Barrington School District | Haddon Heights School District | Lawnside School District | Merchantville School District

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Course Name: Science
Grade: First Grade
Board Approved:

*All curriculum is aligned with the NJSLS in accordance with the Department's curriculum implementation timeline and includes all required components (NJ.A.C.6A:8).
**Resource and activity lists are compiled from all four districts and may not necessarily be reflected in each district or school.

Introduction

New Jersey Student Learning Standards for Science

Michael Heinz, Coordinator

Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions, such as selecting among alternative medical treatments or determining how to invest public funds for water supply options. In addition, understanding science and the extraordinary insights it has produced can be meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering.

Mission: Scientifically literate individuals possess the knowledge and understanding of scientific concepts and processes required for personal decision-making, participation in civic and cultural affairs, and economic productivity.

Vision: The science standards are designed to help realize a vision for education in the sciences and engineering in which students, over multiple years of school, actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields. The learning experiences provided for students should engage them with fundamental questions about the world and with how scientists have investigated and found answers to those questions. Throughout grades K-12, students should have the opportunity to carry out scientific investigations and engineering design projects related to the disciplinary core ideas (pp. 8-9, NRC, 2012).

STANDARD:

1-ESS1--1 Earth's Place in the Universe

Unit 1: Patterns of Change in the Night Sky

ESTABLISHED GOALS (INDICATOR #)	**TRANSFER (How will this apply to their lives?)**	
1-ESS1-1: Use observations of the sun, moon, and stars to describe patterns that can be predicted. 1-ESS1-2: Make observations at different times of year to relate the amount of daylight to the time of year.	*Students will be able to independently use their knowledge to…* ● Observe and describe predictable patterns made by the sun, moon and stars. ● Observe describe how daylight changes throughout the year.	
	MEANING	
	UNDERSTANDINGS: ● Science assumes that natural events happen today as they happened in the past. ● Many events are repeated. ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. ● Patterns in the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. ● Seasonal patterns of sunrise and sunset can be observed, described, and predicted.	ESSENTIAL QUESTIONS: ● *What patterns of change can be predicted when observing the sun, moon, and stars?* ● *What is the relationship between the amount of daylight and the time of year?*

Unit 1: Grade 1- Lessons

In this unit of study, students observe, describe, and predict some patterns of the movement of objects in the sky. Throughout the unit students look for patterns as they plan and carry out investigations and analyze and interpret data.

In this unit's progression of learning, students develop the understanding that natural events happen today as they happened in the past, and that many events are repeated. In addition, they observe and use patterns in the natural world as evidence and to describe phenomena. First graders ask questions and use observations of the sun, moon, and stars to describe apparent patterns of change in each. These patterns are then used to answer questions and make predictions. Some examples of patterns include:

- ✓ The sun and moon appear to rise in one part of the sky, move across the sky, and set.
- ✓ The shape of the moon appears to change over a period of time in a predictable pattern.
- ✓ Stars, other than our sun, are visible at night but not during the day.

After students observe and document these types of patterns over a period of time, they need opportunities to describe the patterns and to make predictions about the changes that occur in the objects in the sky. It is important that they use observed patterns as evidence to support predictions they might make about the sun, moon, and stars.

In this unit, students also learn that seasonal patterns of sunrise and sunset can be observed, described, and predicted. They relate the amount of daylight to the time of year by making observations at different times of the year. Over time, they collect and use data in order to identify the relationship between the amount of sunlight and the season. Grade 1 students are expected to make relative comparisons of the amount of daylight from one season to the next, and assessment should be limited to relative amounts of daylight, not quantifying the hours or time of daylight.

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).

Suggested Mystery Science Lessons:

Spinning Sky: Sun, Moon and Stars

Mystery 1: Sun, Shadows and Daily Patterns (*Could a statue's shadow move?)*

Mystery 2: Sun, Shadows and Daily Patterns (*Read Along: What does your shadow do when you're not looking?)*

Mystery 3: Sun and Daily Patterns (*How can the sun help you if you are lost?)*

Mystery 4: Sun and Seasonal Patterns (*Read Along: Why do you have to go to bed early in the summer?*)

Mystery 5: Stars and Daily Patterns (*Why do the stars come out at night?)*

Mystery 6: Stars and Seasonal Patterns (*Read Along: How can the stars help you if you are lost?)*

Suggested BetterLesson Unit:

What is a Scientist? What do they do?

