picture. Then each group should present their posters to the class **[SP 8: Obtaining, Evaluating, and Communicating Information]**

## Optional Lesson Extensions:

### Digestion Computer Activity

Give students a chance to explore the animations at <http://kitses.com/animation/swfs/digestion.swf>.

In this activity, students select a food they want the character to eat and then they can watch animations of the digestion that is occurring at each step in the digestive system.

### Virtual Owl Pellets

This activity is a digital version of the owl pellet dissection that students did in the lesson. Students may practice their dissection skills at home and can show their parents what they learned in class, without having to purchase more owl pellets. The site can



be accessed at: <http://www.kidwings.com/owlpellets/html5/v1/fullscreen.html>. Students must first click on the pellet multiple times to remove the fur. Then they can click on the bones and drag them to the appropriate place on the skeleton outline.

### **The Magic School Bus “For Lunch”**

Show students The Magic School Bus Episode, “For Lunch”. In this episode, the characters explore Arnold’s digestive system. The Magic School Bus DVD is provided in the bin.

### **Lesson Closing**

Have students look back at their Science Journals to check their responses to the question “What does our body do with the food we eat?” Ask students to share with the class how their responses to this question have changed.

### **Exit Tickets**

Pass out exit tickets for students to complete individually and look at their responses to check for understanding

### **Assessment**

Listen to class discussion following the digestive system video, saltine experiment, owl pellets, and kidney activity to see if the students are engaged and giving accurate, thoughtful answers to discussion questions. Listen to student presentations to see that they have done thorough research on their assigned organ. Check students’ exit ticket question answers to check for understanding.

# Lesson 8: Plant Overview

## BACKGROUND

### Overview of the Lesson

In this lesson, students will be learning about plant parts and function and will also grow their own plants from seed. Next, students will be reading and discussing two systems in the plant structure. Then, students will be dissecting plants in small groups trying to identify the parts. Last, students write a paragraph, about what they have learned. **More lessons on plants structures will be developed in the 2017-2018 school year.**

### Focus Standards

**4-LS1-1.** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statements: Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.] [State Assessment Boundary: State assessment will be limited to macroscopic structures.]

**[2006]** *BS5-3 Identify the structures in plants responsible for food production, support, water transport, reproduction, growth, and protection.*

### Learning Targets

I can identify plant structures and describe their importance to the life of a plant

I can compare plant and animal structures

I can write an informative essay using an appropriate diagram to communicate knowledge about plant structures and their functions

## Assessment

In their science journals have students write this question and then answer it independently.

What are the parts of a plant and what are their functions?

Answer:

Roots - anchor the plant into the ground, soak in water and nutrients from the soil

Stem(s) - hold plant up, transportation system for water and food in the plant

Leaves - make food for plant (by combining sun, water, and air (later they will have to know the air is specifically carbon dioxide)

Flowers - create seeds to make new plants (reproduction)

Check students' exit ticket answers to check for understanding.

## Key Vocabulary

**Tier 1:** stem, seeds, roots, leaves, fruit, flowers,

**Tier 2:** pollination, fertilization

**Tier 3:** photosynthesis, chloroplast

## RESOURCES AND MATERIALS

Quantity	Item	Source
1 per student	Plastic knives	Bin
1-2	Plants with roots (preferably flowering plants)	Sue Beauchamp
1 per student	Clear zip lock sandwich bags	Bin
1 per student	Dry beans	Bin
2 pieces per student	Paper towels	Bin

