

Unit Overview	
<b>Content Area:</b> Life Science	
<b>Unit Title:</b> Animal Classification, Physical Structures, Survival, and Crayfish, Plant Structures and Survival, Plant and Animal Seasonal Responses	<b>Unit:</b> 3 & 4
<b>Target Course/Grade Level:</b> 4	<b>Timeline:</b> 30 Days
<p><b>Unit Summary:</b></p> <p><b><i>How do the internal and external parts of plants and animals support their survival, growth, behavior, and reproduction.</i></b></p> <p>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 <i>systems and system models</i> are called out as organizing concepts for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency <i>in engaging in argument from evidence</i>. Students are also expected to use this practice to demonstrate understanding of the core idea.</p> <p>This unit is based on 4-LS1-1.</p> <p><b><i>How do animals use their perceptions and memories to make decisions?</i></b></p> <p>In this unit of study, students are expected to develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. By developing a model, they describe that an object can be seen when light reflected from its surface enters the eye. The crosscutting concepts of <i>cause and effect, systems and system models, and structure and function</i> are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency <i>in developing and using models</i>. Students are expected to use these practices to demonstrate understanding of the core ideas.</p> <p>This unit is based on 4-LS1-2 and 4-PS4-2.</p>	
Learning Targets	
<b>NJSLS-Science</b>	
4-LS1-1.	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
4-PS4-2.	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
<b>Disciplinary Core Ideas</b>	
<p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> <li>Plants and animals have both internal and external structures that serve various functions in</li> </ul>	

growth, survival, behavior, and reproduction.

PS4.B: Electromagnetic Radiation

- An object can be seen when light reflected from its surface enters the eyes.

### Science and Engineering Practices

Engaging in Argument from Evidence

- Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Construct an argument with evidence, data, and/or a model.

Developing and Using Models

- Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. Develop a model to describe phenomena.

### NJSLS Connections

**Primary Interdisciplinary Connections:**

***English Language Arts/Literacy:***

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.

Students should use text and online media resources when appropriate to help them understand how animals receive and process information they receive from the environment, and to develop a conceptual understanding of what happens when light reflects off objects and enters the eye. They should also use visual displays to enhance their observations and explanations of the concepts in this unit of study.

***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.

Students should model with mathematics as they draw points, lines, line segments, and angles to describe how light behaves when coming into contact with lenses, mirrors, and other objects. Students will also use points, lines, and angles when drawing pictures and diagrams that show how light reflects off objects and into the pinhole viewer or into the human eye.

**Unit Essential Questions**

1. How do internal and external parts of

**Unit Understandings**

<p>plants and animals help them to survive, grow, behave, and reproduce?</p> <p>2. How do animals receive and process different types of information from their environment in order to respond appropriately?</p> <p>3. What happens when light from an object enters the eye?</p> <p>4. What happens when light from an object enters the eye?</p>	<ul style="list-style-type: none"> <li>• A system can be described in terms of its components and their interactions.</li> <li>• Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.</li> <li>• A system can be described in terms of its components and its interactions.</li> <li>• Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain.</li> <li>• Animals are able to use their perceptions and memories to guide their actions.</li> <li>• Cause-and-effect relationships are routinely identified.</li> <li>• An object can be seen when light reflected from its surface enters the eyes.</li> </ul>										
<p><b>Unit Learning Targets (Outcomes) – Formative Assessment</b>  <i>Students who understand the concepts are able to ...</i></p>											
<ul style="list-style-type: none"> <li>· Describe a system in terms of its components and their interactions.</li> </ul>											
<ul style="list-style-type: none"> <li>· Construct an argument with evidence, data, and/or a model.</li> </ul>											
<ul style="list-style-type: none"> <li>· 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. Examples of structures could include:             <table style="margin-left: 100px; border: none;"> <tr> <td>✓ Thorns</td> <td>✓ Heart</td> </tr> <tr> <td>✓ Stems</td> <td>✓ Stomach</td> </tr> <tr> <td>✓ Roots</td> <td>✓ Lung</td> </tr> <tr> <td>✓ Colored petals</td> <td>✓ Brain</td> </tr> <tr> <td></td> <td>✓ Skin</td> </tr> </table> </li> </ul>		✓ Thorns	✓ Heart	✓ Stems	✓ Stomach	✓ Roots	✓ Lung	✓ Colored petals	✓ Brain		✓ Skin
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	✓ Skin										
<ul style="list-style-type: none"> <li>· Describe a system in terms of its components and their interactions.</li> </ul>											
<ul style="list-style-type: none"> <li>· Use a model to test interactions concerning the functioning of a natural system.</li> </ul>											
<ul style="list-style-type: none"> <li>· Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.             <ul style="list-style-type: none"> <li>✓ Emphasis is on systems of information transfer.</li> </ul> </li> </ul>											
<ul style="list-style-type: none"> <li>· Identify cause-and-effect relationships.</li> </ul>											

· Develop a model to describe phenomena.

· Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

**Cross Cutting Concepts:**

Systems and System Models

- A system can be described in terms of its components and their interactions.

Cause and Effect

- Cause and effect relationships are routinely identified.

**Integration of Technology:** Web-based textbook, interactive whiteboard, interactive texts, videos, digital board builder

**Technology Resources:**

<http://faculty.washington.edu/chudler/amaze.html>

<http://pubs.ext.vt.edu/420/420-524/420-524.html>

<http://anapsid.org/crayfish.html>

[www.crayfish.com](http://www.crayfish.com)

[www.mackers.com/crayfish](http://www.mackers.com/crayfish)

[www.delta-education.com](http://www.delta-education.com)

[www.schoolspeciality.com](http://www.schoolspeciality.com)

[www.onlinesciencemall.com](http://www.onlinesciencemall.com)

<http://www.mbgnet.net/bioplants/main.html>

<http://www.enchantedlearning.com/subjects/plants/>

<http://urbanext.illinois.edu/gpe/index.cfm>

[http://www.bbc.co.uk/schools/scienceclips/ages/7\\_8/plants\\_grow.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/7_8/plants_grow.shtml)

<http://www.backyardnature.net/botany.htm>

<http://www.crickweb.co.uk/ks1science.html>

**Opportunities for Differentiation:** Differentiation and support tips, which includes suggestions for ELL, struggling students, and accelerated students, are available below the instructional practice section of each model lesson.

**Teacher Notes:**

**Career Ready Practices:** *In this unit the following career ready practices are addressed*

CRP1: Act as a reasonable and contributing citizen and employee

CRP2: Apply appropriate academic and technical skills

CRP3: Attend to personal health and financial well-being

CRP4: Communicate clearly and effectively and with reason

CRP5: Consider the environmental, social and economic impacts of decisions

CRP6: Demonstrate creativity and innovation

CRP7: Employ valid and reliable research strategies

CRP8: Utilize critical thinking to make sense of problems and persevere in solving them

CRP9: Model integrity, ethical leadership and effective management

CRP10: Plan education and career paths aligned to personal goals

CRP11: Use technology to enhance productivity

CRP12: Work productively in teams while using cultural global competence

**Prior Learning- by the end of Grade 1 , students understand that:**

**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.

**Grade 1 Unit 4: Light and Sound**

- Objects can be seen if light is available to illuminate them or if they give off their own light.
- Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam.

**Evidence of Learning**

**Summative Assessment**

The Crayfish Student Journal, p. 53, Knowing Science, project may be used as a summative assessment.  
Rubric, p. 54, Knowing Science  
Animal Structures/Crayfish Test, p. 73-76, Knowing Science  
Crayfish projects, p. 77, Knowing Science  
The Plant Observation Journal, p. 117, Knowing Science  
Rubric, p. 145, Knowing Science  
Activity Sheet 7, p. 163, Knowing Science

**Equipment needed:** Whiteboard, laptops, headphones, and hands-on materials for lessons

**Teacher Instructional Resources (Hyperlinks):**

**[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.

## **Modifications for ELL's, Special Education, 504, and Gifted and Talented Students:**

*(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: [All Standards, 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 principles  
 ([http://www.cast.org/our-work/about-udl.html#.VXmoXcfD\\_UA](http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA))

<b><u>ACTIVITIES</u></b>	<b><u>MATERIALS</u></b>
<b>1.1: Animal Classification</b> Session 1 Compare and review traits of living and nonliving things	
<b>1.1: Animal Classification</b> Session 2 Compare traits of vertebrates and invertebrates	
<b>1.1: Animal Classification</b> Session 3 Explain how animals' physical structures and body coverings may be used to classify them	Go on an "animal scavenger hunt" around the schoolyard, nearby nature trail, or local neighborhood. Have students record the names of animals they observe.
<b>1.1: Animal Classification</b> Session 4 Explain how animals' physical structures and body coverings may be used to classify them	Visit a Natural History museum.
<b>1.1: Animal Classification</b> Session 5 Identify and compare observable characteristics of each major vertebrate group	
<b>1.1: Animal Classification</b> Session 6 Compare animal groups	Create a classification system for non living objects in the classroom.
<b>1.2: Physical Structures, Survival, and Crayfish</b> Session 1 Prepare to work with crayfish	
<b>1.2: Physical Structures, Survival, and Crayfish</b> Session 2 Prepare to work with crayfish	
<b>1.2: Physical Structures, Survival, and Crayfish</b> Session 3	

