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 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 1 NGSS Science
Course Description for Program of Studies	The performance expectations in first grade help students formulate answers to questions such as: What happens when materials vibrate? What happens when there is no light? What are some ways plants and animals meet their needs so that they can survive and grow? How are parents and their children similar and different? What objects are in the sky and how do they seem to move? First grade performance expectations include PS4, LS1, LS3, and ESS1 Disciplinary Core Ideas from the NRC Framework. Students are expected to develop understanding of the relationship between sound and vibrating materials as well as between the availability of light and ability to see objects. The idea that light travels from place to place can be understood by students at this level through determining the effect of placing objects made with different materials in the path of a beam of

	light. Students are also expected to develop understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs as well as how behaviors of parents and offspring help the offspring survive. The understanding is developed that young plants and animals are like, but not exactly the same as, their parents. Students are able to observe, describe, and predict some patterns of the movement of objects in the sky. The crosscutting concepts of patterns; cause and effect; structure and function; 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 first grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, 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	1
Pre-requisites	
Credit (if applicable)	

District Learning Expectations and Standards	Unit 1	Unit 2	Unit 3	Unit 4
1-PS4-2 Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.	x	x		
1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.	x			
1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.	x	x	x	x
1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.		x		
1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.	x	x		
1-PS4-4 Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.		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		
1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.			x	
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.			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		
1-LS1-2 Read texts and use media to determine patterns in the behavior of parents and offspring that help offspring survive.				x
1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.				x

UNIT 1: Shadows on the Playground

UNWRAPPED STANDARDS

Standard		Dimensions of the NGSS Standard	Skills/Concepts	Academic Vocabulary
1-PS4-2 Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.* ***This PE is not fully accessible in Unit #1, and will be continued in Unit #2.***	**SEP**	**Constructing Explanations and Designing Solutions** Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.	**Skills:** ● Make observations ● Record data ● Use data as evidence **Concepts:** ● Observations help us understand phenomena ● Data is the evidence to support ideas ● Light is needed to see objects ● Some objects give off their own light ● Tests can be used to gather evidence	● Light ● Illuminate ● Dark ● Sun ● Shadow ● Position ● Observation ● Data ● Evidence
	DCI	**PS4.B: Electromagnetic Radiation** Objects can be seen if light is available to illuminate them or if they give off their own light.		
	CCC	**Cause and Effect** Simple tests can be designed to gather evidence to support or refute student ideas about causes.		
1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.	**SEP**	**Analyzing and Interpreting Data** Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.	**Skills:** ● Use observations to describe patterns ● Use patterns to scientific answer questions **Concepts:** ● The position of the sun in the daytime sky can be described and predicted ● The position of the moon can be described and predicted ● Stars (except the sun) can be seen in the nighttime sky	● Moon ● Stars ● Motion ● Patterns ● Describe ● Predict
	DCI	**ESS1.A: The Universe and its Stars** Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.		
	CCC	**Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.		
1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the	**SEP**	**Planning and Carrying Out Investigations** Make observations (firsthand or from media) to collect data that can be used to make	**Skills:** ● Make observations to collect data	● Seasons ● Comparison ● Sunrise

time of year.		comparisons.	• Use data to make comparisons **Concepts:** • Sunrise and sunset can be observed and predicted • Sunset and sunrise patterns times vary predictably with the seasons	• Sunset
	DCI	**ESS1.B: Earth and the Solar System** Seasonal patterns of sunrise and sunset can be observed, described, and predicted.		
	CCC	**Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.		
1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.	**SEP**	**Planning and Carrying Out Investigations** • Plan and conduct investigations collaboratively to produce evidence to answer a question.	**Skills:** • Plan and conduct an investigation • Collaborate with peers • Investigate different materials with light • Record data **Concepts:** • Different materials allow various amounts of light to pass through • Materials that block all light create a dark shadow on the surface beyond • Light can be reflected (redirected) with a mirror • Evidence is used to support cause and effect ideas	• Investigation • Materials • Transparent • Translucent • Opaque • Mirror • Prism • Reflect • Redirect • Bend • Rainbow
	DCI	**PS4.B: Electromagnetic Radiation** • Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam.		
	CCC	**Cause and Effect** • Simple tests can be designed to gather evidence to support or refute student ideas about causes.		

