

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.

• <u>Vision</u>

- 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

Content Area: Science

Course & Grade Level: Life Science, First Grade

Summary and Rationale

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.

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.

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.

Recommended Pacing

20 days	
	New Jersey Student Learning Standards for
Standard: S	tandards for Part 1: Traits and Behaviors in Parents and Their Offspring
CPI #	Cumulative Progress Indicator (CPI)
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.
Standard: S	tandards for Part 2: Biomimicry
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	Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
Standard: S	tandards for Part 3: Climate Change Activism
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.
Science and	Engineering Practices
Constructing of evidence	<u>g Explanations and Designing Solutions</u> g explanations and designing solutions in K–2 builds on prior experiences and progresses to the use and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. vations (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

Standard:			
CPI #	Cumulative Progress Indicator (CPI)		
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.		
N	ew Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills		
CPI #	Cumulative Progress Indicator (CPI)		
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		
511210112	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.	Use a variety of sources including multimedia sources to find information about topics such as		
3	climate change, with guidance and support from adults		
	Interdisciplinary Standards		
CPI #	Cumulative Progress Indicator (CPI)		
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. Reason abstractly and quantitatively.		
MP.2			
MP.5	Use appropriate tools strategically.		
Standard	U.S. History: America in the World - All students will acquire the knowledge and skills to think		
6.1	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 Endurir	ng Understandings		

- Parents and their offspring have similarities and differences. •
- Humans can use the characteristics and traits of plants and animals to invent something to solve a • problem.
- People can counteract the effects of climate change.

Unit Essential Questions

- How are parents and their offspring alike and different?
- How can people use characteristics and traits of plants and animals?
- How can people reverse the effects of climate change?

Objectives

We will know/learn that/to:

- 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
- Define biomimicry
- Compare and contrast plants and animals and inventions •
- Identify examples of biomimicry •
- Use the engineering process to help create an invention •
- Identify a human problem that could possibly be solved with biomimicry
- Design and create an invention using biomimicry •
- Explain biomimicry and how it is beneficial for humans
- Use the principles of engineering to construct a device that offers a solution to a human problem by • mimicking a plant or animal.
- Describe what activism, being an activist is.
- Kids can be activists, too. •
- Students will identify a problem
- Students will develop an action plan to address a problem •
- Students will present their action plan to an authentic audience •

Evidence of Learning

Assessment

Observations

argument and evidence report

Biomimicry STEAM project

Design Solution to a problem

Climate change action plan

Resources

Core Text:

NGSS Lesson Planning Template

Grade/ Grade Band: 1	Topic: Traits and Behaviors in Parents and Offspring	Lesson # 1 in a series of 9 lessons Launch Lesson
Brief Lesson Description:		

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.

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:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and	LS3.A: Inheritance of Traits	Patterns: Patterns in the natural
Designing Solutions	Young animals are very much, but	world can be observed, used to
Constructing explanations and	not exactly like, their parents. Plants	describe phenomena, and used as
designing solutions in K–2 builds	also are very much, but not exactly,	evidence. (1-LS3-1, 1-LS1-2)
on prior experiences and	like their parents. (1- LS3-1)	
progresses to the use of evidence		
and ideas in constructing	LS3.B: Variation of Traits	
evidence-based accounts of natural	Individuals of the same kind of plant	
phenomena and designing	or animal are recognizable as	
solutions. Make observations	similar but can also vary in many	
(firsthand or from media) to	ways. (1-LS3-1)	
construct an evidence-based		
account for natural phenomena.	LS1.B: Growth and Development of	
(1-LS3-1)	Organisms	
	Adult plants and animals can have	
Obtaining, Evaluating, and	young. In many kinds of animals,	
Communicating Information	parents and the offspring	
Obtaining, evaluating, and	themselves engage in behaviors	
communicating information in K– 2	that help the offspring to survive.	
builds on prior experiences and	(1-LS1-2)	
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)		

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

Grade/ Grade Band: 1	Topic: Traits and Behaviors in	Lesson # 2 in a series of 9
	Parents and Offspring	lessons

Brief Lesson Description:

The students explore characteristics and parts of animals/plants vocabulary needed to accurately make observations during later stations.

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:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and	LS3.A: Inheritance of Traits	Patterns: Patterns in the natural
Designing Solutions	Young animals are very much, but	world can be observed, used to
Constructing explanations and	not exactly like, their parents. Plants	describe phenomena, and used as
designing solutions in K–2 builds	also are very much, but not exactly,	evidence. (1-LS3-1, 1-LS1-2)
on prior experiences and	like their parents. (1- LS3-1)	
progresses to the use of evidence		
and ideas in constructing	LS3.B: Variation of Traits	
evidence-based accounts of natural	Individuals of the same kind of plant	
phenomena and designing	or animal are recognizable as	
solutions. Make observations	similar but can also vary in many	
(firsthand or from media) to	ways. (1-LS3-1)	
construct an evidence-based		
account for natural phenomena.	LS1.B: Growth and Development of	
(1-LS3-1)	Organisms	

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)	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)		
Possible Preconceptions/Misconceptions:			
LESSON PLAN – 5-E Model			

Grade/ Grade Band: 1	Topic: Traits and Behaviors in	Lesson # 3 in a series of 9	
	Parents and Offspring	lessons	
Brief Lesson Description:			
The students explore characteri	stics and parts of animals/plants vocabula	ary needed to accurately make	
observations during later station	ns.		
Performance E			
xpectation(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 measurvive.	lia to determine patterns in behavior of p	arents and offspring that help offspring	

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:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and	LS3.A: Inheritance of Traits	Patterns: Patterns in the natural
Designing Solutions	Young animals are very much, but	world can be observed, used to
Constructing explanations and	not exactly like, their parents. Plants	describe phenomena, and used as
designing solutions in K–2 builds on	also are very much, but not exactly,	evidence. (1-LS3-1, 1-LS1-2)
prior experiences and progresses	like their parents. (1- LS3-1)	
to the use of evidence and ideas in		
constructing evidence-based	LS3.B: Variation of Traits	
accounts of natural phenomena	Individuals of the same kind of plant	
and designing solutions. Make	or animal are recognizable as	
observations (firsthand or from	similar but can also vary in many	
media) to construct an	ways. (1-LS3-1)	
evidence-based account for natural		
phenomena. (1-LS3-1)	LS1.B: Growth and Development of	
	Organisms	
Obtaining, Evaluating, and	Adult plants and animals can have	
Communicating Information	young. In many kinds of animals,	
Obtaining, evaluating, and	parents and the offspring	
communicating information in K-2	themselves engage in behaviors	
builds on prior experiences and	that help the offspring to survive.	
uses observations and texts to	(1-LS1-2)	
communicate new information.		
Read grade-appropriate texts and		
use media to obtain scientific		
information to determine patterns		
in the natural world. (1-LS1-2)		
Possible Preconceptions/Misconceptions:		
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LESSON PLAN – 5-E Model

Grade/ Grade Band: 1	Topic: Traits and Behaviors in Parents and Offspring	Lesson # 4 in a series of 9 lessons
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Brief Lesson Description:

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.

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:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and	LS3.A: Inheritance of Traits	Patterns: Patterns in the natural
Designing Solutions	Young animals are very much, but	world can be observed, used to
Constructing explanations and	not exactly like, their parents. Plants	describe phenomena, and used as
designing solutions in K–2 builds	also are very much, but not exactly,	evidence. (1-LS3-1, 1-LS1-2)
on prior experiences and	like their parents. (1- LS3-1)	
progresses to the use of evidence		
and ideas in constructing	LS3.B: Variation of Traits	
evidence-based accounts of natural	Individuals of the same kind of plant	
phenomena and designing	or animal are recognizable as	
solutions. Make observations	similar but can also vary in many	
(firsthand or from media) to	ways. (1-LS3-1)	
construct an evidence-based		
account for natural phenomena.	LS1.B: Growth and Development of	
(1-LS3-1)	Organisms	
	Adult plants and animals can have	
	young. In many kinds of animals,	
Obtaining, Evaluating, and	parents and the offspring	
Communicating Information	themselves engage in behaviors	
Obtaining, evaluating, and	that help the offspring to survive.	
communicating information in K– 2	(1-LS1-2)	
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)		