<p>Associate the physical structures of animals with basic needs                  Identify, describe, and associate the physical structures and behaviors of crayfish with their basic needs.  <b>Crayfish will need to be ordered in a timely manner.</b></p>	
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 4                  Associate the physical structures of animals with survival behaviors</p>	<p>Research on other animals and how they use their physical structures to survive.</p>
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 5                  Measure crayfish physical structure</p>	
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 6                  Measure crayfish physical structure</p>	
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 7                  Study crayfish behavior</p>	
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 8                  Study crayfish behavior</p>	
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 9                  Associate animal senses with survival behaviors</p>	
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 10                  Compare natural and classroom crayfish habits</p>	
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 11                  Design and construct a “prosthetic device” to replace a lost crayfish physical structure</p>	<p>Design modifications to the crayfish school environment.</p>
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 12                  Design and construct a “prosthetic device” to replace a lost crayfish physical structure</p>	
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 13</p>	



<p>Design and construct a “prosthetic device” to replace a lost crayfish physical structure</p>	
<p><b>1.2: Physical Structures, Survival, and Crayfish</b>                  Session 14                  Design and construct a “prosthetic device” to replace a lost crayfish physical structure</p>	
<p><b>1.3: Plant Structures and Survival</b>                  Session 1                  Introduce to basic needs of plants</p>	<p>Plant a Garden Box at least four weeks before. This will ensure that the seedlings will have developed roots, stems, leaves, and perhaps flowers that will be observable for lessons.</p>
<p><b>1.3: Plant Structures and Survival</b>                  Session 2                  Associate the physical structures of plants (roots, stems, leaves, flowers, and fruits) with basic needs of plants                  Associate the physical structures of plants with their specific functions and explain how these structures work together as a system in the plant</p>	
<p><b>1.3: Plant Structures and Survival</b>                  Session 3                  Associate the physical structures of plants (roots, stems, leaves, flowers, and fruits) with basic needs of plants                  Associate the physical structures of plants with their specific functions and explain how these structures work together as a system in the plant</p>	<p>Prepare a root viewer.</p>
<p><b>1.3: Plant Structures and Survival</b>                  Session 4                  Associate the physical structures of plants (roots, stems, leaves, flowers, and fruits) with basic needs of plants                  Associate the physical structures of plants with their specific functions and explain how these structures work together as a system in the plant</p>	
<p><b>1.3: Plant Structures and Survival</b>                  Session 5                  Associate the physical structures of plants (roots, stems, leaves, flowers, and fruits) with basic needs of plants                  Associate the physical structures of plants with their specific functions and explain how these structures work together as a system in the plant</p>	
<p><b>1.3: Plant Structures and Survival</b></p>	

<p>Session 6 Associate the physical structures of plants (roots, stems, leaves, flowers, and fruits) with basic needs of plants Associate the physical structures of plants with their specific functions and explain how these structures work together as a system in the plant</p>	
<p><b>1.4: Plant and Animal Seasonal Responses</b> Session 1 Describe how adaptations of plants allow them to respond to seasonal changes Carry out a guided inquiry about the effects of temperature on plants</p>	<p>Study local plants. (This will require multiple session along the school year.)</p>
<p><b>1.4: Plant and Animal Seasonal Responses</b> Session 2 Describe how adaptations of plants allow them to respond to seasonal changes Carry out a guided inquiry about the effects of temperature on plants</p>	
<p><b>1.4: Plant and Animal Seasonal Responses</b> Session 3 Describe how adaptations of animals allow them to respond to seasonal changes Compare seasonal behaviors of migration, hibernation and staying active Carry out a guided inquiry about the effects of temperature on animals</p>	<p>Research one or more animals that migrate.</p>
<p><b>1.4: Plant and Animal Seasonal Responses</b> Session 4 Describe how adaptations of animals allow them to respond to seasonal changes Compare seasonal behaviors of migration, hibernation and staying active Carry out a guided inquiry about the effects of temperature on animals</p>	
<p><b>1.4: Plant and Animal Seasonal Responses</b> Session 5+ Summarize the learning</p>	