Bristol Public Schools

Office of Teaching & Learning

Department	K-5 Science
Department Philosophy	Bristol Public Schools science program provides students with knowledge of the science and engineering practices, crosscutting concepts, and core ideas of science and engineering to engage in public discussions on science related issues, to be critical consumers of scientific information related to their everyday lives, and continue to learn science throughout their lives. To ensure this level of scientific literacy, Bristol Public Schools anchor science units in phenomena, this practice promotes student ownership of learning and supports student application of the science content as it pertains to the real world. In each science unit, students work to explain phenomena through the applications of the three dimensions of the Next Generation Science Standards: (1) science and engineering practices, (2) disciplinary core ideas, and (3) cross cutting concepts. Bristol's use phenom-based units and the three dimensions ensure that students connect with and build a deep conceptual understanding of science concepts. Throughout the kindergarten through grade 12 experience, this philosophy provides all Bristol students with the skills and concepts to be scientifically literate adults.
Course	Grade 2 NGSS Science
Course Description for Program of Studies	The performance expectations in second grade help students formulate answers to questions such as: How does land change and what are some things that cause it to change? What are the different kinds of land and bodies of water? How are materials similar and different from one another, and how do the properties of the materials relate to their use? What do plants need to grow? How many types of living things live in a place? Second grade performance expectations include PS1, LS2, LS4, ESS1, ESS2, and ETS1 Disciplinary Core Ideas from the NRC Framework. Students are expected to develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination. Students are also expected to compare the diversity of life in different habitats. An understanding of observable properties of materials is developed by students at this level through analysis and classification

	of different materials. Students are able to apply their understanding of the idea that wind and water can change the shape of the land to compare design solutions to slow or prevent such change. Students are able to use information and models to identify and represent the shapes and kinds of land and bodies of water in an area and where water is found on Earth. The crosscutting concepts of patterns; cause and effect; energy and matter; structure and function; stability and change; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. In the second grade performance expectations, students are expected to demonstrate grade appropriate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas. **Items in bold are a priority.**
Grade Level	2
Pre-requisites	
Credit (if applicable)	

District Learning Expectations and Standards	**Unit 1**	**Unit 2**	**Unit 3**
2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.	x		
2-PS1-2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for the intended purpose.	x		
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.	x		
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.	x		
2-PS1-4: Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.		x	

2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow.		x	
2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.		x	
2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats		x	
2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid.		x	
K-2ETS-1-2: 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.		x	
2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.			x
2-ESS2-1: Compare multiple solutions designed to slow or prevent water or wind from changing the shape of the land.			x
2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area.			x
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.			x

UNIT 1: Matter and its Interactions-4th Little Pig

UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Skills/Concepts	Academic Vocabulary
2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.	**SEP**	**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.	Skills ● Plan and conduct an investigation ● Collaborate with peers ● Analyze data from tests ● Observe patterns Concepts ● There are many different types of matter ● Matter can be solid or liquid depending on temperature ● Matter can be described and classified by its properties ● Investigations produce data ● Evidence is used to answer a question ● Observed similarities can be used as patterns	● Plan ● Conduct ● Investigation ● Evidence ● Question ● Answer ● Matter ● Solid ● Liquid ● Gas ● Properties ● Temperature ● Heat ● Cool ● Freeze ● Melt ● Pressure ● Patterns ● Natural World ● Human World
	DCI	**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.		
	CCC	**Patterns** ● Patterns in the natural and human world can be observed.		
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.	**SEP**	**Analyzing and Interpreting Data** ● Analyze data from tests of an object or tool to determine if it works as intended.	Skills ● Analyze data to look for trends. ● Design/perform a simple test ● Support or refute ideas with evidence Concepts ● Different properties are suited for different purposes ● Simple tests are used to gather data ● Data from tests is used to determine if a design solution works as intended	● Analyze ● Data ● Test ● Support ● Refute ● Purpose ● Cause
	DCI	**PS1.A: Structure and Properties of Matter** ● Different properties are suited to different purposes.		
	CCC	**Cause and Effect** ● Simple tests can be designed to gather evidence to support or refute student ideas about causes.		