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	Disciplinary Core Ideas	Crosscutting Concepts:
Constructing Explanations and	LS1.A: Structure and Function	Patterns: Patterns in the natural
Designing Solutions Constructing	All organisms have external parts.	world can be observed, used to
explanations and designing	Different animals use their body	describe phenomena, and used as
solutions in K–2 builds on prior	parts in different ways to see, hear,	evidence. (1-LS1-2)
experiences and progresses to the	grasp objects, protect themselves,	
use of evidence and ideas in	move from place to place, and seek,	Structure and Function The
constructing evidence-based	find, and take in food, water and air.	shape and stability of structures of
accounts of natural phenomena	Plants also have different parts	natural and designed objects are
and designing solutions.	(roots, stems, leaves, flowers, fruits)	related to their function(s).
	that help them survive and grow.	(1-LS1-1)
Use materials to design a device	(1-LS1-1)	
that solves a specific problem or a		Connections to Engineering,
solution to a specific problem. (1-	LS1.B: Growth and Development	Technology, and Applications of
LS1-1)	of Organisms	Science
	Adult plants and animals can have	
Obtaining, Evaluating, and	young. In many kinds of animals,	Influence of Engineering,
Communicating Information	parents and the offspring	Technology, and Science on
Obtaining, evaluating, and	themselves engage in behaviors	Society and the Natural World
communicating information in K–2	that help the offspring to survive.	
builds on prior experiences and	(1-LS1-2)	Every human-made product is
uses observations and texts to		designed by applying some
communicate new information.	LS1.D: Information Processing	knowledge of the natural world
Deed and a conversion to to the start	Animals have body parts that	and is built using materials derived
Read grade-appropriate texts and	capture and convey different kinds	from the natural world. (1-LS1-1)
use media to obtain scientific	of information needed for growth	Connections to Nature of Science
information to determine patterns	and survival. Animals respond to	Connections to Nature of Science
in the natural world. (1-LS1-2)	these inputs with behaviors that	

	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)
Possible Preconceptions/Misconceptions:		
LESSON PLAN – 5-E Model		

Grade/ Grade Band: 1	Topic: Biomimicry STEAM Project: Lesson 2 (This lesson could be split into multiple days)	Lesson #6 in a series of 9 lessons
Brief Lesson Description:		
The students will begin to use the pr	inciples of engineering to construct a de	evice that offers a possible solution
to a human problem by mimicking a	plant or animal.	
Performance Expectation(s):		
1-LS1-1 Use materials to design a solution their external parts to help them sur	lution to a human problem by mimicking vive, grow, and meet their needs.*	how plants and/or animals use
1-1 S1-2 Read texts and use media to	determine patterns in behavior of parer	nts and offspring that help offspring
survive.	acternance patterns in behavior of parer	its and ojjspring that help ojjspring
5010102.		
Specific Learning Outcomes:		
Specific Learning Outcomes:	to hole croate an invention	
Use the engineering process	•	aicn
Use the engineering processIdentify a human problem the	nat could possibly be solved with biomin	nicry
Use the engineering process	nat could possibly be solved with biomin	nicry
Use the engineering processIdentify a human problem the	nat could possibly be solved with biomin on using biomimicry	nicry
 Use the engineering process Identify a human problem th Design and create an invention 	nat could possibly be solved with biomin on using biomimicry	nicry
 Use the engineering process Identify a human problem th Design and create an invention Narrative / Background Information Prior Student Knowledge:	nat could possibly be solved with biomin on using biomimicry	nicry
 Use the engineering process Identify a human problem th Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and oth 	nat could possibly be solved with biomin on using biomimicry n er organisms	nicry
 Use the engineering process Identify a human problem the Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and othe Traits and behaviors of plants 	nat could possibly be solved with biomin on using biomimicry n er organisms s/animals and their offspring	nicry
 Use the engineering process Identify a human problem th Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and oth 	nat could possibly be solved with biomin on using biomimicry n er organisms s/animals and their offspring	nicry
 Use the engineering process Identify a human problem the Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and othe Traits and behaviors of plant 	nat could possibly be solved with biomin on using biomimicry n er organisms s/animals and their offspring	nicry
 Use the engineering process Identify a human problem th Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and oth Traits and behaviors of plant Some examples of biomimic 	nat could possibly be solved with biomin on using biomimicry ner organisms cs/animals and their offspring ry	
 Use the engineering process Identify a human problem th Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and oth Traits and behaviors of plant 	nat could possibly be solved with biomin on using biomimicry n er organisms s/animals and their offspring	nicry Crosscutting Concepts:
 Use the engineering process Identify a human problem th Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and oth Traits and behaviors of plant Some examples of biomimic 	nat could possibly be solved with biomin on using biomimicry ner organisms cs/animals and their offspring ry	
 Use the engineering process Identify a human problem the Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and oth Traits and behaviors of plant Some examples of biomimic Science and Engineering Practices 	hat could possibly be solved with biomin on using biomimicry mer organisms ss/animals and their offspring ry Disciplinary Core Ideas	Crosscutting Concepts:
 Use the engineering process Identify a human problem the Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and oth Traits and behaviors of plants Some examples of biomimic Science and Engineering Practices Constructing Explanations and 	hat could possibly be solved with biomin on using biomimicry her organisms ss/animals and their offspring ry Disciplinary Core Ideas LS1.A: Structure and Function	Crosscutting Concepts: Patterns: Patterns in the natural
 Use the engineering process Identify a human problem the Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and othe Traits and behaviors of plant Some examples of biomimic Science and Engineering Practices Constructing Explanations and Designing Solutions Constructing 	hat could possibly be solved with biomin on using biomimicry her organisms ts/animals and their offspring ry Disciplinary Core Ideas LS1.A: Structure and Function All organisms have external parts.	Crosscutting Concepts: Patterns: Patterns in the natural world can be observed, used to
 Use the engineering process Identify a human problem the Design and create an invention Narrative / Background Information Prior Student Knowledge: Basic parts of plants and oth Traits and behaviors of plant Some examples of biomimic Science and Engineering Practices Constructing Explanations and Designing Solutions Constructing explanations and designing 	 at could possibly be solved with biominition using biomimicry ber organisms is/animals and their offspring ry Disciplinary Core Ideas LS1.A: Structure and Function All organisms have external parts. Different animals use their body 	Crosscutting Concepts: Patterns: Patterns in the natural world can be observed, used to describe phenomena, and used as

constructing evidence-based	find, and take in food, water and air.	shape and stability of structures of
accounts of natural phenomena	Plants also have different parts	natural and designed objects are
and designing solutions.	(roots, stems, leaves, flowers, fruits)	related to their function(s).
	that help them survive and grow.	(1-LS1-1)
Use materials to design a device	(1-LS1-1)	
that solves a specific problem or a		Connections to Engineering,
solution to a specific problem. (1-	LS1.B: Growth and Development	Technology, and Applications of
LS1-1)	of Organisms	Science
	Adult plants and animals can have	
Obtaining, Evaluating, and	young. In many kinds of animals,	Influence of Engineering,
Communicating Information	parents and the offspring	Technology, and Science on
Obtaining, evaluating, and	themselves engage in behaviors	Society and the Natural World
communicating information in K–2	that help the offspring to survive.	
builds on prior experiences and	(1-LS1-2)	Every human-made product is
uses observations and texts to		designed by applying some
communicate new information.	LS1.D: Information Processing	knowledge of the natural world
	Animals have body parts that	and is built using materials derived
Read grade-appropriate texts and use media to obtain scientific	capture and convey different kinds of information needed for growth	from the natural world. (1-LS1-1)
information to determine patterns in the natural world. (1-LS1-2)	and survival. Animals respond to these inputs with behaviors that	Connections to Nature of Science
	help them survive. Plants also	Scientific Knowledge is Based on
	respond to some external inputs.	Empirical Evidence Scientists look
	(1-LS1-1)	for patterns and order when
		making observations about the
		world. (1-LS1-2)

LESSON PLAN – 5-E Model

NGSS Lesson Planning Template

Grade/ Grade Band: 1	Topic: Favorable Traits and Mimicking	Lesson #7 in a series of 9 lessons

Brief Lesson Description:

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.

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.

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:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and	LS1.A: Structure and Function	Structure and Function
Designing Solutions	All organisms have external parts.	The shape and stability of
Constructing explanations and	Different animals use their body	structures of natural and designed
designing solutions in K–2 builds	parts in different ways to see, hear,	objects are related to their
on prior experiences and	grasp objects, protect themselves,	function(s). (1-LS1-1)
progresses to the use of evidence	move from place to place, and seek,	
and ideas in constructing	find, and take in food, water and air.	
evidence-based accounts of natural	Plants also have different parts	
phenomena and designing	(roots, stems, leaves, flowers, fruits)	
solutions.	that help them survive and grow.	
Use materials to design a device	(1-LS1-1)	
that solves a specific problem or a		
solution to a specific problem.	LS1.D: Information Processing	
(1-LS1-1)	Animals have body parts that	
	capture and convey different kinds	
	of information needed for growth	
	and survival. Animals respond to	
	these inputs with behaviors that	
	help them sur	

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
various picture oi kids holding sig		eginning with a phenomena of looking at Il learn about what activism is and that climate activist.

Performance Expectation(s):

<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.

