



West Windsor-Plainsboro Regional School District  
Science Curriculum  
Grade 1 - Characteristics of Living Things

## **The Mission of the West Windsor-Plainsboro Science Department**

Our mission is to cultivate science learners who have the foundational knowledge to make ethical, scientifically literate decisions and the ability to apply scientific practices in order to contribute to the needs of society and a changing world.

- **Vision**

We envision a K-12 science experience that supports and challenges every student in their science learning journey. We will:

- Capitalize on diversity by reaching and exciting students at all levels and interests by differentiating learning within classrooms and by offering a robust program of studies.
- Emphasize authentic science and engineering practices and leverage the interdisciplinary nature of science with arts, technology, math, reading, and writing.
- Integrate scientific knowledge and 21st century competencies to prepare students to make informed decisions and take action to address real world problems.
- Cultivate an inclusive and diverse community where all learners are welcomed, valued, respected, and celebrated.

Unit: Characteristics of Living Things	
<b>Content Area: Science</b>	
<b>Course &amp; Grade Level: Life Science, First Grade</b>	
Summary and Rationale	
<p>Part 1: Traits and Behaviors in Parents and Their Offspring - Students will make observations about adults and young of different plant and animals and learn that the offspring look like/act like their parents but also have differences. Students will learn vocabulary to describe characteristics and parts of animals and plants. Then students will work in stations and use texts and media to determine patterns in behavior of parents and offspring that help offspring survive. The students will make observations to construct an evidence-based claim that young plants and animals are alike, but not exactly like, their parents.</p> <p>Part 2: Biomimicry - Students will understand the idea of biomimicry. Students will use the principles of engineering to construct a device that offers a possible solution to a human problem by mimicking a plant or animal.</p> <p>Part 3: Climate Change Activism - Students will learn what activism is and what it means to be an activist. Students will study an animal that is in danger due to climate change. After learning about the problems the animal faces, students will develop an action plan and begin to act on their plan.</p>	
Recommended Pacing	
20 days	
New Jersey Student Learning Standards for	
<b>Standard: Standards for Part 1: Traits and Behaviors in Parents and Their Offspring</b>	
CPI #	Cumulative Progress Indicator (CPI)
1-LS3-1	<i>Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.</i>
1-LS1-2	<i>Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</i>
<b>Standard: Standards for Part 2: Biomimicry</b>	
CPI #	Cumulative Progress Indicator (CPI)
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.
1-LS1-2	<i>Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</i>
<b>Standard: Standards for Part 3: Climate Change Activism</b>	
CPI #	Cumulative Progress Indicator (CPI)
K-ESS3-3	Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment.
K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.
<b>Science and Engineering Practices</b>	
<u>Constructing Explanations and Designing Solutions</u> 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.	

(1-LS3-1)

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. (1-LS1-2)

**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. (1- LS3-1)

**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. (1-LS3-1)

**LS1.A: Structure and Function**

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. (1-LS1-1)

**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. (1-LS1-2)

**LS1.D: Information Processing**

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)

**Crosscutting Concepts**

**Patterns**

Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS3-1, 1-LS1-2)

**Structure and Function**

The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)

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

**Influence of Engineering, Technology, and Science on Society and the Natural World**

Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)

*Connections to Nature of Science*

**Scientific Knowledge is Based on Empirical Evidence**

Scientists look for patterns and order when making observations about the world. (1-LS1-2)

**New Jersey Student Learning Standards for English Language Arts  
Companion Standards**

<b>Standard:</b>	
<b>CPI #</b>	<b>Cumulative Progress Indicator (CPI)</b>
RL.1.1	Ask and answer questions about key details in a text.
RL.1.2	Identify the main topic and retell key details of a text.
RL.1.10	With prompting and support, read and comprehend stories and poetry at grade level text complexity or above.
W.1.7	Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).
W.1.8	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
<b>New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills</b>	
<b>CPI #</b>	<b>Cumulative Progress Indicator (CPI)</b>
9.1.2.CR.1	Recognize ways to volunteer in the classroom, school and community.
9.1.2.CR.2	List ways to give back, including making donations, volunteering, and starting a business.
9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem
9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive)
9.4.2.DC.7	Describe actions peers can take to positively impact climate change
9.4.2.IML.3	Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults
<b>Interdisciplinary Standards</b>	
<b>CPI #</b>	<b>Cumulative Progress Indicator (CPI)</b>
1.NBT.B.3	Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols $>$ , $=$ , and $<$ .
1.NBT.C.4	Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
1.NBT.C.5	Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.
1.NBT.C.6	Subtract multiples of 10 in the range 10–90 from multiples of 10 in the range 10–90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
1.MD.A.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object.
MP.2	Reason abstractly and quantitatively.
MP.5	Use appropriate tools strategically.
Standard 6.1	U.S. History: America in the World - All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities
<b>Instructional Focus</b>	
<b>Unit Enduring Understandings</b>	

<ul style="list-style-type: none"> <li>• Parents and their offspring have similarities and differences.</li> <li>• Humans can use the characteristics and traits of plants and animals to invent something to solve a problem.</li> <li>• People can counteract the effects of climate change.</li> </ul>
<b>Unit Essential Questions</b>
<ul style="list-style-type: none"> <li>• How are parents and their offspring alike and different?</li> <li>• How can people use characteristics and traits of plants and animals?</li> <li>• How can people reverse the effects of climate change?</li> </ul>
<b>Objectives</b>
<p><b>We will know/learn that/to:</b></p> <ul style="list-style-type: none"> <li>• Describe the different behavior of parents and offspring that help offspring survive.</li> <li>• Compare and contrast external parts of different organisms and compare parents and offspring of the same organism</li> <li>• Collect and use evidence to support a statement about differences and similarities between parents and offspring</li> <li>• Define biomimicry</li> <li>• Compare and contrast plants and animals and inventions</li> <li>• Identify examples of biomimicry</li> <li>• Use the engineering process to help create an invention</li> <li>• Identify a human problem that could possibly be solved with biomimicry</li> <li>• Design and create an invention using biomimicry</li> <li>• Explain biomimicry and how it is beneficial for humans</li> <li>• Use the principles of engineering to construct a device that offers a solution to a human problem by mimicking a plant or animal.</li> <li>• Describe what activism, being an activist is.</li> <li>• Kids can be activists, too.</li> <li>• Students will identify a problem</li> <li>• Students will develop an action plan to address a problem</li> <li>• Students will present their action plan to an authentic audience</li> </ul>
<b>Evidence of Learning</b>
<b>Assessment</b>
<p>Observations  <a href="#">argument and evidence report</a>            Biomimicry STEAM project  <a href="#">Design Solution to a problem</a>            Climate change action plan</p>
<b>Resources</b>
<b>Core Text:</b>

### NGSS Lesson Planning Template

<b>Grade/ Grade Band:</b> 1	<b>Topic:</b> Traits and Behaviors in Parents and Offspring	<b>Lesson # 1 in a series of 9 lessons</b> <b>Launch Lesson</b>
<p><b>Brief Lesson Description:</b>            Begin with phenomena of adults and young of different plants and animals and make observations that the offspring look like/act like their parents but also have differences and make an evidence-based statement.</p>		

**Performance Expectation(s):**

*1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.*

*1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.*

**Specific Learning Outcomes:**

- Describe the different behavior of parents and offspring that help offspring survive.
- Compare and contrast external parts of different organisms and compare parents and offspring of the same organism
- Collect and use evidence to support a statement about differences and similarities between parents and offspring

**Narrative / Background Information****Prior Student Knowledge:**

- Basic parts of plants and other organisms

**Science & 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. (1-LS3-1)

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. (1-LS1-2)

**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. (1-LS3-1)

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. (1-LS3-1)

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. (1-LS1-2)

**Crosscutting Concepts:**

Patterns: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS3-1, 1-LS1-2)

**Possible Preconceptions/Misconceptions:** Not all students will understand that offspring come from parents; names of parent (adult organism) and child (offspring).

## LESSON PLAN – 5-E Model

<b>Grade/ Grade Band:</b> 1	<b>Topic:</b> Traits and Behaviors in Parents and Offspring	<b>Lesson # 2 in a series of 9 lessons</b>
<b>Brief Lesson Description:</b> The students explore characteristics and parts of animals/plants vocabulary needed to accurately make observations during later stations.		
<b>Performance Expectation(s):</b>  <i>1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.</i>  <i>1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</i>		
<b>Specific Learning Outcomes:</b> <ul style="list-style-type: none"> <li>Describe the different behavior of parents and offspring that help offspring survive.</li> <li>Compare and contrast external parts of different organisms and compare parents and offspring of the same organism</li> <li>Collect and use evidence to support a statement about differences and similarities between parents and offspring</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> <ul style="list-style-type: none"> <li>Basic parts of plants and other organisms</li> </ul>		
<b>Science &amp; Engineering Practices:</b> <u>Constructing Explanations and Designing Solutions</u> 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. (1-LS3-1)	<b>Disciplinary Core Ideas:</b> 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. (1- LS3-1)  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. (1-LS3-1)  LS1.B: Growth and Development of Organisms	<b>Crosscutting Concepts:</b> Patterns: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS3-1, 1-LS1-2)



<u>Obtaining, Evaluating, and Communicating Information</u> 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. (1-LS1-2)	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)	
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1	<b>Topic:</b> Traits and Behaviors in Parents and Offspring	<b>Lesson # 3 in a series of 9 lessons</b>
<b>Brief Lesson Description:</b> The students explore characteristics and parts of animals/plants vocabulary needed to accurately make observations during later stations.		
<b>Performance Expectation(s):</b>  <i>1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.</i>  <i>1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</i>		
<b>Specific Learning Outcomes:</b> <ul style="list-style-type: none"> <li>Describe the different behavior of parents and offspring that help offspring survive.</li> <li>Compare and contrast external parts of different organisms and compare parents and offspring of the same organism</li> <li>Collect and use evidence to support a statement about differences and similarities between parents and offspring</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> <ul style="list-style-type: none"> <li>Basic parts of plants and other organisms</li> </ul>		