Common Core State Standards Connections:
ELA/Literacy

W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. (1-PS4-2)
W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-PS4-2) (1-ESS1-1)(1-ESS1-2)
W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-2) (1-ESS1-1)(1-ESS1-2)
SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-2
Mathematics —
MP.2 Reason abstractly and quantitatively. (1-ESS1-2)
MP.4 Model with mathematics . (1-ESS1-2)
MP.5 Use appropriate tools strategically. (1-ESS1-2)

1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)

UNIT 1 DETAILS

Unit Phenomenon: Shadows on the Playground

Storyline:
Students start this unit by exploring their own shadows on the playground. They trace their shadows at three specific times during the day to look for observable patterns. They investigate how their shadows change in length and location relative to the position of the sun. This observation of shadows leads to new questions about what makes a shadow and what causes a shadow's length and position to change?

The students experiment with light and explain how various materials allow different amounts of light to pass through. Students explore how light can be reflected and redirected. They will also make observations of the moon and observe its pattern over time, learning how shadows affect its appearance. The students begin their year long data recording of the seasonal patterns of how many hours of daylight happen, and start to notice seasonal patterns of overall daylight length. The culminating activity of creating a model that shows how the sun affects a toy's shadow over time further deepens their understanding of sunlight and shadow patterns throughout the day.

Unit Essential Questions:
- How do shadows behave?
- What do we need to make a shadow?
- How can we change the direction of light? If we change the angle/direction of light, what happens to our shadow?
- Why does the moon's appearance change?
- How does the amount and intensity of daylight change with the seasons?
- How do sundials work and how can we set up a class model?

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 do shadows behave?	I Can ● **Make observations of shadows from video and on the playground-O, CR** ● **Identify and describe changing shadow patterns (size, position, movement)-CR** ● Describe the patterns of sun's movements-O, CR		**SEP**	**DCI**	**CCC**	● Discuss and draw patterns observed made by various shadows ● Complete a light and shadow mini-book ● Collect data on daylight hours and how that
			● SEP: Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. ● SEP: Make observations (firsthand or from			

		media) to collect data that can be used to make comparisons. ● DCI: (ESS1.B)- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. ● CCC: Simple tests can be designed to gather evidence to support or refute student ideas about causes. ● CCC: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	impacts a schoolyard plant shadow (how the light intensity and shadow change over the months/seasons) ● Complete class summary table
(2) What do we need to make a shadow?	I Can ● Make observations of shadows cast by a variety of objects-O ● Explain that light is needed to see an object-CR ● **Investigate one object made of variety of materials (all light, some light and no light to pass through) and record observations in a data table-P** ● Make predictions about what types of shadows will result from new objects-CR ● **Plan and make a stained glass window design based on what you learned about light passing through materials-P**	**SEP** / **DCI** / **CCC** ● SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. ● DCI: (PS4.B)- Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. ● CCC: Simple tests can be designed to gather evidence to support or refute student ideas about causes. ● CCC: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	● Complete How much light recording sheet ● Create Stain Glass Window Design ● Use checking for understanding prompts from Evaluate LS2 ● Complete Shadow Comparison template, LS2 ● Complete class summary table
(3) How can we change the direction of light? If we change the angle/ direction of light, what happens to our shadow?	I Can ● **Make observations on how light can change direction-O** ● **Investigate what happens to the light from a flashlight using mirrors** and prisms-O ● Explain that light is needed to see an object-CR ● Describe that some objects can give off their own light-CR ● Explain that mirrors can be used to redirect light-CR ● **Explain that a shadow's shape depends on the angle and position of the lightsource-CR**	**SEP** / **DCI** / **CCC** ● SEP: Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena ● SEP: Plan and conduct investigations to produce evidence to answer a question. ● DCI: (PS4.B)- Objects can be seen if light is available to illuminate them or if they give off their own light. Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. ● CCC: Simple tests can be designed to gather evidence to support or refute student ideas about causes.	● Demonstrate how light paths change with mirror and prism ● Complete Icon Template to construct an explanatory model of how to change light direction ● Use question prompts during IRA "*I See Myself*" ● Complete class summary table

(4) Why does the moon's appearance change?	I Can ● **Make observations of moon patterns-O** ● Describe objects seen in the night sky-CR ● **Describe the position/motion of the sun-CR** ● **Describe the position/motion of the moon-CR** ● **Use models to show and explain the relationship of the earth, moon, and sun-CR** ● **Explain the pattern of earth's daily movement (rotation)-CR** ● **Explain that the moon is lit by the sun-CR**	**SEP** / **DCI** / **CCC** ● SEP: Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. ● SEP: Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. ● SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. ● DCI: (ESS1.A)- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described and predicted. ● CCC: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	● Create a class model and discuss patterns, relationship of sun and moon (and earth) ● Create individual models ● Elaborate/Evaluate prompts and drawings ● Complete class summary table
(5) How does the amount and intensity of daylight change with the seasons? How does a sundial work and how can we set up a class sundial?	I Can ● **Compare the amount of daylight in different seasons-CR** ● Predict how playground shadows would change in the seasons-CR ● Record observations on light and shadow intensity-O ● Create a class sundial-P ● **Draw a model and explain on how the sun moves across the sky and makes shadows-P**	**SEP** / **DCI** / **CCC** ● SEP: Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. ● SEP: Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. ● SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. ● DCI: (ESS1.A)- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described and predicted. (ESS1.B)- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. ● CCC: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	● Record class discussion in a T-chart on the seasons ● Record observations of light intensity shadow drawings template ● Create a class sundial ● Complete class summary table ● Create an individual model of sun's predictable patterns and resulting shadows created