1. What Does a Scientist Do? *SWBAT build on prior experiences and information from a text to answer the question, "What does a scientist do?."*
2. Scientists Use Tools to Observe-Hand Lenses *SWBAT make observations of nature.*
3. Scientists Sort/Categorize (Assessment-teacher observation, anectdotal records. *SWBAT use their observations of plants and animals to sort items into the categories living and nonliving.*
4. How Do Scientists Observe, Order, Describe? *SWBAT make and communicate their observations by adding drawings and clarifying ideas.*
5. Scientists Ask and Answer Questions *SWBAT ask and answer questions about external parts of animals.*
6. Scientists Read For Information *SWBAT identify key details that support the author's point, "A trunk is a tool."*
7. How Do Scientists Communicate Their Work Through Writing *SWBAT identify key details that support the author's point, "Animals use their (parts) in very different ways."* (formative assessment-Checklist)
8. Scientists Build Models *SWBAT strengthen their Science Journal writing with guidance from the teacher and peers.*

Patterns in the Sky

1. Introduction and Pre Assessment for Patterns in the Sky *SWBAT demonstrate prior knowledge about patterns in the sky.* (Formative Assessment-Proficiency scale)
2. Observing the Sun *SWBAT observe and describe patterns in the sun's movement.*
3. Analyzing the Sun Data (Proficiency scale) *SWBAT describe patterns of the stars.*
4. The Sun: Facts and Figures *SWBAT ask and answer questions about the sun.*
5. Day and Night: The Hokey Pokey *SWBAT describe patterns in the earth's movement around the sun.* (Formative Assessment-Proficiency Scale)
6. The Man in the Moon *SWBAT describe patterns of the moon.*
7. It's A Pattern! The Moon's Phases *SWBAT describe patterns of the moon.*
8. Planning and Conducting a Moon Investigation *SWBAT conduct an investigation to answer a question.*
9. The Moon Facts and Figures *SWBAT ask and answer questions about the moon.*
10. Spatial Relations in Space- Rotations and Revolutions *SWBAT describe patterns of the sun, earth, and moon's movement.* (Formative

Assessment-Proficiency Scales)

11. Star Light, Star Bright: Star Patterns *SWBAT describe patterns of the stars.*
12. Observing Stars: A Fiction Connection *SWBAT ask and answer questions about the moon.* (Assessment-Proficiency Scales)
13. Presenting the Patterns: Collaborating and Planning *SWBAT describe a pattern in the sky.* (Performance Task)
14. Presenting the Patterns: Collaborating and Drafting *SWBAT describe a pattern in the sky.* (Performance Task)
15. Presenting the Patterns:Sharing Our Products *SWBAT describe a pattern in the sky.* (Performance Task)
16. **Revisit in the spring when discussion seasonal changes

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting concepts
Planning and Carrying Out Investigations ● Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) **Planning and Carrying Out Investigations** ● Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2) Analyzing and Interpreting Data ● Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)	**ESS1.A: The Universe and its Stars** ● Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1) **ESS1.B: Earth and the Solar System** ● Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)	**Patterns** ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2) - ***Connections to Nature of Science*** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** ● Science assumes natural events happen today as they happened in the past. (1-ESS1-1) ● Many events are repeated. (1-ESS1-1)

District/School Formative Assessment Plan	District/School Summative Assessment Plan
Students who understand the concepts can: ● Observe and use patterns in the natural world as evidence and to describe phenomena. ● Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. ● Use observations of the sun, moon, and stars to describe patterns that can be predicted. Examples of patterns could include: ✓ The sun and moon appear to rise in one part of the sky, move across the sky, and set. ✓ Stars other than our sun are visible at night but not during the day. ✓ Observe and use patterns in the natural world as evidence and to describe	*Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.* **Mystery Science Assessments:** *(all resources are accessible on google drive)* ***Mystery 1:*** Sun, Shadows and Daily Patterns ***Mystery 2:*** Sun, Shadows and Daily Patterns ***Mystery 3:*** Sun and Daily Patterns

phenomena. ✓ Make observations (firsthand or from media) to collect data that can be used to make comparisons. ✓ Make observations at different times of the year to relate the amount of daylight to the time of year.	***Mystery 4:*** Sun and Seasonal Patterns ***Mystery 5:*** Stars and Daily Patterns ***Mystery 6:*** Stars and Seasonal Patterns

