

## 1st Grade - Thematic Model - Bundle 4 Patterns in the Natural World

*This is the fourth bundle of the 1<sup>st</sup> Grade Thematic Model. Each bundle has connections to the other bundles in the course, as shown in the [Course Flowchart](#).*

*Bundle 4 Question: This bundle is assembled to address the question “how do patterns related to sunlight throughout the year as well as to relationships between parents and offspring?”*

### **Summary**

The bundle organizes performance expectations around the theme of *patterns in the natural world*, building student understanding of the traits of parents and their offspring and behaviors of parents and offspring, while concluding the study of light with seasonal change throughout the year. Instruction developed from this bundle should always maintain the three-dimensional nature of the standards, but recognize that instruction is not limited to the practices and concepts directly linked with any of the bundle performance expectations.

### **Connections between bundle DCIs**

The idea that adult plants and animals can have young, and that parents and the offspring themselves can sometimes engage in behaviors that help the offspring to survive (LS1.B as in 1-LS1-2) connects to the idea that young animals are very much, but not exactly like, their parents (LS3.A as in 1-LS3-1). There are observable patterns of these relationships between parents and their offspring.

Through the concept of patterns, these ideas about the patterns of relationships between parents and offspring can connect to the idea that seasonal patterns of sunrise and sunset can be observed, described, and predicted (ESS1.B as in 1-ESS1-2).

### **Bundle Science and Engineering Practices**

Instruction leading to this bundle of PEs will help students build toward proficiency in elements of the practices of planning and carrying out investigations (1-ESS1-2), constructing explanations and designing solutions (1-LS3-1), and obtaining, evaluating, and communicating information (1-LS1-2). Many other practice elements can be used in instruction.

### **Bundle Crosscutting Concepts**

Instruction leading to this bundle of PEs will help students build toward proficiency in elements of the crosscutting concept of Patterns (1-LS1-2, 1-LS3-1 and 1-ESS1-2). Many other crosscutting concepts elements can be used in instruction.

*All instruction should be three-dimensional.*

<b>Performance Expectations</b>	<p>1-LS1-2 <b>Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</b> <b>[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).]</b></p> <p>1-LS3-1 <b>Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.</b> <b>[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.]</b></p> <p>1-ESS1-2 <b>Make observations at different times of year to relate the amount of daylight to the time of year.</b> <b>[Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]</b></p>
<b>Example Phenomena</b>	<p>Puppies look similar to their mother.</p> <p>When babies cry, their parents usually feed them.</p>
<b>Additional Practices Building to the PEs</b>	<p><b>Asking Questions and Defining Problems</b></p> <ul style="list-style-type: none"> <li>Ask questions based on observations to find more information about the natural world.</li> </ul> <p>Students could <i>ask questions to find more information based on observations</i> [of] <b><i>behaviors parents and offspring engage in that help the offspring survive.</i></b> 1-LS1-2</p> <p><b>Developing and Using Models</b></p> <ul style="list-style-type: none"> <li>Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).</li> </ul> <p>Students could <i>develop a model to represent the relationships</i> [between] <b><i>behaviors parents and offspring engage in</i></b> [and] <b><i>offspring survival.</i></b> 1-LS1-2</p> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to collect data that can be used to make comparisons.</li> </ul> <p>Students could <i>make observations to collect data that can be used to make comparisons</i> [between] <b><i>individuals of the same kind of plant</i></b> [to see how similar or varied they are]. 1-LS3-1</p> <p><b>Analyzing and Interpreting Data</b></p> <ul style="list-style-type: none"> <li>Use and share pictures, drawings, and/or writings of observations.</li> </ul> <p>Students could <i>use pictures of young animals and their parents</i> [to help them support the idea that] <b><i>young animals are very much, but not exactly like, their parents.</i></b> 1-LS3-1</p> <p><b>Using Mathematical and Computational Thinking</b></p> <ul style="list-style-type: none"> <li>Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs.</li> </ul> <p>Students could <i>describe, measure, and/or compare quantitative attributes of seasonal patterns of sunrise and sunset and display the data using simple graphs.</i> 1-ESS1-2</p>