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.	**SEP**	**Constructing Explanations and Designing Solutions** ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.	Skills ● Make observations ● Construct an explanation from evidence ● Put together and break apart objects for an intended purpose Concepts ● Different properties are suited for different purposes ● Objects may break into smaller pieces, be put together into larger pieces, or change shape. ● A small set of objects can be used to build a variety of objects ● Observations are used to construct an evidence based account for a phenomena	● Observation ● Phenomena ● Put together ● Break apart ● Shape ● Set
	DCI	**PS1.A: Structure and Properties of Matter** ● Different properties are suited to different purposes. ● A great variety of objects can be built up from a small set of pieces.		
	CCC	**Energy and Matter** ● Objects may break into smaller pieces and be put together into larger pieces, or change shapes.		
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.	**SEP**	**Asking Questions and Defining Problems** ● 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.	**Skills:** ● Make observations and ask questions ● Define a problem using gathered information ● Solve a problem through the development of an object or tool **Concepts:** ● People make observations and ask questions to understand the world around them ● In order to solve a problem and design a solution, it is important to understand the problem	● Tool ● Define
	DCI	**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.		
	CCC	**N/A**		

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-1)(2-PS1-2) (2-PS1-3)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-PS1-1) (2-PS1-2)(2-PS1-3)(K-2-ETS1-1)
- RI.2.8 Describe how reasons support specific points the author makes in a text. (2-PS1-2)
- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-PS1-2)(K-2-ETS1-1)
- MP.4 Model with mathematics . (2-PS1-1)(2-PS1-2) (K-2-ETS1-1)
- MP.5 Use appropriate tools strategically. (2-PS1-2)(K-2-ETS1-1)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-PS1-1)(2-PS1-2)(K-2-ETS1-1)

UNIT 1 DETAILS

Unit Phenomenon: Design Problem-The 4th Little Pig's House-What classroom materials are best suited to design a home for the 4th Little Pig?

Storyline:

This unit works under the umbrella of a design problem. Students will plan for and construct the 4th Little Pig's shelter. Students will need to consider the types, changes relative to temperature, and properties of matter in order to construct their final design. Each learning sequence provides students with additional insight in regard to matter and its properties. In the culminating task, students test their design of the 4th Little Pig's house against strong breath of the big bad wolf and the hot summer stormy weather (blow dryers and water bottle spray.

Unit Essential Questions:

- What materials are best suited to design a home for the fourth little pig?
- How are materials similar and different? How do you sort and classify objects based on their properties? How can we categorize different states of matter?
- What happens when materials are heated or cooled?
- Why are different materials better suited for certain purposes than others?
- How can objects be made and remade into new objects using the same pieces?
- How can I build a sound structure using design principles and an understanding of matter?

Learning Sequence # Essential Question	**Learning Targets:** I can (bold are priority)	**Assessment Strategy** SR - Selected Response CR - Constructed Response P - Performance O - Observation (behavioral)	**Priority NGSS Dimensions**	[Assessment]
(1) What materials are best suited to design a home for the fourth little pig?	I Can ● **Compare the building materials/designs of the 3 little pig houses-CR** ● **Identify the problem with some building materials-CR** ● **Explore the classroom materials available to build a safe and strong home for the 4th little pig-O** ● **Create a first draft for the 4th little pig house to withstand hot, stormy, and summer weather and the Big Bad Wolf-P**		**SEP** / **DCI** / **CCC** ● SEP: Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. ● DCI: (PS1.A)- Different properties are suited to different purposes. A great variety of objects can be built up from a small set of pieces. (ETS1.A)- 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	● Record similarities and differences of building materials and designs on a little houses anchor chart ● Highlight strengths and weaknesses in house design and material ● Draft sketch of 4th little pig house ● Complete class summary table