<p><b>Science &amp; Engineering Practices:</b>  <u>Constructing Explanations and Designing Solutions</u>          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. (1-LS3-1)</p> <p><u>Obtaining, Evaluating, and Communicating Information</u>          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. (1-LS1-2)</p>	<p><b>Disciplinary Core Ideas:</b>          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. (1- LS3-1)</p> <p>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. (1-LS3-1)</p> <p>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. (1-LS1-2)</p>	<p><b>Crosscutting Concepts:</b>          Patterns: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS3-1, 1-LS1-2)</p>
<p><b>Possible Preconceptions/Misconceptions:</b></p>		
<p><b>LESSON PLAN – 5-E Model</b></p>		

<p><b>Grade/ Grade Band:</b> 1</p>	<p><b>Topic:</b> Traits and Behaviors in Parents and Offspring</p>	<p><b>Lesson # 4 in a series of 9 lessons</b></p>
<p><b>Brief Lesson Description:</b>          The students will work in stations and use texts and media to determine patterns in behavior of parents and offspring that help offspring survive. The students will make observations to construct an evidence-based claim that young plants and animals are alike, but not exactly like, their parents.</p>		
<p><b>Performance Expectation(s):</b></p> <p><i>1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.</i></p> <p><i>1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</i></p>		
<p><b>Specific Learning Outcomes:</b></p> <ul style="list-style-type: none"> <li>Describe the different behavior of parents and offspring that help offspring survive.</li> </ul>		

- Compare and contrast external parts of different organisms and compare parents and offspring of the same organism
- Collect and use evidence to support a statement about differences and similarities between parents and offspring

### **Narrative / Background Information**

#### **Prior Student Knowledge:**

- Basic parts of plants and other organisms

#### **Science & 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. (1-LS3-1)

##### 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. (1-LS1-2)

#### **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. (1-LS3-1)

##### 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. (1-LS3-1)

##### 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. (1-LS1-2)

#### **Crosscutting Concepts:**

Patterns: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS3-1, 1-LS1-2)

#### **Possible Preconceptions/Misconceptions:**

### **LESSON PLAN – 5-E Model**

**Grade/ Grade Band:** 1

**Topic:** Biomimicry: Lesson 1

**Lesson # 5 in a series of 9 lessons**

#### **Brief Lesson Description:**

The students will begin to understand the idea of biomimicry

**Performance Expectation(s):**

*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.\**

*1-LS1-2 Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.*

**Specific Learning Outcomes:**

- Define biomimicry
- Compare and contrast plants and animals and inventions
- Identify examples of biomimicry

**Narrative / Background Information****Prior Student Knowledge:**

- Basic parts of plants and other organisms
- Traits and behaviors of plants/animals and their offspring

**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.

Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)

**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. (1-LS1-2)

**Disciplinary Core Ideas****LS1.A: Structure and Function**

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. (1-LS1-1)

**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. (1-LS1-2)

**LS1.D: Information Processing**

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

**Crosscutting Concepts:**

**Patterns:** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2)

**Structure and Function** The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)

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

Influence of Engineering, Technology, and Science on Society and the Natural World

Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)

*Connections to Nature of Science*

	help them survive. Plants also respond to some external inputs. (1-LS1-1)	Scientific Knowledge is Based on Empirical Evidence Scientists look for patterns and order when making observations about the world. (1-LS1-2)
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1	<b>Topic:</b> Biomimicry STEAM Project: Lesson 2 (This lesson could be split into multiple days)	<b>Lesson #6 in a series of 9 lessons</b>
<b>Brief Lesson Description:</b> The students will begin to use the principles of engineering to construct a device that offers a possible solution to a human problem by mimicking a plant or animal.		
<b>Performance Expectation(s):</b>  <i>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. *</i>  <i>1-LS1-2 Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</i>		
<b>Specific Learning Outcomes:</b> <ul style="list-style-type: none"> <li>• Use the engineering process to help create an invention</li> <li>• Identify a human problem that could possibly be solved with biomimicry</li> <li>• Design and create an invention using biomimicry</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> <ul style="list-style-type: none"> <li>• Basic parts of plants and other organisms</li> <li>• Traits and behaviors of plants/animals and their offspring</li> <li>• Some examples of biomimicry</li> </ul>		
<b>Science and Engineering Practices</b>  <b>Constructing Explanations and Designing Solutions</b> Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in	<b>Disciplinary Core Ideas</b>  <b>LS1.A: Structure and Function</b> 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,	<b>Crosscutting Concepts:</b>  Patterns: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2)  Structure and Function: The

<p>constructing evidence-based accounts of natural phenomena and designing solutions.</p> <p>Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)</p> <p><b>Obtaining, Evaluating, and Communicating Information</b> Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.</p> <p>Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2)</p>	<p>find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)</p> <p><b>LS1.B: Growth and Development of Organisms</b> 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)</p> <p><b>LS1.D: Information Processing</b> 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)</p>	<p>shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)</p> <p><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Influence of Engineering, Technology, and Science on Society and the Natural World</p> <p>Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)</p> <p><i>Connections to Nature of Science</i></p> <p>Scientific Knowledge is Based on Empirical Evidence Scientists look for patterns and order when making observations about the world. (1-LS1-2)</p>
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

### NGSS Lesson Planning Template

<b>Grade/ Grade Band:</b> 1	<b>Topic:</b> Favorable Traits and Mimicking	<b>Lesson # 7 in a series of 9 lessons</b>
<p><b>Brief Lesson Description:</b></p> <p>The lesson will begin with an anchor chart on biomimicry to see if students have any ideas what this word means. Then several activities or readings will be explored to cite examples of biomimicry. Once there is an understanding of biomimicry, students will work in pairs or small groups to match plant and animal cards with an invention that is similar and record their findings. Students come back together to share out what objects they matched up, and add to the chart a column for “plant/animal feature” and “invention”. In the next phase of the lesson(s) students will identify a human problem and design a solution based off the traits of an animal or plant. Students will test their devices and make changes based on the results.</p>		
<p><b>Performance Expectation(s):</b></p> <p><i>1-LS1-1</i> 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.</p>		

**Specific Learning Outcomes:**

- Explain biomimicry and how it is beneficial for humans
- Students will use the principles of engineering to construct a device that offers a solution to a human problem by mimicking a plant or animal.

**Narrative / Background Information****Prior Student Knowledge:**

Plants and animals (including humans) have certain traits that are favorable and allow them to survive in certain situations. (Prior lessons from Traits and Behaviors in Parents and Offspring will supply prior knowledge)

**Science & 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.

Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)

**Disciplinary Core Ideas:**

## LS1.A: Structure and Function

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. (1-LS1-1)

## LS1.D: Information Processing

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 sur

**Crosscutting Concepts:**

## Structure and Function

The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)

**Possible Preconceptions/Misconceptions:** Students might have the misconception that plants and animals can choose their traits and that humans can use the actual plants or animals as the solution.

**LESSON PLAN – 5-E Model****Grade/ Grade Band:** 1st grade**Topic:** Activism/Climate Change**Lesson # 8 in a series of 9 lessons****Brief Lesson Description:**

Students will learn about other kids who are activists and what it is. Beginning with a phenomena of looking at various picture oi kids holding sign about climate change. Students will learn about what activism is and that kids can be activists too. Students will learn about Greta Thunberg, a climate activist.

**Performance Expectation(s):**

**K-ESS3-3** Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment.

**K-2-ETS1-1** Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.

**Specific Learning Outcomes:**

- Describe what activism, being an activist is.
- Kids can be activists, too.

**Narrative / Background Information**

**Prior Student Knowledge:**

This is the first opportunity for students to encounter these ideas.

**Science & 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. (1-LS1-2)

**Disciplinary Core Ideas:**

LS1.A: Structure and Function

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. (1-LS1-1)

LS1.B: Growth and Development of Organisms

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. (1-LS1-2)

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. (1-LS3-1)

**Crosscutting Concepts:**

Patterns

Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2)

Structure and Function

The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)

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

Influence of Engineering, Technology, and Science on Society and the Natural World

Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)

*Connections to Nature of Science*

Scientific Knowledge is Based on Empirical Evidence

Scientists look for patterns and order when making observations about the world. (1-LS1-2)

**Possible Preconceptions/Misconceptions:**

Students might think that they can't do anything to help the environment.

**LESSON PLAN – 5-E Model**

**Grade/ Grade Band:** 1st grade

**Topic:** Climate Change

**Lesson # 9 in a series of 9 lessons**



<b>Brief Lesson Description:</b> After learning about climate change and its effect on animals and the environment, students take action to counteract climate change. Students will decide how to present their project.		
<b>Performance Expectation(s):</b>  <u>K-ESS3-3</u> Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment. <b>K-2-ETS1-1</b> Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.		
<b>Specific Learning Outcomes:</b> <ul style="list-style-type: none"> <li>• Students will identify a problem</li> <li>• Students will develop an action plan to address a problem</li> <li>• Students will present their action plan to an authentic audience</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <u>Constructing Explanations and Designing Solutions</u> 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.  Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)  <u>Obtaining, Evaluating, and Communicating Information</u> 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	<b>Disciplinary Core Ideas:</b>  <u>LS1.A: Structure and Function</u> 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. (1-LS1-1)  <u>LS1.B: Growth and Development of Organisms</u> 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. (1-LS1-2)  <u>LS3.B: Variation of Traits</u> Individuals of the same kind of plant or animal are recognizable as similar but can	<b>Crosscutting Concepts:</b>  <u>Patterns</u> Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2)  <u>Structure and Function</u> The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)  <i>Connections to Engineering, Technology, and Applications of Science</i>  <u>Influence of Engineering, Technology, and Science on Society and the Natural World</u> Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)  <i>Connections to Nature of Science</i>  <u>Scientific Knowledge is Based on Empirical Evidence</u> Scientists look for patterns and order when making observations about the world. (1-LS1-2)

use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2)	also vary in many ways. (1-LS3-1)	
<b>Possible Preconceptions/Misconceptions:</b> Students might think that they are too young to do anything to help climate change/environment		
<b>LESSON PLAN – 5-E Model</b>		



West Windsor-Plainsboro Regional School District  
Science Curriculum  
Grade 1 - Light and Sound

## **The Mission of the West Windsor-Plainsboro Science Department**

Our mission is to cultivate science learners who have the foundational knowledge to make ethical, scientifically literate decisions and the ability to apply scientific practices in order to contribute to the needs of society and a changing world.