Alternative Assessments

Evaluative Criteria	Assessment Evidence
Suggested Performance Rubric: Use the following or similar rubric to evaluate students' performance on lesson assessments: **4 - Innovating:** Advanced understanding and application of the standard **3 - Applying:** Consistently applies skills independently **2 - Developing:** Progressing towards independent application of skills **1 - Beginning:** Early stages of development, need assistance	Suggested Performance Tasks include but are not limited to: **Performance Task:** **Presenting the Patterns** **This is a BetterLesson resource (see above in suggested lessons)* SWBAT: describe a pattern in the sky. --- **Performance Task:** (STEAM PROJECT): "Yesterday a new child joined our classroom. Please help her to catch up. Teach her about the patterns that are observable in our skies and are responsible for the change of seasons and/or night to day." Responses can include, but are not limited to: artwork (painting, drawing, posters, models, murals, collages), Writing and/or Oral presentations (report, play, readers' theatre), Presentations (Powerpoint), Music and Dance(song, rap, skit) Score using rubric.

District/School Texts	District/School Supplementary Resources
Haddon Heights - Unit Kits for Science Labs and References Lawnside - Houghton Mifflin Harcourt : Science Fusion Merchantville- Exploring Science (National Geographic Learning)	**Suggested Read Alouds** The Moon (RAZ-Kids, level C) On the Moon (RAZ-Kids, level F)

		Sun Up, Sun Down By: Gail GIbbons The Sun, Our Nearest Star By: Franklyn Brandley Why the Sun and the Moon Live in the Sky By: Elphinestone Dayrell Arrow to the Sun: A Pueblo Indian Tale by Gerald McDermott **Scholastic News** A Trip to the Sun (May/June 2019) **BrainPOP Jr.** ● Sun
Interdisciplinary Connections		
ELA In this unit of study, students need opportunities to participate in shared research and writing projects about patterns of change in the sky. For example, students can use online resources or books to research the patterns of change that are visible over time when we observe the objects in the sky. With guidance from adults, students could create books that describe and illustrate the different patterns of change observed in objects in the sky. They could also describe and illustrate the relative amount of daylight in relation to the season using a sequenced set of journal entries or in a sequence-of-events foldable.	**Math** Students need opportunities to represent and interpret data and to use addition and subtraction. The following examples from NGSS Appendix L could provide guidance for instruction and should be done with teacher support: ✓ Science example 1: There were 16 hours of daylight yesterday. On December 21, there were 8 hours of daylight. How many more hours of daylight were there yesterday than on December 21? ✓ Science example 2: Based on the data collected and posted on the bulletin board so far, which day has been the longest of the year so far? Which day has been the shortest?	**Technology** 8.1.2.A.4 - Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).
21st Century Skills/Career Education CRP2. Apply appropriate academic and technical skills.		

CRP6. Demonstrate creativity and innovation.		
Modifications and Accommodations		
Special Education Students Small group Direct instruction restate/rephrase graphic organizers modified assignments chunking leveled text intentional grouping read text extended time breaks Teacher records/ student dictates	**English Language Learners** Labels word banks visuals student friendly definitions extended time chunking intentional grouping	**Students at Risk of School Failure** leveled text graphic organizers modified assignments kinesthetic activities restate/rephrase chunking intentional grouping
Gifted and Talented extension project leveled text leadership roles intentional grouping Targeted learning from assessment	**Students with 504 Plans** breaks chunking preferential seating visual reminders restate/rephrase check-in/check-out system visual time Teacher records/ student dictates	
Unit Duration: 15 days		

STANDARD:

1-LS3-1- Heredity: Inheritance and Variation of Traits

Unit 2: Characteristics of Living Things

ESTABLISHED GOALS (INDICATOR #)	TRANSFER (How will this apply to their lives?)	
1-LS3-1- Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. **1-LS1-2-** Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.	*Students will be able to independently use their knowledge to…* ● Use their five senses to describe patterns observed in living things. ● Make predictions based on patterns observed. ● Describe how young plants and animals are alike and different from their parents.	
	MEANING	
	UNDERSTANDINGS: ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. ● Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. ● Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. ● Scientists look for patterns and order when making observations about the world. ● Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. ● Adult plants and animals can have young.	ESSENTIAL QUESTIONS: ● ***Part A:*** *How are young plants and animals alike and different from their parents?* ● ***Part B:*** *What types (patterns) of behavior can be observed among parents that help offspring survive?*

	• In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring survive.	