		beginning to design a solution, it is important to clearly understand the problem. ● CCC: Simple tests can be designed to gather evidence to support or refute student ideas about causes.	
(2) How are materials similar and different? How do you sort and classify objects based on their properties? How can we categorize different states of matter?	I Can ● Sort a variety of objects by various properties and describe how/why they sorted that way. -P ● **Investigate balloons with ice, liquid water, and air inside-O, CR** ● **Identify characteristics of solids, liquids, and gases-CR** ● **Classify objects as solids and liquids based on the properties of matter-P** ● **Identify materials in the little pig house as sold or liquid-CR**	**SEP** / **DCI** / **CCC** ● SEP: Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. ● DCI: (PS1.A)- 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. ● CCC: Patterns in the natural and human designed world can be observed.	● Sort multiple sets of materials and explain how they are sorted by properties ● Record observations and questions on investigation template ● Create class anchor chart on solids, liquids, and gases ● Classify objects based phase properties ● Complete class summary table
(3) What happens when materials are heated or cooled?	I Can ● Collaborate with my classmates-O ● **Investigate how to change the shape of a solid and a liquid-P** ● **Describe and explain how temperature affects different types of matter-CR** ● **Develop a model to explain an ice pop changing shape-P**	**SEP** / **DCI** / **CCC** ● SEP: Construct an argument with evidence to support a claim. ● DCI: (PS1.B)- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. ● CCC: Events have causes that generate observable patterns.	● Plan investigation on template provided ● Analyze data to identify how to change solids and liquids ● Develop an explanatory model ● Complete class summary table
(4) Why are different materials better suited for certain purposes than others?	I Can ● **Investigate what happens to a material when it gets wet- P** ● **Construct a model of a bridge to hold weight and protect against water-P** ● **Test bridges and analyze data-P** ● **Explain how materials are chosen to meet their purpose-CR**	**SEP** / **DCI** / **CCC** ● SEP: Analyze data from tests of an object or tool to determine if it works as intended. ● DCI: (PS1.A)- Different properties are suited to different purposes. ● CCC: Simple tests can be designed to gather evidence to support or refute student ideas about causes. ● CCC: Patterns in the natural and human designed world can be observed.	● Explore and record observations when materials get wet ● Design a bridge ● Record and analyze bridge data ● Present a rationale to classmates on why bridge materials were chosen ● Complete class summary table
(5)	I Can ● **Design a structure for a purpose and reassemble it into a new**	**SEP** / **DCI** / **CCC**	● Sketch and build a flycatcher using designated

How can objects be made and remade into new objects using existing pieces? How can I build a sound structure using design principles and an understanding of matter?	**structure using the same objects-P** ● **Describe how the second structure is similar and different from the first structure-CR** ● **Revise 4th little pig house plan-P** ● **Build 4th little pig house-P** ● **Test and analyze data from 4th little pig design challenge-P**	● SEP: Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. ● DCI: (PS1.A)- Different properties are suited to different purposes. A great variety of objects can be built up from a small of pieces. ● CCC: Objects may break into smaller pieces and be put together into larger pieces, or change shapes.	set of materials ● Repurpose same pieces from flycater to build a flying machine ● Complete class summary table and review all learning sequences ● Revise initial 4th little pig house plan ● Build and test houses ● Analyze data to determine material performance trends against heat, wind, and water; respond to post assessment prompts

ADDITIONAL CONSIDERATIONS

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY
Students may think: ● Matter is always small ● Materials can only have properties of one state of matter ● Gases are invisible ● Air is not a gas ● Air has no mass, it is light because we cannot see it, and air does not take up space ● That building for aesthetics is the most important part of the design process ● solids and liquids are different materials and do not realize that both are states of matter ● That objects are the same as materials ● The properties that make up the object are the same as the properties of the material(s) the object is made from ● Objects to build a structure can only be designed in a certain way ● The order of similar objects does not create a different structure	K-2-ETS1.A: A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. 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.	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. 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.

