



West Windsor-Plainsboro Regional School District
Science Curriculum
Grade 2 - Earth's Systems: Land & Water/Changes to Earth's Land

The Mission of the West Windsor-Plainsboro Science Department

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

- **Vision**

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

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

Unit 1: Earth's Land & Water/Changes to Earth's Land	
Content Area: Science	
Course & Grade Level: Grade 2	
Summary and Rationale	
<p>Throughout the first half of this unit, students use information and models to identify and represent the shapes and kinds of land and bodies of water that are found on Earth. The crosscutting concept of patterns is called out as an organizing concept for these disciplinary core ideas.</p> <p>Throughout the second half of this unit, students apply their understanding of the idea that wind and water can change the shape of the land. Students will design solutions to slow or prevent such change. The crosscutting concepts of stability and change, structure and function, and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in asking questions and defining problems, developing and using models, and constructing explanations and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas.</p>	
Recommended Pacing	
25 days	
New Jersey Student Learning Standards for	
Standard: Earth's Systems: Processes that Shape the Earth	
CPI #	Cumulative Progress Indicator (CPI)
2-ESS1-1.	Use information from several sources to provide evidence that Earth events can occur quickly or slowly. (Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.) (Assessment Boundary: Assessment does not include quantitative measurements of timescales.)
2-ESS2-1.	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. (Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land).
2-ESS2-2.	Develop a model to represent the shapes and kinds of land and bodies of water in an area. (Assessment Boundary: Assessment does not include quantitative scaling in models.)
2-ESS2-3.	Obtain information to identify where water is found on Earth and that it can be solid or liquid.
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.
Standard: Engineering Design	
CPI #	Cumulative Progress Indicator (CPI)
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.
K-2-ETS1-2.	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.
New Jersey Student Learning Standards for English Language Arts	

Companion Standards	
Standard: Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RL.2.2.	Recount stories, including fables and folktales from diverse cultures, and determine their central message/theme, lesson, or moral.
RL.2.3.	Describe how characters in a story respond to major events and challenges using key details.
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.
9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
9.4.2.DC.2	Explain the importance of respecting digital content of others.
9.4.2.GCA.1	Articulate the role of culture in everyday life by describing one's own culture and comparing it to the cultures of other individuals (e.g., 1.5.2.C2a, 7.1.NL.IPERS.5, 7.1.NL.IPERS.6).
9.4.2.TL.1	Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).
9.4.2.TL.7	Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts (e.g., W.2.6., 8.2.2.ED.2).
9.4.2.IML.1	Identify a simple search term to find information in a search engine or digital resource.
9.4.4.IML.2	Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
9.4.2.IML.4	Compare and contrast the way information is shared in a variety of contexts (e.g., social, academic, athletic) (e.g., 2.2.2.MSC.5, RL.2.9).
8.1.2.DA.1	Collect and present data, including climate change data, in various visual formats.
8.1.2.CS.1	Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and functions.
Interdisciplinary Standards for Social Studies	
CPI #	Cumulative Progress Indicator (CPI)
6.1.2.Geo.SV.1	Use maps to identify physical features (e.g., continents, oceans, rivers, lakes, mountains).
6.1.2.Geo.SV.3	Identify and describe the properties of a variety of maps and globes (e.g., title, legend, cardinal directions, scale, symbols,) and purposes (wayfinding, thematic).
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> Patterns in the natural world can be observed. Scientists learn more about Earth's changing land & water by making observations. Water is found in the ocean, rivers, lakes, and ponds Water can exist as a solid (ice) or liquid. Changes to our Earth's land and water can occur slowly and or quickly. 	
Unit Essential Questions	

- Where is water found on Earth and in what form? (solid ice vs. liquid)
- In what ways can you represent the shapes and kinds of land and bodies of water in an area?
- What evidence can we find to prove that Earth events can occur quickly or slowly?
- In what ways can engineers slow or prevent wind and water from changing the shape of Earth's land?

Objectives

Students will know:

- Water exists in different forms and is found all over our planet.
- Maps show where things are located.
- wind and water can change the shape of the land (ie. weather events, natural disasters, and Climate Change.)
- Some events happen very quickly; others occur very slowly over a time period much longer than one can observe.
- There are things human beings can do to lessen the impact on our planet caused by Climate Change.

Students will be able to:

- Describe specific characteristics of both land and water formations found on Earth. (ie. oceans, ponds, mountains, valleys, volcanoes, etc)
- Use a map and globe to locate where on Earth specific water and land formations are located.
- Design and build a model of an island; labeling all bodies of water and land formations.
- Explain how both wind and water can change the shape of the land.
- Investigate how engineers design solutions to slow or prevent wind and water erosion.

Evidence of Learning

Assessment

- Students will be engaged in multiple opportunities to research and investigate various land and bodies of water. Students will present their research using various technology platforms.
- Students will demonstrate their understanding of different land and bodies of water by designing and constructing a model of an island.
- Students will participate in science investigations that mimic the effects of wind and water erosion on sandcastles. Students will use the Engineering Design Process to design, build, and test a model to slow the effects of erosion.

Grade 2: Earth's Systems: Land & Water/Changes to Earth's Land

(12 Lessons, Approximately 25 Days)

Lesson 1 - Where is Water Found on Earth?		
Grade/ Grade Band: 2	Topic: Where Is Water Found on Earth?	Lesson # 1 in a series of 12 lessons 2 class periods
Brief Lesson Description: In this lesson, students work in small groups and use books, iPads and QR codes to research forms of water on Earth. As they learn about various bodies of water, they record their attributes on a recording sheet and share what they learned with the class.		
Performance Expectation: 2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid.		
Career Readiness, Life Literacies, and Key Skills 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool 9.4.2.TL.7: Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts		
Specific Learning Outcomes: <ul style="list-style-type: none"> To begin this unit's progression of learning, students identify where water is located on Earth and whether it is solid or liquid. Using texts, maps, globes, and other resources (including online resources), students will observe that water is found in liquid form in oceans, rivers, lakes, and ponds. They also discover that water exists as a solid in the Earth's snow caps and glaciers. Students will use QR codes to research and look for patterns as they identify where water is found on Earth. Students will explore the shapes and kinds of bodies of water found in different areas. 		
Narrative / Background Information		
Prior Student Knowledge: Students have studied the continents and oceans in k-1 and earlier this year. Antarctica is covered with ice. Ice is frozen water. They have the basic concept that the oceans are made up of salt water and make up most of the world and the continents are large land masses.		
Science & Engineering Practices: Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. <ul style="list-style-type: none"> Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic 	Disciplinary Core Ideas: ESS2.B: Plate Tectonics and Large-Scale System Interactions <ul style="list-style-type: none"> Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2) ESS2.C: The Roles of Water in Earth's Surface Processes <ul style="list-style-type: none"> Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2- 	Crosscutting Concepts: Patterns <ul style="list-style-type: none"> Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3)

menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)	ESS2-3)	
Possible Preconceptions/Misconceptions: Students may not yet understand the difference between oceans, rivers/streams, lakes, and/or pond. Students may not know what snow caps and glaciers are.		
LESSON PLAN – 5-E Model		

Lesson 2: What are Landforms?		
Grade/ Grade Band: 2	Topic: Introduction to landforms	Lesson # 2 in a series of 12 lessons 1 class period
<p>Brief Lesson Description: Students play the iPad app game <i>Plum's Island Explorer</i> after being introduced to them in a read aloud. This game serves as a review of bodies of water and an introduction to landforms. Plum's Island Explorer is an interactive game that allows students to navigate around the island to explore various landforms and bodies of water. Students journey around the island to pick up trash and unlock information about specific landforms and bodies of water. .</p>		
<p>Performance Expectations: 2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid. ESS2.B. Plate Tectonics and Large-Scale System Interactions</p> <p>Career Readiness, Life Literacies, and Key Skills: 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool</p>		
<p>Specific Learning Outcomes:</p> <ul style="list-style-type: none"> Students use a game and associated supports to take a closer look at bodies of water and landforms that can be found in the natural world. They observe, identify, and record characteristics of common landforms and water bodies as they navigate and represent the landscape from an aerial perspective on a map. Compare and describe ground-level and aerial views of landforms and water bodies. Observe, ask questions, record data, and make evidence-based claims about landforms and water bodies on Earth. Visualize phenomena that are too big or too remote to experience or see in a classroom context. 		
Narrative / Background Information		
<p>Prior Student Knowledge: Students will recognize bodies of water learned in the last lesson. Students know the difference between continents, lakes, islands, oceans, land and water.</p>		
<p>Science & Engineering Practices:</p> <p>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.</p> <ul style="list-style-type: none"> Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful 	<p>Disciplinary Core Ideas:</p> <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions</p> <ul style="list-style-type: none"> Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2) <p>ESS2.C: The Roles of Water in Earth's Surface Processes</p> <ul style="list-style-type: none"> Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3) 	<p>Crosscutting Concepts:</p> <p>Patterns</p> <ul style="list-style-type: none"> Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3)

<p>in answering a scientific question. (2-ESS2-3)</p> <ul style="list-style-type: none">● Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).		
<p>Possible Preconceptions/Misconceptions:</p> <p>Students may have some difficulty with the idea that things look different when viewed from ground level and from above.</p> <p>Some students may not have experience with a keyboard and may need initial guidance on how to use controls in the game.</p>		
LESSON PLAN – 5-E Model		

Lesson 3: Researching Landforms		
Grade/ Grade Band: 2	Topic: Landforms Come in Many Shapes & Sizes	Lesson # 3 in a series of 12 lessons 1 class period
Brief Lesson Description: Students are divided into “expert” groups to collect information about an assigned landform using QR codes (Epic?). They locate and record a definition, describe the characteristics and give examples of their landform.		
Performance Expectation(s): 2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid. Career Readiness, Life Literacies and Key Skills NJSL: 9.4.2.IML.1 Identify a simple search term to find information in a search engine or digital resource. 9.4.2.TL.7: Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts		
Specific Learning Outcomes: After students identify where water is found on the Earth, they take a closer look at bodies of water and landforms that can be found in the natural world. Students will research to discover that landforms come in many shapes and sizes. They will determine definitions, characteristics and examples of different types of landforms. Using firsthand observations and media resources, students should look for patterns among the types of landforms and bodies of water. For example, students should notice that mountains are much taller and more rugged than hills		
Narrative / Background Information		
Prior Student Knowledge: Students will again be researching using iPads and QR codes. They may need a brief reminder of how to use the QR codes and how to navigate websites to find information (i.e. using the menu bar, looking for keywords) Students have studied the continents and oceans in k-1 and earlier this year. They have the basic concepts that the oceans are made up of salt water and make up most of the world and the continents are large land masses.		
Science & Engineering Practices: Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. <ul style="list-style-type: none"> Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, 	Disciplinary Core Ideas: ESS2.B: Plate Tectonics and Large-Scale System Interactions <ul style="list-style-type: none"> Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2) ESS2.C: The Roles of Water in Earth’s Surface Processes <ul style="list-style-type: none"> Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3) 	Crosscutting Concepts: Patterns <ul style="list-style-type: none"> Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3)

icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)		
Possible Preconceptions/Misconceptions: Students may think that land masses of the same type are all the same, that they never change and are all old.		
LESSON PLAN – 5-E Model		

Lesson 4: Use Technology to Create a Presentation to Teach Others (ChatterPix or Pic Collage)		
Grade/ Grade Band: 2	Topic: Landforms Come in Many Shapes & Sizes	Lesson # 4 in a series of 12 lessons 2 class periods
Brief Lesson Description: In the previous lesson students worked in groups to collect information and become “experts” on an assigned landform. Students create a ChatterPix or Pic Collage using that information and present it to classmates.		
Performance Expectation(s): 2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid. 2-ESS2-2 Develop a model to represent the shapes and kinds of land and bodies of water in an area. Career Readiness, Life Literacies and Key Skills NJSLs: 9.4.4.IML.1: Identify a simple search term to find information in a search engine or digital resource. 9.4.2.IML.2: Represent data in a visual format to tell a story about the data. 9.4.2.DC.2: Explain the importance of respecting digital content of others.		
Specific Learning Outcomes: Students take a closer look at bodies of water and landforms that can be found in the natural world. Students create a presentation to teach others and listen as others present their findings. Students look for patterns among the types of landforms and bodies of water.		
Narrative / Background Information		
Prior Student Knowledge: Students worked to collect information and become ‘experts’ on one landform. They have the information they need to create a presentation on their topic.		
Science & Engineering Practices: Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events. <ul style="list-style-type: none"> Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s) 	Disciplinary Core Ideas: ESS2.B: Plate Tectonics and Large-Scale System Interactions Maps show where things are located. One can map the shapes and kinds of land and water in any area.	Crosscutting Concepts: Patterns Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Possible Preconceptions/Misconceptions:

Students may or may not know that as scientists work to learn and discover new things about the world. They also write what they learn in a report to share what they learn with others. There is a sharing and peer review of knowledge to help all.