Unit 2: Grade 1 - Lessons

In this unit of study, students observe organisms in order to recognize that many types of young plants and animals are like, but not exactly the same as, their parents. Students also observe how organisms use their external parts to help them survive, grow, and meet their needs, and how the behaviors of parents and offspring help offspring survive. Throughout the unit, students will look for patterns; obtain, evaluate, and communicate information; and construct explanations.

People look for patterns in the natural world and use these patterns as evidence to describe phenomena. Students begin this unit by observing and comparing external features of organisms, looking for patterns in what they observe. They will need opportunities to observe a variety of plants and animals in order to look for similarities and differences in their features. For example, when comparing the shape, size, color, or number of leaves on plants, students begin to notice that plants of the same kind have leaves that are the same shape and color, but the leaves of one plant may differ from another in size or number. When comparing body coverings; number, size, and type of external features (legs, tail, eyes, mouth parts); body size, body coloring, or eye color of animals, students learn that animals of the same kind have the same type of body covering and the same number and types of external features, but the size of the body, the size of external features, body color, and/or eye color of individuals might differ. Making observations like these helps students recognize that young plants and animals look very much, but not exactly, like their parents, and that even though individuals of the same kind of plant or animal are recognizable as similar, they can also vary in many ways.

In addition to observing and documenting similarities and differences in the external features of organisms, students also need opportunities to make direct observations, read texts, or use multimedia resources to determine patterns in the behaviors of parents and offspring that help offspring survive. While both plants and animals can have young, it is the parents of young animals who might engage in behaviors that help their young survive. Some examples of these patterns of behaviors could include the signals that offspring make, such as crying, cheeping, and other vocalizations, and the responses of parents, such as feeding, comforting, and protecting their young.

Mystery Science Lessons: ** also can be used in Unit 3*

Plant and Animal Superpowers: Plant and Animal Structures and Survival

Mystery 1: Structure and Survival (*Why do birds have beaks?)*

Mystery 2: Parenting and Offspring Survival (Read Along: *Why do baby ducks follow their mother?)*

Mystery 3: Structure and Survival ((*Why are polar bears white?)*

Mystery 4: Inheritance and Variation of Traits (Read Along: *Why do family members looks similar to each other?)*

Mystery 5: Plants and Engineering *(Why don't trees blow down in the wind?)*

Mystery 6: Plant Survival *(Read Along: What do sunflowers do when you are not looking?)*

Better Lessons Suggested Units:

Birds of A Feather Flock Together

1. Building a Nest of Essential Questions *SWBAT ask and answer questions about how animals survive.*

2. External Parts *SWBAT describe external parts of birds.* (Formative-Proficiency Scale)

3. Beaks *SWBAT describe how birds use external parts to meet their needs for food.*

4. Beaks Experiment *SWBAT analyze data to describe how birds meet their needs for food.* (Formative-Proficiency Scale)

5. Introducing Engineering *SWBAT mimic an external part of a bird in order to solve a human problem.*

6. Feet-They Aren't Just for Walking *SWBAT ask and answer questions about how adaptations to an external part-- feet-- help birds meet their needs to survive.*

7. Engineering Solutions *SWBAT design a solution to a human problem by mimicking the external features of birds.*

8. My Feathery Friends *SWBAT locate key details from the text and illustrations about how feathers meet the needs of birds.*

9. My Feathery Friends -Part2 *SWBAT locate key details from the text and illustrations about how feathers meet the needs of birds.*

(Book: Feathers, Not Just For Flying by Sarah Brannen)

10. Nests-Sticks and Stones *SWBAT determine how birds help their offspring survive by building strong nests.*

11. Birds Help Their Young Survive (Cranes) *SWBAT determine patterns in cranes' behavior that help their offspring survive.*

12 Birds Help Their Young Survive (Puffins) *SWBAT determine patterns in puffins' behavior that help their offspring survive.*

13. Birds Help Their Young Survive (Bald Eagles) *SWBAT determine patterns in eagles' behavior that help their offspring survive.*

14. Birds Help Their Young Survive (Penguins) *SWBAT determine patterns in penguins' behavior that help their offspring survive.* (Formative assessment: Venn Diagram of Cranes, Puffins, and Bald Eagles)

15. Forming an Argument *SWBAT write an opinion describing a pattern of behavior that helps offspring survive.* (Performance Task)