RESOURCES

Sample: Bundle Inventory-4th Little Pig

UNIT 2: Ecosystem Dynamics-The Mystery of the Koa Tree

UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Skills/Concepts	Academic Vocabulary
2-PS1-4: Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.	**SEP**	**Engaging in an Argument from Evidence** ● Construct an argument with evidence to support a claim.	Skills ● Construct an argument with evidence ● Make and support a claim Concepts ● Heating or cooling a substance may cause observable changes ● Some changes are reversible and some are not ● Events have causes ● Claims need to be supported by evidence	● Construct ● Argument ● Evidence ● Claim ● Heating ● Cooling ● Change ● Reversible ● Pattern ● Cause
	DCI	**PS1.B: Chemical Reactions** ● Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.		
	CCC	**Cause and Effect** ● Events have causes that generate observable patterns.		
2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow.	**SEP**	**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.	Skills ● Plan and conduct an investigation collaboratively ● Collect data ● Use data as evidence ● Identify cause and effect relationships Concepts ● Plants depend on water and light to grow ● Different conditions cause different effects	● Plan ● Conduct ● Question ● Investigation ● Collaborative ● Data ● Plant ● Water ● Light ● Grow
	DCI	**LS2.A: Interdependent Relationships in Ecosystems** ● Plants depend on water and light to grow.		
	CCC	**Cause and Effect** ● Events have causes that generate observable patterns.		
2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*	**SEP**	**Developing and Using Models** ● Develop a simple model based on evidence to represent a proposed object or tool.	Skills ● Develop a simple model using evidence ● Identify key structures and their function Concepts ● Plants depend on animals for pollination or to move their seeds	● Model ● Object ● Tool ● Pollination ● Seeds ● Designs ● Sketch ● Drawing ● Physical model
	DCI	**LS2.A: Interdependent Relationships in Ecosystems** ● Plants depend on animals for pollination or to move their seeds around.		

		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)*	around ● Design solutions can be conveyed through models or sketches ● The shape and stability of structures are related to their function	● Problem ● Solution ● Communicate ● Shape ● Stability ● Structure ● Function
	CCC	**Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s).		
2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.	**SEP**	**Planning and Carrying Out Investigations** ● Make observations (firsthand or from media) to collect data which can be used to make comparisons.	Skills ● Collect and record data/observations ● Make comparisons Concepts ● There are many different kinds of living things in an area ● Living things exist on land and in water	● Comparison ● Living things ● Land ● Water
	DCI	**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.		
	CCC	**N/A**		
2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid.	**SEP**	**Obtaining, Evaluating, and Communicating Information** ● Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question.	Skills ● Gather information from texts and media ● Use information to answer scientific questions Concepts ● Water is found in oceans, rivers, lakes, and ponds ● Water exists as solid ice and as a liquid ● The real world has similarities we can observe ● Patterns exist in the natural world	● Information ● Map ● Text feature ● Scientific question ● Ocean ● River ● Lake ● Pond ● Solid ● Liquid ● Ice
	DCI	**ESS2.C: The Roles of Water in Earth's Surface Processes** ● Water is found in the oceans, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.		
	CCC	**Patterns** ● Patterns in the natural world can be observed.		
K-2ETS-1-2: 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.	**SEP**	**Developing and Using Models** ● Develop a simple model based on evidence to represent a proposed object or tool.	**Skills:** ● Identify a problem ● Design a solution based on evidence ● Develop design ideas in sketches, drawings or	
	DCI	**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.	models **Concepts:** ● Objects or tools are designed to solve a problem ● Design ideas can be communicated through sketches, drawings, or physical models ● The structural design of a device should be related to its function	
	CCC	**Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s).		

Possible Common Core State Standards Connections:

ELA/Literacy —

- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)(2-LS2-2)
- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-PS1-4)
- RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-PS1-4)
- RI.2.8 Describe how reasons support specific points the author makes in a text. (2-PS1-4)
- W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section. (2-PS1-4)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS2-3)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1)(2-ESS2-3)

Mathematics —

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

UNIT 2 DETAILS

Unit Phenomenon: The Mystery of the Koa Tree-How does the Koa tree grow in two places 10,000 miles apart?

Storyline:

Plants and animals are dependent on each other and the environment in order to survive. The Koa tree provides a scenario for students to figure out the interdependent relationship between plants, animals and the environment while solving the mystery of the Koa tree's presence on Reunion Island. The Koa tree is a known species of Hawaii, the species also exists on Reunion Island, off the western coast of Africa. The mystery the students must solve throughout the unit is, how did the tree travel 10,000 miles to appear on both islands?

The unit provides students with experiences that scaffolded their understanding of plants needs (light, water, climate). The Koa tree on Reunion Island needed a tropical climate with the appropriate amount of light, water, and temperature to germinate and grow. Although we are not sure where the Koa tree originated, we do know that pollination needed to occur in order for new Koa trees to grow. We also know that a Koa seed needed to be dispersed from one island to another. Like scientists before them, students hypothesize how the seed traveled from island to island. Was it by water? Was it attached to a bird? Was it transported in a bird's body and deposited as scat? This unit provides students with a real life science mystery that gives purpose to their study on plants, animals, and habitats.