1 per student	Paper plates	Bin
1 per student	Small Cups (to plant seeds in)	Bin
	Soil	Bin
1 per student	Lined paper	Classroom Teacher
	<a href="http://www.pbslearningmedia.org/resource/5dea21b4-6c92-46ff-982c-8650f9429c01/think-garden-plant-structure/">http://www.pbslearningmedia.org/resource/5dea21b4-6c92-46ff-982c-8650f9429c01/think-garden-plant-structure/</a>	Classroom Teacher
	Plant and Animal Connections PowerPoint	CMC Website
1 per student	Bean Bags Worksheet	Binder
	Crayons	Classroom Teacher
1 per student	Compare and Contrast Worksheet	Binder
1 per student	Build-a-Plant (optional)	Binder
1 per student	Cactus Lab (optional)	Binder
1	Cactus	Contact Sue Beauchamp
1	Plant Dissection Guide (4 pages)	Binder
1 per student	Exit Ticket	Binder

**\*\*Items in bold should be returned for use next year\*\***

## LESSON DETAILS

### Lesson Opening/ Activator

To get the lesson started show the video, Think Garden; <http://www.pbslearningmedia.org/resource/5dea21b4-6c92-46ff-982c-8650f9429c01/think-garden-plant-structure/>

This video will review the needs of plants (sunlight, water, air, and space). Explain that today we will be looking at the parts of plants and seeing how they rely on sunlight, water, air, and space.

## During the Lesson

### 1. Bean Bags

Ask the students, what happens to a seed when you plant it in the soil? Tell the students that when we plant seeds they first sprout or “germinate.” When planted in the soil, we’re unable to see the first sprout push out of the seed coat or see the root system because it is under the soil. In this activity, students will be able to observe germination and the plant’s roots.

- a. Distribute a zip lock bag to each student and write their name in the top corner with a permanent marker.
- b. Dampen one piece of paper towel for each student and have them place the folded towel in the bag. The paper towels should be damp enough to provide moisture for the bean, but not dripping (which could cause mold).
- c. Have the students place a dry bean on top of the damp paper towel and seal the bag. There does not need to be any air in bag.
- d. Tape each bag to a window or a wall which gets some sunlight. The seed mostly needs warmth at this stage, not light – so prioritize for warmth. A window helps for viewing the seed as it germinates. The seeds should begin to germinate in 3-5 days. Moisten the paper towels if they are drying out.
- e. Have children observe the growth of the sprouts. You can have students record the growth on the Bean Bags Worksheet, to the best of their ability. For example, the first sketch should be on Day 1, showing the bean in the bag. The second sketch could be the first sprout, etc.
- f. After 1 ½ to 2 weeks – either in a garden or indoors – transplant the sprouted seeds if soil is available. When the seeds are planted they will have their “seed leaves” and maybe even their “true leaves” (the second leaves after the “seed leaves”). These should be above the soil so the seed can continue to grow. Beans require a fair amount of warmth so they may not grow well outside in the winter. However, in a sunny classroom spot with good soil and water, they may grow enough to give an idea of what they look like as a full grown plant.

## 2. Plant and Animal Connections

Explain to the students that they will learn how to find similarities and differences between the plants and animals and will learn about their needs and structures. Show the students the PowerPoint presentation on plant and animal connections. Students should have the Compare and Contrast worksheet, which is slides 8 and 9 reproduced for their own use. Have students fill them in during the presentation. After viewing the PowerPoint have students complete the worksheet.

## 3. Plant Dissection

Before you begin the classroom teacher and Science Fellows should read the Plant Dissection Guide and become familiar with the sample plant diagram

1. Review behavior and science safety rules as needed before dividing your students into groups (or pairs if you choose) to begin their dissections. Distribute paper plates, plants, and plastic knives.
2. Circulate and provide assistance as needed during the dissection.
3. Turn on document camera, and take one of the plants to show the class. Zoom in/out as needed so students can watch you demonstrate the dissection of the plant.
  - a. Write "dissect" and "dissection" on the board. It may help to underline the "section" in dissection to demonstrate that you are cutting the plant into two SECTIONS. Explain what dissection is and tell them you will properly demonstrate how to carefully dissect your plant. Dissection allows the students to see the actual make up, or parts, of the plants.
  - b. Demonstrate to students (either using student-friendly scissors or a plastic butter knife) how to carefully handle the plant and how long it takes to cut the plant perfectly down the middle of the stem. (After you get the knife into the stem it goes much easier). Try to cut the root system (or taproot, depending on your plant choice) directly in half. If using a flowering plant as recommended, usually the flower is easy to cut

through. Once finished, display the plant you dissected- roots down and leaves up.