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 Informa	tion	
Prior Student Knowledge:		
	udents to encounter these ideas.	Crease withing Components
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Fractices.	LS1.A: Structure and Function	<u>Patterns</u>
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)	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	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
	many ways. (1-LS3-1)	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

Brief Lesson Description:	I	1
-	nge and its effect on animals and	the environment, students take action to
_	ents will decide how to present th	
Performance Expectation(s):	ents will decide now to present th	
K-ESS3-3 Communicate solution	s that will reduce the impact of cli	mate 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 informa	tion about a situation people want to change
(e.g., climate change) to define a	a simple problem that can be solve	ed through the development of a new or
improved object or tool.		
Specific Learning Outcomes:		
 Students will identify a pressure of the students will be a student of the student		
	action plan to address a problem	
	eir action plan to an authentic auc	dience
Narrative / Background Informa	ition	
Prior Student Knowledge:	tudents to encounter these ideas	
,	tudents to encounter these ideas.	
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Flactices.	LS1.A: Structure and Function	Patterns
Constructing Explanations and	All organisms have external	Patterns in the natural world can be
Designing Solutions	parts. Different animals use	observed, used to describe phenomena,
Constructing explanations and	their body parts in different	and used as evidence. (1-LS1-2)
designing solutions in K–2	ways to see, hear, grasp	Structure and Function
builds on prior experiences	objects, protect themselves,	
and progresses to the use of	move from place to place, and	The shape and stability of structures of
evidence and ideas in	seek, find, and take in food,	natural and designed objects are related to
constructing evidence-based	water and air. Plants also have	their function(s). (1-LS1-1)
accounts of natural	different parts (roots, stems,	Connections to Engineering, Technology, and
phenomena and designing	leaves, flowers, fruits) that help them survive and grow.	Applications of Science
solutions.	(1-LS1-1)	Influence of Engineering, Technology, and
Use materials to design a		Science on Society and the Natural World
device that solves a specific	LS1.B: Growth and	Every human-made product is designed by
problem or a solution to a	Development of Organisms	applying some knowledge of the natural
specific problem. (1-LS1-1)	Organisms Adult plants and	world and is built using materials derived
	animals can have young. In	from the natural world. (1-LS1-1)
Obtaining, Evaluating, and	many kinds of animals,	
Communicating Information	parents and the offspring	Connections to Nature of Science
Obtaining, evaluating, and	themselves engage in	Scientific Knowledge is Based on Empirical
communicating information in	behaviors that help the	Evidence
K–2 builds on prior	offspring to survive. (1-LS1-2)	Scientists look for patterns and order when
experiences and uses	LS3.B: Variation of Traits	making observations about the world.
observations and texts to	Individuals of the same kind of	(1-LS1-2)
communicate new	plant or animal are	
information. Read	recognizable as similar but can	
grade-appropriate texts and		1

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



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.

• <u>Vision</u>

- 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

Part 1 - Light and Sound

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.

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.

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?

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.

Recommended Pacing	
20 days	
	New Jersey Student Learning Standards for
Standard:	Standards for Part 1 - Light & Sound
<u>1-PS4-2</u>	Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. [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.]
<u>1-PS4-3</u>	Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light. [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.]
<u>1-PS4-1</u>	Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [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.]

This part of the unit is based on 1-PS4-4, K-2-ETS1-1, and K-2-ETS1-2.

Standard: Pa	rt 2 - Communicating with Light and Sound	
<u>1-PS4-4</u>	Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.* [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.]	
<u>K-2-ETS1-1</u>	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.	
<u>K-2-ETS1-2</u>	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.	
Framework fo	nce expectations above were developed using the following elements from the NRC document <u>A</u> <u>r K-12 Science Education</u> :	
	ngineering Practices:	
Planning and	Carrying Out Investigations	
	conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)	
Constructing	Explanations and Designing Solutions	
Use tools	and materials provided to design a device that solves a specific problem. (1-PS4-4)	
Asking Questi	ons and Defining Problems	
• Ask quest (K-2-ETS1-	ions based on observations to find more information about the natural and/or designed world(s). 1)	
 Define a s (K-2-ETS1- 	imple problem that can be solved through the development of a new or improved object or tool. 1)	
Developing ar	nd Using Models	
Develop a	simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)	
Disciplinary C	ore Ideas:	
PS4.C: Inform	ation Technologies and Instrumentation	
 People als (1-PS4-4) 	o use a variety of devices to communicate (send and receive information) over long distances.	
ETS1.A: Defini	ing and Delimiting Engineering Problems	
	n that people want to change or create can be approached as a problem to be solved through ng. (K-2-ETS1-1)	
 Asking que (K-2-ETS1- 	estions, making observations, and gathering information are helpful in thinking about problems. 1)	
Before beg	ginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)	
ETS1.B: Devel	oping Possible Solutions	
-	an be conveyed through sketches, drawings, or physical models. These representations are useful in cating ideas for a problem's solutions to other people. (K-2-ETS1-2)	
Crosscutting Concepts:		
Structure and	Function	

 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		
CPI #	Cumulative Progress Indicator (CPI)	
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

Grade/ Grade Band: 1	Topic: Light and Sound	Lesson # 1 in a series of 18 lessons What is Light?
Brief Lesson Description: In this les	son, students will discuss what they kn	ow and want to know about light.
when illuminated. (1-PS4-2)	ions to determine the effect of placing	
Specific Learning Outcomes:		
By the end of this lesson, students w Share what they know and y		
Narrative / Background Information	n	
Prior Student Knowledge: This is the first opportunity for stude	ents to encounter these ideas.	_
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and	PS4.B: Electromagnetic Radiation	Cause and Effect
 Designing Solutions Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) 	 Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2) 	 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)
Connections to Nature of Science		
Scientific Investigations Use a Variety of Methods		
 Science investigations begin with a question. (1-PS4-1) 		
 Scientists use different ways to study the world. (1-PS4-1) 		
Possible Preconceptions/Misconceptin		

Grade/ Grade Band: 1st grade	Topic: Light and Sound	Lesson # 2 in a series of 18 lessons Pinhole Box investigation
Brief Lesson Description: In this less	son, students will investigate why we n	need light by using a pinhole box.
when illuminated. (1-PS4-2)	ons to determine the effect of placing	
Specific Learning Outcomes: By the end of this lesson, students w	vill be able to: ething when someone shines a light on	ı it.
Narrative / Background Informatior	1	
Prior Student Knowledge:		
This is the first opportunity for stude		Crossentting Concenter
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out Investigations	PS4.B: Electromagnetic Radiation	Cause and Effect
 Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) 	 Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2) 	 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)
Constructing Explanations and Designing Solutions		
 Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) 		
 Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 		
Connections to Nature of Science		
Scientific Investigations Use a Variety of Methods		
 Science investigations begin with a question. (1-PS4-1) 		
• Scientists use different ways to study the world. (1-PS4-1)		

Grade/ Grade Band: 1st grade	Topic: Light and Sound	Lesson # 3 in a series of 18 lessons What Happens When Light Hits Different Objects: Part 1
-	son, students will use different materia	
through it.		
when illuminated. (1-PS4-2)	ions to determine the effect of placing or grant of placing of the second second second second second second se	
 Investigate what happens w 	hen light hits different objects.	
By the end of the lessons 3 and 4, st	udents will understand:	
	sparent, opaque, and reflective.	
Narrative / Background Information	n	
Prior Student Knowledge:		
This is the first opportunity for stude		Concerntting Concernts.
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out	PS4.B: Electromagnetic Radiation	
 Investigations Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) Constructing Explanations and Designing Solutions Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 	 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) 	
Connections to Nature of Science		
Scientific Investigations Use a Variety of Methods		
• Science investigations begin with a question. (1-PS4-1)		

• Scientists use different ways to study the world. (1-PS4-1)		
Possible Preconceptions/Misconceptions:		
LESSON PLAN – 5-E Model		

Grade/ Grade Band: 1st grade	Topic: Light and Sound	Lesson # 4 in a series of 18 lessons What Happens to Light When Part 2
Brief Lesson Description: In this les	son, students will explore what happer	s when light hits different materials.
Performance Expectation(s):		
	ruct an evidence-based account that ob	ojects in darkness can be seen only
when illuminated. (1-PS4-2)		
_	ions to determine the effect of placing (objects made with different materials
in the path of the beam of li Specific Learning Outcomes:	igni. (1-P34-3)	
By the end of this lesson, students w	vill be able to:	
-	hen light hits different objects.	
	ent, transparent, opaque, and reflective	
Narrative / Background Information	n	
Prior Student Knowledge:		
	when light passes through different of	
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out	PS4.B: Electromagnetic Radiation	
Investigations	 Some materials allow light to 	
 Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) Constructing Explanations and Designing Solutions Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 	 Some maternals 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) 	
Connections to Nature of Science		
Scientific Investigations Use a Variety of Methods		