ADDITIONAL CONSIDERATIONS

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY

Students may believe that: ● The Sun is moving across the sky as opposed to the Earth moving ● The Moon is only present /viewable at night ● Shadows stay the same in different seasons ● The amount of sunlight is the same for all seasons ● If students are asked what helps you see? Most will answer glasses, seeing-eye dogs, binoculars, hand lenses, or microscopes, not light ● White light is colorless light ● Sunlight is red, yellow or orange ● Light travels from our eyes so we can see ● Light comes from the object being looked at ● Humans can see in complete darkness after the eyes adjust ● A shadow is something that exists on its own		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-Shadows on the Playground

UNIT 2: Communicating with Sound and Light

UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Skills/Concepts	Academic Vocabulary
1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.	**SEP**	**Planning and Carrying Out Investigations** Plan and conduct investigations collaboratively to produce evidence to answer a question.	**Skills:** ● Plan and conduct an investigation ● Collaborate with peers ● Investigate vibrating materials ● Record data **Concepts:** ● Different sounds can be made by different materials ● Sounds are made by vibrations ● Evidence is used to support ideas	● Investigate ● Plan ● Sound ● Material ● Vibrate ● Collaborate ● Data ● Evidence ● Cause
	DCI	**PS4.A: Wave Properties** Sound can make matter vibrate, and vibrating matter can make sound.		
	CCC	**Cause and Effect** Simple tests can be designed to gather evidence to support or refute student ideas about causes		
1-PS4-2 Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. *Repeated standard from unit 1*	**SEP**	**Constructing Explanations and Designing Solutions** Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.	**Skills:** ● Make observations ● Record data ● Use data as evidence **Concepts:** ● Observations help us understand phenomena ● Data is the evidence to support ideas ● Light is needed to see objects ● Some objects give off their own light ● Tests can be used to gather evidence	● Light ● Illuminate ● Dark ● Sun ● Shadow ● Position ● Observation ● Data ● Evidence
	DCI	**PS4.B: Electromagnetic Radiation** Objects can be seen if light is available to illuminate them or if they give off their own light.		
	CCC	**Cause and Effect** Simple tests can be designed to gather evidence to support or refute student ideas about causes.		
1-PS4-3 Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.	**SEP**	**Planning and Carrying Out Investigations** Plan and conduct investigations collaboratively to produce evidence to answer a question.	**Skills:** ● Plan and conduct an investigation ● Collaborate with peers	● Plan ● Investigation ● Materials ● Block

Repeated standard from unit 1	**DCI**	**PS4.B: Electromagnetic Radiation** Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach.	• Investigate different materials with light • Record data **Concepts:** • Different materials allow various amounts of light to pass through • Materials that block all light create a dark shadow on the surface beyond • Light can be reflected (redirected) with a mirror • Evidence is used to support cause and effect ideas	• Light • Transparent • Translucent • Opaque
	CCC	**Cause and Effect** Simple tests can be designed to gather evidence to support or refute student ideas about causes.		
1-PS4-4 Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.	**SEP**	**Constructing Explanations and Designing Solutions** Use tools and materials provided to design a device that solves a specific problem.	**Skills:** • Use tools and materials to design communication devices **Concepts:** • Problems can be solved with tools and materials • People can communicate across long distances	• Device • Problem • Solution • Communicate • Distance
	DCI	**PS4.C: Information Technologies and Instrumentation** People use a variety of devices to communicate (send and receive information) over long distances.		
	CCC	**N/A**		
1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.* **Ongoing throughout the units*	**SEP**	**Planning and Carrying Out Investigations** Make observations (firsthand or from media) to collect data that can be used to make comparisons.	**Skills:** • Make observations to collect data • Use data to make comparisons **Concepts:** • Sunrise and sunset can be observed and predicted • Sunset and sunrise patterns times vary predictably with the seasons	• Seasons • Comparison • Sunrise • Sunset
	DCI	**ESS1.B: Earth and the Solar System** Seasonal patterns of sunrise and sunset can be observed, described, and predicted.		
	CCC	**Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.		