- c. Divide the students into groups and let them try the dissection for themselves. While students are dissecting, have them draw pictures of what they observe.
- d. Call students back together and have them discuss what they think the different parts of a plant do. Students should use evidence and reasoning to construct an argument regarding the function of certain plant structures [**SP7: Engaging in argument from evidence**]. After students present their arguments, the teacher can clear up any misunderstandings. Provide the students with a list of what the different parts of a plant are but not what they do.

**Optional Extensions:** Please try the following optional extensions, some of these activities may be incorporated into the Plant and Animal Anatomy Unit next year.

Cactus Lab- (Refer to extension in binder)

Build-A-Plant- (Refer to extension in binder)

## Lesson Closing

Review with students how to write a strong paragraph. It should include a topic sentence, and be backed up with detail sentences. Make sure to discuss what evidence is and what role it plays in science. Remind students that it is important to include facts. On lined paper have students write a paragraph (or more) explaining the parts and functions of a plant. This writing could be used as part of the assessment. You could also choose to write this paragraph together as a class or in smaller groups to model good writing.



## Exit Tickets

Pass out exit tickets for students to complete individually and look at their responses to check for understanding

## Assessment

In their science journals have students write this question and answer independently.

What are the parts of a plant and what are their functions?

Answer:

Roots - anchor the plant into the ground, soak in water and nutrients from the soil

Stem(s) - hold plant up, transportation system for water and food in the plant

Leaves - make food for plant (by combining sun, water, and air (later they will have to know the air is specifically carbon dioxide)

Flowers - create seeds to make new plants (reproduction)

Check students' exit ticket answers to check for understanding.

**Parts of this lesson have been adapted from <http://www.cpalms.org/Public/PreviewResourceLesson/Preview/46624>**

# Lesson 9: Survival Interactions: Plants, Animals, and Humans

## BACKGROUND

### Overview of the Lesson

Students have been learning about specific structures that enable the survival of plants and animals. In this lesson, we will learn about the different interactions between plants, animals, and humans and how their respective structures function. We will watch a video about interactions between plants and animals at Sheep Hill and model some of those interactions.

### Focus Standard

**4-LS1-1.** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statements: Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.] [State Assessment Boundary: State assessment will be limited to macroscopic structures.]

### Learning Targets

I can identify at least 2 different interactions between plant and animal structures on Sheep Hill

I can understand the importance of the environment in plant and animal survival

I can explain how a changing environment, particularly one affected by humans, impacts the survival of plants and animals

## Assessment

Students will be assessed by the “interaction web” they draw in their science journal. Check students’ exit ticket to evaluate comprehension of key ideas.

## WIDA Language Objectives

Dependent on the needs of your ELL students

## Key Vocabulary

**Tier 1:** survival

**Tier 2:** environment, endangered

**Tier 3:** monoculture, agricultural meadow, obligate host

## RESOURCES AND MATERIALS

Quantity	Item	Source
1	“Sheep Hill” Video	CMC Website
1	Computer/Projector to show video	Classroom Teacher
<b>1 ball</b>	<b>Yarn</b>	<b>Bin</b>
1 per student	Science Journals	Classroom Teacher
1 per student	“Protecting Butterflies” and “Butterflies in Culture” readings and questions	Binder
1 per student	Exit Ticket	Binder

**\*\*Items in bold should be returned for use next year\*\***

## LESSON DETAILS

### Lesson Opening/ Activator

Before beginning the lesson, ask if anyone has visited Sheep Hill in Williamstown. Sheep Hill is a former dairy farm located in Williamstown that now serves as an educational and recreational area. Explain that we will watch a video about different interactions between plants, animals and humans at Sheep Hill. Explain that humans are animals as well, but that we will distinguish between animals and humans in this lesson and future lessons because of the different ways humans and animals interact, both with the environment and the organisms in it. If students need help understanding this concept, have a small discussion with examples of the different levels of interactions humans have, versus that which animals have with their environment. For example, widespread deforestation caused by humans has led to loss of habitat for millions of species, whereas the actions of animals have not caused an event of mass extinction remotely similar.