LESSON PLAN – 5-E Model**Lesson 5: Define and Build Models of Landforms****Grade/ Grade Band:** 2**Topic:** Landforms Come in Many Shapes & Sizes (Review)**Lesson # 5 in a series of 12 lessons**
1 class period

Brief Lesson Description: Students play a game where they identify, define and build models to reinforce vocabulary and their understanding of landforms. This prepares them for a design challenge where they apply what they know about water and landforms to design and develop a model of an island.

Performance Expectation(s): 2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area. [Assessment Boundary: Assessment does not include quantitative scaling in models.]

Career Readiness, Life Literacies and Key Skills Standards:

9.4.2.Cl.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).

9.4.2.Cl.2: Demonstrate originality and inventiveness in work

Specific Learning Outcomes:

- Using firsthand observations and media resources, students look for patterns among the types of landforms and bodies of water. (mountains are much taller and more rugged than hills, lakes are an enclosed body of water surrounded by land, and streams flow across land and generally end at a larger body of water, such as a lake or the ocean.
- Students practice the vocabulary terms of the common landforms as well as making very basic models with each of the landforms.
- During this investigation, the students will also be obtaining, evaluating and communicating information.

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

Students will have some knowledge of landforms and bodies of water.

Students played a game that gave them experience with how landforms look from different perspectives (birds-eye and sides).

Science & Engineering Practices:**Developing and Using Models**

Modeling in K-2 builds on prior experiences and progresses to include using and developing models. (i.e, diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events.

- Develop a model to represent patterns in the natural world. (2-ESS2-2)

Disciplinary Core Ideas:**ESS2.B: Plate Tectonics and Large-Scale System Interactions**

Maps show where things are located. One can map the shapes and kinds of land and water in any area.

Crosscutting Concepts:**Patterns**

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

Structure and function:

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

Science Addresses Questions About the Natural and Material World

		<ul style="list-style-type: none"> ● Scientists study the natural and material world. (2-ESS2-1)
Possible Preconceptions/Misconceptions: <ul style="list-style-type: none"> ● Students may not understand the scale of various landforms in relation to one another. (a mountain is much higher than a hill, a valley is between two mountains. ● Students may not know that some mountains are sharp and pointy but others are more rounded as they have been worn down by weathering and erosion. 		
LESSON PLAN – 5-E Model		

Lesson 6 - Design Challenge
Create an Island Park Using Several Landforms
The Engineering Process: Ask, Imagine, Plan, Create, Improve, Present

Note: This will take 3-5 days -
 One possible way it can go.

Day 1: Introduce relief maps (20 minutes). Then, introduce students to the design challenge and imagine how their "island" will look. They begin to plan by sketching initial map designs (10 minutes). After that they share their plan with their science partner(s), choose one to build together, and come up with the final plan (10 minutes).

Day 2: Students follow their plan to make a model of their islands on paper plates, improving as they work (45 minutes). Painting and Labeling (15 mins).

Day 3: Students present their island to the class (20 mins).

Day 4: Students make a map of their island from their model (40 mins).

Lesson 6: Design Challenge - Create an Island Park Using Several Landforms

Grade Level Band: 2

Topic: Build a model of landforms

Lesson #6 in a series of 12 lessons.
 5 days

Brief Lesson Description:

Children design and create their own model island incorporating what they've learned about different water and landforms. The students will make models from their plans by using model magic to create landforms and in the end present them to the class.

Performance Expectation(s):

2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area. [Assessment Boundary: Assessment does not include quantitative scaling in models.]

2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Career Readiness, Life Literacies and Key Skills NJSL:

9.4.2.IML.2: Represent data in a visual format to tell a story about the data.

9.4.2.CI.2: Demonstrate originality and inventiveness in work

9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.

Specific Learning Outcomes: NGSS/Common Core Connections

In the NGSS, one of the performance expectations is for the children to develop a model to represent the shapes and kinds of land and bodies of water in an area. In the science practices, the children also must develop and use models. This lesson will help them understand that process.

Students use maps to determine where landforms and bodies of water are located.

Students use what they know about the types and shapes of landforms and bodies of water, to develop models to represent the landforms and bodies of water found in an area. .

Narrative / Background Information

Prior Student Knowledge:

Students should have prior knowledge about the purpose and function of models as representations from the previous lesson.

Students should be able to identify patterns in the shapes of land and bodies of water they see in different areas. Students have some experience with creating maps.

Science & Engineering Practices:**Developing and Using Models**

Modeling in K-2 builds on prior experiences and progresses to include using and developing models. (i.e, diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a model to represent patterns in the natural world. (2-ESS2-2)

Disciplinary Core Ideas:**ESS2.B: Plate Tectonics and Large-Scale System Interactions**

- Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2)

Crosscutting Concepts:**Patterns**

Patterns in the natural world can be observed.(2-ESS2-2)

Possible Preconceptions/Misconceptions:

Students have used a map key and know the basics of how landforms are shown on geographical maps. They may not understand what elevation means.

Students may not have any experience with the concepts of relative size and scale.

LESSON PLAN – 5-E Model

Lesson 7: Water Changes the Land		
Grade 2	Topic: How can water change the shape of the land?	Lesson # 7 in a series of 12 lessons 2 class periods
Brief Lesson Description: The children experience water erosion in a hands-on investigation. Each partner group makes 2 sand towers and then observe them eroding as they drop water on the top of it slowly, then quickly. They take scientific notes on the process and make comparisons. Students will explore several factors for water erosion, which may include but are not limited to (climate change and other natural weather events: example floods, heavy rains, hurricanes, etc).		
Performance Expectation(s): 2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly. [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.] K-2-ETS1. 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. Career Readiness, Life Literacies and Key Skills NJSLS: 9.4.4.CI.1: Demonstrate openness to new ideas and perspectives. 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem. 9.4.2.GCA:1: Articulate the role of culture in everyday life by describing one's own culture and comparing it to the cultures of other individuals		
Specific Learning Outcomes: In the NGSS the children are expected to provide evidence that Earth events can occur quickly or slowly. In order to understand these events and the speed at which they occur, students must understand the processes themselves. In this activity, they will represent water erosion, which is usually a slow process in land formation. The cross-cutting concept that some things stay the same, while others change will also be practiced as the children observe "water" eroding the land. Students contrast the slow drops and rapid pouring of water help to provide evidence that events like rain can cause changes to the Earth that occur quickly or slowly. While doing this investigation, the children will be using sand to model the land and dropping water to model the rain, which will help them to understand models, as well. Students record, draw, and discuss what kinds of changes happen when water was slowly dropped or poured quickly on the sand tower. During this investigation, the children will also be obtaining, evaluating and communicating information.		

Students see the connection between rising sea levels caused by climate change (melting glaciers) and beach or land erosion.

Effects of climate change can be felt more deeply by certain diverse populations or indigenous people based on geographical location.

Narrative / Background Information

Prior Student Knowledge:

Water comes in solid and liquid states.

Water flows and takes the shape of its container.

Water can be found in rivers, seas, oceans, ponds and streams. Water also comes from the sky when it rains and snows.

People have rain spouts on their houses.

Flooding can happen after heavy rains.

Science & Engineering Practices:

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a model to represent patterns in the natural world
- Use information from observations (firsthand and from media) to construct an evidence-based account for natural phenomena.

Disciplinary Core Ideas:

ESS2.A: Earth Materials and Systems

- Wind and water can change the shape of the land.

ESS1.C: The History of Planet Earth

- Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)
- Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)

Crosscutting Concepts:

Stability and Change

- Things may change slowly or rapidly.

Patterns

- Patterns in the natural world can be observed. (2-ESS2-2)

Possible Preconceptions/Misconceptions:

Some students may know that rain flows into storm drains but not know where it goes after that and *why* we have storm drains to begin with.

Students may know that there is evidence of rain on the ground in puddles and on drops in trees after a rain but not know that it goes in the ground to become groundwater or it flows over the ground and can cause flooding or property damage.

Since we live in an area with a large amount of buildings and roads, we have sewer systems to collect stormwater runoff and carry it away from roads and buildings to a discharge point, often into a stream or river. Much of what we are talking about in this unit happens on a small scale in our yards and neighborhoods but on a larger scale in areas that are less developed.

Students may only think of rain (fast or slow) as the only type of way water can change the land. Rising sea levels caused by climate change is another example of how water can also change the land.

LESSON PLAN – 5-E Model

Lesson 8: Wind Changes the Land		
Grade/ Grade Band: 2	Topic: How Can Wind Change the Shape of the Land?	Lesson # 8 in a series of 12 lessons 2 class periods
Brief Lesson Description: The children experience wind erosion in a hands-on investigation. The class makes sand towers and blow through straws to create wind and observe changes. They take scientific notes on the process. Students watch a short movie about erosion and then explain what they know to their partner.		
Performance Expectation(s): 2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly. [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.] Career Readiness, Life Literacies and Key Skills NJSL: 9.4.4.CI.1: Demonstrate openness to new ideas and perspectives. 9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10). 9.4.2.IML.4: Compare and contrast the way information is shared in a variety of contexts (e.g., social, academic, athletic) (e.g., 2.2.2.MSC.5, RL.2.9).		
Specific Learning Outcomes: In the NGSS the children are expected to provide evidence that Earth events can occur quickly or slowly. In order to understand these events and the speed at which they occur, students must understand the processes themselves. In this activity, they will be representing wind erosion, which is usually a slow process in land formation. The cross-cutting concept that some things stay the same, while others change will also be practiced as the children observe "wind" eroding the land. While doing this investigation, they will be using sand to model the land and blowing through a straw to model the wind, which will help them to understand models, as well. In addition, another NGSS standard is for the children to know that both wind and water can shape the land. They will be interpreting the information observed to help them construct explanations of which will occur quicker, wind or water erosion. During this investigation, the children will also be obtaining, evaluating and communicating information.		
Narrative / Background Information		
Prior Student Knowledge: Students will need to describe their background knowledge and experiences to describe ideas and questions about wind events. Students will need to participate in collaborative discourse and problem solving.		