• Science investigations begin with a question. (1-PS4-1)		
• Scientists use different ways to study the world. (1-PS4-1)		
Possible Preconceptions/Misconceptions:		
LESSON PLAN – 5-E Model		

Grade/ Grade Band: 1st grade	Topic: Light and Sound	Lesson # 5 in a series of 18 lessons Shadows
Brief Lesson Description : In this less shadow.	son, students will complete an experim	nent to investigate what makes a
 when illuminated. (1-PS4-2) Plan and conduct investigation in the path of the beam of limits 	ions to determine the effect of placing	
Specific Learning Outcomes: By the end of this lesson, students w Understand that opaque ob Understand what makes a s Understand how a shadow of Narrative / Background Information Prior Student Knowledge: Students explored shadows during t	jects make a shadow. hadow. can change depending on if a light is clo n	oser or farther away from an object.
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
 Planning and Carrying Out Investigations Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) Constructing Explanations and Designing Solutions Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 	 PS4.B: Electromagnetic Radiation 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) 	
Connections to Nature of Science		

Scientific Investigations Use a Variety of Methods		
 Science investigations begin with a question. (1-PS4-1) 		
• Scientists use different ways to study the world. (1-PS4-1)		
 Possible Preconceptions/Misconcep All objects make a shadow. 	ions:	
LESSON PLAN – 5-E Model		

Grade/ Grade Band: 1st grade	Topic: Light and Sound	Lesson # 6 in a series of 18 lessons The Listening Walk	
Brief Lesson Description: In this lesson, students will record sounds they hear in their environment.			
Performance Expectation(s):			
_	ions to provide evidence that vibrating	materials can make sound and that	
sound can make materials v	ibrate. (1-PS4-1)		
Specific Learning Outcomes:			
By the end of this lesson, students w	about their observations of sound in the	onvironment	
By the end of this lesson, students w		e environment.	
 Sound is created in a variety 			
Narrative / Background Informatio			
Prior Student Knowledge:			
This is the first opportunity for stud	ents to encounter these ideas		
		Crosseutting Concenter	
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:	
Planning and Carrying Out	PS4.A: Wave Properties		
Investigations	• Sound can make matter vibrate,		
Plan and conduct	and vibrating matter can make		
investigations collaboratively	sound. (1-PS4-1)		
to produce evidence to			
answer a question.			
(1-PS4-1),(1-PS4-3)			
Constructing Explanations and			
Designing Solutions			
 Make observations (firsthand or from media) to construct 			
an evidence-based account			
for natural phenomena.			
(1-PS4-2)			
 Use tools and materials 			
provided to design a device			
that solves a specific problem. (1-PS4-4)			
Connections to Nature of Science			

Scientific Investigations Use a Variety of Methods		
• Science investigations begin with a question. (1-PS4-1)		
• Scientists use different ways to study the world. (1-PS4-1)		
Possible Preconceptions/Misconce	ptions:	•
LESSON PLAN – 5-E Model		

Grade/ Grade Band: 1st grade	Topic: Light and Sound	Lesson # 7 in a series of 18 lessons Investigating How We Hear	
Brief Lesson Description: In this lesson, students will conduct an investigation of how we hear.			
Performance Expectation(s):			
	ions to provide evidence that vibrating	materials can make sound and that	
sound can make materials v	vibrate. (1-PS4-1)		
Specific Learning Outcomes:			
By the end of this lesson, students w			
• Conduct an investigation of			
 By the end of this lesson, students w The parts of an ear. 	wiii understand.		
 Sound waves cause the ear 	drum to vibrato		
Narrative / Background Informatio			
Prior Student Knowledge:			
This is the first opportunity for stud	ents to encounter these ideas		
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:	
• •		crosscutting concepts.	
Planning and Carrying Out	PS4.A: Wave Properties		
Investigations	• Sound can make matter vibrate,		
Plan and conduct	and vibrating matter can make		
investigations collaboratively	sound. (1-PS4-1)		
to produce evidence to			
answer a question.			
(1-PS4-1),(1-PS4-3)			
Constructing Explanations and			
Designing Solutions			
 Make observations (firsthand 			
or from media) to construct			
an evidence-based account			
for natural phenomena.			
(1-PS4-2)			
. ,			
Use tools and materials			
provided to design a device			
that solves a specific problem.			
(1-PS4-4)			

Connections to Nature of Science		
Scientific Investigations Use a Variety of Methods		
 Science investigations begin with a question. (1-PS4-1) 		
• Scientists use different ways to study the world. (1-PS4-1)		
 Possible Preconceptions/Misconce The outer ear does all the w There are no bones in the ear does all the w 	vork for us to hear.	
LESSON PLAN – 5-E Model		

Lesson # 8 in a series of 18 lessons Grade/ Grade Band: 1st grade Topic: Light and Sound Making a Splash Brief Lesson Description: In this lesson, the students will investigate how vibrating materials make sound and that sound can make other materials vibrate. **Performance Expectation(s):** Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (1-PS4-1) **Specific Learning Outcomes:** By the end of this lesson, students will be able to: Discover how vibrations create sound waves that travel through the air to your ear. • • Discover how vibrating materials make sound and that sound can make other materials vibrate. By the end of this lesson, students will understand: • Vibrating materials can cause sound and that sound can cause other materials to vibrate. Narrative / Background Information Prior Student Knowledge: This is the first opportunity for students to encounter these ideas. Science & Engineering Practices: **Disciplinary Core Ideas: Crosscutting Concepts: Planning and Carrying Out PS4.A: Wave Properties Cause and Effect** Investigations Sound can make matter vibrate, Simple tests can be designed to Plan and conduct and vibrating matter can make gather evidence to support or investigations collaboratively sound. (1-PS4-1) refute student ideas about to produce evidence to causes. answer a question. (1-PS4-1),(1-PS4-2),(1-PS4-3) (1-PS4-1),(1-PS4-3) **Constructing Explanations and Designing Solutions** • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)

Connections to Nature of Science	
Scientific Investigations Use a Variety of Methods	
 Science investigations begin with a question. (1-PS4-1) 	
• Scientists use different ways to study the world. (1-PS4-1)	
Possible Preconceptions/Misconce	ons:
LESSON PLAN – 5-E Model	

Grade/ Grade Band: 1st grade	Topic: Light and Sound	Lesson # 9 in a series of 18 lessons What's the Buzz?
Brief Lesson Description: In this les	son, students will discover how vibratic	ons create sound waves.
Performance Expectation(s):		
-	ions to provide evidence that vibrating	materials can make sound and that
sound can make materials v	ibrate. (1-PS4-1)	
Specific Learning Outcomes:		
By the end of this lesson, students w		
	ate sound waves that travel through the	e air to your ear.
By the end of this lesson, students w		
 Vibrating materials can caus 		
Narrative / Background Information	n	
Prior Student Knowledge: This is the first opportunity for stude	ents to encounter these ideas.	
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out	PS4.A: Wave Properties	Cause and Effect
Investigations	• Sound can make matter vibrate,	• Simple tests can be designed to
 Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) 	and vibrating matter can make sound. (1-PS4-1)	 Shifple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3)
Constructing Explanations and Designing Solutions		
 Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) 		
Connections to Nature of Science		

Scientific Investigations Use a Variety of Methods	
• Science investigations begin with a question. (1-PS4-1)	
• Scientists use different ways to study the world. (1-PS4-1)	
Possible Preconceptions/Misconce	ions:
LESSON PLAN – 5-E Model	

Grade/ Grade Band: 1st grade	Topic: Light and Sound	Lesson # 10 in a series of 18 lessons Musical Rulers
Brief Lesson Description : In this less the length of the sound waves make	son, the students will investigate how vertifies the sounds.	vibrating materials make sound and
 Performance Expectation(s): Plan and conduct investigat sound can make materials v 	ions to provide evidence that vibrating ibrate. (1-PS4-1)	materials can make sound and that
• Sound waves are different le By the end of this lesson, students v	ate sound waves that travel through th engths and the length of the wave char vill understand: se sound and that sound can cause othe	ges the sound.
Prior Student Knowledge: This is the first opportunity for stude		
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying OutInvestigationsPlan and conduct	 PS4.A: Wave Properties Sound can make matter vibrate, and vibrating matter can make 	 Cause and Effect Simple tests can be designed to gather evidence to support or
investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3)	sound. (1-PS4-1)	refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3)
Constructing Explanations and Designing Solutions		
 Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) 		
Connections to Nature of Science		

Scientific Investigations Use a Variety of Methods		
 Science investigations begin with a question. (1-PS4-1) 		
 Scientists use different ways to study the world. (1-PS4-1) 		
Possible Preconceptions/Misconceptions:		
LESSON PLAN – 5-E Model		