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 import to clearly understand the problem.		
	CCC	**N/A**		
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 0compare their strengths and weaknesses **Concepts:** ● Comparing strengths and weaknesses helps to determine the effectiveness of a design ● There are multiple solutions to a problem	● Test ● Design ● Strength ● Weakness ● Compare ● 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 —

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-1)(1-PS4-3) (1-PS4-4)(1-ESS1-2)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-1)(1-PS4-3)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-1)(1-PS4-3)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)
- 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)

- 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.2.8 Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (1-ESS1-2)(K-2-ETS1-1)
- MP.4 Model with mathematics .(1-ESS1-2)(1-ESS1-2)(K-2-ETS1-1)
- MP.5 Use appropriate tools strategically. (1-ESS1-2)(1-PS4-4)(K-2-ETS1-1)
- 1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
- 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.(1-PS4-4)
- 1.MD.A.2 Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps. (1-PS4-4)
- 1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)
- 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-ETS1-1)Possible Common Core State Standards Connections:

UNIT 2 DETAILS

Unit Phenomenon: Sound and light work together to communicate a message as illustrated by film

Storyline:

Students start this unit by viewing an animation to build a connection between the use of both light and sound in order to better understand how they work together to communicate a message. Students investigate throughout the unit the things needed to produce a sound, what mediums allow light to pass through them to varying degrees (or not at all), what people use to communicate over long distances, and how certain sound and light effects can be used to trigger behaviors and enhance the understanding of the message being communicated.

To demonstrate their understanding of these diverse topics and tie them all together, students are tasked with improving a *Nuggets* animation in their culminating performance task. Students become sound engineers to create a specific message for a simple animation to be shared with their class.

Unit Essential Questions:

- How do sound and light communicate information?
- What causes sound? Why are there different sounds? How can we make a sound device?
- Is light necessary to see? How can we use shadows to tell a story?
- How are sound and light used to communicate across a distance?
- How can we engineer a soundtrack with a specific message for an animation?

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 do sound and light communicate information?	I Can ● **Make observations and ask questions on a film clip with and without sound-O** ● **Explain how the message of the clip is clearer with sound and light-CR** ● List ways that people communicate-CR		**SEP** / **DCI** / **CCC** ● SEP: Ask questions based on observations to find more information about the natural and/or designed world(s). ● CCC: Simple tests can be designed to gather evidence to support or refute student ideas about causes. ● CCC: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	● Complete observation recording sheet ● Build class anchor chart on communication ● Complete class summary table
(2)	I Can ● **Make and record observations at sound stations-SR, CR** ● **Describe what it means to vibrate-CR**		**SEP** / **DCI** / **CCC** ● SEP: Plan and conduct investigations	● Complete sound station recording sheet ● Create class Sound anchor chart

What causes sound? Why are there different sounds? How can we make a sound device?	• **Demonstrate that vibrating materials make sound-O** • **Collaborate with my peers to plan and conduct a sound investigation-CR** • Record various sounds around the school-CR • **Make a sound device that makes at least two different sounds-P** • **Compare how different materials make different sounds-P** • **Use a test to show cause and effect (vibration causes sound)-P** • **Collect and analyze data on sound devices for potential fire alarm-P**	collaboratively to produce evidence to answer a question. • SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. • SEP: Analyze data from tests of an object or tool to determine if it works as intended. • DCI: (PS4.A)- Wave Properties Sound can make matter vibrate, and vibrating matter can make sound. • DC: (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: Simple tests can be designed to gather evidence to support or refute student ideas about causes.	• Complete listening Walk data sheet • Design a sound device • Test devices as a potential school Fire Alarm • Complete class summary table
(3) Is light necessary to see? How can we use shadows to tell a story? What is light? How can we use light to communicate a message? How can we use shadows to tell a story?	I Can • **Conduct an investigation with my classmates on how different materials can be used to block all the light coming into the classroom-P** • **Describe how different materials can block none, some, or all light-CR** • **Explain how light affects how much I can see-CR** • **Make a claim on how to make the classroom as dark as possible-CR** • Investigate and determine the best materials for a shadow puppet play-P • **Create and perform a shadow puppet play-P**	**SEP** / **DCI** / **CCC** • SEP: Plan and conduct investigations collaboratively to produce evidence to answer a question. • SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. • SEP: Use tools and materials provided to design a device that solves a specific problem. • SEP: Ask questions based on observations to find more information about the natural and/or designed world(s). • DCI: (PS4.B)- Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach (PS4.C)- People also use a variety of devices to communicate (send and receive information) over long distances. • CCC: Simple tests can be designed to gather evidence to support or refute student ideas about causes. • CCC: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	• Complete blocking light investigation template • Make a claim with evidence • Create Light Anchor Chart • Develop a Class Claim with evidence • Complete Light Resource Interactive Reader • Complete In the Dark-Draw and Write • Create a Shadow Puppet set up template • Put on a Shadow Puppet Play • Complete class summary table