<p>Science & Engineering Practices: Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.</p> <ul style="list-style-type: none"> • Develop a model to represent patterns in the natural world 	<p>Disciplinary Core Ideas: ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> • Wind and water can change the shape of the land. <p>ESS1.C: The History of Planet Earth</p> <ul style="list-style-type: none"> • Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. 	<p>Crosscutting Concepts: Stability and Change</p> <ul style="list-style-type: none"> • Things may change slowly or rapidly. <p>Patterns</p> <ul style="list-style-type: none"> • Patterns in the natural world can be observed.(2-ESS2-2) <p>Connections to Nature of Science</p> <p>Science Addresses Questions About the Natural and Material World</p> <ul style="list-style-type: none"> • Scientists study the natural and material world.
<p>Possible Preconceptions/Misconceptions: Most children are aware of storms that create a large amount of damaging wind, such as tornadoes, but they may be unaware that wind can cause variations in landforms over large spans of time.</p>		
<p>LESSON PLAN – 5-E Model</p>		

Optional Lesson

Lesson 9: Design Challenge - Design a Way to Lessen the Impact of Wind on a Sand Castle		
Grade/ Grade Band: 2	Topic: Engineering: Erosion Control- Design a way to lessen the impact of wind on a sand hill	Lesson # 9 in a series of 12 lessons 1 class period
Brief Lesson Description: Students are given a scenario where they will have to work collaboratively in a group to design a solution to prevent wind from ruining sand ‘castles.’ They then compare solutions to see which one worked best.		
Performance Expectation(s): 2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.* [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.] 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. Career and Readiness, Life Literacies, and Key Skills NJSLs: 9.4.2. CT.1: Gather information about an issue, such as climate change, and brainstorm ways to solve the problem. 9.4.2.CT.2: Identify possible approaches and resources to execute a plan		
Specific Learning Outcomes: Students will make observations to compare changes to sand ‘castles’ before and after a design solution. Students will participate in collaborative meaning making by offering and asking for ideas from others using questions to clarify , question, and define.		
Narrative / Background Information		
Prior Student Knowledge: Students will need to participate in collaborative discourse and problem solving. Students will need to understand that engineers design solutions for problems that happen in the real world.		

<p>Science & Engineering Practices:</p> <p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.</p> <ul style="list-style-type: none"> • Compare multiple solutions to a problem. • Define a simple problem that can be solved through the development of a new or improved object or tool. 	<p>Disciplinary Core Ideas:</p> <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> • Wind and water can change the shape of the land. <p>ETS.1.A: Defining and Delimiting Engineering Problems *A situation that people want to change or create can be approached as a problem to be solved through engineering. *Asking questions, making observations, and gathering information are helpful in thinking about problems. *Before beginning to develop a solution, it is important to clearly understand the problem.</p>	<p>Crosscutting Concepts:</p> <p>Stability and Change</p> <ul style="list-style-type: none"> • Things may change slowly or rapidly. <p>Influence of Engineering, Technology, and Science on Society and the Natural World</p> <ul style="list-style-type: none"> • Developing and using technology has impacts on the natural world. <p>Science Addresses Questions About the Natural and Material World</p> <ul style="list-style-type: none"> • Scientists study the natural and material world.
<p>Possible Preconceptions/Misconceptions: Up to this lesson we have only been focusing on natural phenomena. There is evidence of manmade landscapes everywhere. How have humans shaped the landscape? Why have we done so? Students may be unaware of erosion and therefore might have never thought about why things have been engineered in our landscapes.</p>		
<p>LESSON PLAN – 5-E Model</p>		

Lesson 10: Erosion and Landslides: Imagining What Can be Done to Stop It

Grade/ Grade Band: 2

Topic: Erosion can be a big problem here at school and in our neighborhood. What can be done to stop its destruction? **Design an erosion control** of our own.

Lesson # 10 in a series of 12 lessons
2 class periods

Brief Lesson Description: The class takes a mini field trip on the school grounds to find evidence of erosion. As students find evidence, they stop, observe, take a picture with an iPad and report. Once inside students write claims and evidence about erosion using their data. Then they will learn about landslides, and how they are caused by erosion. Students will brainstorm ways to prevent landslides, and perform an experiment to test their ideas. To finish they share and compare their solutions with the class.

Performance Expectation(s):

2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.* [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]

K-2-ETS1-1. 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-ETS1-2. 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.

Career and Readiness, Life Literacies, and Key Skills NJSLs:

9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).

9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).

Specific Learning Outcomes:

As part of the NGSS the children are expected to compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. In this lesson, they will be investigating the need for erosion controls, which will help them understand different erosion solutions. They will be asking questions, making observations and gathering information about a situation that people want to change that can be solved through the development of a new object.

When sharing their ideas, they must recount an experience that has happened to them with relevant details while speaking audibly and in complete sentences, which will help them work towards speaking and listening goals.

The students will also be designing their own solution for erosion control.

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

Students have seen photos and videos of the effects of erosion on a large scale.

Students know that water and wind cause erosion and that people can use engineering to prevent the destruction it causes.

Science & Engineering Practices:**Constructing Explanations and Designing Solutions**

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Asking Questions and Defining Problems Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.
- Ask questions based on observations to find more information about the natural and/or designed world(s).
- Define a simple problem that can be solved through the development of a new or improved object or tool.
- Use information from observations (firsthand

Disciplinary Core Ideas:**ESS1.C: The History of Planet Earth**

- Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard. [Clarification Statement: Examples of design solutions to weather-related hazards could

Crosscutting Concepts:**Stability and Change**

- Things may change slowly or rapidly. (2- ESS1-1),(2-ESS2-1)

and from media) to construct an evidence-based account for natural phenomena.	include barriers to prevent flooding, wind resistant roofs, and lightning rods.]	
Possible Preconceptions/Misconceptions: <ul style="list-style-type: none"> • Students may know what rain spouts are but have no idea of their purpose and why we need them. • Students may notice the various surfaces in the schoolyard but not know that they have been put there for very specific reasons. (curbs, flower beds, ramps, storm drains, grass, asphalt, concrete, etc.) • Students may know that water can make gullies or rivelets during a rain but they don't see that as a change in the earth's surface that could cause damage to property over time. 		
LESSON PLAN – 5-E Model		

Lesson 11: Comparing Natural Events that Change the Earth's Surface		
Grade 2	Topic: Earth changes can happen quickly or slowly.	Lesson #11 in a series of 12 Lessons 2 class periods
Brief Lesson Description: Students have studied erosion from wind and rain but there are other natural events that change the earth. Students brainstorm the events, then they use several sources to find evidence that natural events such as earthquakes, volcanoes, or erosion happen quickly or slowly. To do this they use their background knowledge to make a claim and then they search for evidence to back up their claim by researching in different books. To end the lesson, they discuss their claims and evidence as a whole group.		

<p>Performance Expectation(s):</p> <p>2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly. [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]</p> <p>K-2-ETS1-1. 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.</p>		
<p>Specific Learning Outcomes:</p> <p>Students learn how to use several sources to conduct shared research, which is one of the writing standards. Students make a claim and then find evidence to support a claim, as part of the science practices. The children will be using text features, such as table of contents and indexes, to help them locate information. This skill is both part of the NGSS and the Common Core.</p>		
<p>Narrative / Background Information</p> <p>Prior Student Knowledge: Students should have some experience using a table of contents and the index for finding information. In order for students to make predictions, they need to use their knowledge about the characteristics of landforms.</p>		
<p>Science & Engineering Practices:</p> <p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.</p> <ul style="list-style-type: none"> Make observations from several sources to construct an evidence-based account for natural phenomena. 	<p>Disciplinary Core Ideas:</p> <p>ESS1.C: The History of Planet Earth</p> <ul style="list-style-type: none"> Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. <p>ETS.1.A: Defining and Delimiting Engineering Problems</p> <p>*A situation that people want to change or create can be approached as a problem to be solved through engineering.</p> <p>*Asking questions, making observations, and gathering information are helpful in thinking about problems.</p> <p>*Before beginning to develop a solution, it is important to clearly understand the problem.</p>	<p>Crosscutting Concepts:</p> <p>Stability and Change</p> <ul style="list-style-type: none"> Things may change slowly or rapidly.
<p>Possible Preconceptions/Misconceptions: Children often generalize and have trouble distinguishing between what they think is a fact and what is really a fact. When we talk of how long it took landforms to be created and change students will often have a difficult time with the idea of hundreds, thousands, millions of years. They are not expected to fully understand it yet but it should still be discussed.</p>		

Lesson 12: Erosion Solution Game (Optional Review Game)		
Grade/ Grade Band: 2	Topic: Comparing design solutions for erosion in the world.	Lesson #12 in a series of 12 lessons 1class period

Brief Lesson Description:

In a previous lesson the class took a mini field trip on the school grounds to find evidence of erosion and they created their own erosion solution for one of the problems they witnessed. In this lesson, the children view a Google Slide presentation to help them obtain information about how engineers have developed erosion solutions to help hold back either wind or water. They take notes on a chart that will help them distinguish between the solutions. Then they play a game called *Erosion Explosion* to help them review the concepts learned.

Performance Expectation(s):

2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.* [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]

K-2-ETS1-1. 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.

Specific Learning Outcomes:

As part of the NGSS the children are expected to compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. (dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land)

In this lesson, the children will be obtaining information to determine patterns about the natural and designed worlds. They will use a comparison chart to help them understand how each of the selected erosion solutions are alike and how they are different.

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

Students have observed erosion near the school and that it can be damaging.

Science & Engineering Practices:**Constructing Explanations and Designing Solutions**

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Compare multiple solutions to a problem.

Disciplinary Core Ideas:**ESS2.A: Earth Materials and Systems**

- Wind and water can change the shape of the land.

ETS.1.A: Defining and Delimiting Engineering Problems

*A situation that people want to change or create can be approached as a problem to be solved through engineering.

*Asking questions, making observations, and gathering information are helpful in thinking about problems.

*Before beginning to develop a solution, it is important to clearly

Crosscutting Concepts:**Stability and Change**

- Things may change slowly or rapidly.

Connections to Nature of Science**Science Addresses Questions About the Natural and Material World**

- Scientists study the natural and material world.

understand the problem.

3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard. [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]

Possible Preconceptions/Misconceptions:

Humans change the land. They might not know that we live in an environment that is landscaped. Many things students see around them are put there to prevent damage to property by natural events.

Everytime it rains there is erosion, but our landscape is engineered to prevent damage. We have systems to divert water to drains. We have dams to hold back water.

Heavy rains can cause flooding which can wash out roads, knock down trees, and forever change the flow of a river or stream.