Eat Like a Bird! January: This lesson and activity is one of several lessons about birds. In this lesson, students learn that bird beaks come in many different sizes and shape. Each beak has a specific shape and function to help the bird to get and eat food.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting concepts
Analyzing and Interpreting Data • Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1) **Obtaining, Evaluating, and Communicating**	**LS3.A: Inheritance of Traits** • Many characteristics of organisms are inherited from their parents. (3-LS3-1) **LS1.B: Growth and Development of**	**Patterns** • Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1) • Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as

Information	Organisms	evidence. (1-LS1-2) - ***Connections to Nature of Science*** **Scientific Knowledge is Based on Empirical Evidence**
• Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2)	• Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)	• Scientists look for patterns and order when making observations about the world. (1-LS1-2)

District/School Formative Assessment Plan	District/School Summative Assessment Plan
Pre-assessment: Schema chart **Part A:** How are young plants and animals alike and different from their parents? • Observe and use patterns in the natural world as evidence and to describe phenomena. • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. • Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. ○ Examples of patterns could include features plants or animals share. ○ Examples of observations could include that leaves from the same kind of plant are the same shape but can differ in size and that a particular breed of puppy looks like its parents but is not exactly the same. **Part B:** What types (patterns) of behavior can be observed among parents that help offspring survive? • Observe and use patterns in the natural world as evidence and to describe phenomena. • Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. • Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. Examples of patterns of behaviors could include: ○ The signals that offspring make, such as crying, cheeping, and other vocalizations. ○ The responses of the parents, such as feeding, comforting, and protecting the offspring.	*Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.* **Mystery Science Assessments:** ***(all resources are accessible on google drive)*** ***Mystery 1:*** ***Structure and Survival*** ***Mystery 2:*** ***Parent and Offspring Survival*** ***Mystery 3:*** ***Structure and Survival*** ***Mystery 4:*** ***Variation and Inheritance of Traits*** ***Mystery 5:*** ***Plants and Engineering*** ***Mystery 6:*** ***Plant Survival***

Alternative Assessments	
Evaluative Criteria	**Assessment Evidence**
Suggested Performance Rubric: Use the following or similar rubric to evaluate	Suggested Performance Tasks include but are not limited to:

students' performance on lesson assessments:

4 - Innovating:	Advanced understanding and application of the standard
3 - Applying:	Consistently applies skills independently
2 - Developing:	Progressing towards independent application of skills
1 - Beginning:	Early stages of development, need assistance

Performance Task: Forming an Argument

**This is a BetterLesson resource (see above in suggested lessons)*
SWBAT: write an opinion describing a pattern of behavior that helps offspring survive.

Performance Task: (STEAM) "EWW! There is something gross under the cafeteria table! Design and build a tool to pick up our trash."

District/School Texts	District/School Supplementary Resources
Haddon Heights - Unit Kits for Science Labs and References Lawnside - Houghton Mifflin Harcourt : Science Fusion Merchantville- Exploring Science (National Geographic Learning)	**Suggested Read Alouds** Mom's Do So Much (Raz-Kids, level C) Animal Dad's (RAZ Kids, Level F) From Seed to Plant By: Gail Gibbons Roots By: Vijaya Khisty Bodach Stems By: Vijaya Khisty Bodach Leaves By: Vijaya Khisty Bodach Seeds By: Vijaya Khisty Bodach Flowers By: Vijaya Khisty Bodach **Scholastic News** ● Rainbow Plants (April 2019)

<table>
<tr><td colspan="2"></td><td>

- Is a Cloud a Living Thing? (March 2017)
- How Do you Grow a Giant Pumpkin? (October 2017)
- Tortoise's Big Day (April 2018)
- Go, Team. Go! (January 2018)
- Copycat Cub (January 2017)
- Fuzzy Penguin Chick (January 2019)
- Mama Chameleon's Big Day (April 2019)
- Make Way for Ducklings (April 2018)

BrainPOP Jr.