Unit Essential Questions:

- How does the Koa tree grow in two places 10,000 miles apart?
- What do plants need to survive? Do all plants need the same amount of water and sunlight?
- What is the habitat and climate in Hawaii and Reunion Island? Can the Koa tree survive and grow in Connecticut?
- How do plants depend on animals?
- How does freezing or heating a plant change it? How does temperature determine if a Koa tree can survive?

Learning Sequence # Essential Question	**Learning Targets:** I can (bold are priority)	**Assessment Strategy** SR - Selected Response CR - Constructed Response P - Performance O - Observation (behavioral)	**Priority NGSS Dimensions**			**Assessment**
(1) How does the Koa tree grow in two places 10,000 miles apart?	I Can ● **Share ideas on how the Koa tree can live in two different places that are far apart-CR** ● **Ask and group questions for the Koa tree mystery-CR**		**SEP**	**DCI**	**CCC**	● Compare and summarize ideas about how the tree exists in two places using a discussion diamond ● Pose and organize questions related to the Koa tree mystery
			● SEP: Ask and/or identify questions that can be answered by an investigation. ● SEP: Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s). ● DCI: (LS4.D)- There are many different kinds of living things in any area, and			

		they exist in different places on land and in water. ● CCC: Simple investigations can be designed to gather evidence to support or refute student ideas about causes.	
(2) What do plants need to survive? Do all plants need the same amount of water and sunlight?	I Can ● Share my ideas about what all plants need to live-CR ● Collaborate with my classmates-O ● **Plan and investigate how much light and water are needed for plants to grow-P** ● **Collect and analyze data-P** ● **Explain what all plants need to survive-CR** ● **Make a map of sunlight conditions available on school grounds-P** ● **Sort seed packets based on sunlight and water needs-P** ● **Determine where seeds/plants would thrive on school grounds-P**	**SEP** / **DCI** / **CCC** ● SEP: Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. ● SEP: Make observations (firsthand or from media) to collect data which can be used to make comparisons. ● DCI: (LS2.A)- Plants depend on water and light to grow. ● CCC: Events have causes that generate observable patterns. ● CCC: Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower).	● Record thinking on notice/wonder chart and plant needs pre-assessment ● Set up class plant needs investigation and care schedule ● Record data in plant journal ● Analyze data to determine plant growth patterns ● Complete CER template ● Make sunlight map of school grounds ● Complete class summary table
(3) What is the habitat and climate in Hawaii and Reunion Island? Can the Koa tree survive and grow in Connecticut?	I Can ● **Study and organize information about the climates and habitats of Reunion Island, Hawaii, and CT-CR** ● **Identify similarities and differences in the habitats of Reunion Island, Hawaii, and CT-CR** ● **Construct an argument supported by evidence about whether or not the Koa tree can survive and grow in Connecticut-P** ● **Make a claim supported by evidence on which citrus tree to plant and where on school grounds-P**	**SEP** / **DCI** / **CCC** ● SEP: Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. ● SEP: Construct an argument with evidence to support a claim. ● SEP: Make observations (firsthand or from media. ● DCI: (LS2.A)- Plants depend on water and light to grow. (LS4.D)- There are many different kinds of living things in any area, and they exist in different places on land and in water. ● CCC: Patterns in the natural world can be observed.	● Use Exploration Template to compare climates and habitats of 3 locations ● Evaluate information to identity patterns ● Construct an argument with evidence on Claim Posters ● Make a claim with evidence on elaborate template ● Complete class summary table
(4) How do plants depend on animals?	Part I I Can **Make observations and ask questions about the process of pollination-CR** **Explore how structure relates to function at pollination stations-P** **Identify and explain the most important structures that assist with bee**	**SEP** / **DCI** / **CCC** ● SEP: Develop a simple model based on evidence to represent a proposed object or tool.	● Record thinking on class I notice/I wonder chart to develop initial definition of pollination ● Sketch floral and bee parts