LESSON PLAN – 5-E Model



West Windsor-Plainsboro Regional School District
Science Curriculum
Grade 2 - Properties and Changes to Matter

The Mission of the West Windsor-Plainsboro Science Department

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

- **Vision**

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

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

Unit 2: Properties and Changes to Matter	
Content Area: Science	
Course & Grade Level: Grade 2	
Summary and Rationale	
<p>In this unit of study, students demonstrate an understanding of observable properties of materials through analysis and classification of different materials. Students will investigate how solids and liquids can undergo both physical and chemical changes. Later in the unit, they will learn to describe these types of changes as “reversible” or “irreversible.” The crosscutting concepts of cause and effect and energy and matter are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in constructing explanations, designing solutions, and engaging in argument from evidence. Students are also expected to use these practices to demonstrate understanding of the core ideas.</p>	
Recommended Pacing	
19 days	
New Jersey Student Learning Standards for	
Standard: Standards for 2. Structure and Properties of Matter	
CPI #	Cumulative Progress Indicator (CPI)
2-PS1-1.	Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. <i>[Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]</i>
2-PS1-2.	Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. <i>[Clarification Statement: Examples of properties could include strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]</i>
2-PS1-3.	Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. <i>[Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]</i>
2-PS1-4.	Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. <i>[Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]</i>
Standard: K-2-ETS1 Engineering Design	
CPI #	Cumulative Progress Indicator (CPI)
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.
K-2-ETS1-3.	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
New Jersey Student Learning Standards for English Language Arts Companion Standards	

Standard: Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RL.2.1.	Ask and answer such questions as <i>who</i> , <i>what</i> , <i>where</i> , <i>when</i> , <i>why</i> , and <i>how</i> to demonstrate understanding of key details in a text.
Standard: Craft and Structure	
CPI #	Cumulative Progress Indicator (CPI)
RI.2.4.	Determine the meaning of words and phrases in a text relevant to a <i>grade 2 topic or subject area</i> .
RI.2.5.	Know and use various text features (e.g., captions, bold print, subheadings, glossaries, indexes, electronic menus, icons) to locate key facts or information in a text efficiently.
Standard: Integration of Knowledge and Ideas	
CPI #	Cumulative Progress Indicator (CPI)
RI.2.7.	Explain how specific illustrations and images (e.g., a diagram showing how a machine works) contribute to and clarify a text.
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	Cumulative Progress Indicator (CPI)
9.1.2.RM.1	Describe how valuable items might be damaged or lost and ways to protect them.
9.1.2.CAP.1	Make a list of different types of jobs and describe the skills associated with each job.
9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
New Jersey Student Learning Standards for Technology	
CPI #	Cumulative Progress Indicator (CPI)
8.1.2.DA.1	Collect and present data, including climate change data, in various visual formats.
8.1.2.CS.1	Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and functions.
Interdisciplinary Standards (Mathematics and Social Studies)	
2.MD.A.1	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tape.
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	
<ul style="list-style-type: none"> Everything in our world is made up of matter. Scientists observe matter using the five senses. Matter can be described and classified based on its' properties. (size, shape, color, weight, texture,) Objects can be made up of smaller pieces. Different properties are suited for different purposes. 	

<ul style="list-style-type: none"> ● Matter can undergo physical and chemical changes.
Unit Essential Questions
<ul style="list-style-type: none"> ● What are some different properties of matter? ● In what ways can an object made of a small set of pieces be disassembled and made into a new object? ● Why is it useful for engineers to know the properties of materials when it comes to designing products for consumers? ● What are some examples of how matter can change? ● Can all changes caused by heating and cooling be reversed? How would a scientist prove it?
Objectives
<p>Students will know:</p> <ul style="list-style-type: none"> ● scientists classify matter by identifying its' properties (ie., size, shape, color, weight, texture, flexibility, transparency, etc). ● products we use everyday can be created using different pieces; each piece serving a different function. ● how to collect data from observations and use it to form an evidence based claim. ● some changes caused by heating or cooling can or cannot be reversed. <p>Students will be able to:</p> <ul style="list-style-type: none"> ● sort a given set of objects into categories based on their unique properties. ● collect and analyze data to find patterns, such as similar properties that different materials share, and use the data to classify materials. ● investigate solids and liquids to determine how their properties may be similar and different to one another. ● examine everyday man made objects and identify the smaller pieces it's composed of and then determine the functions of the smaller parts. (example- a pencil is made of wood, metal, graphite, rubber, glue, and paint). ● form an evidence based claim to support their understanding of reversible vs. irreversible changes. ● select materials that are best suited for an intended purpose.
Evidence of Learning
Assessment
<ul style="list-style-type: none"> ● Students will be engaged in multiple opportunities to observe, manipulate, build, collect data and identify patterns they uncover when working with matter. Students will present their research using various technology platforms. ● Students will use various recording sheets and digital platforms to collect and record their observations; using that evidence to help them form "evidence based claims" about their findings. ● Students will create diagrams to identify an object's materials and the properties of the materials that support the object's purpose. ● Students will participate in two engineering tasks that require them to work through the Engineering Design Process. Students will apply their knowledge of materials and properties when selecting materials that would be best suited for the task. (ie., building a sailboat, constructing a roof on a dog house, designing and building an island)
Resources
<p>Core Text:</p> <p><u>What is the World Made Of? All About Solids, Liquids, and Gases</u> by Kathleen Weidner Zoehfeld</p> <p><u>Touch It! Materials Matter, and You</u> by Primary Physical Science</p> <p><u>See It, Touch It, Taste It, Smell It</u> by Darlene Stille</p> <p><u>What's the Matter in Mr. Whisker's Room</u> by Michael Eisohn Ross</p> <p><u>If I Built a Car</u> by Chris Van Deusen</p> <p><u>Melting And Freezing</u> by Lisa Greathouse</p> <p><u>Rosie Revere Engineer</u> by Andrea Beaty</p>

EPIC books

[Mystery Science "Material Magic"](#)

LESSON 1- "What Is The World Made Of?" (Launching Part 1)

Grade/ Grade Band: 2	Topic: Changes to Matter	Lesson # 1 in a series of <u>7</u> lessons 3-4 class periods
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Brief Lesson Description: Different kinds of matter exist. Matter can be described and classified by its observable properties (e.g., visual, aural, textural), by its uses, and by whether it occurs naturally or is manufactured. To begin the unit students plan and conduct an investigation to describe different kinds of material using observable properties. They will collect data, analyze the data to find patterns, such as similar properties that different materials share, and use the data to classify materials.

Performance Expectation(s):

Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. *[Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]* ([2-PS1-1](#))

Career Readiness, Life Literacies and Key Skills Standards:

9.4.2.CI.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).

9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).

Specific Learning Outcomes:

Explore and describe properties of solid objects.

Use senses to observe different solid objects and sort them in different ways..

Develop vocabulary that describes the properties of solid objects.

Students will observe, compare and contrast, sort and describe objects by their properties.

Discuss properties of all solids.

Develop a working definition of solids.

Narrative / Background Information

Prior Student Knowledge:

1. The students should be able to work in cooperative learning groups.
2. The students should be able to sort objects.

Science & Engineering Practices:

Planning and Carrying Out Investigations

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.(2-PS1-1)

Constructing Explanations and Designing Solutions

Disciplinary Core Ideas:

PS1.A: Structure and Properties of Matter

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)

Crosscutting Concepts:

Patterns

- Patterns in the natural and human designed world can be observed. (2-PS1-1)

<ul style="list-style-type: none"> Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) 		
Possible Preconceptions/Misconceptions: Students may arrive with a fixed mindset that the only way to identify properties is by color, shape, size, texture. Observations should include color, texture, hardness, strength, absorbency, and flexibility.		
LESSON PLAN		

LESSON 2 - States of Matter (Launching Part 2)		
Grade/ Grade Band: 2	Topic: Changes to Matter	Lesson # <u> 2 </u> in a series of <u> 7 </u> lessons One Class Period
Brief Lesson Description: Different kinds of matter exist. In this lesson students make observations about solids and liquids in order to explain the properties of each. They collect and analyze data to find patterns, such as similar properties that different materials share, and use the data to classify materials.		
Performance Expectation(s): Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. <i>[Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]</i> (2-PS1-1) Career Readiness, Life Literacies and Key Skills Standards: 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2). 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).		
Specific Learning Outcomes: The students will observe, sort and describe materials the properties of solids and liquids. With guidance, students plan and conduct an investigation in collaboration with peers to produce data to serve as the basis for evidence to answer the questions; What is a solid?what is a liquid? Make observations to collect data that can be used to make comparisons. Students will use science vocabulary to describe materials by their observable properties.		
Narrative / Background Information		
Prior Student Knowledge: The students learned the definition of matter and sorted objects by observable properties in Lesson One. Here their understanding of matter is extended to include three states of matter, solid, liquid and gas.		
Science & Engineering Practice: Constructing Explanations and Designing Solutions <ul style="list-style-type: none"> Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) Engaging in Argument from Evidence Construct an argument with evidence to support a claim. (2-PS1-4)	Disciplinary Core Ideas: PS1.A: Structure and Properties of Matter <ul style="list-style-type: none"> Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) 	Crosscutting Concepts: Patterns <ul style="list-style-type: none"> Patterns in the natural and human designed world can be observed. (2-PS1-1)

Possible Preconceptions/Misconceptions:

Students might think that solids are hard and cannot be broken. they might think pourability is only a criterion for a liquid.

LESSON PLAN**LESSON 3 - Objects May Break Into Smaller Pieces & Put Back Together****Grade/ Grade Band: 2****Topic: Changes to Matter****Lesson # 3 in a series of 7 lessons
2 Class Periods**

Brief Lesson Description: In this session students learn more about the properties of matter, in order to understand that different properties are suited for different purposes. Students use this understanding as they construct evidence-based accounts of how an object made of small pieces can be disassembled and made into new objects. In order to do this, they need multiple opportunities to take apart and reassemble objects that are made of small pieces. For example, using blocks, building bricks, and other small objects such as Legos, small groups of students can build an object, and then a second group of students can take the object apart and build another object using those same small blocks or bricks. As students construct and deconstruct objects, then reconstruct the pieces into new objects, they will document the process in their science journals, explaining how they went about reconstructing the pieces into a new object.

Performance Expectation(s):

Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. *[Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]* ([2-PS1-3](#))

Career Readiness, Life Literacies and Key Skills Standards:

9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).

9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Specific Learning Outcomes:

Can disassemble an object into its pieces and is reassembled into a new object or objects.

Can build many different objects from the same set of pieces.

Make observations to show that a new object or objects can have different characteristics, even though they were made of the same set of pieces.

Make observations to collect data that can be used to make comparisons.

Use and share pictures, drawings, and/ or writings of observations.

Make observations to construct an evidence based account for natural phenomena.

Narrative / Background Information

Students know that objects and organisms can be described in terms of their parts and properties and natural and manmade systems have parts that work together.

Science & Engineering Practices: Constructing Explanations and Designing Solutions Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3)	Disciplinary Core Ideas: PS1.A: Structure and Properties of Matter Different properties are suited for different purposes A great variety of objects can be built up from a small set of pieces. (2-PS1-3)	Crosscutting Concepts: Energy and Matter Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)
Possible Preconceptions/Misconceptions:		
LESSON PLAN		

LESSON 4 - Identifying the Parts of Everyday Classroom Objects

Grade/ Grade Band: 2

Topic: Changes to Matter

Lesson # 4 **in a series of** 7 **lessons**
2 Class Periods

Brief Lesson Description:

In this session students learn more about the properties of matter, in order to understand that different properties are suited for different purposes. Students use this understanding as they construct evidence-based accounts of how an object made of small pieces can be disassembled and made into new objects. In order to do this, they need multiple opportunities to examine everyday man made objects and identify the smaller pieces it's composed of. For example, a pencil is composed of smaller parts such as wood, metal, graphite, rubber, glue, and paint.

As students observe classroom objects, they observe that materials have different properties and provide evidence that materials can be combined to form different things. As they observe they will notice and name the functions of the smaller parts. They will record the materials and their properties on a poster, labeling the smaller parts that make up the whole object. By doing this students learn how parts of a product are related to the whole thing.

Performance Expectation(s): Students will observe and describe materials by properties of matter.

Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. *[Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]* **(2-PS1-3)**

Career Readiness, Life Literacies and Key Skills Standards:

9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.