- Classifying Animals
- Mammals
- Birds
- FIsh
- Insects

</td></tr>
<tr><td colspan="3"><u>Interdisciplinary Connections</u></td></tr>
<tr><td>ELA
To integrate English Language Arts into this unit, students need opportunities to read informational texts to gather information about traits and behaviors of organisms. With adult guidance, they identify the main topic, retell key details from texts, and ask and answer questions about key details. Students should also participate in shared research and writing projects. They can gather information from a variety of preselected, grade-level-appropriate texts and resources and use that information to answer questions about traits and behaviors of organisms. In pairs or small groups, students can use pictures and words to create simple books that describe features that parents and offspring share or behaviors that parents and offspring exhibit that help offspring survive.</td><td>Math
To integrate mathematics into this unit, students reason abstractly and quantitatively and use appropriate tools strategically as they collect and organize data, and use it to solve problems. For example, when students gather information about the shape, size, color, and number of leaves on plants, they can:
Use grade-level-appropriate tools and strategies to measure, compare, and order leaves by length.
Organize data (e.g., number of leaves) into simple graphs or tables, and then use strategies based on place value, properties of operations, and/or the relationship between addition and subtraction to make comparisons.
Use drawings and equations as they solve problems (e.g., more or less,</td><td>Technology
8.1.2.A.4 - Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).</td></tr>
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	total amount, how many in each).	
21st Century Skills/Career Education CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation.		
Modifications and Accommodations		
Special Education Students Small group Direct instruction restate/rephrase graphic organizers modified assignments chunking leveled text intentional grouping read text extended time breaks Teacher records/ student dictates	**English Language Learners** Labels word banks visuals student friendly definitions extended time chunking intentional grouping	**Students at Risk of School Failure** leveled text graphic organizers modified assignments kinesthetic activities restate/rephrase chunking intentional grouping
Gifted and Talented extension project leveled text leadership roles intentional grouping Targeted learning from assessment	**Students with 504 Plans** breaks chunking preferential seating visual reminders restate/rephrase check-in/check-out system visual time Teacher records/ student dictates	
Unit Duration: 15 days		

STANDARD:

1-LS1-1: From Molecules to Organisms: Structures and Processes

Unit 3: Mimicking Organisms to Solve Problems

ESTABLISHED GOALS (INDICATOR #)	TRANSFER (How will this apply to their lives?)	
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. **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.	*Students will be able to independently use their knowledge to…* ● Design a solution to a human problem by mimicking plant and animal survival characteristics. ● Collect data about a problem that can be solved with the use of a new tool. ● Demonstrate how the shape of an object helps it solve a problem. ● Compare two solutions to a problem and determine which is best.	
	MEANING	
	UNDERSTANDINGS: ● Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. ● The shape and stability of structures of natural and designed objects are related to their function(s). ● 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. ● Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs	ESSENTIAL QUESTIONS: ● *How can humans mimic how plants and animals use their external parts to help them survive and grow?*

	with behaviors that help them survive. Plants also respond to some external inputs. ● 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.	

Unit 3: Grade 1 - Lessons

In this unit of study, students investigate how plants and animals use their external structures to help them survive, grow, and meet their needs. Then students are challenged to apply their learning to design a solution to a human problem that mimics how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

In order to recognize ways in which animals and plants use their external structures, students need opportunities to observe and describe how the shape and stability of organisms' structures are related to their functions. Students can make direct observations and use media resources to find relevant examples for both plants and animals. They should observe that 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. In addition, animals have body parts that capture and convey different kinds of information from the environment, enabling them to respond to these inputs in ways that aid in survival. Plants, like animals, have different parts (roots, stems, leaves, flowers, fruits) that each serve specific functions in survival and growth, and plants also respond to external inputs. For each structure that students observe, they should describe how the shape and stability of that structure is related to its function.

The next step in this unit is to engage in engineering design. Students need opportunities to use materials to design a device that solves a specific human problem. Designs should mimic how plants and/or animals use their external parts to help them survive and grow. The engineering design process students engage in should include the following steps:

- As a class or in small groups, students participate in shared research to find examples of human-made products that have been designed and built by applying knowledge of the natural world. For each example, students identify the human problem(s) that the product solves and how that solution was designed using an understanding of the natural world.
- Students brainstorm possible human problems that can be solved by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. Examples could include:
  - ✓ Designing clothing or equipment to protect bicyclists that mimics turtle shells, acorn shells, and animal scales.
  - ✓ Stabilizing structures that mimic animal tails and plant roots.
  - ✓ Keeping out intruders by mimicking thorns on branches and animal quills.
  - ✓ Detecting intruders by mimicking eyes and ears.
- In small groups, students use sketches, drawings, or physical models to convey a design that solves a problem by mimicking one or more external structures of plants and/or animals.

- Use materials to create the design solution.
- Share the design solution with others in the class.