- **Vision**

We envision a K-12 science experience that supports and challenges every student in their science learning journey. We will:

- Capitalize on diversity by reaching and exciting students at all levels and interests by differentiating learning within classrooms and by offering a robust program of studies.
- Emphasize authentic science and engineering practices and leverage the interdisciplinary nature of science with arts, technology, math, reading, and writing.
- Integrate scientific knowledge and 21st century competencies to prepare students to make informed decisions and take action to address real world problems.

Unit : Light and Sound	
Content Area: Science	
Course & Grade Level: Grade 1 Light & Sound	
Summary and Rationale	
<p><b>Part 1 - Light and Sound</b></p> <p>In the first part of this unit of study, students develop an understanding of the relationship between sound and vibrating materials as well as between the availability of light and the ability to see objects. The idea that light travels from place to place can be understood by students at this level by placing objects made with different materials in the path of a beam of light and determining the effect of the different materials.</p> <p>The crosscutting concept of cause and effect is called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas.</p> <p><b>Part 2 - Communicating with Light and Sound: How would we communicate over a distance without the use of any of the devices that people currently use?</b></p> <p>In the second part of this unit of study, students continue to develop their understanding of the relationship between sound and vibrating materials as well as between the availability of light and the ability to see objects. Students apply their knowledge of light and sound to engage in engineering design to solve a simple problem involving communication with light and sound. The crosscutting concepts of structure and function and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in constructing explanations and designing solutions, asking questions and defining problems, and developing and using models. Students are also expected to use these practices to demonstrate understanding of the core ideas.</p> <p>This part of the unit is based on 1-PS4-4, K-2-ETS1-1, and K-2-ETS1-2.</p>	
Recommended Pacing	
20 days	
New Jersey Student Learning Standards for	
Standard: Standards for Part 1 - Light & Sound	
<a href="#"><u>1-PS4-2</u></a>	<b>Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.</b> [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]
<a href="#"><u>1-PS4-3</u></a>	<b>Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.</b> [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [Assessment Boundary: Assessment does not include the speed of light.]
<a href="#"><u>1-PS4-1</u></a>	<b>Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.</b> [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]

<b>Standard: Part 2 - Communicating with Light and Sound</b>	
<b><u>1-PS4-4</u></b>	<b>Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.*</b> [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]
<b><u>K-2-ETS1-1</u></b>	<b>Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.</b>
<b><u>K-2-ETS1-2</u></b>	<b>Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.</b>
The performance expectations above were developed using the following elements from the NRC document <a href="#">A Framework for K-12 Science Education</a> :	
<b>Science and Engineering Practices:</b>	
<b>Planning and Carrying Out Investigations</b>	
<ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul>	
<b>Constructing Explanations and Designing Solutions</b>	
<ul style="list-style-type: none"> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul>	
<b>Asking Questions and Defining Problems</b>	
<ul style="list-style-type: none"> <li>Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)</li> <li>Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> </ul>	
<b>Developing and Using Models</b>	
<ul style="list-style-type: none"> <li>Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)</li> </ul>	
<b>Disciplinary Core Ideas:</b>	
<b>PS4.C: Information Technologies and Instrumentation</b>	
<ul style="list-style-type: none"> <li>People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)</li> </ul>	
<b>ETS1.A: Defining and Delimiting Engineering Problems</b>	
<ul style="list-style-type: none"> <li>A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)</li> <li>Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)</li> <li>Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)</li> </ul>	
<b>ETS1.B: Developing Possible Solutions</b>	
<ul style="list-style-type: none"> <li>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. (K-2-ETS1-2)</li> </ul>	
<b>Crosscutting Concepts:</b>	
<b>Structure and Function</b>	

- The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)

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

**Influence of Engineering, Technology, and Science, on Society and the Natural World**

- People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

**New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills**

<b>CPI #</b>	<b>Cumulative Progress Indicator (CPI)</b>
9.1.2.CAP.1	Make a list of different types of jobs and describe the skills associated with each job.
8.1.P.C.1	Collaborate with peers by participating in interactive digital games or activities.
8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.

**Interdisciplinary Standards**

**Mathematics:**

Reason abstractly and quantitatively. (K-2-ETS1-1) **MP.2**

Model with mathematics. (K-2-ETS1-1) **MP.4**

Use appropriate tools strategically. (1-PS4-4),(K-2-ETS1-1) **MP.5**

Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4) **1.MD.A.1**

Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps. (1-PS4-4) **1.MD.A.2**

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 using information presented in a bar graph. (K-2-ETS1-1) **2.MD.D.10**

**Social Studies:**

Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

**Instructional Focus**

**Unit Enduring Understandings**

- Light is needed to see objects.
- Vibrating materials can make sounds and sound can cause other materials to vibrate.
- Light and sound can be used to communicate over a distance.

**Unit Essential Questions**

- How do we see?
- Can light pass through objects?
- How do instruments make sound?
- How can light or sound be used to communicate over a distance?

**Objectives**

By the end of this unit, students will be able to:

- Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (1-PS4-2)
- Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of the beam of light. (1-PS4-3)
- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (1-PS4-1)
- Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)
- Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)
- Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2)

By the end of this unit, students will understand:

- That we need light to see.
- The terms: translucent, transparent, opaque, and reflective.
- Sound is created in a variety of ways.
- Vibrating materials can cause sound and that sound can cause other materials to vibrate.
- Light and sound can be used to communicate in a variety of ways and over long distances.

#### **Evidence of Learning**

##### **Assessment:**

- Students use the engineering process to plan, design, evaluate, and redesign an instrument.

#### **Resources**



# **NGSS Lesson Plans**

<b>Grade/ Grade Band:</b> 1	<b>Topic:</b> Light and Sound	<b>Lesson # 1 in a series of 18 lessons</b> <b>What is Light?</b>
<b>Brief Lesson Description:</b> In this lesson, students will discuss what they know and want to know about light.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (1-PS4-2)</li> <li>Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of the beam of light. (1-PS4-3)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Share what they know and want to know about light</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> </ul> <b>Connections to Nature of Science</b>  <b>Scientific Investigations Use a Variety of Methods</b> <ul style="list-style-type: none"> <li>Science investigations begin with a question. (1-PS4-1)</li> <li>Scientists use different ways to study the world. (1-PS4-1)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>PS4.B: Electromagnetic Radiation</b> <ul style="list-style-type: none"> <li>Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3)</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>People can see in complete darkness</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Light and Sound	<b>Lesson # 2 in a series of 18 lessons</b> <b>Pinhole Box investigation</b>
<b>Brief Lesson Description:</b> In this lesson, students will investigate why we need light by using a pinhole box.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>● Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (1-PS4-2)</li> <li>● Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of the beam of light. (1-PS4-3)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>● Prove that you can see something when someone shines a light on it.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>● Why we need light.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>● Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> <li>● Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <b>Connections to Nature of Science</b> <b>Scientific Investigations Use a Variety of Methods</b> <ul style="list-style-type: none"> <li>● Science investigations begin with a question. (1-PS4-1)</li> <li>● Scientists use different ways to study the world. (1-PS4-1)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>PS4.B: Electromagnetic Radiation</b> <ul style="list-style-type: none"> <li>● Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Cause and Effect</b> <ul style="list-style-type: none"> <li>● Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3)</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>● People can see in complete darkness.</li> </ul>		

# LESSON PLAN – 5-E Model

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Light and Sound	<b>Lesson # 3 in a series of 18 lessons</b> <b>What Happens When Light Hits</b> <b>Different Objects: Part 1</b>
<b>Brief Lesson Description:</b> In this lesson, students will use different materials to test whether or not they can see through it.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (1-PS4-2)</li> <li>Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of the beam of light. (1-PS4-3)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Investigate what happens when light hits different objects.</li> </ul> By the end of the lessons 3 and 4, students will understand: <ul style="list-style-type: none"> <li>The terms: translucent, transparent, opaque, and reflective.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <b>Connections to Nature of Science</b> <b>Scientific Investigations Use a Variety of Methods</b> <ul style="list-style-type: none"> <li>Science investigations begin with a question. (1-PS4-1)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>PS4.B: Electromagnetic Radiation</b> <ul style="list-style-type: none"> <li>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. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3)</li> </ul>	<b>Crosscutting Concepts:</b>

<ul style="list-style-type: none"> <li>Scientists use different ways to study the world. (1-PS4-1)</li> </ul>		
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Light and Sound	<b>Lesson # 4 in a series of 18 lessons What Happens to Light When Part 2</b>
<b>Brief Lesson Description:</b> In this lesson, students will explore what happens when light hits different materials.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (1-PS4-2)</li> <li>Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of the beam of light. (1-PS4-3)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Investigate what happens when light hits different objects.</li> <li>Explain the terms: translucent, transparent, opaque, and reflective.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> Students investigated what happens when light passes through different objects in the previous lesson.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <b>Connections to Nature of Science</b> <b>Scientific Investigations Use a Variety of Methods</b>	<b>Disciplinary Core Ideas:</b>  <b>PS4.B: Electromagnetic Radiation</b> <ul style="list-style-type: none"> <li>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. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3)</li> </ul>	<b>Crosscutting Concepts:</b>

<ul style="list-style-type: none"> <li>Science investigations begin with a question. (1-PS4-1)</li> <li>Scientists use different ways to study the world. (1-PS4-1)</li> </ul>		
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Light and Sound	<b>Lesson # 5 in a series of 18 lessons Shadows</b>
<b>Brief Lesson Description:</b> In this lesson, students will complete an experiment to investigate what makes a shadow.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (1-PS4-2)</li> <li>Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of the beam of light. (1-PS4-3)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Understand that opaque objects make a shadow.</li> <li>Understand what makes a shadow.</li> <li>Understand how a shadow can change depending on if a light is closer or farther away from an object.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> Students explored shadows during the Patterns in the Sky unit.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <b>Connections to Nature of Science</b>	<b>Disciplinary Core Ideas:</b>  <b>PS4.B: Electromagnetic Radiation</b> <ul style="list-style-type: none"> <li>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. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3)</li> </ul>	<b>Crosscutting Concepts:</b>

