K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment

Students who demonstrate understanding can:

**K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.** [Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water.]

**K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.** [Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digging in the ground to hide its food and tree roots can break concrete.]

**K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.** [Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas, and grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]

**K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.** [Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]

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### Science and Engineering Practices

**Developing and Using Models**
Modeling in K-2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions:
- Use a model to represent relationships in the natural world. (K-ESS3-1)

**Analyzing and Interpreting Data**
Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations.
- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)

**Engaging in Argument from Evidence**
Engaging in argument from evidence in K-2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).
- Construct an argument with evidence to support a claim. (K-ESS2-2)

**Obtaining, Evaluating, and Communicating Information**
Obtaining, evaluating, and communicating information in K-2 builds on prior experiences and uses observations and texts to communicate new information.
- Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)

### Disciplinary Core Ideas

**LS1.C: Organization for Matter and Energy Flow in Organisms**
- All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)

**ESS2.E: Biogeography**
- Plants and animals can change their environment. (K-ESS2-2)

**ESS3.A: Natural Resources**
- Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1)

**ESS3.C: Human Impacts on Earth Systems**
- Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (secondary to K-ESS2-2)(K-ESS3-3)

**ETS1.B: Developing Possible Solutions**
- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (secondary to K-ESS3-3)

### Crosscutting Concepts

**Patterns**
- Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1)

**Cause and Effect**
- Events have causes that generate observable patterns. (K-ESS3-3)

**Systems and System Models**
- Systems in the natural and designed world have parts that work together. (K-ESS2-2)(K-ESS3-1)

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### Connections to Nature of Science

**Scientific Knowledge is Based on Empirical Evidence**
- Scientists look for patterns and order when making observations about the world. (K-LS1-1)

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**Connections to other DCIs in kindergarten:** K.LES1.A (K-ESS3-3)

**Articulation of DCIs across grade bands:***
- K.LES1.A (K-LS1-1), (K-ESS3-1); 1.LES2.A (K-LS1-1); 3.LES2.C (K-LS1-1); 1.LS2.B (K-LS1-1); 3.LS2.A (K-LS1-1); 3.LS2.B (K-LS1-1); 4.LS2.C (K-LS1-1); 4.LS4.B (K-LS1-1); 4.ESS2.E (K-ESS2-2); 4.ESS3.A (K-ESS3-3); 5.LS1.C (K-LS1-1); 5.LS2.A (K-ESS3-1); 5.LS2.B (K-ESS3-1); 5.LS2.C (K-ESS3-1); 5.ESS2.A (K-ESS2-2)(K-ESS3-1); 5.ESS3.C (K-ESS3-3)

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**Common Core State Standards Connections:**

**ELA/Literacy**
- **W.K.1** Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book. (K-ESS2-2)
- **W.K.2** Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS2-2)(K-ESS3-3)
- **W.K.7** Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS1-1)
- **RL.K.1** With prompting and support, ask and answer questions about key details in a text. (K-ESS2-2)
- **SL.K.3** Add drawings or other visual displays to descriptions as desired to provide additional detail. (K-ESS3-1)

**Mathematics**
- **MP.2** Reason abstractly and quantitatively. (K-ESS3-1)
- **MP.4** Model with mathematics. (K-ESS3-1)
- **K.CC** Counting and Cardinality (K-ESS3-1)
- **K.MD.A.2** Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. (K-LS1-1)

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*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

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1. Structure, Function, and Information Processing

Students who demonstrate understanding can:

1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.* [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.]

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

<table>
<thead>
<tr>
<th>Constructing Explanations and Designing Solutions</th>
<th>Disciplinary Core Ideas</th>
<th>Crosscutting Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.</td>
<td>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.</td>
<td>Patterns</td>
</tr>
<tr>
<td>• Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS1-1)</td>
<td>• Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)</td>
<td>• The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)</td>
</tr>
<tr>
<td>• Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)</td>
<td>• 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. (1-LS1-1)</td>
<td>Connections to Engineering, Technology, and Applications of Science</td>
</tr>
</tbody>
</table>

Obtaining, Evaluating, and Communicating Information

| • Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2) | • 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. | • Every human-made product is designed by applying some knowledge of the natural world and is built by using natural materials. (1-LS1-1) |
| • Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1) | • Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2) | |
| • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS1-1) | • 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. (1-LS1-1) | |


April 2013 NGSS Release

10
2. Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

2-LS2-1. **Plan and conduct an investigation to determine if plants need sunlight and water to grow.** [Assessment Boundary: Assessment is limited to testing one variable at a time.]