Grade/ Grade Band: 1st grade	Topic: Communicating with Light and Sound	Lesson # 11 in a series of 18 lessons Non-verbal Communication with Sound
Brief Lesson Description : In this lessound.	sson students will create two non-verba	l signals to communicate through
communicating over a dista		
Use scientific knowledge to	people solve problems.	ople communicating through sound.
Prior Student Knowledge:		
Students will use their knowledge of Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out Investigations	PS4.C: Information Technologies and Instrumentation	Connections to Engineering, Technology, and Applications of
 Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) 	 People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) 	Science Influence of Engineering, Technology, and Science, on Society and the Natural World
Constructing Explanations and Designing Solutions	ETS1.A: Defining and Delimiting Engineering Problems	 People depend on various technologies in their lives; human life would be very
 Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 	 A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) 	different without technology. (1-PS4-4)
Asking Questions and Defining Problems	 Asking questions, making observations, and gathering information are helpful in 	

 Ask questions based on 	thinking about problems.
observations to find more	(K-2-ETS1-1)
information about the natural and/or designed world(s). (K-2-ETS1-1)	 Before beginning to design a solution, it is important to clearly understand the problem.
• Define a simple problem that	(K-2-ETS1-1)
can be solved through the development of a new or improved object or tool.	ETS1.B: Developing Possible Solutions
(K-2-ETS1-1)	• Designs can be conveyed
Developing and Using Models	through sketches, drawings, or physical models. These
 Develop a simple model based on evidence to 	representations are useful in communicating ideas for a
represent a proposed object or tool. (K-2-ETS1-2)	problem's solutions to other people. (K-2-ETS1-2)

• Animals and people making sound/noises are not communication.

LESSON PLAN – 5-E Model

Grade/ Grade Band: 1st grade	Topic: Communicating with Light and Sound	Lesson # 12 in a series of 18 lessons Cup-a-Phone Part 1
Brief Lesson Description: In this less	sson, students will experiment with com	nmunicating across a distance by
creating a telephone using given ma	aterials.	
Performance Expectation(s):		
• Use tools and materials to d	design and build a device that uses light	or sound to solve the problem of
communicating over a dista	ince. (1-PS4-4)	
 Ask questions, make observ 	vations, and gather information about a	situation people want to change to
define a simple problem the	at can be solved through the developme	ent of a new or improved object or
tool. (K-2-ETS1-1)		
 Develop a simple sketch, dr 	awing, or physical model to illustrate he	ow the shape of an object helps it
function as needed to solve	e a given problem. (K-2-ETS1-2)	
Specific Learning Outcomes: By the	e end of this lesson, students will be abl	e to:
0	generate design solutions involving peo	
	mation they use to design the solution,	with guidance as needed.
By the end of this lesson, students v		
How people can communic	ate over long distances	
Narrative / Background Informatio	n	
Prior Student Knowledge:		
Students will use their knowledge o	f sound from previous lessons.	
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Planning and Carrying Out	PS4.C: Information Technologies	Connections to Engineering,
Investigations	and Instrumentation	Technology, and Applications of
-		Science
Plan and conduct	People also use a variety of	
investigations collaboratively	devices to communicate (send	
to produce evidence to		

 answer a question. (1-PS4-1),(1-PS4-3) Constructing Explanations and Designing Solutions Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 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) Define a simple problem that can be solved through the development of a new or 	 and receive information) over long distances. (1-PS4-4) ETS1.B: Developing Possible Solutions Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2) 	 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)
improved object or tool. (K-2-ETS1-1) Developing and Using Models		
 Developing and osing wodels Develop a simple model based on evidence to represent a proposed object 		

 Brief Lesson Description: In this lesson, students will expand on the previous letelephone, changing one variable from the previous lesson. Performance Expectation(s): Use tools and materials to design and build a device that uses light or scommunicating over a distance. (1-PS4-4) Ask questions, make observations, and gather information about a situ define a simple problem that can be solved through the development of tool. (K-2-ETS1-1) Develop a simple sketch, drawing, or physical model to illustrate how t function as needed to solve a given problem. (K-2-ETS1-2) 	Grade/ Grade Band: 1st grade	Topic: Communicating with Light and Sound	Lesson # 13 in a series of 18 lessons Cup-a-Phone Part 2
 Performance Expectation(s): Use tools and materials to design and build a device that uses light or scommunicating over a distance. (1-PS4-4) Ask questions, make observations, and gather information about a situ define a simple problem that can be solved through the development tool. (K-2-ETS1-1) Develop a simple sketch, drawing, or physical model to illustrate how to the development of the d	Brief Lesson Description: In this lesson, students will expand on the previous lesson and invent their own		
 Use tools and materials to design and build a device that uses light or scommunicating over a distance. (1-PS4-4) Ask questions, make observations, and gather information about a situ define a simple problem that can be solved through the development tool. (K-2-ETS1-1) Develop a simple sketch, drawing, or physical model to illustrate how to the solved to illustrate how to the solved to the so	elephone, changing one variable fi	om the previous lesson.	
 communicating over a distance. (1-PS4-4) Ask questions, make observations, and gather information about a situ define a simple problem that can be solved through the development tool. (K-2-ETS1-1) Develop a simple sketch, drawing, or physical model to illustrate how t 	Performance Expectation(s):		
function as needed to solve a given problem. (K-2-ETST-2)	 communicating over a dista Ask questions, make observed define a simple problem th tool. (K-2-ETS1-1) Develop a simple sketch, dr 	nce. (1-PS4-4) vations, and gather information about a at can be solved through the developm rawing, or physical model to illustrate h	a situation people want to change to ent of a new or improved object or

• Use scientific knowledge to generate design solutions involving people communicating through sound across a distance.

• Describe the scientific information they use to design the solution, with guidance as needed. By the end of this lesson, students will understand:

• How people can communicate over long distances

Narrative / Background Information

Prior Student Knowledge:

- Students will use their knowledge of sound from previous lessons.
- Students will use their knowledge of constructing a cup telephone from the previous lesson.

Science & Engineering Practices: **Disciplinary Core Ideas: Crosscutting Concepts: Planning and Carrying Out PS4.C: Information Technologies Connections to Engineering**, Investigations and Instrumentation Technology, and Applications of Science • Plan and conduct • People also use a variety of investigations collaboratively devices to communicate (send Influence of Engineering, and receive information) over Technology, and Science, on to produce evidence to Society and the Natural World answer a question. long distances. (1-PS4-4) (1-PS4-1),(1-PS4-3) **ETS1.A: Defining and Delimiting** People depend on various **Constructing Explanations and Engineering Problems** technologies in their lives; **Designing Solutions** human life would be very A situation that people want to different without technology. Use tools and materials change or create can be (1-PS4-4)provided to design a device approached as a problem to be that solves a specific problem. solved through engineering. (1-PS4-4) (K-2-ETS1-1) Asking Questions and Defining • Asking questions, making Problems observations, and gathering information are helpful in Ask questions based on • thinking about problems. observations to find more (K-2-ETS1-1) information about the natural and/or designed world(s). Before beginning to design a • (K-2-ETS1-1) solution, it is important to clearly understand the problem. • Define a simple problem that (K-2-ETS1-1) can be solved through the development of a new or **ETS1.B: Developing Possible** improved object or tool. Solutions (K-2-ETS1-1) Designs can be conveyed **Developing and Using Models** through sketches, drawings, or physical models. These Develop a simple model representations are useful in based on evidence to communicating ideas for a represent a proposed object problem's solutions to other or tool. (K-2-ETS1-2) people. (K-2-ETS1-2) **Possible Preconceptions/Misconceptions:** None of the materials offered will work All of the materials offered will work LESSON PLAN – 5-E Model

Grade/ Grade Band: 1st grade

Topic: Communicating with Light

	and Sound	Making Sound Travel Farther When
		Communicating (1 or 2 day lesson, you choose)
Brief Lesson Description: Students	will test their ability to hear sound ove	r a distance
 communicating over a distant Ask questions, make observent define a simple problem that tool. (K-2-ETS1-1) Develop a simple sketch, dragonal structure 	esign and build a device that uses light nce. (1-PS4-4) ations, and gather information about a at can be solved through the developme awing, or physical model to illustrate he a given problem. (K-2-ETS1-2)	situation people want to change to ent of a new or improved object or
Specific Learning Outcomes:		
By the end of this lesson, students w		
How sound travels over a di		
Narrative / Background Information Prior Student Knowledge:	1	
_	f sound and communication from previ	ous lessons
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
		Structure and Function
Planning and Carrying Out Investigations	PS4.C: Information Technologies and Instrumentation	
 Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) 	 People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) 	 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
Constructing Explanations and Designing Solutions		Science
 Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 		 Technology, and Science, on Society and the Natural World People depend on various technologies in their lives;
Asking Questions and Defining Problems		human life would be very different without technology.
 Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) 		(1-PS4-4)
Developing and Using Models		
 Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2) 		

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

Grade/ Grade Band: 1st grade	Topic: Communicating with Light	Lesson # 15 in a series of 18 lessons Using Light to Communicate
Brief Lesson Description: In this less	son, students will explore how people	communicate with light
 communicating over a distant Ask questions, make observations, make observations, make observation define a simple problem that tool. (K-2-ETS1-1) Develop a simple sketch, drate function as needed to solve Specific Learning Outcomes: By the end of this lesson, students of the set of the se	ations, and gather information about a at can be solved through the developm awing, or physical model to illustrate h a given problem. (K-2-ETS1-2) will be able to: bout their observations of how light is	situation people want to change to ent of a new or improved object or ow the shape of an object helps it
Light can be used to commu Narrative / Background Information Prior Student Knowledge:	1	
Students will use their knowledge of		
 Science & Engineering Practices: Planning and Carrying Out Investigations Plan and conduct investigations collaboratively to produce evidence to answer a question. 	 Disciplinary Core Ideas: PS4.C: Information Technologies and Instrumentation People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) 	Crosscutting Concepts: Connections to Engineering, Technology, and Applications of Science Influence of Engineering, Technology, and Science, on Society and the Natural World
 (1-PS4-1),(1-PS4-3) Constructing Explanations and Designing Solutions Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 		 People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)
 Asking Questions and Defining Problems Ask questions based on observations to find more information about the natural and/or designed world(s). 		