9.4.2.CI.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).

9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).

9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).

Specific Learning Outcomes:

- Objects may break into smaller pieces and be put together into larger pieces or change shapes.
- Different properties are suited to different purposes.
- A great variety of objects can be built up from a small set of pieces.

Explore how objects may break into smaller pieces and be put together into larger pieces or change shapes.
Explore how parts of something are related to the whole thing.

Create diagrams to identify the objects' materials and the properties of the materials that support the object's purpose.

Man made products have been designed by scientists and engineers for our use. They study the particular properties of materials (wood, plastic, glass, metal) and solve problems by designing products for us to make life easier.

Record information (observations, thoughts, and ideas).

Narrative / Background Information

Prior Student Knowledge:

Materials are made up of properties of matter.

Man made materials are composed of smaller pieces, which have properties that contribute to its function.

<p>Science & Engineering Practices:</p> <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) 	<p>Disciplinary Core Ideas:</p> <p>PS1.A: Structure and Properties of Matter</p> <ul style="list-style-type: none"> • Different properties are suited to different purposes. (2-PS1-2),(2-PS1-3) • A great variety of objects can be built up from a small set of pieces. (2-PS1-3) 	<p>Crosscutting Concepts:</p> <p>Energy and Matter</p> <ul style="list-style-type: none"> • Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)
<p>Possible Preconceptions/Misconceptions:</p> <p>Many children haven't given thought to what things are made of. To them, a chair is a chair.</p>		
<p>LESSON PLAN</p>		

LESSON 5A - Reversible Changes : Identify Cause & Effect to Explain Natural Events (Heating and Cooling Investigation)		
Grade/ Grade Band: 2	Topic: Changes to Matter	Lesson # <u>5A</u> in a series of <u>7</u> lessons 1 Class Periods (50 minutes)
Brief Lesson Description: In this lesson, students investigate changes to materials caused by adding heat (butter, chocolate, popcorn, ice). Students will then remove the materials from the heat source and predict what will happen.		
Performance Expectation(s): Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. <i>[Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]</i> (2-PS1-1) Career Readiness, Life Literacies and Key Skills Standards: 9.1.2.RM.1: Describe how valuable items might be damaged or lost and ways to protect them. 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2). 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).		
Specific Learning Outcomes: Students can prove that adding heat to certain substances causes a change from solid to liquid. With guidance, students plan and conduct an investigation in collaboration with peers to produce data to serve as the basis for evidence to answer a question. Make observations to collect data that can be used to make comparisons about heating and cooling		
Narrative / Background Information		
Prior Student Knowledge: Students discussed temperature in math and in the weather unit in science in first grade. They have observed that when it is cold it can snow and water freezes outside. When the temperature raises the snow melts.		
Science & Engineering Practices: Planning and Carrying Out Investigations <ul style="list-style-type: none"> Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.(2-PS1-1) Analyzing and Interpreting Data <ul style="list-style-type: none"> Analyze data from tests of an 	Disciplinary Core Ideas: PS1.A: Structure and Properties of Matter <ul style="list-style-type: none"> Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) PS1.B: Chemical Reactions <ul style="list-style-type: none"> Heating or cooling a substance may cause changes that can be 	Crosscutting Concepts: Cause and Effect <ul style="list-style-type: none"> Events have causes that generate observable patterns. (2-PS1-4) Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2) Connections to Nature of Science Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena <ul style="list-style-type: none"> Science searches for cause and effect relationships to explain natural events. (2-PS1-4)

<p>object or tool to determine if it works as intended. (2-PS1-2)</p> <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) <p>Engaging in Argument from Evidence</p> <p>Construct an argument with evidence to support a claim. (2-PS1-4)</p>	<p>observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)</p> <p>ETS1.A: Defining and Delimiting Engineering Problems</p> <p>*A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)</p> <p>*Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)</p> <p>*Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)</p>	
<p>Possible Preconceptions/Misconceptions:</p> <p>Students may believe all materials (solids) can be melted through heating on a stove.</p>		
<p>LESSON PLAN</p>		

LESSON 5B - Constructing an Argument about Reversible Changes		
Grade/ Grade Band: 2	Topic: Changes to Matter	Lesson # <u>5B</u> in a series of <u>7</u> lessons] 1 Class Period
Brief Lesson Description: In this lesson students use what they learned in the previous 2 lessons to construct an argument with evidence that some changes caused by heating or cooling that can be reversed and some cannot.		
Performance Expectation(s): Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. <i>[Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.] (2-PS1-4)</i> Career Readiness, Life Literacies and Key Skills Standards: 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).		
Specific Learning Outcomes: Students will use their observations to construct an argument with evidence using shared writing. . Students will engage in whole class conversations using ‘talk moves.’ Students will use scientific vocabulary.		
Narrative / Background Information		
Prior Student Knowledge: In the last lesson students gathered the data they will need to write an argument with evidence that some changes caused by heating or cooling that can be reversed and some cannot.		
Science & Engineering Practices: Engaging in Argument from Evidence Construct an argument with evidence to support a claim. (2-PS1-4)	Disciplinary Core Ideas: PS1.A: Structure and Properties of Matter <ul style="list-style-type: none"> Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) PS1.B: Chemical Reactions <ul style="list-style-type: none"> Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2- 	Crosscutting Concepts: Patterns <ul style="list-style-type: none"> Patterns in the natural and human designed world can be observed. (2-PS1-1) Cause and Effect <ul style="list-style-type: none"> Events have causes that generate observable patterns. (2-PS1-4) Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena <ul style="list-style-type: none"> Science searches for cause and effect relationships to explain natural events. (2-PS1-4)

	PS1-4)	
Possible Preconceptions/Misconceptions: 2 nd graders often know about water melting and freezing but they have not thought about it in terms of reversible and irreversible changes.		
LESSON PLAN		

LESSON 6 – Irreversible Changes		
Grade/ Grade Band: 2	Topic: Changes to Matter	Lesson # <u>6</u> in a series of <u>7</u> lessons 2 Class Periods
Brief Lesson Description: Students identify key properties and take observations of a material as it heated and cooled. They describe how the material's properties change when heat is removed and added and decide if it is a reversible or an irreversible change. Then support their answer with their data.		
Performance Expectation(s): Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. <i>[Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]</i> (2-PS1-1) Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. <i>[Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]</i> (2-PS1-4) Career Readiness, Life Literacies and Key Skills Standards: 9.1.2.RM.1: Describe how valuable items might be damaged or lost and ways to protect them. 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).		
Specific Learning Outcomes: Students observe how adding or removing heat can cause a material's properties to change Some things can be changed back when heated or cooled, but others cannot. Some changes that we make to materials are irreversible. This is part of the basic understanding of how things are made, and how the materials matter. Students can observe that different materials melt at different temperatures.		
Narrative / Background Information		
Prior Student Knowledge: Students know that heat can cause materials to melt and some can go back to their original state when cooled and some do not. Students know that higher temperature means that something is hotter.		
Science & Engineering Practices: Planning and Carrying Out Investigations <ul style="list-style-type: none"> Plan and conduct an investigation collaboratively to produce data to serve as the basis for 	Disciplinary Core Ideas: PS1.A: Structure and Properties of Matter <ul style="list-style-type: none"> Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by 	Crosscutting Concepts: Patterns <ul style="list-style-type: none"> Patterns in the natural and human designed world can be observed. (2-PS1-1) Cause and Effect <ul style="list-style-type: none"> Events have causes that generate observable patterns. (2-PS1-4)

<p>evidence to answer a question.(2-PS1-1)</p> <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) 	<p>its observable properties. (2-PS1-1)</p> <p>PS1.B: Chemical Reactions</p> <ul style="list-style-type: none"> Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4) 	<ul style="list-style-type: none"> Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)
<p>Possible Preconceptions/Misconceptions:</p> <p>Children may be surprised to find out that</p> <p>Second graders may think that if something changes it is different, and if it changes back, it has to be exactly as it started.</p> <p>Students may think that any difference in form and it is a different thing.</p> <p>Students may lack experiences with things that have been heated and cooled.</p>		
<p>LESSON PLAN</p>		

LESSON 7 - Engineering Challenge (Option 1)

A House for Chase the Dog by By Meghan E. Marrero, Amanda M. Gunning, and Christina Buonamano,
Science and Children, January 2016 pages 76-83

Grade/ Grade Band: 2

Topic: Changes to Matter

Lesson # 7 **in a series of** 7 **lessons**
2 Class Periods

Brief Lesson Description: In this investigation, students use observations and engineering design to decide which material would make the best roof for a doghouse. The project requires that the students apply what they have learned in the unit about physical properties and how that can determine how a material is used.

Performance Expectation(s):

Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. *[Clarification Statement: Examples of properties could include strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]* **(2-PS1-2)**

Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. **(K-2-ETS1-3)**

Career Readiness, Life Literacies and Key Skills Standards:

9.1.2.RM.1: Describe how valuable items might be damaged or lost and ways to protect them.

9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).

9.4.2.CI.2: Demonstrate originality and inventiveness in work

Specific Learning Outcomes:

- Students should be able to explain that different materials have different characteristics, or properties. Some of the materials, for example, have the property of absorbing or repelling water.
- Students will be introduced to the Next Generation Science Standards model of the engineering design process and be given different materials to test to determine the best solution for creating the roof of a dog house to withstand rain.
- Interpret data to determine whether each material was effective.
- Test materials' suitability for use as a roofing material.

Narrative / Background Information

Prior Student Knowledge:

Students know that materials have properties and properties help scientists figure out how to use them.
Students can work in cooperative groups and record observations.
Students can write claims with evidence from observations.

<p>Science & Engineering Practices:</p> <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.(2-PS1-1) <p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2) <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) 	<p>Disciplinary Core Ideas:</p> <p>PS1.A: Structure and Properties of Matter</p> <ul style="list-style-type: none"> Different properties are suited to different purposes. (2-PS1-2),(2-PS1-3) <p>ETS1.A: Defining and Delimiting Engineering Problems <i>*A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)</i> <i>*Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)</i> <i>*Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)</i></p> <p>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3) 	<p>Crosscutting Concepts:</p> <p>Patterns</p> <ul style="list-style-type: none"> Patterns in the natural and human designed world can be observed. (2-PS1-1) <p>Structure and Function.</p> <ul style="list-style-type: none"> <p>Connections to Engineering, Technology, and Applications of Science</p> <p>Influence of Engineering, Technology, and Science, on Society and the Natural World</p> <ul style="list-style-type: none"> Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (2-PS1-2)
<p>Possible Preconceptions/Misconceptions:</p>		
<p>LESSON PLAN – 5-E Model</p>		

LESSON 7 - Engineering Challenge (Option 2)

Build a Sail: Part 1 of 2

Grade/ Grade Band: 2

Topic: Changes to Matter

Lesson # 7 in a series of 7 lessons
4 Class Periods

Brief Lesson Description: In this lesson students follow the Engineer Design Process to explore which materials are best to make a sail that will catch the wind to propel a boat. They will observe the structure and properties of various solids to select the best materials for constructing a model sail. An effective model sail will enable a plastic boat to catch wind and propel across a surface of water. Students will collect and analyze data to determine whether or not their selected materials are best suited for their sail and then make improvements..

Performance Expectation(s):

Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. *[Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]* ([2-PS1-1](#))

Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. *[Clarification Statement: Examples of properties could include strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]* ([2-PS1-2](#))

Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ([K-2-ETS1-3](#))

Career Readiness, Life Literacies and Key Skills Standards:

9.4.2.CI.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2)

9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).