<b>Scientific Investigations Use a Variety of Methods</b> <ul style="list-style-type: none"> <li>Science investigations begin with a question. (1-PS4-1)</li> <li>Scientists use different ways to study the world. (1-PS4-1)</li> </ul>		
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>All objects make a shadow.</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Light and Sound	<b>Lesson # 6 in a series of 18 lessons</b> <b>The Listening Walk</b>
<b>Brief Lesson Description:</b> In this lesson, students will record sounds they hear in their environment.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (1-PS4-1)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Communicate information about their observations of sound in the environment.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>Sound is created in a variety of ways.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <b>Connections to Nature of Science</b>	<b>Disciplinary Core Ideas:</b>  <b>PS4.A: Wave Properties</b> <ul style="list-style-type: none"> <li>Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)</li> </ul>	<b>Crosscutting Concepts:</b>

<b>Scientific Investigations Use a Variety of Methods</b> <ul style="list-style-type: none"> <li>Science investigations begin with a question. (1-PS4-1)</li> <li>Scientists use different ways to study the world. (1-PS4-1)</li> </ul>		
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Light and Sound	<b>Lesson # 7 in a series of 18 lessons Investigating How We Hear</b>
<b>Brief Lesson Description:</b> In this lesson, students will conduct an investigation of how we hear.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (1-PS4-1)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Conduct an investigation of how we hear.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>The parts of an ear.</li> <li>Sound waves cause the eardrum to vibrate.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>PS4.A: Wave Properties</b> <ul style="list-style-type: none"> <li>Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)</li> </ul>	<b>Crosscutting Concepts:</b>

<b>Connections to Nature of Science</b>  <b>Scientific Investigations Use a Variety of Methods</b> <ul style="list-style-type: none"> <li>Science investigations begin with a question. (1-PS4-1)</li> <li>Scientists use different ways to study the world. (1-PS4-1)</li> </ul>		
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>The outer ear does all the work for us to hear.</li> <li>There are no bones in the ear.</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Light and Sound	<b>Lesson # 8 in a series of 18 lessons</b> <b>Making a Splash</b>
<b>Brief Lesson Description:</b> In this lesson, the students will investigate how vibrating materials make sound and that sound can make other materials vibrate.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (1-PS4-1)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Discover how vibrations create sound waves that travel through the air to your ear.</li> <li>Discover how vibrating materials make sound and that sound can make other materials vibrate.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>Vibrating materials can cause sound and that sound can cause other materials to vibrate.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>PS4.A: Wave Properties</b> <ul style="list-style-type: none"> <li>Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3)</li> </ul>



<b>Connections to Nature of Science</b>  <b>Scientific Investigations Use a Variety of Methods</b> <ul style="list-style-type: none"> <li>Science investigations begin with a question. (1-PS4-1)</li> <li>Scientists use different ways to study the world. (1-PS4-1)</li> </ul>		
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Light and Sound	<b>Lesson # 9 in a series of 18 lessons</b> <b>What's the Buzz?</b>
<b>Brief Lesson Description:</b> In this lesson, students will discover how vibrations create sound waves.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (1-PS4-1)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Discover how vibrations create sound waves that travel through the air to your ear.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>Vibrating materials can cause sound.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> </ul> <b>Connections to Nature of Science</b>	<b>Disciplinary Core Ideas:</b>  <b>PS4.A: Wave Properties</b> <ul style="list-style-type: none"> <li>Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3)</li> </ul>

<b>Scientific Investigations Use a Variety of Methods</b> <ul style="list-style-type: none"> <li>Science investigations begin with a question. (1-PS4-1)</li> <li>Scientists use different ways to study the world. (1-PS4-1)</li> </ul>		
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Light and Sound	<b>Lesson # 10 in a series of 18 lessons</b> <b>Musical Rulers</b>
<b>Brief Lesson Description:</b> In this lesson, the students will investigate how vibrating materials make sound and the length of the sound waves make different sounds.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (1-PS4-1)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Discover how vibrations create sound waves that travel through the air to your ear.</li> <li>Sound waves are different lengths and the length of the wave changes the sound.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>Vibrating materials can cause sound and that sound can cause other materials to vibrate.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> </ul> <b>Connections to Nature of Science</b>	<b>Disciplinary Core Ideas:</b>  <b>PS4.A: Wave Properties</b> <ul style="list-style-type: none"> <li>Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3)</li> </ul>

<b>Scientific Investigations Use a Variety of Methods</b> <ul style="list-style-type: none"> <li>Science investigations begin with a question. (1-PS4-1)</li> <li>Scientists use different ways to study the world. (1-PS4-1)</li> </ul>		
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Communicating with Light and Sound	<b>Lesson # 11 in a series of 18 lessons</b> <b>Non-verbal Communication with Sound</b>
<b>Brief Lesson Description:</b> In this lesson students will create two non-verbal signals to communicate through sound.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Use scientific knowledge to generate design solutions involving people communicating through sound.</li> <li>Describe the scientific information they use to design the solution, with guidance as needed.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>how communication helps people solve problems.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> Students will use their knowledge of sound from previous lessons.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <b>Asking Questions and Defining Problems</b>	<b>Disciplinary Core Ideas:</b>  <b>PS4.C: Information Technologies and Instrumentation</b> <ul style="list-style-type: none"> <li>People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)</li> </ul> <b>ETS1.A: Defining and Delimiting Engineering Problems</b> <ul style="list-style-type: none"> <li>A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)</li> <li>Asking questions, making observations, and gathering information are helpful in</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Connections to Engineering, Technology, and Applications of Science</b>  <b>Influence of Engineering, Technology, and Science, on Society and the Natural World</b> <ul style="list-style-type: none"> <li>People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)</li> </ul>

<ul style="list-style-type: none"> <li>Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)</li> <li>Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> </ul> <p><b>Developing and Using Models</b></p> <ul style="list-style-type: none"> <li>Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)</li> </ul>	<p>thinking about problems. (K-2-ETS1-1)</p> <ul style="list-style-type: none"> <li>Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)</li> </ul> <p><b>ETS1.B: Developing Possible Solutions</b></p> <ul style="list-style-type: none"> <li>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. (K-2-ETS1-2)</li> </ul>	
<p><b>Possible Preconceptions/Misconceptions:</b></p> <ul style="list-style-type: none"> <li>Animals and people making sound/noises are not communication.</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Communicating with Light and Sound	<b>Lesson # 12 in a series of 18 lessons</b> <b>Cup-a-Phone Part 1</b>
<p><b>Brief Lesson Description:</b> In this lesson, students will experiment with communicating across a distance by creating a telephone using given materials.</p>		
<p><b>Performance Expectation(s):</b></p> <ul style="list-style-type: none"> <li>Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)</li> <li>Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> <li>Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2)</li> </ul>		
<p><b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>Use scientific knowledge to generate design solutions involving people communicating through sound.</li> <li>Describe the scientific information they use to design the solution, with guidance as needed.</li> </ul> <p>By the end of this lesson, students will understand:</p> <ul style="list-style-type: none"> <li>How people can communicate over long distances</li> </ul>		
<b>Narrative / Background Information</b>		
<p><b>Prior Student Knowledge:</b></p> <p>Students will use their knowledge of sound from previous lessons.</p>		
<p><b>Science &amp; Engineering Practices:</b></p> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to</li> </ul>	<p><b>Disciplinary Core Ideas:</b></p> <p><b>PS4.C: Information Technologies and Instrumentation</b></p> <ul style="list-style-type: none"> <li>People also use a variety of devices to communicate (send</li> </ul>	<p><b>Crosscutting Concepts:</b></p> <p><b>Connections to Engineering, Technology, and Applications of Science</b></p>

<p>answer a question. (1-PS4-1),(1-PS4-3)</p> <p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <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 and/or designed world(s). (K-2-ETS1-1)</li> <li>Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> </ul> <p><b>Developing and Using Models</b></p> <ul style="list-style-type: none"> <li>Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)</li> </ul>	<p>and receive information) over long distances. (1-PS4-4)</p> <p><b>ETS1.B: Developing Possible Solutions</b></p> <ul style="list-style-type: none"> <li>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. (K-2-ETS1-2)</li> </ul>	<p><b>Influence of Engineering, Technology, and Science, on Society and the Natural World</b></p> <ul style="list-style-type: none"> <li>People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)</li> </ul>
<p><b>Possible Preconceptions/Misconceptions:</b></p> <ul style="list-style-type: none"> <li>The materials provided cannot be used to communicate through sound</li> </ul>		
<p><b>LESSON PLAN – 5-E Model</b></p>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Communicating with Light and Sound	<b>Lesson # 13 in a series of 18 lessons</b> <b>Cup-a-Phone Part 2</b>
<p><b>Brief Lesson Description:</b> In this lesson, students will expand on the previous lesson and invent their own telephone, changing one variable from the previous lesson.</p>		
<p><b>Performance Expectation(s):</b></p> <ul style="list-style-type: none"> <li>Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)</li> <li>Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> <li>Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2)</li> </ul>		
<p><b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>Use scientific knowledge to generate design solutions involving people communicating through sound across a distance.</li> </ul>		

<ul style="list-style-type: none"> <li>Describe the scientific information they use to design the solution, with guidance as needed.</li> </ul> <p>By the end of this lesson, students will understand:</p> <ul style="list-style-type: none"> <li>How people can communicate over long distances</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> <ul style="list-style-type: none"> <li>Students will use their knowledge of sound from previous lessons.</li> <li>Students will use their knowledge of constructing a cup telephone from the previous lesson.</li> </ul>		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <b>Asking Questions and Defining Problems</b> <ul style="list-style-type: none"> <li>Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)</li> <li>Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> </ul> <b>Developing and Using Models</b> <ul style="list-style-type: none"> <li>Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>PS4.C: Information Technologies and Instrumentation</b> <ul style="list-style-type: none"> <li>People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)</li> </ul> <b>ETS1.A: Defining and Delimiting Engineering Problems</b> <ul style="list-style-type: none"> <li>A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)</li> <li>Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)</li> <li>Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)</li> </ul> <b>ETS1.B: Developing Possible Solutions</b> <ul style="list-style-type: none"> <li>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. (K-2-ETS1-2)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Connections to Engineering, Technology, and Applications of Science</b>  <b>Influence of Engineering, Technology, and Science, on Society and the Natural World</b> <ul style="list-style-type: none"> <li>People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>None of the materials offered will work</li> <li>All of the materials offered will work</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Communicating with Light	<b>Lesson # 14 in a series of 18 lessons</b>
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	and Sound	<b>Making Sound Travel Farther When Communicating (1 or 2 day lesson, you choose)</b>
<b>Brief Lesson Description:</b> Students will test their ability to hear sound over a distance		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)</li> <li>Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> <li>Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will describe: <ul style="list-style-type: none"> <li>How sound travels over a distance</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> Students will use their knowledge of sound and communication from previous lessons.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <b>Asking Questions and Defining Problems</b> <ul style="list-style-type: none"> <li>Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)</li> </ul> <b>Developing and Using Models</b> <ul style="list-style-type: none"> <li>Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>PS4.C: Information Technologies and Instrumentation</b> <ul style="list-style-type: none"> <li>People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Structure and Function</b> <ul style="list-style-type: none"> <li>The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)</li> </ul> <b>Connections to Engineering, Technology, and Applications of Science</b>  <b>Influence of Engineering, Technology, and Science, on Society and the Natural World</b> <ul style="list-style-type: none"> <li>People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)</li> </ul>

**Possible Preconceptions/Misconceptions:**

You can't hear people whispering unless you are right next to them.