(4) How are sound and light used to communicate across a distance?	I Can ● **Brainstorm different ways that people and animals communicate-CR** ● **Explain how people use a variety of devices (sound and light) to receive and send messages in the community-CR** ● **Plan and conduct a class investigation on communication in the school-P, CR** ● **Collect data and make comparisons on communication types (and related devices)-CR** ● **Create a communication plan on how to communicate with a friend during a power outage (no cell phones)-P** ● **Use cup communicators to relay a secret sound message-P**	**SEP** / **DCI** / **CCC** ● SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. ● SEP: Plan and conduct investigations collaboratively to produce evidence to answer a question. ● DCI: (PS4.C)- People also use a variety of devices to communicate (send and receive information) over long distances. (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. ● CCC: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	● Complete a discussion Diamond ● Categorize types of communications using the sound and light cards ● Complete Light and Sound Hunt data template ● Create and Analyze communication graph ● Create a Communication plan for power outage ● Complete class summary table
(5) How can we engineer a soundtrack with a specific message for an animation?	I Can ● **Engineer the sound for a simple animation-P** ● **Describe how light and sound work together to tell a story-CR**	**SEP** / **DCI** / **CCC** ● SEP: Use tools and materials provided to design a device that solves a specific problem. ● SEP: Define a simple problem that can be solved through the development of a new or improved object or tool. ● DCI: (PS4.A)- Sound can make matter vibrate, and vibrating matter can make sound. (PS4.B)- Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (PS4.C)- People also use a variety of devices to communicate (send and receive information) over long distances. (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 beginning to design a solution, it is important to clearly understand the problem. ● CCC: Patterns in the natural world can	● Design a sound track and share with the class ● Complete the culminating Task Template

		be observed, used to describe phenomena, and used as evidence.	

ADDITIONAL CONSIDERATIONS

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY
Students may believe that: ● Sound comes from people's mouths ● Sound can't travel in liquids or solids ● Sound travels in one direction like a flashlight beam ● You can see and hear a distant event at the same moment ● Hitting an object harder changes its pitch. ● Sound can be produced without using any material objects ● If students are asked what helps you see? Most will answer glasses, seeing-eye dogs, binoculars, hand lenses, or microscopes, not light ● Light travels from our eyes so we can see ● Light comes from the object being looked at ● Humans can see in complete darkness after the eyes adjust ● A shadow is something that exists on its own		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-Communicating with Sound and Light

UNIT 3: Learning from Nature

UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Skills/Concepts	Academic Vocabulary
1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.	**SEP**	**Constructing Explanations and Designing Solutions** Use materials to design a device that solves a specific problem or a solution to a specific problem.	**Skills:** ● Use materials to design a device ● Solve a problem **Concepts:** ● All organisms have external parts ● Organisms use their external parts to survive ● Plants and Animals have different external parts ● Animals have specialized body parts that capture and convey information for growth and survival ● Plants respond to some external inputs ● Organisms external structures are related to their function	● Materials ● Design ● Device ● Problem ● Solution ● Organism ● Plants ● Animals ● External ● Structures/Parts ● Survive ● Grow ● Protect ● Respond ● Function ● Shape ● Water ● Air ● Root ● Stem ● Leaf ● Flower ● Fruit ● Seed ● Behavior
	DCI	**LS1.A: Structure and Function** All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. **LS1.D: Information Processing** Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.		
	CCC	**Structure and Function** The shape and stability of structures of natural and designed objects are related to their function(s).		
1-ESS1-2 *Make observations at different times of year to relate the amount of daylight to the time of year.** **Ongoing throughout the units*	**SEP**	**Planning and Carrying Out Investigations** Make observations (firsthand or from media) to collect data that can be used to make comparisons.	**Skills:** ● Make observations to collect data ● Use data to make comparisons **Concepts:** ● Sunrise and sunset can be observed and predicted ● Sunset and sunrise patterns times vary predictably with the seasons	● Seasons ● Comparison ● Sunrise ● Sunset
	DCI	**ESS1.B: Earth and the Solar System** Seasonal patterns of sunrise and sunset can be observed, described, and predicted.		
	CCC	**Patterns** Patterns in the natural world can be observed,		

		used to describe phenomena, and used as evidence.		
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.	**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 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	● Stetch ● Model ● Evidence ● Shape ● Stability
	DCI	**ETS1.B: Developing Possible Solutions** Designs can be conveyed through sketches, drawings or physical models. These representations are useful in communicating ideas or a problem's solutions to other people.		
	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-