	pollination-P ● Identify floral and animal structures that function to help with pollination-CR ● Make a prediction with evidence on how the Koa tree is pollinated-CR Part II I Can ● **Explore how plants and animals work together to scatter seeds-P** ● **Identify seed structures that help seed transport-CR** ● **Design a simple sketch to show how the shape and properties of a seed help it move to a place where it can grow-P**	● SEP: Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. ● DCI: (LS2.A)- Plants depend on animals for pollination or to move their seeds around. (ETS1.B)- 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) ● CCC: The shape and stability of structures of natural and designed objects are related to their functions. ● CCC: Events have causes that generate observable patterns.	that help with pollination ● Create an explanatory model for bee pollination ● Make a class anchor chart adaptations of animals and plants that assist in pollination after viewing elaborate video and IRA ● Record thinking on explore station notice and wonder templates ● Build seed structure and function anchor chart ● Complete How do Seeds move template with structure/function evidence ● Use discussion diamond to predict how Koa seed might be dispersed ● Sketch seed design based on habitat provided ● Complete class summary table
(5) How does freezing or heating a plant change it? How does temperature determine if a Koa tree can survive?	I Can ● Make predictions about what happens when a plant is heated or frozen-CR ● **Explore the effect of heating and freezing a plant-P** ● **Identify changes in plants that have been heated and cooled-CR** ● Set up a simple investigation to notice what happens to water when it freezes-CR ● **Identify that some observed changes with extreme temperatures are reversible and some are not-CR** ● **Construct an argument with evidence to explain the impact of extreme temperature on the class plant-P** ● **Develop a model to explain how the Koa Tree can live in two places 10,000 miles apart-P**	**SEP** / **DCI** / **CCC** ● SEP: Construct an argument with evidence to support a claim. ● DCI: (PS1.B)- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (PS1.A)- Different kinds of matter exist and many of them can be either a liquid or a solid depending on temperature. ● CCC: Events have causes that generate observable patterns.	● Post predictions on chart paper ● Record observations on an explore template ● Compare raw, heated, and frozen plant changes on a triple bubble template ● Build a class CER on impact of temperature on substances and on plants ● Complete class summary table ● Use culminating task template to develop model and respond to supportive prompts

ADDITIONAL CONSIDERATIONS

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY
Students may think that ● All plants need the same amount of water	K-2-ETS1.A: A situation that people want to change or create can be approached as a problem to be solved through	K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define

• You can't overwater a plant • All plants need the same amount of light • Large animals are the main characters in an ecosystem; smaller organisms are less important in the success of an ecosystem • All ecosystems are composed of the same plants and animals • Heating or freezing an item/material does not cause any significant changes • Only heating a material causes changes	engineering. Such problems may have many acceptable solutions. 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. K-2-ETS1.B: Designs can be conveyed through sketches, drawings or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. K-LS1.C: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. K-ESS3.A: Living things need water, air, and resources from the land, and they live in places that have the things they need. 1-LS1.A: All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, ad take in food, water, and air. Plants also have different parts (roots, setms, leaves, flowers, fruits) that help them survive and grow.	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. 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.

RESOURCES

Bundle Inventory-Koa Tree

UNIT 3: Beavers-Nature's Engineers

UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Skills/Concepts	Academic Vocabulary
2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.	**SEP**	**Constructing Explanations and Designing Solutions** ● Make observations from several sources to construct an evidence-based account for natural phenomena.	Skills ● Make observations from several sources ● Construct an evidence based account to explain phenomena Concepts ● Events can happen quickly or slowly over time ● Some events happen over a longer time period than can be observed	● Observation ● Evidence ● Quick ● Slow ● Phenomena
	DCI	**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.		
	CCC	**Stability and Change** ● Things may change slowly or rapidly.		
2-ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.	**SEP**	**Constructing Explanations and Designing Solutions** ● Compare multiple solutions to a problem.	Skills ● Compare multiple solutions to a problem ● Compare and test designs Concepts ● Wind and water can change the shape of land ● There is always more than one design solution to a problem ● Things may change slowly or rapidly ● Multiple solutions should be compared	● Problem ● Solution ● Wind ● Water ● Shape ● Land ● Compare ● Similarity ● Difference ● Test ● Design ● Rapid
	DCI	**ESS2.A: Earth Materials and Systems** ● Wind and water can change the shape of the land. **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. *(secondary)*		
	CCC	**Stability and Change** ● Things may change slowly or rapidly.		
2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area.	**SEP**	**Developing and Using Models** ● Develop a model to represent patterns in the natural world.	Skills ● Develop a model ● Map the shapes and kinds of land and water in an area	● Model ● Patterns ● Map ● Area ● Location
	DCI	**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.	Concepts ● Maps show where things are located ● Models can represent patterns	● Key ● Landform
	CCC	**Patterns** ● Patterns in the natural world can be observed.		
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.	**SEP**	**Analyzing and Interpreting Data** ● Analyze data from tests of an object or tool to determine if it works as intended.	**Skills:** ● Analyze data ● Design objects/tools to solve a problem ● Test designs to compare their strengths and weaknesses **Concepts:** ● Comparing strengths and weaknesses helps to determine the effectiveness of a design ● There are multiple solutions to a problem	● Strength ● Weakness ● Analyze
	DCI	**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.		
	CCC	**N/A**		