You can hear someone yelling no matter how far away you are from them.

**LESSON PLAN – 5-E Model**

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Communicating with Light	<b>Lesson # 15 in a series of 18 lessons Using Light to Communicate</b>
<b>Brief Lesson Description:</b> In this lesson, students will explore how people communicate with light		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)</li> <li>Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> <li>Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Communicate information about their observations of how light is used to communicate.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>Light can be used to communicate .</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> Students will use their knowledge of light from previous lessons.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <b>Asking Questions and Defining Problems</b> <ul style="list-style-type: none"> <li>Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>PS4.C: Information Technologies and Instrumentation</b> <ul style="list-style-type: none"> <li>People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Connections to Engineering, Technology, and Applications of Science</b>  <b>Influence of Engineering, Technology, and Science, on Society and the Natural World</b> <ul style="list-style-type: none"> <li>People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)</li> </ul>



<b>Developing and Using Models</b> <ul style="list-style-type: none"> <li>Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)</li> </ul>		
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Communicating with Light and Sound	<b>Lesson # 16 in a series of 18 lessons</b> <b>Using Light and Sound To Communicate</b>
<b>Brief Lesson Description:</b> In this lesson, students will explore and understand how light and sound can be used to communicate over distance.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)</li> <li>Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Communicate information about their observations of how light and sound are used to communicate.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>Light and sound can be used to communicate in a variety of ways.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> Students will use their knowledge of light, sound and communication from previous lessons.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <b>Asking Questions and Defining Problems</b>	<b>Disciplinary Core Ideas:</b>  <b>PS4.C: Information Technologies and Instrumentation</b> <ul style="list-style-type: none"> <li>People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Connections to Engineering, Technology, and Applications of Science</b>  <b>Influence of Engineering, Technology, and Science, on Society and the Natural World</b> <ul style="list-style-type: none"> <li>People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)</li> </ul>

<ul style="list-style-type: none"> <li>Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)</li> </ul> <p><b>Developing and Using Models</b></p> <ul style="list-style-type: none"> <li>Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)</li> </ul>		
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Communicating with Light and Sound	<b>Lesson # 17</b> in a series of 18 lessons <b>Using Light and Sound to Communicate Across Distances</b>
<b>Brief Lesson Description:</b> In this lesson, Students will explore how communication with light and sound can be used over distances		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)</li> <li>Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> <li>Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2)</li> </ul>		
<ul style="list-style-type: none"> <li><b>Specific Learning Outcomes:</b></li> </ul> <p>By the end of this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>Identify and record information about their observations of how light and sound are used to communicate over distance.</li> </ul> <p>By the end of this lesson, students will understand:</p> <ul style="list-style-type: none"> <li>Light and sound can be used to communicate over distance.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b>		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>PS4.C: Information Technologies and Instrumentation</b> <ul style="list-style-type: none"> <li>People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Connections to Engineering, Technology, and Applications of Science</b>  <b>Influence of Engineering, Technology, and Science, on Society and the Natural World</b>

<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul> <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 and/or designed world(s). (K-2-ETS1-1)</li> <li>Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> </ul> <p><b>Developing and Using Models</b></p> <ul style="list-style-type: none"> <li>Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)</li> </ul>		<ul style="list-style-type: none"> <li>People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Communicating with Light and Sound	<b>Lesson #18 in a series of 18 lessons STEM lesson - build upon earlier device to communicate with sound across distances</b>
<b>Brief Lesson Description:</b> In this lesson, the students will design an instrument and engineer it.		
<p><b>Performance Expectation(s):</b></p> <ul style="list-style-type: none"> <li>Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)</li> <li>Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</li> <li>Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. (K-2-ETS1-2)</li> </ul>		
<p><b>Specific Learning Outcomes:</b></p> <p>By the end of this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>design and instrument that makes sound and then explain how it makes sound and how it could be used as a communication tool</li> </ul> <p>By the end of this lesson, students will understand:</p> <ul style="list-style-type: none"> <li>that engineers have a process that they follow when designing something new.</li> </ul>		

<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> The students will use the knowledge acquired through the previous sound lessons of this unit.		
<b>Science &amp; Engineering Practices:</b>  <b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>PS4.C: Information Technologies and Instrumentation</b> <ul style="list-style-type: none"> <li>People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)</li> </ul> <b>ETS1.B: Developing Possible Solutions</b> <ul style="list-style-type: none"> <li>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. (K-2-ETS1-2)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Structure and Function</b> <ul style="list-style-type: none"> <li>The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)</li> </ul> <b>Connections to Engineering, Technology, and Applications of Science</b>  <b>Influence of Engineering, Technology, and Science, on Society and the Natural World</b> <ul style="list-style-type: none"> <li>People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b>		
<b>LESSON PLAN – 5-E Model</b>		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Light Pollution	<b>Lesson # 1 in a series of lessons 1</b> <b>Light Pollution</b>
<b>Brief Lesson Description:</b> Students will begin to explore light pollution and its effect on the planet, humans and animals		
<b>Performance Expectation(s):</b> <b>(K-2-ETS1-1)</b> Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.		
<b>Specific Learning Outcomes:</b> By the end of this lesson students will be able to: <ul style="list-style-type: none"> <li>Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (1-PS4-2)</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>Lights on at night causes light pollution.</li> <li>Lights pollution affects what we can see at night.</li> <li>Animals are affected by light pollution.</li> </ul>		

Narrative / Background Information		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Analyzing and Interpreting Data</b> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>ETS1.A: Defining and Delimiting Engineering Problems</b> <ul style="list-style-type: none"> <li>Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Events have causes that generate observable patterns.</li> </ul> <hr/> <p style="text-align: center;"><b><i>Connections to Engineering, Technology, and Applications of Science</i></b></p> <b>Interdependence of Science, Engineering, and Technology</b> <ul style="list-style-type: none"> <li>People encounter questions about the natural world every day.</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b> Humans can see the same things with lights on or off. Animals aren't affected by lights at night.		
LESSON PLAN – 5-E Model		

Teacher Professional Learning Resources
<p><a href="#"><u>Teaching NGSS in Elementary School—First Grade</u></a></p> <p>The presenters were Carla Sembal-Saul, Professor of Science Education at Penn State University, Mary Starr, Executive Director at Michigan Mathematics and Science Centers Network, and Kathy Renfrew, K-5 Science Coordinator, VT Agency of Education and NGSS Curator introduced the NGSS Web seminar Series for K-5 educators.</p> <p>After a brief overview of this NGSS for First Grade web seminar, Mary discussed the science and engineering practices in relation to teaching first grade. The web seminar focused on the concept of sound, and how performance expectations should be incorporated into teaching. Sound was further considered as a disciplinary core idea within first grade teaching. Participants viewed a video of a teacher supporting students in developing towards the performance expectations. The science and engineering practices of explanation and argument was considered within the lesson presented. Claim, evidence, reasoning and rebuttal were discussed, and a CER framework was shared. Carla introduced the KLEWS chart and discussed its use in an elementary classroom. Kathy shared the importance of classroom discourse and science talk. The web seminar closed with the sharing of resources in relation to the NGSS and teaching K-5 grades. Ted, in closing, shared NSTA resources in relation to the NGSS.</p>

Visit the [resource collection](#).

Continue discussing this topic in the [community forums](#).

### **NSTA Web Seminar: Teaching NGSS in K-5: Constructing Explanations from Evidence**

Carla Zemba-Saul, Mary Starr, and Kathy Renfrew, provided an overview of the NGSS for K-5th grade. The web seminar focused on the three dimensional learning of the NGSS, while introducing CLAIMS-EVIDENCE-REASONING (CER) as a framework for introducing explanations from evidence. The presenters highlighted and discussed the importance of engaging learners with phenomena, and included a demonstration on using a KLEWS chart to map the development of scientific explanations of those phenomena.

To view related resources, visit the [resource collection](#).

Continue discussing this topic in the [community forums](#).

### **NGSS Core Ideas: Earth's Place in the Universe**

The presenter was Julia Plummer from Penn State University. The program featured strategies for teaching about Earth science concepts that answer questions such as "What goes on in stars?" and "What patterns are caused by Earth's movements in the solar system?"

Dr. Plummer began the presentation by discussing what students should know about the disciplinary core idea of Earth's Place in the Universe. She talked about using the scientific and engineering practices to help engage students. Participants shared their ideas about applying this core idea to the classroom, and then Dr. Plummer shared strategies for effective instruction. She also discussed the importance of spatial thinking for students to begin thinking scientifically about these concepts.

Continue the discussion in the [Community Forums](#).



West Windsor-Plainsboro Regional School District  
Science Curriculum  
Grade 1 - Patterns of Change in the Sky

## **The Mission of the West Windsor-Plainsboro Science Department**

Our mission is to cultivate science learners who have the foundational knowledge to make ethical, scientifically literate decisions and the ability to apply scientific practices in order to contribute to the needs of society and a changing world.