Developing and Using Models		
 Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2) 		
Possible Preconceptions/Misconce	ptions:	
LESSON PLAN – 5-E Model		

Grade/ Grade Band: 1st grade	Topic: Communicating with Light and Sound	Lesson # 16 in a series of 18 lessons Using Light and Sound To Communicate
Brief Lesson Description : In this les to communicate over distance.	son, students will explore and understa	and how light and sound can be used
communicating over a distaAsk questions, make observ	lesign and build a device that uses light nce. (1-PS4-4) ations, and gather information about a at can be solved through the developme	situation people want to change to
By the end of this lesson, students v Light and sound can be used Narrative / Background Information	bout their observations of how light ar vill understand: d to communicate in a variety of ways.	nd sound are used to communicate.
	f light, sound and communication from	
Science & Engineering Practices: Planning and Carrying Out Investigations	Disciplinary Core Ideas: PS4.C: Information Technologies and Instrumentation	Crosscutting Concepts: Connections to Engineering, Technology, and Applications of
 Plan and conduct investigations collaboratively to produce evidence to answer a question. 	 People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) 	Science Influence of Engineering, Technology, and Science, on Society and the Natural World
(1-PS4-1),(1-PS4-3) Constructing Explanations and Designing Solutions		 People depend on various technologies in their lives; human life would be very
 Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 		different without technology. (1-PS4-4)
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) 		
Developing and Using Models		
 Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2) 		
Possible Preconceptions/Misconceptin	ions:	

Grade/ Grade Band: 1st grade	Topic: Communicating with Light and Sound	Lesson # 17 in a series of 18 lessons Using Light and Sound to Communicate Across Distances
-	son, Students will explore how commu	inication with light and sound can be
used over distances		
 communicating over a dista Ask questions, make observed define a simple problem that tool. (K-2-ETS1-1) Develop a simple sketch, drafunction as needed to solve Specific Learning Outcomes By the end of this lesson, students ved to communicate over distance By the end of this lesson, students ved to solve the end of this lesson, students ved to communicate over distance 	rations, and gather information about a at can be solved through the developm awing, or physical model to illustrate h a given problem. (K-2-ETS1-2) s: will be able to: ation about their observations of how l	a situation people want to change to ent of a new or improved object or ow the shape of an object helps it
Narrative / Background Information		
Prior Student Knowledge: Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
 Planning and Carrying Out Investigations Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) 	 PS4.C: Information Technologies and Instrumentation People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) 	Connections to Engineering, Technology, and Applications of Science Influence of Engineering, Technology, and Science, on Society and the Natural World

Constructing Explanations and Designing Solutions	 People depend on various technologies in their lives;
 Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 	human life would be very different without technology. (1-PS4-4)
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) 	
 Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) 	
Developing and Using Models	
 Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2) 	

Grade/ Grade Band: 1st grade	Topic: Communicating with Light and Sound	Lesson #18 in a series of 18 lessons STEM lesson - build upon earlier device to communicate with sound across distances	
Brief Lesson Description: In this les	son, the students will design an instrum	nent and engineer it.	
Performance Expectation(s):			
 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) 			
Specific Learning Outcomes:			
By the end of this lesson, students will be able to:			
• design and instrument that as a communication tool			
By the end of this lesson, students w	By the end of this lesson, students will understand:		
 that engineers have a proce 	ss that they follow when designing som	ething new.	

Narrative / Background Information

Prior Student Knowledge:

The students will use the knowledge acquired through the previous sound lessons of this unit.

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Constructing Explanations and Designing Solutions	PS4.C: Information Technologies and Instrumentation	Structure and FunctionThe shape and stability of
 Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) 	 People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) ETS1.B: Developing Possible 	structures of natural and designed objects are related to their function(s). (K-2-ETS1-2) Connections to Engineering, Technology, and Applications of
	Solutions	Science
	• 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)	 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)
Possible Preconceptions/Misconce	ptions:	·

LESSON PLAN – 5-E Model

Grade/ Grade Band: 1st grade	Topic: Light Pollution	Lesson # 1 in a series of lessons 1 Light Pollution		
Brief Lesson Description: Stude animals	ents will begin to explore ligh	t pollution and its effect on the planet, humans and		
Performance Expectation(s):				
(K-2-ETS1-1) Ask questions, mal	e observations, and gather in	nformation 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:				
By the end of this lesson studen	ts will be able to:			
• Make observations to construct an evidence-based account that objects in darkness can be seen only				
when illuminated. (1-PS By the end of this lesson, studer	1			
 Lights on at night cause 				
• •	•			
Lights pollution affects what we can see at night.Animals are affected by light pollution.				

Prior Student Knowledge:	students to encounter these ideas	
Science & Engineering Practices: Analyzing and Interpreting	Disciplinary Core Ideas: ETS1.A: Defining and Delimiting Engineering Problems	Crosscutting Concepts: Cause and Effect Events have causes that generate observable patterns.
Data • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)	 Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) 	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/Misco Humans can see the same thing Animals aren't affected by light LESSON PLAN – 5-E Model	gs with lights on or off.	

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 <u>resource collection</u>.

Continue discussing this topic in the <u>community forums</u>.

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 <u>Community Forums</u>.



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.

• <u>Vision</u>

- 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	
Content Area: Science		
Course & Gra	de Level: Grade 1 Earth and Space Science	
	Summary and Rationale	
describe, and	udents will learn about the patterns of the sun, moon, earth and stars. Students will observe, predict some patterns of movement of objects in the sky. Students will also learn about the seasonal g with sunrise and sunset patterns.	
	Recommended Pacing	
16 days		
	New Jersey Student Learning Standards for	
Standard: Ap	ppendix A: NGSS and Foundations for the Unit	
(<u>1-ESS1-1</u>)	Use observations of the sun, moon, and stars to describe patterns that can be predicted. [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.]	
(<u>1-ESS1-2</u>)	Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]	
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.	
•	ance expectations above were developed using the following elements from the NRC document <u>A</u> or K-12 Science Education:	
	Engineering Practices:	
Planning and	Carrying Out Investigations	
	conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) Carrying Out Investigations	
•	servations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)	
	Interpreting Data	
	rvations (firsthand or from media) to describe patterns in the natural world in order to answer questions. (1-ESS1-1)	
Disciplinary (Core Ideas:	
	Jniverse and its Stars	
 Patterns (1-ESS1-1) 	of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. .)	
ESS1.B: Earth	and the Solar System	
• Seasonal	patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)	