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1)
- RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1)(2-ESS2-1)
- RI.2.9 Compare and contrast the most important points presented by two texts on the same topic. (2-ESS2-1)
- W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1)(K-2-ETS1-3)
- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1)(K-2-ETS1-3)
- SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (2-ESS1-1) (2-ESS2-2)(K-2-ETS1-3)
- MP.4 Model with mathematics . (2-ESS1-1)(2-ESS2-2)(K-2-ETS1-3)
- MP.5 Use appropriate tools strategically. (2-ESS2-1)(K-2-ETS1-3)
- 2.NBT.A Understand place value. (2-ESS1-1)
- 2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2)
- 2.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. (2-ESS2-1)

- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-3)

UNIT 3 DETAILS

Unit Phenomenon: Beavers-Nature's Engineers

Storyline:
The beaver is the largest rodent in North America. One of the most notable traits of this species, however, is not its size but its ability to transform its environment to suit itself. Most animals have at least some effect on the environment around them. Spiders weave webs to catch passing insects. Woodpeckers chip cavities in the trunks of trees to build their nests. But few animals (except for humans) have as much of an impact on their environment as the beaver does. In fact, a single family of beavers can in a matter of weeks turn a small, rushing stream into acres of deep, still, interconnected ponds, creating a wetland that would otherwise not exist. Throughout this unit, students explore the natural processes of weathering and erosion at the hands of beavers and other forces of nature (water and wind). Students will investigate these events through the lenses of both quick and slow change. Students will be exposed to photos, videos, and maps that illustrate these ideas. Students will experience the core ideas by investigating, constructing models, constructing explanations, and designing solutions.

Unit Essential Questions:
- How do you think beavers change the land and impact the ecosystem?
- Why do beavers need dams?
- How are beavers nature's engineers? What is an engineer? What is the engineering cycle?
- How do rivers change the land? How quickly does this happen? How do dams change the land?
- What are the other ways that landforms can be created, besides erosion along river beds?

Learning Sequence # Essential Question	**Learning Targets:** I can (bold are priority)	**Summative Assessment Strategy** SR - Selected Response CR - Constructed Response P - Performance O - Observation (behavioral)	**Priority NGSS Dimensions**	[Assessment]
(1) How do you think beavers change the land and the ecosystem?	I Can • **Make observations and ask questions about beavers and how they can change the landscape-CR** • **Create an initial model on how beavers change the landscape-CR**		**SEP** / **DCI** / **CCC** • SEP: Ask questions based on observations to find more information about the natural and/or designed world(s).: • CCC: Patterns in the natural world can be observed.	• Record observations and questions on a Notice/Wonder template • Create a class anchor chart on beavers and their ability to change the landscape • Create an explanatory model on beaver impact using a template