- **Vision**

We envision a K-12 science experience that supports and challenges every student in their science learning journey. We will:

- Capitalize on diversity by reaching and exciting students at all levels and interests by differentiating learning within classrooms and by offering a robust program of studies.
- Emphasize authentic science and engineering practices and leverage the interdisciplinary nature of science with arts, technology, math, reading, and writing.
- Integrate scientific knowledge and 21st century competencies to prepare students to make informed decisions and take action to address real world problems.



Unit : Patterns of Change in the Sky	
<b>Content Area: Science</b>	
<b>Course &amp; Grade Level: Grade 1 Earth and Space Science</b>	
Summary and Rationale	
In this unit, students will learn about the patterns of the sun, moon, earth and stars. Students will observe, describe, and predict some patterns of movement of objects in the sky. Students will also learn about the seasonal patterns along with sunrise and sunset patterns.	
Recommended Pacing	
16 days	
New Jersey Student Learning Standards for	
<b>Standard: Appendix A: NGSS and Foundations for the Unit</b>	
<b>(1-ESS1-1)</b>	<b>Use observations of the sun, moon, and stars to describe patterns that can be predicted.</b> [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]
<b>(1-ESS1-2)</b>	<b>Make observations at different times of year to relate the amount of daylight to the time of year.</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>K-2-ETS1-1</b>	<b>Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.</b>
The performance expectations above were developed using the following elements from the NRC document <a href="#">A Framework for K-12 Science Education</a> :	
<b>Science and Engineering Practices:</b>	
<b>Planning and Carrying Out Investigations</b>	
<ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul>	
<b>Planning and Carrying Out Investigations</b>	
<ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)</li> </ul>	
<b>Analyzing and Interpreting Data</b>	
<ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul>	
<b>Disciplinary Core Ideas:</b>	
<b>ESS1.A: The Universe and its Stars</b>	
<ul style="list-style-type: none"> <li>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)</li> </ul>	
<b>ESS1.B: Earth and the Solar System</b>	
<ul style="list-style-type: none"> <li>Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)</li> </ul>	

**Crosscutting Concepts:****Patterns**

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)

**Connections to Nature of Science****Scientific Knowledge Assumes an Order and Consistency in Natural Systems**

- Science assumes natural events happen today as they happened in the past. (1-ESS1-1)
- Many events are repeated. (1-ESS1-1)

**New Jersey Student Learning Standards for English Language Arts  
Companion Standards**

**English Language Arts/Literacy:**

In this unit of study, students need opportunities to participate in shared research and writing projects about patterns of change in the sky. For example, students can use online resources or books to research the patterns of change that are visible over time when we observe the objects in the sky. With guidance from adults, students could create books that describe and illustrate the different patterns of change observed in objects in the sky. They could also describe and illustrate the relative amount of daylight in relation to the season using a sequenced set of journal entries or in a sequence-of-events foldable.

Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-ESS1-1),(1-ESS1-2) **W.1.7**

With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1),(1-ESS1-2) **W.1.8**

**New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills**

<b>CPI #</b>	<b>Cumulative Progress Indicator (CPI)</b>
9.1.2.CAP.1	Make a list of different types of jobs and describe the skills associated with each job.
<b>CPI #</b>	<b>Cumulative Progress Indicator (CPI)</b>
8.1. P.C.1	Collaborate with peers by participating in interactive digital games or activities.
8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.

**Interdisciplinary Standards**

**Mathematics:**

Students need opportunities to represent and interpret data and to use addition and subtraction. The following examples from NGSS Appendix L could provide guidance for instruction and should be done with teacher support:

- ✓ Science example 1: There were 16 hours of daylight yesterday. On December 21, there were 8 hours of daylight. How many more hours of daylight were there yesterday than on December 21?
- ✓ Science example 2: Based on the data collected and posted on the bulletin board so far, which day has been the longest of the year so far? Which day has been the shortest?

Reason abstractly and quantitatively. (1-ESS1-2) **MP.2**

Model with mathematics. (1-ESS1-2) **MP.4**

Use appropriate tools strategically. (1-ESS1-2) **MP.5**

Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2) **1.OA.A.1**

Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2) **1.MD.C.4**

### **Social Studies:**

Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

### **Instructional Focus**

#### **Unit Enduring Understandings**

- Scientists observe and look for patterns.
- Objects in the sky have patterns.
- Patterns can be used to make predictions.

#### **Unit Essential Questions**

- How do objects move in the sky?
- Can the patterns in the sky be predicted?
- How does the Moon's appearance change over time?
- What causes the seasons?
- Why can we only see the stars at night?
- How does the Sun's path across the sky differ during the summer and winter?

#### **Objectives**

By the end of this unit, students will be able to:

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)
- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)

By the end of this unit, students will understand:

- How the Sun appears to travel across the sky and that this is due to the Earth's motion, not the Sun's.
- The moon is an object that revolves around Earth.
- The Moon shines because it is reflecting sunlight.
- The Moon appears to grow and shrink in the sky based on how much reflected sunlight we can see.
- Because the Sun is so close, its brightness keeps us from seeing other stars during the day.
- Seasons are caused by the Earth's tilt.
- The Sun appears to be higher in the sky during the summer and lower in the winter due to Earth's tilt and revolution around the sun.

### **Evidence of Learning**

**Assessment:** Students will create a project of choice to demonstrate what they learned throughout the Patterns of Change in the Sky unit.

### **Resources**

Lesson Plans		
<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Patterns of Change in the Sky	<b>Lesson # 1 in a series of 13 lessons</b> Introduction to the Sun and Pre-Assessment
<b>Brief Lesson Description:</b> In this lesson, students will be taking a pre-assessment to demonstrate prior knowledge about patterns in the sky.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)</li> <li>Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Identify the Sun, Earth and Moon as permanent objects in the sky.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>The Sun is larger than the Earth and Moon.</li> <li>The Earth is larger than the Moon.</li> <li>The Sun, Earth and Moon are permanent objects in the sky and are from nature and not man-made.</li> </ul>		
Narrative / Background Information		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Analyzing and Interpreting Data</b> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>ESS1.A: The Universe and its Stars</b> <ul style="list-style-type: none"> <li>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Patterns</b> <ul style="list-style-type: none"> <li>Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>The Earth is the center and the Sun rotates around the Earth.</li> <li>The moon gives off its own light.</li> <li>The Earth is the biggest planet.</li> <li>Daylight time is the same throughout the year.</li> <li>Everybody on Earth has daytime/nighttime at the same time.</li> <li>Everybody on earth has seasons at the same time.</li> </ul>		
LESSON PLAN – 5-E Model		

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Patterns of Change in the Sky	<b>Lesson # 2 in a series of 13 lessons</b> Observing the Sun
<b>Brief Lesson Description:</b> In this lesson, students observe and gather data about the sun.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)</li> <li>Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)</li> <li>Observe and describe patterns in the sun's movement.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>How the Sun appears to travel across the sky and that this is due to the Earth's motion, not the Sun's.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>ESS1.A: The Universe and its Stars</b> <ul style="list-style-type: none"> <li>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Patterns</b> <ul style="list-style-type: none"> <li>Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>The Earth is the center and the Sun rotates around the Earth.</li> <li>The Moon gives off its own light.</li> <li>The Earth is the biggest planet.</li> <li>Daylight time is the same throughout the year.</li> <li>Everybody on Earth has daytime/nighttime at the same time.</li> <li>Everybody on Earth has seasons at the same time.</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		
<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Patterns of Change in the Sky	<b>Lesson # 3 in a series of 13 lessons</b> Analyzing Shadows and Data
<b>Brief Lesson Description:</b> In this lesson, students observe, describe, and predict some patterns in the movement the sun in the sky.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)</li> <li>Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)</li> <li>Observe and describe patterns in the sun's movement by analyzing data.</li> </ul> By the end of this lesson, students will understand:		

- How the Sun appears to travel across the sky and that this is due to the Earth's motion, not the Sun's.

### Narrative / Background Information

#### Prior Student Knowledge:

Students will use their knowledge and observations of shadows that they used in the previous lesson.

#### Science & Engineering Practices:

##### Planning and Carrying Out Investigations

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)

##### Analyzing and Interpreting Data

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)

#### Disciplinary Core Ideas:

##### ESS1.A: The Universe and its Stars

- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)

#### Crosscutting Concepts:

##### Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)

#### Possible Preconceptions/Misconceptions:

- The Earth is the center and the Sun rotates around the Earth.
- The moon gives off its own light.
- The Earth is the biggest planet.
- Daylight time is the same throughout the year.
- Everybody on Earth has daytime/nighttime at the same time.
- Everybody on earth has seasons at the same time.

### LESSON PLAN – 5-E Model

**Grade/ Grade Band:** 1st grade

**Topic:** Patterns of Change in the Sky

**Lesson # 4 in a series of 13 lessons**

Understanding Day and Night- Rotation and Revolution

**Brief Lesson Description:** In this lesson, students will understand the relationship between the Earth and Sun.

#### Performance Expectation(s):

- Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)
- Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)

#### Specific Learning Outcomes:

By the end of this lesson, students will be able to:

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)
- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)
- Describe that the Sun's path across the sky is due to the Earth's motion, not the Sun's.

By the end of this lesson, students will understand:

- How the Sun appears to travel across the sky and that this is due to the Earth's motion, not the Sun's.
- The Earth is an object that revolves around Sun.

### **Narrative / Background Information**

#### **Prior Student Knowledge:**

Students have learned that the sun is a permanent object in the sky and that it travels in a pattern across the sky.

#### **Science & Engineering**

##### **Practices:**

##### **Planning and Carrying Out Investigations**

- Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)

##### **Analyzing and Interpreting Data**

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)

#### **Disciplinary Core Ideas:**

##### **ESS1.A: The Universe and its Stars**

- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)

#### **Crosscutting Concepts:**

##### **Patterns**

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)

#### **Possible Preconceptions/Misconceptions:**

- The Earth is the center and the Sun rotates around the Earth.
- The moon gives off its own light.
- The Earth is the biggest planet.
- Daylight time is the same throughout the year.
- Everybody on Earth has daytime/nighttime at the same time.
- Everybody on earth has seasons at the same time.

### **LESSON PLAN – 5-E Model**

**Grade/ Grade Band:** 1st grade

**Topic:** Patterns of Change in the Sky

**Lesson # 5 in a series of 13 lessons**  
Introduction to the Moon

**Brief Lesson Description:** In this lesson, students will use models of the moon, sun, and earth to investigate why the moon has phases.