9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.

Specific Learning Outcomes:

Investigate and describe the physical properties of a variety of materials. (shape, strength, flexibility, hardness, texture, and absorbency)

Use materials to build a sail, testing to see what materials are most effective for catching the wind.

Record information (observations, thoughts, and ideas).

Communicate the design process and solutions in written and or video format using an iPad as a possible communication device.

Use and share pictures, drawings, and/ or writings of observations.

Use observations to describe patterns and/ or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.

Analyze data from tests of an object or tool to determine if it works as intended.

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

Students understand that in the natural world, matter exists all around us and can be described and classified by its characteristics. Therefore, human made products are also constructed of various matter. Engineers and scientists must consider an object's properties before deciding if it is suitable for a certain purpose.

Different Properties Are Suited for Different Purposes.

Science & Engineering Practices:**Planning and Carrying Out Investigations**

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.(2-PS1-1)

Analyzing and Interpreting Data

- Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2)

Constructing Explanations and Designing Solutions**Disciplinary Core Ideas:****PS1.A: Structure and Properties of Matter**

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)
- Different properties are suited to different purposes. (2-PS1-2),(2-PS1-3)
- A great variety of objects can be built up from a small set of pieces. (2-PS1-3)

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-

Crosscutting Concepts:**Cause and Effect**

- Events have causes that generate observable patterns. (2-PS1-4)
- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)

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. (2-PS1-2)

<p>· Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3)</p> <p><u>Engaging in Argument from Evidence</u></p> <p>Construct an argument with evidence to support a claim. (2-PS1-4)</p>	<p>ETS1-3)</p>	
<p>Possible Preconceptions/Misconceptions:</p> <p>Students may arrive with the misconception that any paper or cloth material would serve as an effective sail for a boat. Students must consider such properties as strength, flexibility, hardness, texture, and absorbency when conducting and testing their models.</p>		
<p style="text-align: center;">LESSON PLAN – The Engineering Design Process (Follow over 2 Lessons)</p> <p>Note: This is a 4 - day lesson plan</p> <p>Part 1 -Students work on the engage activities and observe the properties of the materials for the sail</p> <p>Part 2 - Students plan and share their plans</p> <p>Part 3 - Students built and test their sail and then improve upon their model.</p> <p>Part 4 - They reflect on the whole Engineering Design Process</p>		

LESSON 7 - Option 2 - Part 2

Build a Sail Part 2 of 2- e-journaling, construct an argument w/evidence

Grade/ Grade Band: 2

Topic: Changes to Matter

Lesson # 7 in a series of 7 lessons

It is suggested this lesson be taught over 2 days

Brief Lesson Description: This is a continuation of Lesson #4A “Build a Sail” where students are asked to follow the Engineering Design Process to plan and construct a sail that can catch a wind. Today students will be conducting trials to test the effectiveness of their model and make improvements as needed. Students will be recording their work in their STEM journals and constructing an argument from evidence gathered.

Performance Expectation(s):

Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. *[Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]* ([2-PS1-1](#))

Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. *[Clarification Statement: Examples of properties could include strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]* ([2-PS1-2](#))

Analyze data from tests of two objects designed to solve the same problem to compare the strengths and

weaknesses of how each performs. ([K-2-ETS1-3](#))

Career Readiness, Life Literacies and Key Skills Standards:

Specific Learning Outcomes:

Can plan and conduct an investigation to describe the physical properties of a variety of materials. (shape, strength, flexibility, hardness, texture, and absorbency)

Use materials to build a sail, testing to see what materials are most effective for catching the wind.

Communicate their design process and solutions in written, drawing and or video format using an iPad as a possible communication device.

Narrative / Background Information

Prior Student Knowledge:

Students will be reminded that different properties of matter are suited for different purposes.

Man made materials can be composed of a small set of pieces.

<p>Science & Engineering Practices:</p> <p><u>Planning and Carrying Out Investigations</u></p> <ul style="list-style-type: none"> Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.(2-PS1-1) <p><u>Analyzing and Interpreting Data</u></p> <ul style="list-style-type: none"> Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2) <p><u>Constructing Explanations and Designing Solutions</u></p> <ul style="list-style-type: none"> Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) <p><u>Engaging in Argument from Evidence</u></p> <p>Construct an argument with evidence to support a claim. (2-PS1-4)</p>	<p>Disciplinary Core Ideas:</p> <p><u>PS1.A: Structure and Properties of Matter</u></p> <ul style="list-style-type: none"> Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) Different properties are suited to different purposes. (2-PS1-2),(2-PS1-3) A great variety of objects can be built up from a small set of pieces. (2-PS1-3) <p><u>ETS1.C: Optimizing the Design Solution</u></p> <ul style="list-style-type: none"> Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3) 	<p>Crosscutting Concepts:</p> <p><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p><u>Influence of Engineering, Technology, and Science, on Society and the Natural World</u></p> <ul style="list-style-type: none"> Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (2-PS1-2)
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Connecting with English Language Arts/Literacy

English Language Arts/Literacy

- Students need opportunities to read texts that give information about matter and the changes that can happen to matter. With adult support, students can identify the main idea and details in informational text

in order to answer questions about matter. With teacher support and modeling, students can ask and answer who, what, where, when, why, and how questions to demonstrate their understanding of key details in informational text.

- As students investigate reversible and irreversible changes to matter, they should record observations in science journals, using drawings or other visual displays, when appropriate, to help clarify their thinking. To further support their learning, students can conduct shared research using trade books and online resources in order to learn more about physical changes to matter.
- After reading informational texts and conducting investigations, students should be able to write opinion pieces in which they state an opinion, supply evidence to support their opinion, use linking words to connect opinion to evidence (reasons), and provide a concluding statement. For example, students can be presented with an example of matter that has been changed in some way, then asked to write an opinion piece in which they state whether or not they think the change is reversible or irreversible, and supply evidence to support their thinking. Evidence can include information recalled from experiences or information gathered from informational texts or other resources.



West Windsor-Plainsboro Regional School District
Science Curriculum
Grade 2 - Relationships In Habitats

The Mission of the West Windsor-Plainsboro Science Department

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

- **Vision**

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

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

Unit 3: Relationships In Habitats	
Content Area: Science	
Course & Grade Level: Grade 2	
Summary and Rationale	
<p>In this unit of study, students develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination. Students also compare the diversity of life in different habitats. The crosscutting concepts of cause and effect and structure and function are called out as organizing concepts for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in planning and carrying out investigations and developing and using models. Students are also expected to use these practices to demonstrate understanding of the core ideas.</p>	
Recommended Pacing	
20 days	
New Jersey Student Learning Standards for	
Standard: 2-LS2 Ecosystems: Interactions, Energy, and Dynamics	
CPI #	Cumulative Progress Indicator (CPI)
2-LS2-1.	Plan and conduct an investigation to determine if plants need sunlight and water to grow. {Assessment Boundary: Assessment if limited to testing one variable at a time.}
2-LS2-2.	Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
Standard: 2-LS4 Biological Evolution: Unity and Diversity	
CPI #	Cumulative Progress Indicator (CPI)
2-LS4-1.	Make observations of plants and animals to compare the diversity of life in different habitats. {Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.} {Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.}
Standard: K-2-ETS1 Engineering Design	
CPI #	Cumulative Progress Indicator (CPI)
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.
K-2-ETS1-2.	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.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Key Ideas and Details	
CPI #	Cumulative Progress Indicator (CPI)
RL.2.1.	Ask and answer such questions as <i>who</i> , <i>what</i> , <i>where</i> , <i>when</i> , <i>why</i> , and <i>how</i> to demonstrate understanding of key details in a text.
Standard: Craft and Structure	
CPI #	Cumulative Progress Indicator (CPI)
RI.2.4.	Determine the meaning of words and phrases in a text relevant to a <i>grade 2 topic or subject area</i> .

RI.2.5.	Know and use various text features (e.g., captions, bold print, subheadings, glossaries, indexes, electronic menus, icons) to locate key facts or information in a text efficiently.
Standard: Integration of Knowledge and Ideas	
CPI #	Cumulative Progress Indicator (CPI)
RI.2.7.	Explain how specific illustrations and images (e.g., a diagram showing how a machine works) contribute to and clarify a text.
New 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.
9.1.2.FP.2	Differentiate between financial wants and needs.
9.1.2.FP.3	Identify the factors that influence people to spend or save (e.g., commercials, family, culture, society).
9.1.2.RM.1	Describe how valuable items might be damaged or lost and ways to protect them.
9.1.2.CAP.1	Make a list of different types of jobs and describe the skills associated with each job.
9.1.2.CAP.3	Define entrepreneurship and social entrepreneurship.
9.1.2.CAP.4	List the potential rewards and risks to starting a business.
9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
9.4.4.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
9.4.2.DC.2	Explain the importance of respecting digital content of others.
9.4.2.DC.6	Identify respectful and responsible ways to communicate in digital environments.
9.4.2.DC.7	Describe actions peers can take to positively impact climate change (e.g., 6.3.2.CivicsPD.1).
9.4.2.IML.2	Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
9.4.2.IML.3	Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults (e.g., 6.3.2.GeoGI.2, 6.1.2.HistorySE.3, W.2.6, 1-LSI-2).
9.4.2.TL.6	Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).
9.4.2.TL.7	Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts (e.g., W.2.6., 8.2.2.ED.2).
8.1.2.DA.1	Collect and present data, including climate change data, in various visual formats.
Interdisciplinary Standards (Mathematics and Social Studies)	
6.1.2.Geo.H E.1	Explain how seasonal weather changes, climate, and other environmental characteristics affect people's lives in a place or region.
6.1.2.Geo.H E.4	Investigate the relationship between the physical environment of a place and the economic activities found there.
6.1.2.Geo.G I.2	Use technology to understand the culture and physical characteristics of regions.

6.1.2.EconE M.2	Describe the goods and services that individuals and businesses in the local community produce and those that are produced in other communities.
Reason abstractly and quantitatively. (2-LS2-1),(K-2-ETS1-1) MP.2 Model with mathematics. (2-LS2-1),(2-LS2-2),(K-2-ETS1-1) MP.4 Use appropriate tools strategically. (2-LS2-1),(K-2-ETS1-1) MP.5 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. (2-LS2-2) 2.MD.D.10	
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> Like all living things, plants have basic needs for survival. (ie., water and light to grow) Each part of a plant has a specific function and those parts work together to keep the plant alive. Plants depend on animals for pollination and seed dispersal. There are many different kinds of living organisms in a habitat. 	
Unit Essential Questions	
<ul style="list-style-type: none"> How does the diversity of plants and animals compare among different habitats? What are the parts of a plant and how do they function? What do plants need to live and grow? How do some plants depend on other organisms for reproduction? How are plants and animals adapted to live its' environment? 	
Objectives	
Students will know: <ul style="list-style-type: none"> that all plants have basic needs for survival. (sunlight and water) each part of a plant performs a specific function. plants depend on other organisms or "pollinators" for pollination and seed dispersal. (ie., bees, butterflies, birds, bats, etc.) plants and animals are well adapted to survive in their own habitat. Students will be able to: <ul style="list-style-type: none"> diagram the parts of a plant and explain how each part plays a vital role in helping the plant to survive. design and carry out an investigation to determine the optimal environment for growing plants. observe and describe cross-pollination of flowers and fruit by bees. describe the process of pollination and seed dispersal and the interdependence that exists between plants and animals. identify how climate change negatively impacts pollination and plant growth cycles in certain parts of the world. design and test a tool created to make the pollination process easier for vanilla bean farmers. compare the diversity of life within different habitats and notice distinct patterns that exist. 	
Evidence of Learning	
Assessment	
<ul style="list-style-type: none"> Students will be engaged in multiple opportunities to observe, manipulate, build, collect data and identify patterns they uncover when observing plant growth and pollination. Students will present their research using various technology platforms. Students will use various recording sheets and digital platforms to collect and record their observations; using that evidence to help them form "evidence based claims" about their findings. Teacher will look for evidence of learned vocabulary in students' oral and written language. 	