	<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. Students could <i>make observations (firsthand or from media) to construct an evidence-based account for <b>parents engaging in</b> [certain] <b>behaviors</b>, [such as feeding their offspring].</i> 1-LS1-2</li> </ul> <p><b>Engaging in Argument From Evidence</b></p> <ul style="list-style-type: none"> <li>● Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument. Students could <i>listen actively to arguments [related to] <b>seasonal patterns of sunrise and sunset</b> to indicate agreement or disagreement based on evidence, or to retell the main points of the argument.</i> 1-ESS1-2</li> </ul> <p><b>Obtaining, Evaluating, and Communicating Information</b></p> <ul style="list-style-type: none"> <li>● Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea. Students could <i>describe how specific images support [the] scientific idea [that] <b>plants are very much, but not exactly, like their parents.</b></i> 1-LS3-1</li> </ul>
<b>Additional Crosscutting Concepts Building to the PEs</b>	<p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>● Events have causes that generate observable patterns. Students could describe <i>that events have causes that generate observable patterns [using the] <b>behaviors parents and offspring engage in that help the offspring to survive</b> [as an example].</i> 1-LS1-2</li> </ul> <p><b>Scale, Proportion, and Quantity</b></p> <ul style="list-style-type: none"> <li>● Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; faster and slower). Students could use <i>relative scales to compare and describe [how] <b>individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.</b></i> 1-LS3-1</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>● Things may change slowly or rapidly. Students could describe that <i>things may change slowly, [such as the change in] <b>sunrise and sunset</b> [over the course of the year] or rapidly, [such as the daily change in the sun's position between] <b>sunrise and sunset.</b></i> 1-ESS1-2</li> </ul>
<b>Additional Connections to Nature of Science</b>	<p><b>Scientific Investigations Use a Variety of Methods</b></p> <ul style="list-style-type: none"> <li>● Science investigations begin with a question. Students could describe that <i>science investigations begin with a question, [just as their investigations about] <b>seasonal patterns of sunrise and sunset began with a question</b> [they were curious about].</i> 1-ESS1-2</li> </ul> <p><b>Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena</b></p> <ul style="list-style-type: none"> <li>● Scientists search for cause and effect relationships to explain natural events. Students could describe that <i>scientists search for cause and effect relationships to explain natural events [such as the relationship between parental] <b>behavior</b> [and] <b>offspring survival.</b></i> 1-LS1-2</li> </ul>

## 1-LS1-2 From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

- 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).]

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

### Science and Engineering Practices

#### 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.

- Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world.

#### Connections to Nature of Science

#### Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world.

### Disciplinary Core Ideas

#### LS1.B: Growth and Development of Organisms

- 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.

### Crosscutting Concepts

#### Patterns

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

## Observable features of the student performance by the end of the grade:

1	Obtaining information	
	a	Students use grade-appropriate books and other reliable media to obtain the following scientific information:
		i. Information about the idea that both plants and animals can have offspring.
		ii. Information about behaviors of animal parents that help offspring survive (e.g., keeping offspring safe from predators by circling the young, feeding offspring).
		iii. Information about behaviors of animal offspring that help the offspring survive (e.g., crying, chirping, nuzzling for food).
2	Evaluating information	
	a	Students evaluate the information to determine and describe* the patterns of what animal parents and offspring do to help offspring survive (e.g., when a baby cries, the mother feeds it; when danger is present, parents protect offspring; some young animals become silent to avoid predators).

## 1-LS3-1 Heredity: Inheritance and Variation of Traits

Students who demonstrate understanding can:

- 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 expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

### Science and Engineering Practices

#### Constructing Explanations and Designing Solutions

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.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.

### Disciplinary Core Ideas

#### LS3.A: Inheritance of Traits

- Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents.

#### LS3.B: Variation of Traits

- Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.