#### **Performance Expectation(s):**

- Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)
- Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)

#### **Specific Learning Outcomes:**

By the end of this lesson, students will be able to:

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)
- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer

scientific questions. (1-ESS1-1)

- Describe patterns of the moon and understand that the moon is an object that revolves around the earth.

By the end of this lesson, students will understand:

- The moon is an object that revolves around Earth.
- The Moon shines because it is reflecting sunlight.
- The Moon appears to grow and shrink in the sky based on how much reflected sunlight we can see.

### **Narrative / Background Information**

#### **Prior Student Knowledge:**

This is the first opportunity for students to encounter these ideas.

<p><b>Science &amp; Engineering Practices:</b></p> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>● Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <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. (1-ESS1-2)</li> </ul> <p><b>Analyzing and Interpreting Data</b></p> <ul style="list-style-type: none"> <li>● Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul>	<p><b>Disciplinary Core Ideas:</b></p> <p><b>ESS1.A: The Universe and its Stars</b></p> <ul style="list-style-type: none"> <li>● Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)</li> </ul>	<p><b>Crosscutting Concepts:</b></p> <p><b>Patterns</b></p> <ul style="list-style-type: none"> <li>● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)</li> </ul>
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#### **Possible Preconceptions/Misconceptions:**

- The Earth is the center and the Sun rotates around the Earth.
- The moon gives off its own light.
- The Earth is the biggest planet.
- Daylight time is the same throughout the year.
- Everybody on Earth has daytime/nighttime at the same time.
- Everybody on earth has seasons at the same time.

### **LESSON PLAN – 5-E Model**

<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Patterns of Change in the Sky	<b>Lesson # 6 in a series of 13 lessons</b> Phases of the Moon



**Brief Lesson Description:** In this lesson, students will use ipads to explore how long the moon takes to complete a phase.

**Performance Expectation(s):**

- Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)
- Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)

**Specific Learning Outcomes:**

By the end of this lesson, students will be able to:

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)
- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)
- Describe patterns of the moon.

By the end of this lesson, students will understand:

- The moon is an object that revolves around Earth.
- The Moon shines because it is reflecting sunlight.
- The Moon appears to grow and shrink in the sky based on how much reflected sunlight we can see.

**Narrative / Background Information**

**Prior Student Knowledge:**

The students have learned that the moon has phases.

**Science & Engineering Practices:**

**Planning and Carrying Out Investigations**

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)

**Analyzing and Interpreting Data**

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)

**Disciplinary Core Ideas:**

**ESS1.A: The Universe and its Stars**

- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)

**Crosscutting Concepts:**

**Patterns**

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)

**Connections to Nature of Science**

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

- Science assumes natural events happen today as they happened in the past. (1-ESS1-1)
- Many events are repeated. (1-ESS1-1)

**Possible Preconceptions/Misconceptions:**

- The Earth is the center and the Sun rotates around the Earth.
- The moon gives off its own light.
- The Earth is the biggest planet.
- Daylight time is the same throughout the year.
- Everybody on Earth has daytime/nighttime at the same time.
- Everybody on earth has seasons at the same time.

**LESSON PLAN – 5-E Model**

**Grade/ Grade Band:** 1st grade

**Topic:** Patterns of Change in the Sky

**Lesson # 7 in a series of 13 lessons**  
Moon Data

<b>Brief Lesson Description:</b> In this lesson, students will create a model of the moon out of modeling clay.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)</li> <li>Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Use models to describe patterns in the natural world in order to answer scientific questions.</li> <li>Create a model to represent the moon</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>The moon is an object that revolves around Earth.</li> <li>The Moon shines because it is reflecting sunlight.</li> <li>The Moon appears to grow and shrink in the sky based on how much reflected sunlight we can see.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> Students have learned that the moon is an object that revolves around the earth and the moon changes phases as time goes by.		
<b>Science &amp; Engineering Practices:</b>  <b>Analyzing and Interpreting Data</b> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>ESS1.A: The Universe and its Stars</b> <ul style="list-style-type: none"> <li>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Patterns</b> <ul style="list-style-type: none"> <li>Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>The Earth is the center and the Sun rotates around the Earth.</li> <li>The moon gives off its own light.</li> <li>The Earth is the biggest planet.</li> <li>Daylight time is the same throughout the year.</li> <li>Everybody on Earth has daytime/nighttime at the same time.</li> <li>Everybody on Earth has seasons at the same time.</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		
<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Patterns of Change in the Sky	<b>Lesson # 8 in a series of 13 lessons</b> Spatial Relations of the Earth, Sun, and Moon
<b>Brief Lesson Description:</b> In this lesson, students describe and predict some patterns in the movement of the Sun, Earth and Moon.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)</li> <li>Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> <li>Describe patterns of the sun, earth, and moon’s movement.</li> </ul>		

By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>How the Sun appears to travel across the sky and that this is due to the Earth's motion, not the Sun's.</li> <li>The moon is an object that revolves around Earth.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> The students have learned that the sun and moon are both permanent objects in the sky.		
<b>Science &amp; Engineering Practices:</b>  <b>Analyzing and Interpreting Data</b> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul>	<b>Disciplinary Core Ideas:</b>  <b>ESS1.A: The Universe and its Stars</b> <ul style="list-style-type: none"> <li>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)</li> </ul>	<b>Crosscutting Concepts:</b>  <b>Patterns</b> <ul style="list-style-type: none"> <li>Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>The Earth is the center and the Sun rotates around the Earth.</li> <li>The moon gives off its own light.</li> <li>The Earth is the biggest planet.</li> <li>Daylight time is the same throughout the year.</li> <li>Everybody on Earth has daytime/nighttime at the same time.</li> <li>Everybody on earth has seasons at the same time.</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		
<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Patterns of Change in the Sky	<b>Lesson # 9 in a series of 13 lessons</b> Understanding Stars
<b>Brief Lesson Description:</b> In this lesson, students describe some patterns in the stars.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)</li> <li>Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)</li> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> <li>Describe patterns of the stars and understand that because the sun is so close, its brightness keeps us from seeing other stars during the day.</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>Because the Sun is so close, its brightness keeps us from seeing other stars during the day.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> This is the first opportunity for students to encounter these ideas.		
<b>Science &amp; Engineering Practices:</b>	<b>Disciplinary Core Ideas:</b>	<b>Crosscutting Concepts:</b>

<b>Analyzing and Interpreting Data</b> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul>	<b>ESS1.A: The Universe and its Stars</b> <ul style="list-style-type: none"> <li>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)</li> </ul>	<b>Patterns</b> <ul style="list-style-type: none"> <li>Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)</li> </ul>
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>The Earth is the center and the Sun rotates around the Earth.</li> <li>The moon gives off its own light.</li> <li>The Earth is the biggest planet.</li> <li>Daylight time is the same throughout the year.</li> <li>Everybody on Earth has daytime/nighttime at the same time.</li> <li>Everybody on earth has seasons at the same time.</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		
<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Patterns of Change in the Sky	<b>Lesson # 10 in a series of 13 lessons</b> Patterns of Daylight
<b>Brief Lesson Description:</b> In this lesson, students observe, describe, and predict some patterns in the movement of the Sun in the sky.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)</li> <li>Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</li> </ul>		
<b>Specific Learning Outcomes:</b> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)</li> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul> By the end of this lesson, students will understand: <ul style="list-style-type: none"> <li>The Sun appears to be higher in the sky during the summer and lower in the winter due to Earth’s tilt and revolution around the sun.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> The students have learned that the sun moves in a pattern across the sky.		
<b>Science &amp; Engineering Practices:</b>  <b>Planning and Carrying Out Investigations</b> <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>	<b>Disciplinary Core Ideas:</b> <b>ESS1.A: The Universe and its Stars</b> <ul style="list-style-type: none"> <li>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and</li> </ul>	<b>Crosscutting Concepts:</b> <b>Patterns</b> <ul style="list-style-type: none"> <li>Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)</li> </ul>

<p>(1-ESS1-2)</p> <p><b>Analyzing and Interpreting Data</b></p> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul>	<p>predicted. (1-ESS1-1)</p> <p><b>ESS1.B: Earth and the Solar System</b></p> <ul style="list-style-type: none"> <li>Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)</li> </ul>	
<p><b>Possible Preconceptions/Misconceptions:</b></p> <ul style="list-style-type: none"> <li>The Earth is the center and the Sun rotates around the Earth.</li> <li>The Moon gives off its own light.</li> <li>The Earth is the biggest planet.</li> <li>Daylight time is the same throughout the year.</li> <li>Everybody on Earth has daytime/nighttime at the same time.</li> <li>Everybody on Earth has seasons at the same time.</li> </ul>		
<p><b>LESSON PLAN – 5-E Model</b></p>		
<p><b>Grade/ Grade Band:</b> 1st grade</p>	<p><b>Topic:</b> Patterns of Change in the Sky</p>	<p><b>Lesson # 11 in a series of 13 lessons</b></p> <p>Introduction to the Seasons- Tilt of the Earth and Earth’s revolution around the sun to make the seasons</p>
<p><b>Brief Lesson Description:</b> In this lesson, students will be able to understand how the movement of the earth makes the seasons.</p>		
<p><b>Performance Expectation(s):</b></p> <ul style="list-style-type: none"> <li>Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)</li> <li>Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</li> </ul>		
<p><b>Specific Learning Outcomes:</b></p> <p>By the end of this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul> <p>By the end of this lesson, students will understand:</p> <ul style="list-style-type: none"> <li>Seasons are caused by the Earth’s tilt and the revolution of the earth around the sun.</li> <li>The Sun appears to be higher in the sky during the summer and lower in the winter due to Earth’s tilt and revolution around the Sun.</li> </ul>		
<p><b>Narrative / Background Information</b></p>		
<p><b>Prior Student Knowledge:</b></p> <p>The students have learned that the sun moves in a pattern across the sky.</p>		
<p><b>Science &amp; Engineering Practices:</b></p> <p><b>Analyzing and Interpreting Data</b></p> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to</li> </ul>	<p><b>Disciplinary Core Ideas:</b></p> <p><b>ESS1.A: The Universe and its Stars</b></p> <ul style="list-style-type: none"> <li>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and</li> </ul>	<p><b>Crosscutting Concepts:</b></p> <p><b>Patterns</b></p> <ul style="list-style-type: none"> <li>Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)</li> </ul>