2-LS2-2. **Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

2-LS4-1. **Make observations of plants and animals to compare the diversity of life in different habitats.** [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]

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

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### Science and Engineering Practices

#### Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.
- Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)

#### Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.
- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1)
- Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1)

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### Disciplinary Core Ideas

#### LS2.A: Interdependent Relationships in Ecosystems
- Plants depend on water and light to grow. (2-LS2-1)
- Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

#### LS4.D: Biodiversity and Humans
- There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)

ETS1.B: Developing Possible Solutions
- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (secondary to 2-LS2-2)

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### Crosscutting Concepts

#### Cause and Effect
- Events have causes that generate observable patterns. (2-LS2-1)

#### Structure and Function
- The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

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### Common Core State Standards Connections:

**ELA/Literacy -**
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1),(2-LS4-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1),(2-LS4-1)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-LS2-2)

**Mathematics -**
- MP.2 Reason abstractly and quantitatively. (2-LS2-1),(2-LS4-1)
- MP.4 Model with mathematics. (2-LS2-1),(2-LS2-2),(2-LS4-1)
- MP.5 Use appropriate tools strategically. (2-LS2-1)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems. (2-LS2-2),(2-LS4-1)

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April 2013
NGSS Release
14
3. Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

- **3-LS2-1.** Construct an argument that some animals form groups that help members survive.
- **3-LS4-1.** Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. [Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]
- **3-LS4-3.** Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.] [Assessment Boundary: Assessment does not include the greenhouse effect or climate change.]
- **3-LS4-4.** Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.* [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change.]

### Science and Engineering Practices

Analyzing and Interpreting Data

Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)

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 worlds.

- Construct an argument with evidence, data, and/or a model. (3-LS2-1)
- Construct an argument with evidence. (3-LS4-3)
- Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4)

### Disciplinary Core Ideas

**LS2.C: Ecosystem Dynamics, Functioning, and Resilience**

- When the environment changes in ways that affect a place’s physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4)

**LS2.D: Social Interactions and Group Behavior**

- Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. (Note: Moved from K–2) (3-LS2-1)

**LS4.A: Evidence of Common Ancestry and Diversity**

- Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (Note: Moved from K–2) (3-LS4-1)
- Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)

**LS4.C: Adaptation**

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

**LS4.D: Biodiversity and Humans**

- Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

### Crosscutting Concepts

**Cause and Effect**

- Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1), (3-LS4-3)

**Scale, Proportion, and Quantity**

- Observable phenomena exist from very short to very long time periods. (3-LS4-1)

**Systems and System Models**

- A system can be described in terms of its components and their interactions. (3-LS4-4)

### Connections to Engineering, Technology, and Applications of Science

**Interdependence of Science, Engineering, and Technology**

- Knowledge of relevant scientific concepts and research findings is important in engineering. (3-LS4-3)

### Connections to Nature of Science

**Scientific Knowledge Assumes an Order and Consistency in Natural Systems**

- Science assumes consistent patterns in natural systems. (3-LS4-1)

**Science is a Human Endeavor**

- Most scientists and engineers work in teams. (3-LS4-3)

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*The performance expectations marked with an asterisk indicate traditional science content with engineering through a Practice or Disciplinary Core Idea.*
3.Inheritance and Variation of Traits: Life Cycles and Traits

Students who demonstrate understanding can:

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]

3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. [Clarification Statement: Patterns are the similarities in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment. [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]

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

- 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 models to describe phenomena. (3-LS1-1)

- Analyzing and Interpreting Data
  - Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations.
  - When possible and feasible, digital tools should be used.
  - Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)

- Constructing Explanations and Designing Solutions
  - Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.
  - Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2)
  - Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)

Disciplinary Core Ideas

- LS1.B: Growth and Development of Organisms
  - Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

- LS3.A: Inheritance of Traits
  - Many characteristics of organisms are inherited from their parents. (3-LS3-1)
  - Other characteristics result from individuals’ interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS2-3)

- LS3.B: Variation of Traits
  - Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)
  - The environment also affects the traits that an organism develops. (3-LS3-2)

- LS4.B: Natural Selection
  - Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)

Crosscutting Concepts

- Patterns
  - Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1)
  - Patterns of change can be used to make predictions. (3-LS1-1)

- Cause and Effect
  - Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2), (3-LS4-2)