### During the Lesson

1. Show students the “Sheep Hill” video found on the thumb drive. Depending on where the class may be, you may want to ask students to take notes of interactions between plants, animals and humans in their science journal, or, watch the video once for a general understanding and a second time to pay closer attention to the examples of interaction.

Sample interactions include:

- Humans mowing the meadow to prevent it from becoming a forest
- Beaver meadows serving as natural meadows
- A squirrel playing in the grass
- Humans letting the milkweed grow, which butterflies lay eggs on and get nectar from
- The Baltimore Checkerspot (a butterfly) lays its eggs on plankton and turtlehead
- Milk cows grazing on the hill
- Sheep grazing on the hill, and wool mills using sheep for their wool
- The impacts of farming in creating the Sheep Hill meadow

- Woodchuck holes hiding under leaves
- Fly/wasp lay their eggs in the stem of the plant. Birds sometimes peck out the larvae, and kids sometimes accidentally eat that larvae
- Bees: the waggle dance tells other bees where flowers are located

After the video, make sure to review the tiered vocabulary. Point out that, to an extent, humans have shaped Sheep Hill. How do humans control this environment? What would happen if Sheep Hill wasn't kept by humans? (It would grow into a forest again). Who or what would be impacted?

2. In small groups of 4, students will choose one of the interactions and perform it for the class. The skits should include specific details about the different structures of the species and how they interact. For example, a squirrel uses its arms, legs and muscular system to move its body in the grass **[SP 2: Developing and Using Models]**.

### **Food Webs Introduction Activity**

1. Introduce the concept of food webs to the students. Food webs show the direct connections and interactions between plants, animals and humans. Explain that today we will create an “interaction web”, which is similar to a food web, but allows for broader interactions between species. The “interaction web” models the different, yet interconnected relationships of the species in a habitat. On the board or a large sheet of paper, brainstorm the different species we learned about in the Sheep Hill video. How are they connected? Taking the yarn, assign a species to each student (as many as students are able to come up with). Have students that have species that interact with each other in one way or another hold the string of the other species that they interact with. Once your “interaction web” is done, ask one student to release their yarn. What happens if one species disappears? **[SP 1: Asking Questions]** How does this affect other species **[SP 6: Constructing Explanations]**
2. Collectively, try to come up with interaction webs for other habitats. Allow students to rotate the activity so everyone has a chance to participate in the “interaction web.”

## Lesson Closing

In their science journals, students will draw an “interaction web.” It cannot be one from today’s in-class activity, but can be from a previous lesson. In small groups, we will share our webs and the specific interactions that connect them.

**Paired Texts** (This activity can be led by the classroom teacher when the science fellows are not present.)

In this exercise, students will read two passages that discuss similar topics. Students will compare and contrast the texts and then complete the Paired Text Questions worksheet individually, which tests for comprehension. The texts for this lesson are “Protecting Butterflies” and “Butterflies in Culture” (located in the binder).

## Exit Tickets

Pass out exit tickets for students to complete individually and look at their responses to check for understanding

## Assessment

Students will be assessed by the “interaction web” they draw in their science journal. Check students’ exit ticket to evaluate comprehension of key ideas.