W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS1-1)(1-ESS1-2)

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

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-ETS1-3)

W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-3)

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)

Mathematics —

MP.2 Reason abstractly and quantitatively. (1-ESS1-2)(K-2-ETS1-3)

MP.4 Model with mathematics .(1-ESS1-2)(K-2-ETS1-3)

MP.5 Use appropriate tools strategically. (1-ESS1-2)(K-2-ETS1-3)

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

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

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: How can we mimic how plants and animals use their external parts to solve our video problem?

Storyline: Students view a video from a child's perspective of getting lost in the woods as darkness sets in, and she slides down a hillside. Students are presented with the Video Problem: How will she find her way safely home? Students will use learning about how animals and plants use their external parts (structures) to help them grow, survive, and meet their needs to give them ideas on solving the video problem! Learning Sequence 2 focuses on plant structures and Learning Sequence 3 examines animal structures. Students will identify that structures are used for growth and survival, by numerous examples of structures as they relate to protection/safety, specialized movement, responding to the environment with senses, and obtaining food. In Learning Sequence 4, students will be introduced to the concept of biomimicry, learning from nature to make things better or to solve human problems. Students will be able to explain the structures and functions of animals and plants as well as identify survival needs for both plants and animals.

The culminating task will have the students take all information learned throughout the unit and tie it together to solve the problem of making their way up the hill (or out of a hole or just lost in general) and through a dark, cold forest with predators by using plant and animal inspired structures.

Unit Essential Questions:

- How can we mimic how plants and animals use their external parts to solve a problem?
- How do plant structures help the plant meet its needs?
- How do animal body structures help it meet its needs?
- How have humans used nature to solve their problems? How can we mimic nature to develop a solution for our video problem?

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 do external parts of living things help them grow and survive?	I Can ● **Make observations and ask questions on videos-O** ● **Identify a problem using evidence-CR** ● Explain how plants and animals use their external parts to help them stay alive-CR		**SEP** / **DCI** / **CCC** ● SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. ● DCI: (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, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (LS1.D)- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals	● Record observations and questions in a class T-Chart ● Complete Notice/Wonder template for star-nosed mole and venus fly trap ● Complete class summary Table

		respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. ● CCC: The shape and stability of structures of natural and designed objects are related to their function(s).	
(2) How do plant structures help the plant meet its needs?	I Can ● Identify similarities and differences between two plants-CR ● **Observe and record evidence at plant stations-P** ● **Notice how the shape of plant relates to it function-CR** ● **Identify and explain basic plant parts(root, stem, leaf, flower, fruit/seed) and their functions-CR** ● **Compare the similarities and differences between a pea plant and an oak tree-CR** ● Identify possible plant inspired structures that would help solve the video problem-CR .	**SEP** **DCI** **CCC** ● SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. ● SEP: Develop a simple model based on evidence to represent a proposed object or tool. ● DCI: (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, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (LS1.D)- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (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. ● CCC: The shape and stability of structures of natural and designed objects are related to their function(s).	● Complete a Plant Scientist Evidence Log ● Complete Structure and shape related to function template ● Complete a Venn Diagram for Pea plant and oak tree ● Complete Plant Structure/Function template ● Complete class summary Table
(3) How do animal body structures help it meet its needs for growth and survival?	I Can ● Compare external parts of a star-nosed mole and a student-CR ● **Share ways that animals use their body parts (nose/ears/tail/eyes/feet/mouth)-CR** ● **Recognize patterns (size, shape, consistent parts) in various animal structure/functions-CR** ● **Explain that animals use their structures in a wide variety of ways to survive (move, see, hear, protect, find and capture food)** ● Describe ways that animals can use behaviors to to survive in addition to structures-CR	**SEP** **DCI** **CCC** ● SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. ● SEP: Develop a simple model based on evidence to represent a proposed object or tool. ● DCI: (LS1.A)- All organisms have external parts. Different animals use their body parts in different ways to see, hear,	● Complete Venn Diagram on a mole versus a student ● Complete animal use templates ● Complete discussion Diamond on animal parts/purpose ● Complete mole explanatory model template ● Identify animal survival behaviors during IRA