(2) Why do beavers need dams?	I Can ● Draw and explain parts of human homes that are needed for people to live, grow, and stay safe-CR ● Identify similarities in human and beaver homes-CR ● **Explain how a beaver dam raises the water table to create a pond ecosystem-CR** ● **Describe animals that can live in the beaver ecosystem-P** ● **Make a claim on how an animal can survive in the beaver ecosystem-P**	**SEP** / **DCI** / **CCC** ● SEP: Make observations from several sources to construct an evidence-based account for natural phenomena. ● SEP: Compare multiple solutions to a problem. ● DCI: (LS4.D)- There are many different kinds of living things in any area, and they exist in different places on land and in water. ● CCC: Patterns in the natural world can be observed.	● Draw your house, then label and explain the parts that are necessary for you to live, grow, and stay safe ● Identify key parts of beaver homes and human homes for patterns ● Develop a class anchor image of the beaver ecosystem with details of lodge, dam, and resulting pond ecosystem ● Describe the animals that live in the beaver ecosystem ● Provide evidence on whether an animal lives or does not live in a beaver ecosystem ● Complete class summary table
(3) How are beavers nature's engineers? What is an engineer? What is the engineering cycle?	I Can ● Identify the characteristics of an engineer-CR ● **Design and test ways to slow or stop water from moving through a river bed using Legos-P** ● **Identify similarities and differences in beaver and human designed dams-CR** ● **Explain how humans and beavers solve problems by building dams-CR**	**SEP** / **DCI** / **CCC** ● SEP: Make observations from several sources to construct an evidence-based account for natural phenomena. ● SEP: Analyze data from tests of an object or tool to determine if it works as intended. ● DCI: (ESS2.B)- Maps show where things are located. One can map the shapes and kinds of land and water in any area. (ESS2.A)- Wind and water can change the shape of the land. (ETS1.C)- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. ● CCC: Things may change slowly or rapidly. ● CCC: Patterns in the natural world can be observed.	● Make a claim with evidence of Agree/Disagree line format-Is the beaver an engineer? ● Build Lego river bed and dam ● Test and analyze Lego build data ● Generate a class definition of engineer after reviewing the engineering cycle ● Compare dams using the Venn Diagram of human vs beaver dams ● Use evidence to tell how humans and beavers solve problems with dams-template ● Complete class summary table
(4) How do rivers change the land? How quickly does this happen? How do dams change the land?	I Can ● Make observations and ask questions about how a river can cause erosion-CR ● **Investigate and observe the effects of water in river flow demonstrations-P** ● **Observe and explain what happens to the water levels on either side of the dams-CR** ● **Build and test a "beaver" dam-P** ● **Analyze results to decide which materials were most effective for building dams and describe what happened to the surrounding "landscape"-P**	**SEP** / **DCI** / **CCC** ● SEP: Make observations from several sources to construct an evidence-based account for natural phenomena. ● SEP: Develop a model to represent patterns in the natural world. ● DCI: (ESS1.C)- Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (ESS2.A)- ~~Wind and~~ water can	● Categorize questions on Code slide ● Build rivers in earth materials to demonstrate erosion with water flow ● Explain how the river changes above and below the dam ● Build, test, and analyze beaver dams-record on Think Like a Beaver

	● **Construct a model to show changes to landscape before and after the dam is built-CR** ● **Compare quick vs slow change to the landscape using evidence-CR**	change the shape of the land. ● CCC: Things may change slowly or rapidly.	template ● Develop model to show and explain landscape before and after a dam is constructed ● Compare quick vs slow change using CER template ●
(5) What are the other ways that landforms can be created, besides erosion along river beds?	I Can ● **Identify landforms and how they are created-CR** ● **Investigate landforms with nonfiction text and media-P** ● Make predictions on what landforms could be found in different locations on a map-CR ● **Use maps and their keys to determine where landforms are found-P** ● Identify major landforms found in CT-CR ● **Create a map/model of how a beaver changes the land-P**	**SEP** / **DCI** / **CCC** ● SEP: Develop a model to represent patterns in the natural world. ● DCI: (ESS2.B)- Maps show where things are located. One can map the shapes and kinds of land and water in any area. (ESS2.A)- Wind and water can change the shape of the land. ● CCC: Patterns in the natural world can be observed.	● Match landform cards to the description ● Revise matches based on video information ● Record prediction supported with evidence ● Identify landforms on various maps, including CT ● Complete class summary table ● Use culminating task template to summarize learning

ADDITIONAL CONSIDERATIONS

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY
Students may think that ● Land always stays the same ● Water can't move something heavy, such as sand or rock ● Erosion is the action of the object "falling" (i.e. a house or tree falling due to erosion.) ● Water does not destroy objects ● Any landform can be found anywhere ● Landforms always stay the same	K-2-ETS1.A: A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. 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.	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. 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.

RESOURCES

Bundle Inventory-Beavers