## Optional Lesson Extensions

1. Visit Sheep Hill: Take a class field trip to Sheep Hill to learn about different plant and animal interactions.
2. Tech integration: Students can make their own video about their experience at Sheep Hill. If video technology is not available, pictures, drawings or verbal reports may also work in substitute.
3. Backyard/schoolyard extension: If a field trip to Sheep Hill is not possible, students can explore the schoolyard and observe the different interactions between species.

# Optional Extension: Create-A-Habitat

## BACKGROUND

### Overview of the Lesson

In this lesson, students will create a habitat and learn about the different species that exist in that habitat. Students will create presentations about a species within the habitat, and present their findings.

### Focus Standard

**4-LS1-1.** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statements: Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.] [State Assessment Boundary: State assessment will be limited to macroscopic structures.]

### Learning Targets

- I can explain important internal and external structures within a specific organism
- I can identify some of the complex interactions between different organisms in a habitat
- I can conduct and present independent research to an audience

### Assessment

Students will be assessed by their presentation. Pay close attention to the entire process and provide support, particularly during the research stage, to ensure students are adequately prepared and confident in their abilities when presenting. Have students reflect on their experience conducting research and creating a presentation, as well as what they learned in this unit.

## Key Vocabulary

**Tier 1:** Habitat

**Tier 2:** Model, organisms

**Tier 3:** Endangered, species

## RESOURCES AND MATERIALS

Quantity	Item	Source
	All art materials will be provided by the teacher	Classroom Teacher
1 per student	Readings: “Vanishing Frogs” and “Back From the Brink”	Binder
1 per student	Paired Text Questions	Binder

**\*\*Items in bold should be returned for use next year\*\***

## LESSON DETAILS

### Lesson Opening/ Activator

Prior to the lesson, it would be a good idea to choose 3 to 4 different habitats that would be reasonable to “create” within the classroom. Some potential habitats include: the rainforest, the ocean, forests, the desert, etc. More specific locations, like the Amazon Rainforest, would also be a good idea. Have students vote on their favorite habitat, with the understanding that they will be responsible for creating a model of that environment. Begin the lesson with a short review of what a habitat is (students learned about habitats in 2nd grade).

## During the Lesson

### Activity 1

1. Once the class has chosen a habitat, students should research the different plants and animals that live in the habitat and each choose one **[SP 8: Obtaining, Evaluating, and Communicating Information]**. Try to have an even distribution of plants and animals.
2. Decorate the classroom: Students can work together to decorate the classroom to make it look like the chosen habitat. It is ideal if one wall is cleared off for this project as students will need space to place their chosen organisms.
3. Independent research: students should spend ample time researching their organism online. Before using technology, remind students that some sources are more reliable than others for scientific explanation. Information from a website like National Geographic will most likely be more reliable than information from a website that has many pop-up ads and doesn't cite sources.
4. Students should aim to answer these questions in their presentation:
  - a. Where in the habitat is this organism found?
  - b. What internal or external systems does it use to create or consume food?
  - c. What is the lifespan of this organism?
  - d. What type of skin coverings does it have?
  - e. Does it have an exoskeleton, endoskeleton, or neither?
  - f. Is this species endangered? Why?
  - g. Other questions that related to the different lessons in this unit should apply and can be assigned at the discretion of the teacher/Science Fellows.
5. Creating an organism: students should create a model of their organism using the art supplies provided. They may draw it, create a 2-d model using construction paper, or create a 3d model using clay or paper mache (the latter will most



probably have to be done at home with parent supervision). Students may also create a costume for themselves or use another art form to represent their organism.

6. **Creating a presentation:** Students will create a short presentation about their chosen organism. They may use note cards, write a song, create a skit, or use another creative medium to deliver the information about their organism. When crafting the presentation, remind students that it should be short but informative, and that it can be creative, entertaining and funny. Students should take time to practice their presentations.
7. **Presenting:** Coordinate “field trips” with other classes. Younger students will come listen to some of the presentations and ask questions about the habitat and organisms. Another idea is to have a “family day” when family members are invited to explore the habitat the students have created and listen to the presentations. Questions from audience members are encouraged.