	• Identify possible animal inspired structures that would help solve the initial video problem-CR	grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (LS1.D)- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. • CCC: The shape and stability of structures of natural and designed objects are related to their function(s). • CCC: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	• Complete class summary table
(4) How have humans used nature to solve their problems? How can we mimic nature to solve our video problem?	I Can • List ways that humans and animals behave in similar ways(ex. make soft beds to sleep on)-CR • **Explain ways that humans have copied nature to inspire solutions to their problems-CR** • **Identify and explain a plant and animal structure, and "super sense" that would solve the initial video problem-P** • **Design (sketch, draw, label) a device inspired by nature to help solve the problem in our video-P**	**SEP** / **DCI** / **CCC** • SEP: Use materials to design a device that solves a specific problem or a solution to a specific problem. • SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. • SEP: Develop a simple model based on evidence to represent a proposed object or tool. • DCI: (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, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (LS1.D)- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (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.	• Build class chart on animal and human behaviors • Match and explain Biomimicry card pictures • Complete Biomimicry plant or animal structure used to solve a problem template • Complete class summary table • Complete culminating task template

		(ETS1.C)- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. ● CCC: The shape and stability of structures of natural and designed objects are related to their function(s). ● CCC: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	

ADDITIONAL CONSIDERATIONS

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY
Possible Preconceptions/Misconceptions: ● All plants look alike (similar to our climate) ● Plants don't grow/change ● Plants do not move ● Plants do not need the sun ● Plants do not have distinct parts that serve a specific purpose ● Living objects can change to meet all their survival needs ● Birds, fish, insects and worms are not animals ● All animals can move from place to place ● All animals have the same body parts ● Everything that makes our lives easier has been invented ● We cannot learn from nature because we are smarter	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. Humans use natural resources for everything they do.	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-Learning from Nature

UNIT 4: Season Changes

UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Skills/Concepts	Academic Vocabulary
1-LS1-2 Read texts and use media to determine patterns in the behavior of parents and offspring that help offspring survive.	**SEP**	**Obtaining, Evaluating, and Communicating Information** Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world.	**Skills:** ● Read Texts on parent/offspring behavior for survival ● Use Media on parent/offspring behavior for survival ● Determine patterns of parent/offspring behavior for survival ● Use patterns as evidence **Concepts:** ● People use text and media to gather information about the world ● Adult plants and animals have young (babies) ● Parents and offspring engage in survival behaviors ● Patterns in nature help us understand our world	● Behavior ● Parents ● Offspring ● Survival ● Patterns ● Adults ● Plants ● Animals ● Evidence ● Migration ● Hibernation ● Grow ● Change ● Winter ● Summer ● Spring ● Fall ● Season ● Features ● Seeds ● Field Biologist
	DCI	**LS1.B: Growth and Development of Organisms** Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.		
	CCC	**Patterns** Patterns in the natural and human designed world can be observed, use to describe phenomena, and used as evidence.		
1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.	**SEP**	**Constructing Explanations and Designing Solutions** Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.	**Skills:** ● Make observations ● Describe patterns from evidence ● Develop and support claims with evidence **Concepts:** ● Evidence is needed to support a claim ● Evidence based patterns help us to understand phenomena ● Young plants and animals usually look similar, not identical, to their parents ● The same kind of plant and	● Compare ● Similarities ● Differences ● Recognize ●
	DCI	**LS3.A: Inheritance of Traits** Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. **LS3.B: Variation of Traits** Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.		

	CCC	**Patterns** Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.	animal may look similar, but can vary in many ways	
1-ESS1-2 *Make observations at different times of year to relate the amount of daylight to the time of year.** **Ongoing throughout the units*	**SEP**	**Planning and Carrying Out Investigations** Make observations (firsthand or from media) to collect data that can be used to make comparisons.	**Skills:** ● Make observations to collect data ● Use data to make comparisons **Concepts:** ● Sunrise and sunset can be observed and predicted ● Sunset and sunrise patterns times vary predictably with the seasons	● Seasons ● Comparison ● Sunrise ● Sunset
	DCI	**ESS1.B: Earth and the Solar System** Seasonal patterns of sunrise and sunset can be observed, described, and predicted.		
	CCC	**Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.		