Lesson #1- “Parts of a Plant & Their Functions”

Grade/ Grade Band: Second Grade	Topic: Relationships In Habitats	Lesson # <u> 1 </u> in a series of <u> 8 </u> lessons 2-3 class periods needed
<p>Brief Lesson Description: In this lesson, students will observe and describe the parts of a plant including its stem, leaves, flowers, seeds and root system. Students will begin to consider how a plant is adapted to live in its environment and how its structure plays a role in its survival.</p> <p>Performance Expectations(s): 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]</p> <p>Career Readiness, Life Literacies and Key Skills Standards: 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive). 9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.</p>		
<p>Specific Learning Outcomes: Investigate the parts of a plant and describe its functions. Collect evidence in the form of measurements, observations, sketches or photographs they will use to form their claim. Recognize that plants must be adapted to survive in their environment. These adaptations could include (but are not limited to) their root systems, method for seed dispersal, spurs or thorns on their leaves, poisonous, etc.</p>		
Narrative / Background Information		
<p>Prior Student Knowledge: Students will arrive with a basic understanding that a plant is a living thing. In Kindergarten, students learned that all living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.</p>		
<p>Science & Engineering Practices:</p> <p>Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.</p> <ul style="list-style-type: none"> Develop a simple model based on evidence to represent a proposed object or 	<p>Disciplinary Core Ideas:</p> <p>LS2.A: Interdependent Relationships in Ecosystems Plants depend on water and light to grow. (2-LS2-1) Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)</p> <p>LS4.D: Biodiversity and Humans There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)</p>	<p>Crosscutting Concepts:</p> <p>Structure and Function The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)</p> <p>Cause and Effect Events have causes that generate observable patterns. (2-LS2-1)</p>

<p>tool. (2-LS2-2)</p> <p>Planning and Carrying Out Investigations</p> <p>Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.</p> <ul style="list-style-type: none"> • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1) • Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1) <p>-----</p> <p>Connections to Nature of Science</p> <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> • Scientists look for patterns and order when making observations about the world. (2-LS4-1) 	<p>ETS1.B: Developing Possible Solutions</p> <p>Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (secondary to 2-LS2-2)</p>	
<p>Possible Preconceptions/Misconceptions:</p> <p>Some students will only consider vegetable plants and houseplants to be true “plants.” Students will also conclude that a tree, no matter how big or small is also classified as a plant.</p> <p>Some students may not have a concept of weed.</p> <p>.</p>		
<p>LESSON PLAN – 5-E Model</p>		

Lesson #2- “Let’s Plan an Experiment: What Do Plants Need?”

Grade/ Grade Band: Second Grade	Topic: Relationships In Habitats	Lesson # <u> 2 </u> in a series of <u> 8 </u> lessons 2 class periods needed plus additional time for plant observation
Brief Lesson Description: In the previous lesson, students learned the structure of plants and began to look at how each part plays a vital role in helping the plant to survive. In this particular lesson, students will design and carry out an investigation to determine the optimal environment for growing plants. Students will experiment with changing one variable such as using varying light, water and soil conditions. Students will conduct observations of their plants over time and record their observations in their science journal OR recording sheets provided. This lesson will be ongoing throughout the remainder of the unit.		
Performance Expectations(s): 2-LS2-1- Plan and conduct an investigation to determine if plants need sunlight and water to grow. [Assessment Boundary: Assessment is limited to testing one variable at a time.] Career Readiness, Life Literacies and Key Skills Standards: 9.4.2.TL.7- Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts 9.4.2.CI.1- Demonstrate openness to new ideas and perspectives 9.4.2.CI.2- Demonstrate originality and inventiveness in work 9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.		
Specific Learning Outcomes: Observe that all plants have basic needs (water, space, sunlight, CO ₂) for survival. Recognize that depriving a plant of water, space or sunlight will have a negative effect on its growth. Design and carry out an investigation. Use a variety of methods for recording data which could include taking photographs, drawing sketches, taking measurements, and using technology to publish observations. Conduct research to learn more about optimal conditions for successful plant growth.		
Narrative / Background Information		
Prior Student Knowledge: Students have an understanding that plants have basic needs (water, space, CO ₂ , and sunlight) and if these needs are not met, the plant may be affected in some way. Students can identify the parts of a plant and describe each of its functions. Some students have a basic understanding of plant adaptations and how they help the plant survive in their environment.		
Science & Engineering Practices: Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.	Disciplinary Core Ideas: <u>LS2.A: Interdependent Relationships in Ecosystems</u> <ul style="list-style-type: none"> Plants depend on water and light to grow. (2-LS2-1) Plants depend on animals for pollination or to move their seeds around. (2-LS2-2) 	Crosscutting Concepts: <u>Cause and Effect</u> Events have causes that generate observable patterns. (2-LS2-1) <u>Structure and Function</u> The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

<p>Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2) Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.</p> <p>Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1)</p>	<p><u>ETS1.B: Developing Possible Solutions</u></p> <ul style="list-style-type: none"> • 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. <i>(secondary to 2-LS2-2)</i> <p><u>ETS1.B: Developing Possible Solutions</u> Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.</p> <p><u>ETS1.C: Optimizing the Design Solution</u> Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.</p>	
<p>Possible Preconceptions/Misconceptions:</p> <p>Students may believe that all plants need soil to grow. Students may also think that all plants need the same amount of sunlight and water to survive. Students may not transfer the parts of a plant to larger plants like trees.</p>		
<p>LESSON PLAN – 5-E Model</p>		

Lesson 3: "The Bees Have It!"

Grade/ Grade Band: Second Grade	Topic: Relationships in Habitats Bees as pollinators	Lesson # <u> 3 </u> in a series of <u> 8 </u> lessons 1 class period needed (but additional time outside of your science block for students to pollinate)
Brief Lesson Description: In this lesson, students will observe and understand cross-pollination of flowers and fruit by bees. They will learn the important job bees have in flowering plant reproduction.		
Performance Expectation(s): 2-LS2-2- Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. Career Readiness, Life Literacies and Key Skills Standards: 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2). 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3). 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).		
Specific Learning Outcomes: Students will demonstrate understanding by simulating the process of pollination. Students will understand the importance of bees in flowering plant reproduction. They will observe and understand cross-pollination of flowers and fruits. Students will identify the impact of climate change on bee populations in North America and discuss ways to protect these precious pollinators.		
Narrative / Background Information		
Prior Student Knowledge: Students learned, in a prior lesson, about the interdependence of plants and animals. They learned how different animals helped with plant reproduction through pollination. Students also learned what plants need in order to reproduce.		
Science & Engineering Practices: Science & Engineering Practices: Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. <ul style="list-style-type: none"> Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2) Planning and Carrying Out Investigations	Disciplinary Core Ideas: LS2.A: Interdependent Relationships in Ecosystems Plants depend on animals for pollination or to move their seeds around. (2-LS2-2) LS4.D: Biodiversity and Humans There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) ETS1.A: Defining and Delimiting Engineering Problems <ul style="list-style-type: none"> A situation that people want to change or create can be approached as a 	Crosscutting Concepts: Crosscutting Concepts: Structure and Function <ul style="list-style-type: none"> The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2) Cause and Effect <ul style="list-style-type: none"> Events have causes that generate observable patterns. (2-LS2-1)

<p>Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.</p> <ul style="list-style-type: none"> • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1) • Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1) <p>Connections to Nature of Science</p> <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> • Scientists look for patterns and order when making observations about the world. (2-LS4-1) 	<p>problem to be solved through engineering. (K-2-ETS1-1)</p> <ul style="list-style-type: none"> • Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) • Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1) <p>ETS1.B: Developing Possible Solutions</p> <p>Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (secondary to 2-LS2-2)</p>	
<p>Possible Preconceptions/Misconceptions:</p> <p>Students may say that bees help pollinate plants but they may not understand completely the importance of pollination in plant reproduction.</p> <p>Some students may think bees are bad because they sting people.</p> <p>Students should understand by now that not all plants use the pollination process to reproduce. Only flowering plants do.</p> <p>Students may think polar bears are the only animal/organism effected by climate change.</p>		
<p>LESSON PLAN – 5-E Model</p>		

Lesson #4- “Plants Depend On Others for Pollination & Seed Dispersal” A Jigsaw Activity

Grade/ Grade Band: Second Grade	Topic: Relationships in Habitats	Lesson # <u> 4 </u> in a series of <u> 8 </u> lessons 3 class periods needed
<p>Brief Lesson Description: In this lesson, students research, observe the importance of the pollination process and the interdependence between plants and animals. Students will also learn how seeds are dispersed, allowing for the possible growth of new plants.</p> <p>As an overarching goal of the NGSS the children need to understand how plants and animals depend on one another. At the second grade level, they need to know specifically that animals can help move the seeds around. The students will use a cross-cutting concept of understanding the shape and design of a seed relates to its function.</p>		
<p>Performance Expectation(s): 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]</p> <p>Career Readiness, Life Literacies and Key Skills Standards: 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2). 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3). 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive). 9.4.2.DC.6: Identify respectful and responsible ways to communicate in digital environments. 9.4.2.DC.7: Describe actions peers can take to positively impact climate change</p>		
<p>Specific Learning Outcomes: Understand the pollination process and why it is important. Investigate the different types of pollinators and the different ways plants are pollinated. Recognize that plants and animals are interdependent of one another and the role each one plays in producing more plants. Students will understand that plants compete for space and therefore must find alternative methods for spreading their seeds. Students will learn different methods for seed dispersal; wind & animal. Students will identify animals that support “hitchhiking” seeds. Students will understand the effects of climate change on pollination and identify possible plans to protect pollinators and plant life. Students will create plans to protect pollinators from climate change.</p>		
Narrative / Background Information		
<p>Prior Student Knowledge: In a previous lesson, students learned the parts of a plant including its stem, leaves, flowers, seeds and root system. Students started to consider how a plant is adapted to live in its environment and how its structure plays a role in its survival. Students also learned the importance of plants to humans and other animals.</p>		

<p>Science & Engineering Practices: Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.</p> <ul style="list-style-type: none"> Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2) <p>Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.</p> <ul style="list-style-type: none"> Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1) Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1) <p>Connections to Nature of Science</p> <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> Scientists look for patterns and order when making observations about the world. (2-LS4-1) 	<p>Disciplinary Core Ideas: LS2.A: Interdependent Relationships in Ecosystems Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)</p> <p>LS4.D: Biodiversity and Humans There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)</p> <p>ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1) <p>ETS1.B: Developing Possible Solutions Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (secondary to 2-LS2-2)</p>	<p>Crosscutting Concepts: Structure and Function</p> <ul style="list-style-type: none"> The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2) <p>Cause and Effect</p> <ul style="list-style-type: none"> Events have causes that generate observable patterns. (2-LS2-1)
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Possible Preconceptions/Misconceptions:

Students may not know that there are different ways plants are pollinated.

Some students may feel that all plants pollinate in order to reproduce.

Students may think that plants that do not produce flowers cannot reproduce.