## Lesson Closing

**Paired Texts:** Note: This activity can be performed by the classroom teacher when the science fellows are not present.

In this exercise, we will read two passages that discuss similar topics. We will compare and contrast the texts and then complete the Paired Text Questions worksheet, which tests for comprehension. The texts for this lesson are “Vanishing Frogs” and “Back From the Brink” (located in the binder).

## Assessment

Students will be assessed by their presentation. Pay close attention to the entire process and provide support, particularly during the research stage, to ensure students are adequately prepared and confident in their abilities when presenting. Have students reflect on their experience conducting research and creating a presentation, as well as what they learned in this unit.

# List of Unit Resources

## Lesson 1

Quantity	Item	Source
<b>4 sets</b>	<b>Picture Cards of different Animals</b>	CMC Website
1	Computer/Projector to show video	Classroom Teacher
1 per student	Animal types/classifications handout	Binder
	Brain Pop Jr video: <a href="https://youtu.be/uB1y-BzLKaQ">https://youtu.be/uB1y-BzLKaQ</a>	Thumb Drive
1 per student	Science Journals	Classroom Teacher
1 per student	Plain white paper	Classroom Teacher
	Crayons or Colored Pencils	Classroom Teacher
1 per student	Top-down web and Top-down web Answer Sheet	Binder
	Animal Classification PowerPoint	CMC Website
1 per student	A New Vertebrate Prompt	Binder
1 per student	Exit Ticket	Binder

## Lesson 2

Quantity	Item	Source
1 per class	Computer/Projector for PowerPoint Presentation	Classroom Teacher
1 per student	Science Journals	Classroom Teacher
1 per class	Skin and Skin Coverings PowerPoint	CMC Website
1 copy of each animal	Animal Outline Worksheets (10 pages)	Binder
<b>4 sets</b>	<b>Skin Covering Matching Cards</b>	<b>Bin</b>

	Bill Nye the Science Guy “Skin” video	CMC Website
	<b>Yarn</b>	<b>Bin</b>
	<b>Feathers</b>	<b>Bin</b>
	<b>Beads</b>	<b>Bin</b>
	<b>Felt</b>	<b>Bin</b>
	<b>Shiny/Smooth paper</b>	<b>Bin</b>
	<b>Scaley paper</b>	<b>Bin</b>
1 per group	Scissors	Classroom Teacher
1 per student	Exit ticket	Binder
1 per group	Glue	Classroom Teacher

### Lesson 3

Quantity	Item	Source
1 per student	Science Journal	Classroom Teacher
1 per student	Scissors	Classroom Teacher
1	Projector and computer for video at: <a href="https://www.youtube.com/watch?v=j918PoWWaB0">https://www.youtube.com/watch?v=j918PoWWaB0</a> <a href="https://www.youtube.com/watch?v=Xf7adknGGck">https://www.youtube.com/watch?v=Xf7adknGGck</a>	Classroom Teacher
1 per student	Glue sticks	Classroom Teacher
<b>4 sets</b>	<b>Locomotion League Cards and Answers (laminated)</b>	<b>Bin</b>
1	Bucket with students’ names	Classroom Teacher
<b>1 per student</b>	<b>Cardstock or thin cardboard</b>	<b>Bin</b>
1 per student	Pen	Classroom Teacher
<b>3 balls of yarn/string</b>	<b>Thin String</b>	<b>Bin</b>
<b>1</b>	<b>Tape</b>	<b>Bin</b>
1 per student	Article: “Move Your Muscles!”	Binder