Mystery Science Suggested Lessons:

Plant and Animal Superpowers: Plant and Animal Structures and Survival

Mystery 1: Structure and Survival (*Why do birds have beaks?)*

Mystery 2: Structure and Survival ((*Why are polar bears white?)*

Mystery 5: Plants and Engineering *(Why don't trees blow down in the wind?)*

Mystery 6: Plant Survival *(Read Along: What do sunflowers do when you are not looking?)*

Better Lesson Suggested Unit:

Plants: *Parts, Parents, Patterns (Jack and the Beanstalk)*

1. What Makes a Seed? Book: Jack and the Beanstalk *SWBAT describe the major events in the story, including the life cycle of the a plant.*
2. Planting and Planning *SWBAT plan an investigation to answer questions about how plants grow.*
3. Plants We Eat (Formative assessment: Proficiency scale) *SWBAT connect to prior knowledge and describe external parts of plants we eat.*
4. What Makes a Root? *SWBAT describe how roots help a plant to survive, grow, and meet its needs.*
5. Comparing Seedlings *SWBAT use qualitative and quantitative data to describe and compare seedlings.*
6. Comparing Seedling #2 *SWBAT use qualitative and quantitative data to describe and compare seedlings.*
7. Plants' Secrets *SWBAT describe connections between parts of the plant life cycle as they determine that young plants are alike, but not identical, to their parents.*
8. What Makes A Leaf (Formative Assessment: Proficiency Scale) *SWBAT describe leaves as external parts of plants.*
9. Planning Safety Equipment (Performance Assessment) *SWBAT mimic external features of plants in order to solve a problem.*
10. Designing Safety Equipment (Performance Assessment) *SWBAT design a solution to a problem.*

Eat Like a Bird! January: This lesson and activity is one of several lessons about birds. In this lesson, students learn that bird beaks come in many different sizes and shape. Each beak has a specific shape and function to help the bird to get and eat food.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting concepts
Analyzing and Interpreting Data ● Analyze and interpret data to make sense of phenomena using logical reasoning.	**LS1.A: Structure and Function** ● All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects,	**Patterns** ● Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as

(3-LS3-1)

Constructing Explanations and Designing Solutions

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

Developing and Using Models

- Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)

LS1.B: Growth and Development of Organisms

- Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)

LS1.D: Information Processing

- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)

evidence. (1-LS1-2)

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)
- The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)

Connections to Engineering, Technology, and Applications of Science

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

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

District/School Formative Assessment Plan	District/School Summative Assessment Plan
Pre-assessment: Plant parts pre assessment **(Schema chart and proficiency scale)** *Students who understand the concepts are able to:* ● Observe and describe how the shape and stability of structures of natural and designed objects are related to their functions.	*Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.* **Mystery Science Assessments:** ***(all resources are accessible on google drive)*** *Mystery 1: Structure and Survival*

- Use materials to design a device that solves a specific problem or [design] a solution to a specific problem.
- Use materials to design a solution to a human problem that mimics how plants and/or animals use their external parts to help them survive, grow, and meet their needs: Examples of human problems that can be solved by mimicking plant or animal solutions could include:
  - ✓ Designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales.
  - ✓ Stabilizing structures by mimicking animal tails and roots on plants.
  - ✓ Keeping out intruders by mimicking thorns on branches and animal quills.
  - ✓ Detecting intruders by mimicking eyes and ears.
- Develop a simple model based on evidence to represent a proposed object or tool.
- 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

  - Plants We Eat (Formative assessment: Proficiency scale)
  - What Makes A Leaf (Formative Assessment: Proficiency Scale)

Mystery 2: Structure and Survival

Mystery 3: Plants and Engineering

Mystery 4: Plant Survival

Alternative Assessments

Evaluative Criteria	Assessment Evidence

Suggested Performance Rubric: Use the following or similar rubric to evaluate students' performance on lesson assessments:

4 - Innovating:	Advanced understanding and application of the standard
3 - Applying:	Consistently applies skills independently

Suggested Performance Tasks include but are not limited to:

Performance Task: Designing Safety Equipment

**This is a BetterLesson resource (see above in suggested lessons)*

SWBAT mimic external features of plants in order to solve a problem.

