Unit Summary
How do the internal and external parts of plants and animals support their survival, growth, behavior, and reproduction.
In this unit of study, students develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. The crosscutting concepts of *systems and system models* are called out as organizing concepts for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency *in engaging in argument from evidence*. Students are also expected to use this practice to demonstrate understanding of the core idea.
This unit is based on 4-LS1-1.
Student Learning Objectives
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. *[Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.]* [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.*]* **(4-LS1-1)**

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Unit Sequence	
Part A: *How do internal and external parts of plants and animals help them to survive, grow, behave, and reproduce?*	
Concepts	**Formative Assessment**
• A system can be described in terms of its components and their interactions. • Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.	*Students who understand the concepts are able to:* • Describe a system in terms of its components and their interactions. • Construct an argument with evidence, data, and/or a model. • Construct an argument to support the claim that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. *(Assessment is limited to macroscopic structures within plant and animal systems.)* Examples of structures could include: ✓ Thorns ✓ Stems ✓ Roots ✓ Colored petals ✓ Heart ✓ Stomach ✓ Lung ✓ Brain ✓ Skin

What It Looks Like in the Classroom

In this unit of study, students spend time observing plants and animals in order to gather evidence that organisms are living systems. A system is made up of structures and processes that interact and enable the system to function. Every plant and animal can be described in terms of its internal and external structures and their interactions, and these structures each have specific functions that support survival, growth, behavior, and reproduction for the organism.

Using a variety of plants and animals as examples, students need multiple opportunities to:

- ✓ Describe the internal and external structures of a plant or animal and the function of each of those structures. Description should explain how each structure serves various functions in growth, survival, behavior, and/or reproduction. *(Note: This is limited to macroscopic structures within plant and animal systems, and could include such structures as thorns, stems, roots, and colored petals for plants, and heart, stomach, lung, brain, and skin for animals.)*
- ✓ Describe the interactions that occur among the structures within the plant or animal system.

As students observe the structures of an animal or plant, explain the function of each, and describe how these structures help the animal grow, survive, and/or reproduce, they should use evidence from their observations to support their explanations.

Connecting with English Language Arts/Literacy and Mathematics
English Language Arts Students use the evidence from their observations of plants and animals to support the claim that all organisms are systems with structures that function in growth, survival, behavior, and/or reproduction. Students need opportunities to observe plants and animals closely, taking notes and drawing pictures, so that they can describe various structures and their functions. *Mathematics* Students describe the symmetry that can be observed in an organism's structures. For example, the leaves of many plants and the bodies of many animals display bilateral symmetry. Students should be encouraged to draw each organism that they observe, pointing out any structures that are symmetrical. Students should also trace lines of symmetry in their drawings to support their thinking. In addition, students can conduct research to determine whether the symmetry serves a function in the growth, reproduction, or survival of the organism.

Modifications
(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Students/Case Studies for vignettes and explanations of the modifications.) • Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable phenomena. • Structure the learning around explaining or solving a social or community-based issue. • Provide ELL students with multiple literacy strategies. • Collaborate with after-school programs or clubs to extend learning opportunities. • Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).

Research on Student Learning
N/A

Prior Learning
Grade 1 Unit 3: Mimicking Organisms to Solve Problems • All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. • Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.

Future Learning
Grade 3 Unit 4: Traits • Different organisms vary in how they look and function because they have different inherited information. • The environment also affects the traits that an organism develops. **Grade 7 Unit 4: Structure and Function** • All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). • Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. • In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.

Connections to Other Units
In **Grade 1 Unit 3: Mimicking Organisms to Solve Problems**, students developed an understanding of how plants and animals use their parts to help them survive, grow, and meet their needs.

Sample of Open Education Resources
Animal Mouth Structures In this lesson, students gather evidence to understand features that enable them to meet their needs. In particular, they examine the mouth structures of different animals to help them understand how animals are adapted to obtain food in their environment.

Teacher Professional Learning Resources
Connections Between Practices in *NGSS*, Common Core Math, and Common Core ELA The presenter was Sarah Michaels from Clark University. In this seminar Dr. Michaels talked about connecting the scientific and engineering practices described in A Framework for K–12 Science Education with the Common Core State Standards in Mathematics and English Language Arts. **Engineering Design as a Core Idea** The presenter was Cary Sneider, Associate Research Professor at Portland State University in Portland, Oregon. The seminar focused on the Core Idea of Engineering, led by Cary Sneider, Associate Research Professor at Portland State University. Cary explained the overall *NGSS* engineering components for K-2, MS and HS, and went through a number of practical examples of how teachers could develop modules and investigations for their students to learn them. Cary also spoke about the ways in which teachers could include cross-cutting engineering concepts to a number of classroom subjects. The seminar concluded with an overview of NSTA resources about *NGSS* available to teachers by Ted, and a Q & A session with Cary. Visit the resource collection. Continue discussing this topic in the community forums. **NGSS Core Ideas: From Molecules to Organisms: Structures and Processes** The presenters were Aaron Rogat of Educational Testing Service (ETS) and Barbara Hug of the University of Illinois at Urbana-Champaign. The program featured strategies for teaching about life science concepts that answer questions such as "How do the structures of organisms enable life's functions?" and "How do organisms grow and develop?" Dr. Hug began the presentation by discussing the arrangement of life science core ideas within *NGSS* and comparing them to previous standards. Next, Dr. Rogat shared an example of a learning progression, showing how a concept can be taught from early elementary through high school. The presenters then talked about strategies for instruction and shared links to resources. Participants had the opportunity to submit their questions and comments in the chat. Visit the resource collection. Continue discussing this topic in the community forums. **Annenberg Media's Teachers' Resources** are short video courses covering essential science content for K-6 teachers.

Appendix A: NGSS and Foundations for the Unit
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. *[Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.]* [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.*]* **(4-LS1-1)**

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence • Construct an argument with evidence, data, and/or a model. (4-LS1-1)	**LS1.A: Structure and Function** • Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)	**Systems and System Models** • A system can be described in terms of its components and their interactions. (4-LS1-1)

English Language Arts	Mathematics
Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1) **W.4.1**	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1) **4.G.A.3**