Scientific Knowledge is Based on Empirical Evidence

- Science findings are based on recognizing patterns. (3-LS1-1)

Connections to Nature of Science

Alighting of DCIs across grade-bands: 1.LS3.A (3-LS3-1), (3-LS4-2); 1.LS3.B (3-LS3-1); MS.LS1.B (3-LS1-1), (3-LS2-3); MS.LS2.A (3-LS4-2); MS.LS3.A (3-LS3-1), (3-LS3-2); MS.LS3.B (3-LS3-1), (3-LS4-2); MS.LS4.B (3-LS4-2)

Common Core State Standards Connections:

ELA/Literacy –

RI.3.1. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS3-1), (3-LS3-2), (3-LS4-2)

RI.3.2. Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS3-1), (3-LS3-2), (3-LS4-2)

RI.3.3. Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS3-1), (3-LS3-2), (3-LS4-2)

RI.3.6. Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-LS1-1)

W.3.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-1), (3-LS3-2), (3-LS4-2)

SL.3.4. Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS3-1), (3-LS3-2), (3-LS4-2)

SL.3.5. Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. (3-LS1-1)

Mathematics –

MP.2. Reason abstractly and quantitatively. (3-LS3-1), (3-LS3-2)

MP.4. Model with mathematics. (3-LS3-1), (3-LS3-2)

3.NBT. Number and Operations in Base Ten. (3-LS1-1)

3.NF. Number and Operations—Fractions. (3-LS1-1)

3.MD.8.3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. (3-LS3-2)

3.MD.8.4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS3-1), (3-LS3-2)

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April 2013

20
# 4. Structure, Function, and Information Processing

## 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.** (4-PS4-2)
- **Use a model to test interactions concerning the functioning of a natural system.** (4-LS1-2)

## 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.** (4-LS1-1)

## Crosscutting Concepts

### Cause and Effect
- Cause and effect relationships are routinely identified. (4-PS4-2)

### Systems and System Models
- A system can be described in terms of its components and their interactions. (4-LS1-1), (LS1-2)

## Disciplinary Core Ideas

### PS4.B: Electromagnetic Radiation
- An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)

### LS1.A: Structure and Function
- Plants and animals have both internal and external structures that function to support survival, growth, behavior, and reproduction. (4-LS1-1)

### LS1.D: Information Processing
- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal’s brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)

## Common Core State Standards Connections:

### ELA/Literacy –

| **W.4.1** | Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1) |
| **SL.4.5** | Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-2), (4-LS1-2) |

### Mathematics –

| **MP.4** | Model with mathematics. (4-PS4-1), (4-PS4-2) |
| **4.G.A.1** | Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-2) |
| **4.G.A.3** | 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) |

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5. Matter and Energy in Organisms and Ecosystems

5-PS3.1. Use models to describe that energy in animals’ food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. [Clarification Statement: Examples of models could include diagrams, and flow charts.]

5-LS1.1. Support an argument that plants get the materials they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]

5-LS2.1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. [Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]

Science and Engineering Practices

- Developing and Using Models: Model 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.
  - Use models to describe phenomena. (5-PS3-1)
  - Develop a model to describe phenomena. (5-LS2-1)
- 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).
  - Support an argument with evidence, data, or a model. (5-LS1-1)

Disciplinary Core Ideas

- PS3.D: Energy in Chemical Processes and Everyday Life
  - The energy released [from food] was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)

  - Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)
  - Plants acquire their material for growth chiefly from air and water. (5-LS1-1)

- LS2.A: Interdependent Relationships in Ecosystems
  - The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

- LS2.B: Cycles of Matter and Energy Transfer in Ecosystems
  - Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)

Crosscutting Concepts

- Systems and System Models
  - A system can be described in terms of its components and their interactions. (5-LS2-1)

- Energy and Matter
  - Matter is transported into, out of, and within systems. (5-LS1-1)
  - Energy can be transferred in various ways and between objects. (5-PS3-1)

Common Core State Standards Connections:

ELA/Literacy –

- RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-LS1-1)
- RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS3-1)(5-LS2-1)

Mathematics –

- MP.2 Reason abstractly and quantitatively. (5-LS2-1)
- MP.4 Model with mathematics. (5-LS2-1)
- 5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. (5-LS2-1)

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea. The section entitled “Disciplinary Core Ideas” is reproduced verbatim from A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas. Integrated and reprinted with permission from the National Academy of Sciences.