### Crosscutting Concepts

#### Patterns

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

## Observable features of the student performance by the end of the grade:

1	Articulating the explanation of phenomena								
a	Students articulate a statement that relates a given phenomenon to a scientific idea, including the idea that young plants and animals are like, but not exactly like, their parents (not to include animals that undergo complete metamorphoses, such as insects or frogs).								
b	Students use evidence and reasoning to construct an evidence-based account of the phenomenon.								
2	Evidence								
a	Students describe* evidence from observations (firsthand or from media) about patterns of features in plants and animals, including: <table border="1"> <tr> <td>i.</td><td>Key differences between different types of plants and animals (e.g., features that distinguish dogs versus those that distinguish fish, oak trees vs. bean plants).</td></tr> <tr> <td>ii.</td><td>Young plants and animals of the same type have similar, but not identical features (e.g., size and shape of body parts, color and/or type of any hair, leaf shape, stem rigidity).</td></tr> <tr> <td>iii.</td><td>Adult plants and animals (i.e., parents) of the same type have similar, but not identical features (e.g., size and shape of body parts, color and/or type of any hair, leaf shape, stem rigidity).</td></tr> <tr> <td>iv.</td><td>Patterns of similarities and differences in features between parents and offspring.</td></tr> </table>	i.	Key differences between different types of plants and animals (e.g., features that distinguish dogs versus those that distinguish fish, oak trees vs. bean plants).	ii.	Young plants and animals of the same type have similar, but not identical features (e.g., size and shape of body parts, color and/or type of any hair, leaf shape, stem rigidity).	iii.	Adult plants and animals (i.e., parents) of the same type have similar, but not identical features (e.g., size and shape of body parts, color and/or type of any hair, leaf shape, stem rigidity).	iv.	Patterns of similarities and differences in features between parents and offspring.
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iv.	Patterns of similarities and differences in features between parents and offspring.								
3	Reasoning								
a	Students logically connect the evidence of observed patterns in features to support the evidence-based account by describing* chains of reasoning that include: <table border="1"> <tr> <td>i.</td><td>Young plants and animals are very similar to their parents.</td></tr> <tr> <td>ii.</td><td>Young plants and animals are not exactly the same as their parents.</td></tr> <tr> <td>iii.</td><td>Similarities and differences in features are evidence that young plants and animals are very much, but not exactly, like their parents.</td></tr> <tr> <td>iv.</td><td>Similarities and differences in features are evidence that although individuals of the same type of animal or plant are recognizable as similar, they can also vary in many ways.</td></tr> </table>	i.	Young plants and animals are very similar to their parents.	ii.	Young plants and animals are not exactly the same as their parents.	iii.	Similarities and differences in features are evidence that young plants and animals are very much, but not exactly, like their parents.	iv.	Similarities and differences in features are evidence that although individuals of the same type of animal or plant are recognizable as similar, they can also vary in many ways.
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iv.	Similarities and differences in features are evidence that although individuals of the same type of animal or plant are recognizable as similar, they can also vary in many ways.								

## 1-ESS1-2 Earth's Place in the Universe

Students who demonstrate understanding can:

- 1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year.** [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]

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

### Science and Engineering Practices

#### 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.

- Make observations (firsthand or from media) to collect data that can be used to make comparisons.

### Disciplinary Core Ideas

#### ESS1.B: Earth and the Solar System

- Seasonal patterns of sunrise and sunset can be observed, described, and predicted.

### Crosscutting Concepts

#### Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.

## Observable features of the student performance by the end of the grade:

1	Identifying the phenomenon under investigation
a	Students identify and describe* the phenomenon and purpose of the investigation, which include the following idea: the relationship between the amount of daylight and the time of year.
2	Identifying evidence to address the purpose of the investigation
a	Based on the given plan for the investigation, students (with support) describe* the data and evidence that will result from the investigation, including observations (firsthand or from media) of relative length of the day (sunrise to sunset) throughout the year.
b	Students individually describe* how these observations could reveal the pattern between the amount of daylight and the time of year (i.e., relative lightness and darkness at different relative times of the day and throughout the year).
3	Planning the investigation
a	Based on the given investigation plan, students describe* (with support):
i.	How the relative length of the day will be determined (e.g., whether it will be light or dark when waking in the morning, at breakfast, when having dinner, or going to bed at night).
ii.	When observations will be made and how they will be recorded, both within a day and across the year.
4	Collecting the data
a	According to the given investigation plan, students collaboratively make and record observations about the relative length of the day in different seasons to make relative comparisons between the amount of daylight at different times of the year (e.g., summer, winter, fall, spring).