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**

1	New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills		
CPI #	Cumulative Progress Indicator (CPI)		
9.1.2.CAP.1	Make a list of different types of jobs and describe the skills associated with each job.		
CPI #	Cumulative Progress Indicator (CPI)		
8.1.	Collaborate with peers by participating in interactive digital games or activities.		
P.C.1			
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) **1.0A.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		
Grade/ Grade Band: 1st grade	Topic: Patterns of Change	Lesson #1 in a series of 13 lessons
	in the Sky	Introduction to the Sun and Pre-Assessment
about patterns in the sky.	lesson, students will be taking	a pre-assessment to demonstrate prior knowledge
Performance Expectation(s):		
 Use observations of the s 		e patterns that can be predicted. (1-ESS1-1) he amount of daylight to the time of year.
Specific Learning Outcomes:		
By the end of this lesson, student		
	d Moon as permanent objects	in the sky.
By the end of this lesson, student		
 The Sun is larger than the The Earth is larger than the 		
 The Earth is larger than the Sun Earth and Moon 		sky and are from nature and not man-made.
Narrative / Background Informat		sky and are normature and not mar-made.
Prior Student Knowledge:		
This is the first opportunity for stu	udents to encounter these idea	IS.
Science & Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:
Practices:		
Analyzing and Interpreting	ESS1.A: The Universe and its Stars • Patterns of the	 Patterns Patterns in the natural world can be observed, used to describe phenomena, and
 Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1) 	• motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)	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	Lesson # 2 in a series of 13 lessons	
	in the Sky	Observing the Sun	
Brief Lesson Description: In this lesson, students observe and gather data about the sun.			
Performance Expectation(s):			
		e patterns that can be predicted. (1-ESS1-1) ne amount of daylight to the time of year. (1-ESS1-2)	
Specific Learning Outcomes:			
By the end of this lesson, student			
	and or from media) to collect	data that can be used to make comparisons.	
(1-ESS1-2)			
	terns in the sun's movement.		
By the end of this lesson, student			
		his is due to the Earth's motion, not the Sun's.	
Narrative / Background Informat	ion		
Prior Student Knowledge:			
This is the first opportunity for stu			
Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:	
Practices:	ESS1.A: The Universe and	Patterns	
Planning and Carrying Out	its Stars	 Patterns in the natural world can be 	
Investigations	• Patterns of the	observed, used to describe phenomena, and	
 Make observations 	motion of the sun,	used as evidence. (1-ESS1-1),(1-ESS1-2)	
(firsthand or from media) to	moon, and stars in the		
collect data that can be	sky can be observed,		
used to make comparisons.	described, and		
(1-ESS1-2)	predicted. (1-ESS1-1)		
Possible Preconceptions/Miscon	ceptions:		
	id the Sun rotates around the I	Earth.	
• The Moon gives off its ow			
• The Earth is the biggest p	-		
 Daylight time is the same 	throughout the year.		
 Everybody on Earth has d 	 Everybody on Earth has daytime/nighttime at the same time. 		
 Everybody on Earth has s 	easons at the same time.		
LESSON PLAN – 5-E Model			
	Topic: Patterns of Change	Lesson # 3 in a series of 13 lessons	
Grade/ Grade Band: 1st grade	in the Sky	Analyzing Shadows and Data	
Brief Lesson Description: In this	lesson, students observe, desc	ribe, and predict some patterns in the movement	
the sun in the sky.			
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) • Observe and describe patterns in the sup's meyoment by applyzing data			
 Observe and describe patterns in the sun's movement by analyzing data. 			
By the end of this lesson, student	s 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. **Disciplinary Core Ideas: Science & Engineering Crosscutting Concepts:** Practices: ESS1.A: The Universe and Patterns its Stars Patterns in the natural world can be **Planning and Carrying Out** • Patterns of the observed, used to describe phenomena, and • Investigations motion of the sun, used as evidence. (1-ESS1-1),(1-ESS1-2) Make observations • moon, and stars in the (firsthand or from media) to sky can be observed, collect data that can be described, and used to make comparisons. predicted. (1-ESS1-1) (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)

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
	In the sky	Revolution
Brief Lesson Description: In this	lesson, students will understar	nd 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.		

- 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	Disciplinary Core Ideas:	Crosscutting Concepts:	
Practices: Planning and Carrying Out	ESS1.A: The Universe and	Patterns	
Investigations	• Patterns of the	• Patterns in the natural world can be	
 Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) 	• Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)	observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(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)			
 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 mode	Is of the moon, sun, and earth to investigate why the	
moon has phases.			
Performance Expectation(s):	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 (firsthat) 	Use observations (firsthand or from media) to describe patterns in the natural world in order to answer		

scientific questions. (1-ES	SS1-1)	
	-	e moon is an object that revolves around the earth.
By the end of this lesson, student		
 The moon is an object that revolves around Earth. The Moon shines because it is reflecting sunlight. 		
Narrative / Background Information		
Prior Student Knowledge:		
This is the first opportunity for st	udents to encounter these ide	as
Science & Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:
Practices:	Disciplinary core ideas.	crosscatting concepts.
Planning and Carrying Out	ESS1.A: The Universe and	Patterns
	its Stars	• Patterns in the natural world can be
Investigations	Patterns of the	observed, used to describe phenomena, and
 Plan and conduct 	motion of the sun,	used as evidence. (1-ESS1-1),(1-ESS1-2)
investigations		used as evidence. (1-ESS1-1),(1-ESS1-2)
collaboratively to produce	moon, and stars in the	
evidence to answer a	sky can be observed,	
question.	described, and	
(1-PS4-1),(1-PS4-3)	predicted. (1-ESS1-1)	
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)		
. ,		
Possible Preconceptions/Miscon	-	
	nd the Sun rotates around the	Earth.
 The moon gives off its ov 	-	
 The Earth is the biggest p 		
 Daylight time is the same 		
 Everybody on Earth has d 	laytime/nighttime at the same	time.
 Everybody on earth has s 	seasons at the same time.	
LESSON PLAN – 5-E Model		
	Topic: Patterns of Change	Lesson # 6 in a series of 13 lessons
Grade/ Grade Band: 1st grade	in the Sky	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

The students have learned that the moon has phases.		
Science & Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:
Practices:	ESS1.A: The Universe and	Patterns
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 	its Stars • Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)	 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)
answer scientific questions. (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. • Exervition 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

Brief Lesson Description: In this lesson, students will create a model of the moon out of modeling clay. **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: Use models to describe patterns in the natural world in order to answer scientific questions. • Create a model to represent 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:** Students have learned that the moon is an object that revolves around the earth and the moon changes phases as time goes by. **Disciplinary Core Ideas:** Science & Engineering **Crosscutting Concepts: Practices:** ESS1.A: The Universe and Patterns its Stars Patterns in the natural world can be Analyzing and Interpreting observed, used to describe phenomena, and Patterns of the Data • motion of the sun, used as evidence. (1-ESS1-1),(1-ESS1-2) Use observations moon, and stars in the (firsthand or from media) to sky can be observed, describe patterns in the described, and natural world in order to predicted. (1-ESS1-1) answer scientific questions. (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 **Topic:** Patterns of Change Lesson #8 in a series of 13 lessons Grade/ Grade Band: 1st grade in the Sky Spatial Relations of the Earth, Sun, and Moon Brief Lesson Description: In this lesson, students describe and predict some patterns in the movement of the Sun, Earth and Moon. **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: 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 sun, earth, and moon's movement. West Windsor-Plainsboro RSD

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 moon is an object that revolves around Earth. •

 The moon is an object that 	at revolves around Earth.		
Narrative / Background Informat	ion		
Prior Student Knowledge:			
The students have learned that the sun and moon are both permanent objects in the sky.			
Science & Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:	
Practices:	FCC1 A. The Universe and	Detterme	
	ESS1.A: The Universe and	Patterns	
Analyzing and Interpreting	its Stars	• Patterns in the natural world can be	
Data	 Patterns of the 	observed, used to describe phenomena, and	
 Use observations 	motion of the sun,	used as evidence. (1-ESS1-1),(1-ESS1-2)	
	moon, and stars in the		
(firsthand or from media) to	sky can be observed,		
describe patterns in the	described, and		
natural world in order to	predicted. (1-ESS1-1)		
answer scientific questions.			
(1-ESS1-1)			
Possible Preconceptions/Miscon	ceptions:		
-	Id the Sun rotates around the I	Earth.	
 The moon gives off its ow 			
• The Earth is the biggest p	-		
 Daylight time is the same 			
, c	aytime/nighttime at the same	time.	
 Everybody on earth has s 	, , ,		
LESSON PLAN – 5-E Model			
Grade/ Grade Band: 1st grade	Topic: Patterns of Change	Lesson #9 in a series of 13 lessons	
	in the Sky	Understanding Stars	
Brief Lesson Description: In this lesson, students describe some patterns in the stars.			
	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, student	s will be able to:		
 Make observations (firsth 	and 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 stars and understand that because the sun is so close, its brightness keeps us from			
seeing other starts during the day.			
By the end of this lesson, students will understand:			
Because the Sun is so close, its brightness keeps us from seeing other stars during the day.			
Narrative / Background Information			
Prior Student Knowledge:			
This is the first opportunity for students to encounter these ideas.			
Science & Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:	
Practices:	• • • • • • • • • •	5	