	<a href="https://www.readworks.org/article/Move-Your-Muscles!/6b4042b3-d433-43c9-bbf5-d51cc958735c#!articleTab:content/">https://www.readworks.org/article/Move-Your-Muscles!/6b4042b3-d433-43c9-bbf5-d51cc958735c#!articleTab:content/</a>	
1 per student	Article Questions worksheet <a href="https://www.readworks.org/article/Move-Your-Muscles!/6b4042b3-d433-43c9-bbf5-d51cc958735c#!articleTab:questionsets/">https://www.readworks.org/article/Move-Your-Muscles!/6b4042b3-d433-43c9-bbf5-d51cc958735c#!articleTab:questionsets/</a>	Binder
1 per student	Exit Ticket	Binder

#### Lesson 4

Quantity	Item	Source
	Nervous System Video: <a href="https://www.youtube.com/watch?v=dah-4mtAnsQ">https://www.youtube.com/watch?v=dah-4mtAnsQ</a>	CMC Website
	Computer/Projector to show video	Classroom Teacher
1 per student	"The Nervous System" Video Worksheet	Binder
1 per student	Science Journals	Classroom Teacher
1 per student	Nervous System Data Collection Sheet	Binder
<b>1</b>	<b>Timer</b>	<b>Bin</b>
	Markers	Classroom Teacher
<b>2 balls</b>	<b>Different colors yarn</b>	<b>Bin</b>
	Construction paper	Classroom Teacher
1	Large paper to trace a student	Classroom Teacher
	Crayons	Classroom Teacher
1 per student	Body Outlines	Binder
1 per student	Exit Ticket	Binder

#### Lesson 5

Quantity	Item	Source
1	Computer/Projector for PowerPoint Presentation	Classroom Teacher
1 per student	Science Journals	Classroom Teacher
1	Reproduction Types PowerPoint	CMC Website
<b>3</b>	<b>Plastic cups</b>	<b>Bin</b>
<b>1 container</b>	<b>Vinegar</b>	<b>Bin</b>
Half dozen eggs	Chicken Eggs	Contact Sue Beauchamp 5 days prior to lesson
<b>1 set</b>	<b>Measuring cups</b>	<b>Bin</b>
<b>1 set</b>	<b>Measuring spoons</b>	<b>Bin</b>
<b>1 medium sized bowl</b>	<b>Plastic bowl</b>	<b>Bin</b>
¼ tsp	Blue food coloring	Bin
1/4 tsp	Dishwasher detergent	Bin
<b>1</b>	<b>Spoon</b>	<b>Bin</b>
<b>1 set</b>	<b>Fish Action Cards (Laminated and Cut)</b>	<b>Bin</b>
1 per student	“Eggs, Eggs, Eggs” Reading	Binder
1 per student	“The Egg Challenge” Reading	Binder
1 per student	Paired Text Questions Worksheet	Binder
1 per student	Exit ticket	Binder

Lesson 6

Quantity	Item	Source
1 per student	Science Journal	Classroom Teacher
1	Computer/Projector for YouTube videos	Classroom Teacher
	YouTube Videos: Respiratory System, What is Blood?, Fish Have Gills, Amphibians Breathe Through Skin	CMC Website
<b>5</b>	<b>Plastic bottles with bottoms cut off (may be 20oz-2L)</b>	<b>Bin</b>
15	Straws	Bin
<b>10</b>	<b>Elastic bands</b>	<b>Bin</b>
10	Rubber gloves	Bin
<b>1 large container</b>	<b>Play dough</b>	<b>Bin</b>
	Scissors	Classroom Teacher
<b>3 sets</b>	<b>Circulation name tags</b>	<b>Bin</b>
<b>3 sets</b>	<b>Oxygenated blood cutouts</b>	<b>Bin</b>
<b>3 sets</b>	<b>Deoxygenated blood cutout</b>	<b>Bin</b>
1	Chart Paper	Classroom Teacher
1	Heart Chambers Poster	Binder
1 per student	Exit Ticket	Binder

Lesson 7

Quantity	Item	Source
1 per student	Science Journals	Classroom Teacher
1	Computer/Projector to show YouTube videos	Classroom Teacher
	YouTube videos	CMC Website