answer scientific questions. (1-ESS1-1)	<p>predicted. (1-ESS1-1)</p> <p><b>ESS1.B: Earth and the Solar System</b></p> <ul style="list-style-type: none"> <li>Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)</li> </ul>	
<p><b>Possible Preconceptions/Misconceptions:</b></p> <ul style="list-style-type: none"> <li>The Earth is the center and the Sun rotates around the Earth.</li> <li>The moon gives off its own light.</li> <li>The Earth is the biggest planet.</li> <li>Daylight time is the same throughout the year.</li> <li>Everybody on Earth has daytime/nighttime at the same time.</li> <li>Everybody on earth has seasons at the same time.</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		
<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Patterns of Change in the Sky	<b>Lesson # 12 in a series of 13 lessons</b> The Four Seasons
<b>Brief Lesson Description:</b> In this lesson, students will describe the four seasons.		
<p><b>Performance Expectation(s):</b></p> <ul style="list-style-type: none"> <li>Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)</li> <li>Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</li> </ul>		
<p><b>Specific Learning Outcomes:</b></p> <p>By the end of this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> <li>Identify and describe the four seasons.</li> </ul> <p>By the end of this lesson, students will understand:</p> <ul style="list-style-type: none"> <li>Seasons are caused by the Earth's tilt.</li> <li>The Sun appears to be higher in the sky during the summer and lower in the winter due to Earth's tilt and revolution around the sun.</li> </ul>		
<b>Narrative / Background Information</b>		
<p><b>Prior Student Knowledge:</b></p> <p>The students have learned why the earth has seasons.</p>		
<p><b>Science &amp; Engineering Practices:</b></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. (1-ESS1-2)</li> </ul> <p><b>Analyzing and Interpreting</b></p>	<p><b>Disciplinary Core Ideas:</b></p> <p><b>ESS1.A: The Universe and its Stars</b></p> <ul style="list-style-type: none"> <li>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)</li> </ul> <p><b>ESS1.B: Earth and the</b></p>	<p><b>Crosscutting Concepts:</b></p> <p><b>Patterns</b></p> <ul style="list-style-type: none"> <li>Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)</li> </ul>

<b>Data</b> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul>	<b>Solar System</b> <ul style="list-style-type: none"> <li>Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)</li> </ul>	
<b>Possible Preconceptions/Misconceptions:</b> <ul style="list-style-type: none"> <li>The Earth is the center and the Sun rotates around the Earth.</li> <li>The moon gives off its own light.</li> <li>The Earth is the biggest planet.</li> <li>Daylight time is the same throughout the year.</li> <li>Everybody on Earth has daytime/nighttime at the same time.</li> <li>Everybody on earth has seasons at the same time.</li> </ul>		
<b>LESSON PLAN – 5-E Model</b>		
<b>Grade/ Grade Band:</b> 1st grade	<b>Topic:</b> Patterns of Change in the Sky	<b>Lesson # 13 in a series of 13 lessons</b> Assessment/Final Project/Culminating Activity
<b>Brief Lesson Description:</b> In this unit of study, students observe, describe, and predict some patterns in the movement of objects in the sky.		
<b>Performance Expectation(s):</b> <ul style="list-style-type: none"> <li>Use observations of the sun, moon, and stars to describe patterns that can be predicted. (1-ESS1-1)</li> <li>Make observations at different times of year to relate the amount of daylight to the time of year. (1-ESS1-2)</li> </ul>		
<b>Specific Learning Outcomes:</b> SWBAT demonstrate their knowledge of patterns of change in the sky. By the end of this unit, students will be able to: <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)</li> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul> By the end of this unit, students will understand: <ul style="list-style-type: none"> <li>How the Sun appears to travel across the sky and that this is due to the Earth’s motion, not the Sun’s.</li> <li>The moon is an object that revolves around Earth.</li> <li>The Moon shines because it is reflecting sunlight.</li> <li>The Moon appears to grow and shrink in the sky based on how much reflected sunlight we can see.</li> <li>Because the Sun is so close, its brightness keeps us from seeing other stars during the day.</li> <li>Seasons are caused by the Earth’s tilt.</li> <li>The Sun appears to be higher in the sky during the summer and lower in the winter due to Earth’s tilt and revolution around the sun.</li> </ul>		
<b>Narrative / Background Information</b>		
<b>Prior Student Knowledge:</b> The students have explored the relationship between the earth, sun, and moon. The students have also learned about the four seasons and why the earth has seasons.		

<p><b>Science &amp; Engineering Practices:</b> <b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)</li> </ul> <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. (1-ESS1-2)</li> </ul> <p><b>Analyzing and Interpreting Data</b></p> <ul style="list-style-type: none"> <li>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)</li> </ul>	<p><b>Disciplinary Core Ideas:</b> <b>ESS1.A: The Universe and its Stars</b></p> <ul style="list-style-type: none"> <li>Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)</li> </ul> <p><b>ESS1.B: Earth and the Solar System</b></p> <ul style="list-style-type: none"> <li>Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)</li> </ul>	<p><b>Crosscutting Concepts:</b> <b>Patterns</b></p> <ul style="list-style-type: none"> <li>Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)</li> </ul> <p>-----</p> <p><b>Connections to Nature of Science</b> <b>Scientific Knowledge Assumes an Order and Consistency in Natural Systems</b></p> <ul style="list-style-type: none"> <li>Science assumes natural events happen today as they happened in the past. (1-ESS1-1)</li> <li>Many events are repeated. (1-ESS1-1)</li> </ul>
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**Possible Preconceptions/Misconceptions:**

- The Earth is the center and the Sun rotates around the Earth.
- The moon gives off its own light.
- The Earth is the biggest planet.
- Daylight time is the same throughout the year.
- Everybody on Earth has daytime/nighttime at the same time.
- Everybody on earth has seasons at the same time.

**LESSON PLAN – 5-E Model**

**Patterns of Change in the Sky Climate Change**

<p><b>Grade/ Grade Band:</b> 1st grade</p>	<p><b>Topic:</b> Patterns of Change in the Sky - Climate Change Mini-Unit</p>	<p><b>Lesson # 1 in a series of 1 lessons</b> Introduction to Global Warming (3 days)</p>
<p><b>Brief Lesson Description:</b> In this lesson, students will be introduced to global warming and the impact on Earth.</p>		
<p><b>Performance Expectation(s):</b> <b>K-2-ETS1-1</b> Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.</p>		
<p><b>Specific Learning Outcomes:</b> By the end of this lesson students will be able to:</p>		



- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)

By the end of this lesson, students will understand:

- What climate change is
- Impact that global warming has on the Earth
- North and South Polar Ice Caps have shrunk due to global warming

### Narrative / Background Information

#### Prior Student Knowledge:

This is the first opportunity for students to encounter these ideas.

#### Science & Engineering Practices:

##### Asking Questions and Defining Problems

- Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)

#### Disciplinary Core Ideas:

##### ETS1.A: Defining and Delimiting Engineering Problems

- Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)

#### Crosscutting Concepts:

##### Cause and Effect

- Events have causes that generate observable patterns.

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

##### Interdependence of Science, Engineering, and Technology

- People encounter questions about the natural world every day.

#### Possible Preconceptions/Misconceptions:

- Earth temperatures haven't changed
- North and South Poles have not changed over the past 25 years
- Climate change is the weather changing

### LESSON PLAN – 5-E Model

### Teacher Professional Learning Resources

#### [Teaching NGSS in Elementary School—First Grade](#)

The presenters were Carla Sembal-Saul, Professor of Science Education at Penn State University, Mary Starr, Executive Director at Michigan Mathematics and Science Centers Network, and Kathy Renfrew, K-5 Science Coordinator, VT Agency of Education and NGSS Curator introduced the NGSS Web seminar Series for K-5 educators.

After a brief overview of this NGSS for First Grade web seminar, Mary discussed the science and engineering practices in relation to teaching first grade. The web seminar focused on the concept of sound, and how performance expectations should be incorporated into teaching. Sound was further considered as a disciplinary core idea within first grade teaching. Participants viewed a video of a teacher supporting students in developing towards the performance expectations. The science and engineering practices of explanation and argument was considered within the lesson presented. Claim, evidence, reasoning and rebuttal were discussed, and a CER framework was shared. Carla introduced the KLEWS chart and discussed its use in an elementary classroom. Kathy shared the importance of classroom discourse and science talk. The web seminar closed with the sharing of resources in relation to the NGSS and teaching K-5 grades. Ted, in closing, shared NSTA resources in relation to the

NGSS.

Visit the [resource collection](#).

Continue discussing this topic in the [community forums](#).

#### **NSTA Web Seminar: Teaching NGSS in K-5: Constructing Explanations from Evidence**

Carla Zembal-Saul, Mary Starr, and Kathy Renfrew, provided an overview of the NGSS for K-5th grade. The web seminar focused on the three dimensional learning of the NGSS, while introducing CLAIMS-EVIDENCE-REASONING (CER) as a framework for introducing explanations from evidence. The presenters highlighted and discussed the importance of engaging learners with phenomena, and included a demonstration on using a KLEWS chart to map the development of scientific explanations of those phenomena.

To view related resources, visit the [resource collection](#).

Continue discussing this topic in the [community forums](#).

#### **NGSS Core Ideas: Earth's Place in the Universe**

The presenter was Julia Plummer from Penn State University. The program featured strategies for teaching about Earth science concepts that answer questions such as "What goes on in stars?" and "What patterns are caused by Earth's movements in the solar system?"

Dr. Plummer began the presentation by discussing what students should know about the disciplinary core idea of Earth's Place in the Universe. She talked about using the scientific and engineering practices to help engage students. Participants shared their ideas about applying this core idea to the classroom, and then Dr. Plummer shared strategies for effective instruction. She also discussed the importance of spatial thinking for students to begin thinking scientifically about these concepts.

Continue the discussion in the [Community Forums](#).

#### **NGSS ONLINE RESOURCES FOR WEST WINDSOR-PLAINSBORO (K-5)**