Students need to know that there is a difference with the method of reproduction in flowering and nonflowering plants. Flowering plants reproduce through pollination while nonflowering plants rely on dispersion.

LESSON PLAN – 5-E Model

Lesson 5: Engineering Challenge “I Scream, You Scream, We All Scream For Ice Cream!”

The Ben & Jerry’s Challenge

Grade/ Grade Band: Second Grade	Topic: Relationships In Habitats	Lesson # __5_ in a series of __8__ lessons 3-4 class periods needed
Brief Lesson Description: In this end of unit challenge, students use the engineering design process to define a problem, brainstorm ideas and then choose their best idea for creating a plant pollinator. Students will enjoy designing a vanilla plant pollinator. Expect this challenge to take about 3-4 days to complete from start to finish. First, they will watch a video that tells about the problems of hand pollinating vanilla. Then, the students will pretend to be employees of Ben and Jerry's ice cream and design a pollinator for the vanilla plant. In this part, they will work on defining the problem and brainstorming ideas for their vanilla plant pollinator. They will ask themselves questions to help them choose their best idea.		
Performance Expectation(s): 2-LS2-2- Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. K-2-ETS1-1. 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-ETS1-2. 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. Career Readiness, Life Literacies and Key Skills Standards: 9.1.2.FP.2: Differentiate between financial wants and needs 9.1.2.FP.3: Identify the factors that influence people to spend or save (e.g., commercials, family, culture, society). 9.1.2.RM.1: Describe how valuable items might be damaged or lost and ways to protect them. 9.1.2.CR.2: List ways to give back, including making donations, volunteering, and starting a business. 9.1.2.CAP.3: Define entrepreneurship and social entrepreneurship. 9.1.2.CAP.4: List the potential rewards and risks to starting a business.		
Specific Learning Outcomes: Students will use the Engineering Design Process to develop a simple model that mimics the function of an animal pollinating seeds. Students will learn how to define a problem and brainstorm possible solutions to solve the problem. Students will build upon prior knowledge of pollinators and the pollination process to help them create their model of a pollinator. Communication is essential for students as they will be working with their science teams and presenting their model for the class. Realize that the shape of an object also relates to the function of their design.		
Narrative / Background Information		
Prior Student Knowledge: Students have prior knowledge of pollinators and the pollination process. Plants have various methods for dispersing seeds. For example: wind, hitchhiking on animals, and animal waste.		

<p>Science & Engineering Practices:</p> <p>Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.</p> <p>Develop a simple model based on evidence to represent a proposed object or tool.</p> <p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem.</p>	<p>Disciplinary Core Ideas:</p> <p>LS2.A: Interdependent Relationships in Ecosystems Plants depend on animals for pollination or to move their seeds around.</p> <p>ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> • A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) • Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) • Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1) <p>ETS1.B: Developing Possible Solutions Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (secondary)</p> <p>ETS1.B: Developing Possible Solutions Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.</p>	<p>Crosscutting Concepts:</p> <p>Structure and Function The shape and stability of structures of natural and designed objects are related to their function(s).</p> <p><u>Influence of Science, Engineering, and Technology on Society and the Natural World</u> People’s needs and wants change over time, as do their demands for new and improved technologies.</p> <p><u>Influence of Science, Engineering, and Technology on Society and the Natural World</u> Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.</p>
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Possible Preconceptions/Misconceptions: Some students may think that pollination is a simple process for all plants. Students may not know that humans pollinate plants to grow food. Students may not know that we get many of the flavoring and spices from plants all over the world. Students may not understand that engineers move their ideas through a set of steps BEFORE constructing their model. At this age, students are anxious to build their model and may rush to construction without considering structure and function. Students may underestimate the complexity of pollination that is common for some plants; such as the vanilla plant.		
LESSON PLAN – 5-E Model		

PART 2 of Unit

Lesson #6: Inquiry: "What is a Habitat?"

Grade/ Grade Band: Second Grade	Topic: Relationships In Habitats	Lesson # <u>6</u> in a series of <u>8</u> lessons 1-2 class periods needed
<p>Brief Lesson Description: In this launching lesson, students will explore the concept of a habitat. They will begin to compare the diversity of life within these different habitats and notice distinct patterns. Students will observe photographs of various habitats and try to imagine what it would be like to live in that particular environment, the organisms that live there, and how these organisms adapted for survival.</p>		
<p>Performance Expectation(s): Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.] (2-LS4-1)</p> <p>Career Readiness, Life Literacies and Key Skills Standards: 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).</p>		
<p>Specific Learning Outcomes: Students will be able to describe the characteristics of certain habitats (including climate, temperature, weather, and animals that might live there). Students will identify adaptations that animals have developed in order to survive in a given habitat.</p>		
Narrative / Background Information		
<p>Prior Student Knowledge:</p> <ol style="list-style-type: none"> Students should be able to work cooperatively in teams (groups of 3 or more). Students should be able to apply their prior knowledge about habitats and organisms to formulate questions. 		
<p>Science & Engineering Practices: (standards)</p> <p><u>Planning and Carrying Out Investigations</u> <u>Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.</u></p> <ul style="list-style-type: none"> Plan and conduct an investigation collaboratively to 	<p>Disciplinary Core Ideas:</p> <p><u>LS4.D: Biodiversity and Humans</u></p> <ul style="list-style-type: none"> There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) <p><u>ETS1.B: Developing Possible Solutions</u></p> <ul style="list-style-type: none"> Designs can be conveyed through sketches, drawings, or physical models. These representations are 	<p>Crosscutting Concepts:</p> <p><u>Cause and Effect</u></p> <ul style="list-style-type: none"> Events have causes that generate observable patterns. (2-LS2-1) <p><u>Structure and Function</u></p> <ul style="list-style-type: none"> The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

<p>produce data to serve as the basis for evidence to answer a question. (2-LS2-1)</p> <ul style="list-style-type: none"> • Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1) 	<p>useful in communicating ideas for a problem's solutions to other people. (<i>secondary to 2-LS2-2</i>)</p>	
<p>Possible Preconceptions/Misconceptions:</p> <p>Students may arrive with a basic understanding that a habitat is a place where animals live. They will further their understanding by identifying several different habits found on Earth. Students will learn that all organisms are an important part of their habitat and are dependent upon one another for survival. Students may think there is only one type of forest, ocean, grassland, etc.</p>		
<p>LESSON PLAN – 5-E Model</p>		

Lesson #7: "Animal Adaptations"

Grade/ Grade Band: Second Grade	Topic: Relationships in Habitats	Lesson # <u> 7 </u> in a series of <u> 8 </u> lessons 2 class periods needed
Brief Lesson Description: In this lesson, students will observe, learn, and record how animals adapt to living in a particular habitat by learning about that habitat's climate and challenges.		
Performance Expectations(s): Make observations of plants and animals to compare the diversity of life in different habitats. (Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.)(Assessment Boundary: Assessment does not include include specific animal and plant names in specific habitats) 2-LS4-1 Career Readiness, Life Literacies and Key Skills Standards: 9.1.2.CR.1: Recognize ways to volunteer in the classroom, school and community. 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 (e.g., 6.3.2.CivicsPD.1). 9.4.2.IML.3: Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults (e.g., 6.3.2.GeoGI.2, 6.1.2.HistorySE.3, W.2.6, 1-LSI-2).		
Specific Learning Outcomes: Students will be able to learn about different ways animals and plants adapt to their environment.		
Narrative / Background Information		
Prior Student Knowledge: <ol style="list-style-type: none"> Students should be able to use their writing skills to record their thinking in their journals. Students should be able to apply their prior knowledge about habitats and organisms to formulate questions. Some students may have visited the zoo and have observed different animals in their habitats. 		
Science & Engineering Practices: <u>Planning and Carrying Out Investigations</u> <u>Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.</u> <ul style="list-style-type: none"> Plan and conduct an investigation collaboratively to produce data to serve as the basis 	Disciplinary Core Ideas: <u>LS4.D: Biodiversity and Humans</u> <ul style="list-style-type: none"> There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) <u>ETS1.B: Developing Possible Solutions</u> <ul style="list-style-type: none"> Designs can be conveyed through sketches, drawings, or physical models. These representations are 	Crosscutting Concepts: <u>Structure and Function</u> <ul style="list-style-type: none"> The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2) <u>Cause and Effect</u> <ul style="list-style-type: none"> Events have causes that generate observable patterns. (2-LS2-1)

<p>for evidence to answer a question. (2-LS2-1)</p> <ul style="list-style-type: none"> • Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1) 	<p>useful in communicating ideas for a problem's solutions to other people. (<i>secondary to 2-LS2-2</i>)</p> <p>ETS1.A: Defining and Delimiting Engineering Problems</p> <p>-A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)</p> <p>-Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)</p> <p>-Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)</p>	
<p>Possible Preconceptions/Misconceptions:</p> <p>Students may think that animals can be moved from one habitat to another and still survive.</p> <p>Students may think that all bears species have the same adaptations.</p>		
<p>LESSON PLAN – 5-E Model</p>		

Lesson #8- "Field Work: Comparing Habitats: Woodland & Pond"

Grade/ Grade Band: Second Grade	Topic: Relationships in Habitats	Lesson # <u> 8 </u> in a series of <u> 8 </u> lessons 3 class periods needed
Brief Lesson Description: In the first part of this lesson, students make close observations of a small square area on the schoolyard. They use the data they collect to construct an evidence based claim to describe the relationship between living and nonliving things. For the second part of the lesson, the class takes a field trip to investigate two more habitats (woodlands and ponds). They also compare the diversity of life in these two habitats.		
Performance Expectations(s): Make observations about how animals have adapted to their environments. 2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.] Career Readiness, Life Literacies and Key Skills Standards: 9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10). 9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.). 9.4.2.TL.7: Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts (e.g., W.2.6., 8.2.2.ED.2).		
Specific Learning Outcomes: Students will gather information so they are able to compare and contrast two different habitats. Students will form evidence-based claims about the relationship between living and nonliving things these habitats.		
Narrative / Background Information		
Prior Student Knowledge: <ol style="list-style-type: none"> 1. Students should be able to use their writing skills to record their thinking and observations in their journals. 2. Students should be able to apply their prior knowledge about habitats and organisms to formulate questions. 3. Some students may have visited the Plainsboro Preserve or other similar habitats prior to the lesson. 		
Science & Engineering Practices: Planning and carrying out investigations to answer questions n K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support	Disciplinary Core Ideas: <u>LS4.D: Biodiversity and Humans</u> <ul style="list-style-type: none"> • There are many different kinds of living things in any area, and they exist in different places on land and in 	Crosscutting Concepts: <u>Structure and Function</u> <ul style="list-style-type: none"> • The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2) <u>Cause and Effect</u>

<p>explanations or design solutions.</p> <ul style="list-style-type: none"> • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1) • Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1) 	<p>water. (2-LS4-1)</p>	<ul style="list-style-type: none"> • Events have causes that generate observable patterns. (2-LS2-1)
<p>Possible Preconceptions/Misconceptions:</p> <p>Students may develop research questions to help them compare and contrast a woodland habitat and a water habitat.</p> <p>Students may or may not understand that some plants and animals can adapt to both habitats.</p> <p>Students may not know that some plants/animals begin in one habitat and then, after maturing, live in another habitat.</p> <p>Students may not fully grasp what distinguishes living things from nonliving things. For example, a tree is alive but a rock is not alive. Something that was once alive but is now dead (ie: a stick) is considered living.</p>		
<p>LESSON PLAN – 5-E Model</p>		