	<a href="https://youtu.be/4E_Fc4ZGQqc">https://youtu.be/4E_Fc4ZGQqc</a> <a href="https://www.youtube.com/watch?v=0Swcik07kGE&amp;index=18&amp;list=PLsAWD8mKKE96t6PdJnLC5v07fWSx8lBe">https://www.youtube.com/watch?v=0Swcik07kGE&amp;index=18&amp;list=PLsAWD8mKKE96t6PdJnLC5v07fWSx8lBe</a> <a href="https://www.youtube.com/watch?v=fWqyr5QZnVI&amp;index=15&amp;list=PLsAWD8mKKE96t6PdJnLC5v07fWSx8lBe">https://www.youtube.com/watch?v=fWqyr5QZnVI&amp;index=15&amp;list=PLsAWD8mKKE96t6PdJnLC5v07fWSx8lBe</a>	
1 box	Saltine Crackers	Bin
1 per student	Owl pellets	Bin
<b>2 per student</b>	<b>Toothpicks</b>	<b>Bin</b>
<b>1 piece per student</b>	<b>Black paper</b>	<b>Bin</b>
<b>5-10</b>	<b>Magnifying glasses</b>	<b>Bin</b>
1 per student	Owl Pellet Identification Chart	Binder
6	Poster paper	Classroom Teacher
	Markers or crayons	Classroom Teacher
1 group or 1 per student	iPads or laptops	Classroom Teacher
2 per group (16)	Clear plastic cups	Bin
1 per group (8)	Coffee filters	Bin
	Sand	Bin
<b>1 container</b>	<b>Red food coloring</b>	<b>Bin</b>
1 per group	Plastic spoon	Bin
1 per student	Exit Ticket	Binder
Optional	The Magic School Bus "For Lunch" <a href="https://vimeo.com/168181557">https://vimeo.com/168181557</a>	CMC Website

### Lesson 8

Quantity	Item	Source
<b>1 per student</b>	<b>Plastic knives</b>	<b>Bin</b>
1-2	Plants with roots (preferably flowering plants)	Classroom Teacher/Sue

		Beauchamp
1 per student	Clear zip lock sandwich bags	Bin
1 per student	Dry beans	Bin
2 pieces per student	Paper towels	Bin
1 per student	Paper plates	Bin
1 per student	Small Cups (to plant seeds in)	Bin
	Soil	Bin
1 per student	Lined paper	Classroom Teacher
	<a href="http://www.pbslearningmedia.org/resource/5dea21b4-6c92-46ff-982c-8650f9429c01/think-garden-plant-structure/">http://www.pbslearningmedia.org/resource/5dea21b4-6c92-46ff-982c-8650f9429c01/think-garden-plant-structure/</a>	Classroom Teacher
	Plant and Animal Connections PowerPoint	CMC Website
1 per student	Bean Bags Worksheet	Binder
	Crayons	Classroom Teacher
1 per student	Compare and Contrast Worksheet	Binder
1 per student	Build-a-Plant (optional)	Binder
1 per student	Cactus Lab (optional)	Binder
1	Cactus	Contact Sue Beauchamp
1	Plant Dissection Guide (4 pages)	Binder
1 per student	Exit Ticket	Binder

Lesson 9

Quantity	Item	Source
1	“Sheep Hill” Video	CMC Website
1	Computer/Projector to show video	Classroom Teacher
<b>1 ball</b>	<b>Yarn</b>	<b>Bin</b>
1 per student	Science Journals	Classroom Teacher
1 per student	“Protecting Butterflies” and “Butterflies in Culture” readings and questions	Binder
1 per student	Exit Ticket	Binder

Optional Extension: Create a Habitat Lesson

Quantity	Item	Source
	All art materials will be provided by the teacher	Classroom Teacher
1 per student	Readings: “Vanishing Frogs” and “Back From the Brink”	Binder
1 per student	Paired Text Questions	Binder