Possible Common Core State Standards Connections:

ELA/Literacy -

RI.1.1 Ask and answer questions about key details in a text. (1-LS1-2)(1-LS3-1)

RI.1.2 Identify the main topic and retell key details of a text. (1-LS1-2)

RI.1.10 With prompting and support, read informational texts appropriately complex for grade. (1-LS1-2)

W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS3-1)(1-ESS1-2)

W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)(1-ESS1-2)

Mathematics -

1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols >, =, and <. (1-LS1-2)

1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. (1-LS1-2)

1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. (1-LS1-2)

1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (1-LS1-2)

1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-LS3-1)

1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions

	about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)
1.OA.A.1	Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
MP.2	Reason abstractly and quantitatively. (1-LS3-1)(1-ESS1-2)
MP.4	Model with mathematics .(1-ESS1-2)
MP.5	Use appropriate tools strategically. (1-LS3-1)(1-ESS1-2)

UNIT 4 DETAILS

Unit Phenomenon: Time Lapse of Seasons-Video

Storyline:

Through patterns of the sunlight and Earth's seasons, students will explore how living things respond to seasonal changes. Unlike humans, animals and plants have strong biological seasonal cycles that are linked to the amount of sunlight in their day. The response from plants and animals to these changes in daylight through the year include reproduction, denning, migration, hibernation, changes to coat thickness, coloration, leaf production, growth and dormancy. These characteristics and behaviors connect offspring to their parents in both their traits (offspring that are alike and not exactly alike their parents) and their survival.

Students learn what it is like to be a field biologist. They will study the different living things in our local region or deciduous forest biome in order to generate a field guide. Using a variety of media, students will investigate how living things change with the seasons and record these findings on the pages of the field guide. To continue in their role as field biologists, students record the ways in which parents help their offspring to survive.

Unit Essential Questions:

- How can seasonal patterns be described?
- How do living things prepare for the seasons? How does the behavior of living things help them survive in different seasons?
- How are offspring similar and different from their parents?
- How do parents care for their offspring to ensure survival?

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 can seasonal patterns be described?	I Can ● **Identify trends in the amount of daylight during the school year-CR** ● **Make observations to describe the phenomenon video-O** ● **Record observations that apply to each season from the video-CR** ● Find similarities and differences in the seasons posters-CR ● **Plant mystery seeds and create a care schedule** (*set up for learning sequence 3*)**-P**		**SEP** / **DCI** / **CCC** ● SEP: Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. ● SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. ● DCI: (ESS1.B)- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. ● CCC: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.	● Analyze and make conclusions from class daylight data ● Design initial season models ● Compare class seasons models

(2) How do living things prepare for the seasons? How does the behavior of living things help them survive in different seasons?	I Can ● **Describe and communicate seasonal changes/patterns in a deciduous forest biome (Bristol)-P** ● Develop a definition of survival-CR ● **Gather and record information from books and videos to learn about plants and animals of the deciduous forest-CR** ● **Describe features of plants and animals that live in the deciduous forest-CR** ● **Explain patterns of behavior that promote survival in the different seasons-P, CR** ● Describe the role of a field biologist-CR ● **Experience the deciduous forest biome (*on school grounds or beyond-can be part of LS 2 or 3)*-P** ● **Make and record observations of mystery plant (ongoing in unit)-CR**	**SEP** / **DCI** / **CCC** ● SEP: Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. ● SEP: Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. ● DCI: (LS1.B)- Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. ● CCC: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.	● Complete discussion Diamond-Plant and animal changes ● Revise season models ● Complete individual Season Changes Field Guide ● Record observations and collect artifacts from class outdoor experience ● Complete Mystery Plant Journal
(3) How are offspring similar and different from their parents?	I Can ● **Identify plant and animal features that help to compare offspring to parent-CR** ● **Observe images and plants to describe and prove that young animals and plants are similar yet different from their parents-P** ● **Describe behavior patterns of how parents respond to their offspring's cues-CR** ● Identify behaviors offspring do for survival-CR	**SEP** / **DCI** / **CCC** ● SEP: Make observations (firsthand or from media) to collect data that can be used to make comparisons. ● SEP: Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. ● SEP: Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. ● DCI: (LS3.A)- Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. (LS3.B)- Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. ● CCC: Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.	● Create anchor list of plant and animal identifying features ● Complete Venn Diagram on Similarities and Differences Plants/Animals ● Complete Mystery Plant Journal ● Complete and present Season Changes Field Guide ● Record survival behaviors from the bluebird IRA and video

ADDITIONAL CONSIDERATIONS

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY
Possible Preconceptions/Misconceptions: ● The amount of daylight is the same every day ● Changes in temperature, rather than in light, cause seasonal cycles in plants and animals ● All animals migrate or hibernate in winter ● If there is snow, it is winter ● If it is warm, it is summer ● Months are the same as seasons ● All baby animals look the same ● Baby animals look exactly like the parents and/or baby animals look nothing like their parents	K-ESS2.D: Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. K-ESS3.A: Living things need water, air, and resources from the land, and they live in places that have the things they need. 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-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-Season Changes