 The moon gives off its ow The Earth is the biggest p Daylight time is the same Everybody on Earth has d 	nd the Sun rotates around the I yn light. lanet. throughout the year. aytime/nighttime at the same	
Everybody on earth has s	easons at the same time.	
LESSON PLAN – 5-E Model		
Grade/ Grade Band: 1st grade	Topic: Patterns of Change	Lesson # 10 in a series of 13 lessons
Glade, Glade Ballu. 15t glade	in the Sky	Patterns of Daylight
Brief Lesson Description: In this	lesson, students observe, desc	ribe, and predict some patterns in the movement of
the Sun in the sky.		
 Make observations at diff Specific Learning Outcomes: By the end of this lesson, student Make observations (firsthe (1-ESS1-2)) Use observations (firsthe scientific questions. (1-ES) By the end of this lesson, student 	Ferent times of year to relate the s will be able to: and or from media) to collect nd or from media) to describe S1-1) s will understand: gher in the sky during the sume	e patterns that can be predicted. (1-ESS1-1) ne amount of daylight to the time of year. (1-ESS1-2) data that can be used to make comparisons. patterns in the natural world in order to answer mer and lower in the winter due to Earth's tilt and
Narrative / Background Informat	ion	
Prior Student Knowledge:		
The students have learned that th	<u>ne sun moves in a p</u> attern acro	ss the sky
Science & Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:
Practices: Planning and Carrying Out Investigations Make observations (firsthand or from media) to collect data that can be used to make comparisons.	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 	 Patterns Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)

(1-ESS1-2)	predicted. (1-ESS1-1)	
Analyzing and Interpreting	ESS1.B: Earth and the	
Data	Solar System	
 Use observations 	 Seasonal 	
(firsthand or from media) to	patterns of sunrise and	
describe patterns in the	sunset can be	
natural world in order to	observed, described,	
answer scientific questions.	and predicted.	
(1-ESS1-1)	(1-ESS1-2)	
Possible Preconceptions/Miscon	ceptions:	
• The Earth is the center ar	nd the Sun rotates around the I	Earth.
 The Moon gives off its ov 	vn light.	
 The Earth is the biggest p 	lanet.	
 Daylight time is the same 		
	laytime/nighttime at the same	time.
 Everybody on Earth has s 	easons at the same time.	
LESSON PLAN – 5-E Model		
		Lesson # 11 in a series of 13 lessons
Grade/ Grade Band: 1st grade	Topic: Patterns of Change	Introduction to the Seasons- Tilt of the Earth and
Glade, Glade Balla. 13t glade	in the Sky	Earth's revolution around the sun to make the
		seasons
_	lesson, students will be able to	understand how the movement of the earth makes
the seasons.		
Performance Expectation(s):		\sim wetter that say he are disted (1.5001.1)
		e patterns that can be predicted. (1-ESS1-1)
	lerent times of year to relate th	ne amount of daylight to the time of year. (1-ESS1-2)
Specific Learning Outcomes: By the end of this lesson, student	a will be able to:	
•		patterns in the natural world in order to answer
scientific questions. (1-ES		patterns in the natural world in order to answer
By the end of this lesson, student	-	
-	e Earth's tilt and the revolutior	of the earth around the sun
		mer and lower in the winter due to Earth's tilt and
revolution around the Su		
Narrative / Background Informat		
Prior Student Knowledge:		
The students have learned that the	ne sun moves in a pattern acro	ss the sky.
Science & Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:
Practices:	ESS1.A: The Universe and	Patterns
Analyzing and Interpreting	its Stars	
Data		• Patterns in the natural world can be
	Patterns of the	observed, used to describe phenomena, and
Use observations	motion of the sun,	used as evidence. (1-ESS1-1),(1-ESS1-2)
(firsthand or from media)	moon, and stars in the	
to describe patterns in the	sky can be observed,	
natural world in order to	described, and	

answer scientific questions.	predicted. (1-ESS1-1)	
(1-ESS1-1)	ESS1.B: Earth and the Solar	
	System	
	 Seasonal 	
	patterns of sunrise and	
	sunset can be	
	observed, described,	
	and predicted.	
	(1-ESS1-2)	
Possible Preconceptions/Miscon	ceptions:	
• The Earth is the center an	d the Sun rotates around the I	Earth.
 The moon gives off its ow 	n light.	
• The Earth is the biggest p	lanet.	
 Daylight time is the same 		
	aytime/nighttime at the same	time.
Everybody on earth has s	easons at the same time.	
LESSON PLAN – 5-E Model		
Grade/ Grade Band: 1st grade	Topic: Patterns of Change	Lesson # 12 in a series of 13 lessons
	in the Sky	The Four Seasons
Brief Lesson Description: In this	esson, students will describe t	he four seasons.
Performance Expectation(s):		
		e patterns that can be predicted. (1-ESS1-1)
	erent times of year to relate th	ne amount of daylight to the time of year. (1-ESS1-2)
Specific Learning Outcomes:		
By the end of this lesson, student		patterns in the natural world in order to answer
scientific questions. (1-ES	-	patterns in the natural world in order to answer
 Identify and describe the 	•	
By the end of this lesson, student		
 Seasons are caused by the 		
		mer and lower in the winter due to Earth's tilt and
revolution around the sur		
Narrative / Background Informat	ion	
Prior Student Knowledge:		
The students have learned why th	e earth has seasons.	
Science & Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:
Practices:	ESS1.A: The Universe and	Patterns
Planning and Carrying Out	its Stars	
Investigations		• Patterns in the natural world can be
-	• Patterns of the	observed, used to describe phenomena, and
Make observations (firsthand or from modia) to	motion of the sun,	used as evidence. (1-ESS1-1),(1-ESS1-2)
(firsthand or from media) to	moon, and stars in the	
collect data that can be	sky can be observed,	
used to make comparisons. (1-ESS1-2)	described, and predicted. (1-ESS1-1)	
Analyzing and Interpreting	ESS1.B: Earth and the	

Data	Solar System	
• Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)	 Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2) 	
 The moon gives off its ow The Earth is the biggest p Daylight time is the same Everybody on Earth has d Everybody on earth has same 	nd the Sun rotates around the B n light. lanet. throughout the year. aytime/nighttime at the same	
LESSON PLAN – 5-E Model		
Grade/ Grade Band: 1st grade	Topic: Patterns of Change in the Sky	Lesson # 13 in a series of 13 lessons Assessment/Final Project/Culminating Activity
	unit of study, students observe	e, describe, and predict some patterns in the
movement of objects in the sky.		
		e patterns that can be predicted. (1-ESS1-1) ne amount of daylight to the time of year. (1-ESS1-2)
 (1-ESS1-2) Use observations (firsthan scientific questions. (1-ES By the end of this unit, students w How the Sun appears to t The moon is an object that The Moon shines because The Moon appears to gro Because the Sun is so close Seasons are caused by the The Sun appears to be hig revolution around the sur 	vill be able to: and or from media) to collect of nd or from media) to describe S1-1) vill understand: ravel across the sky and that th at revolves around Earth. e it is reflecting sunlight. w and shrink in the sky based of se, its brightness keeps us from e Earth's tilt. gher in the sky during the summ n.	ne sky. data that can be used to make comparisons. patterns in the natural world in order to answer his is due to the Earth's motion, not the Sun's. on how much reflected sunlight we can see. In seeing other stars during the day. mer and lower in the winter due to Earth's tilt and
Narrative / Background Informat	ion	
Prior Student Knowledge: The students have explored the re about the four seasons and why t	-	sun, and moon. The students have also learned

Science & Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:
Practices:	ESS1.A: The Universe and	Patterns
Planning and Carrying Out		
 Plan and conduct investigations Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) Planning and Carrying Out Investigations Make observations (firsthand or from media) to collect data that can be 	 Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1) ESS1.B: Earth and the Solar System Seasonal patterns of sunrise and sunset can be Seasonal be 	 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)
used to make comparisons. (1-ESS1-2)	observed, described, and predicted. (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)		
Possible Preconceptions/Miscon	ceptions:	
The Earth is the center arThe moon gives off its ow	nd the Sun rotates around the n light.	Earth.
• The Earth is the biggest p	lanet.	
• Daylight time is the same	0 /	
	aytime/nighttime at the same	time.
Everybody on earth has s	easons at the same time.	
LESSON PLAN – 5-E Model		
	Patterns of Change in the Sk	y Climate Change
Grade/ Grade Band: 1st grade	Topic: Patterns of Change in the Sky - Climate Change Mini-Unit	Lesson # 1 in a series of 1 lessons Introduction to Global Warming (3 days)
Brief Lesson Description: In this Earth.	lesson, students will be introdu	uced to global warming and the impact on
	-	nation about a situation people want to an be solved through the development of a
new or improved object or tool.		
Specific Learning Outcomes: By the end of this lesson students	s will be able to:	

• 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

Prior Student Knowledge:				
This is the first opportunity for students to encounter these ideas.				
Science & Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:		
Practices: Asking Questions and Defining Problems	ETS1.A: Defining and Delimiting Engineering Problems	Cause and Effect • Events have causes that generate observable patterns.		
• Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1)	• Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)	Connections to Engineering,Technology, and Applications of Science Interdependence of Science, Engineering, and Technology People encounter questions about the natural world every day.		

- 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 <u>resource collection</u>.

Continue discussing this topic in the <u>community forums</u>.

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 <u>Community Forums</u>.

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