2 - Developing:	Progressing towards independent application of skills
1 - Beginning:	Early stages of development, need assistance

District/School Texts	District/School Supplementary Resources
Haddon Heights - Unit Kits for Science Labs and References Lawnside - Houghton Mifflin Harcourt : Science Fusion Merchantville- Exploring Science (National Geographic Learning)	**Suggested Read Alouds** (all geared towards problem solving skills and strategies) Prudy's Problem and How She Solved it By: Carey Armstrong-Ellis The Water Princess By: Susan Verde The Backyard Build By: Jonathan Litton Be a Maker By: Katey Howes Rosie the Riveter, Engineer By: Andrea Beaty Papa's Mechanical Fish By: Candance Fleming **Scholastic News** Amazing Animal Teeth (February 2017) One Tough Bug (May/June 2017) Problem and Solution (OCtober 2017) Frog Feet (March 2017) Amazing Plants (March 2017)

Interdisciplinary Connections

ELA	21st Century Skills/Career Education	Technology
Students participate in shared research and writing projects. Engaging in engineering	CRP2. Apply appropriate academic and technical skills.	8.1.2.A.4 - Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).

design provides a perfect opportunity for students to conduct shared research and complete writing projects. Students can use text and media resources to gather information about how the shape and stability of external structures of organisms are related to their functions. In addition, students can conduct simple research to find examples of how humans solve problems using an understanding of the natural world. Examples of writing projects could include creating a book that includes examples of how humans mimic the characteristics of organisms to design solutions to human problems. Students can also use drawings or other visual displays to accompany their design solutions. Students will need support from teachers to conduct shared research and complete writing projects.	CRP6. Demonstrate creativity and innovation.	

Modifications and Accommodations		
Special Education Students Small group Direct instruction restate/rephrase graphic organizers modified assignments chunking leveled text intentional grouping read text extended time breaks Teacher records/ student dictates	**English Language Learners** Labels word banks visuals student friendly definitions extended time chunking intentional grouping	**Students at Risk of School Failure** leveled text graphic organizers modified assignments kinesthetic activities restate/rephrase chunking intentional grouping
Gifted and Talented extension project leveled text leadership roles intentional grouping	**Students with 504 Plans** breaks chunking preferential seating visual reminders	

Targeted learning from assessment	restate/rephrase check-in/check-out system visual time Teacher records/ student dictates	
Unit Duration: 25 Days		

STANDARD:
1-PS4 Waves and their Applications in Technology for Information Transfer

Unit 4: Light and Sound

ESTABLISHED GOALS (INDICATOR #)	TRANSFER (How will this apply to their lives?)	
1-PS4-1- Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. **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.** **1-PS4-1- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.**	*Students will be able to independently use their knowledge to…* ● Plan and show that vibrating objects make sound and that sound makes objects vibrate. ● Demonstrate how objects can only be seen when illuminated. ● Determine the effect light has on objects made of different materials. ● Communicate over a distance by creating a device that uses light or sound.	
	MEANING	
	UNDERSTANDINGS: ● Simple tests can be designed to gather evidence to support or refute student ideas about causes. ● Objects can be seen if light is available to illuminate them or if they give off their own light. ● Simple tests can be designed to gather evidence to support or refute student ideas about causes. ● 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. ● Sound can make matter vibrate, and vibrating matter can make sound. ● Simple tests can be designed to gather	ESSENTIAL QUESTIONS: ● *How can you prove that you can only see something when someone shines a light on it or if the object gives off its own light?* ● *What happens to a beam of light when you put different kinds of things in front of it?* ● *How would you design an experiment to prove your thinking?* ● How do instruments (band) make sound?

	evidence to support or refute student ideas about causes.	

Unit 4: Grade 1 - Lessons

In this unit of study, students plan and conduct investigations and make observations as they explore sound and light energy. Students describe the relationships between sound and vibrating materials and the availability of light and the ability to see objects. They also investigate the effect on a beam of light when objects made of different materials are placed in its path. Throughout the unit, students will use their observations and data as evidence to determine cause-and-effect relationships in the natural world.

Students begin this unit by observing objects with and without available light. They need opportunities to observe a variety of objects in both illuminated and non-illuminated settings. For example, observations could be made in a completely dark room, or students can use a pinhole box to observe objects. Students can also watch videos of cave explorers deep in the earth, using light from a single flashlight. With experiences such as these, they will come to understand that objects can be seen only when illuminated, either from an external light source or by when they give off their own light.

Next, students plan and conduct simple investigations to determine what happens to a beam of light when objects made of various materials are placed in its path. Students need the opportunity to explore the interaction of light with a variety of materials, and they should record what they observe with each one. When selecting materials to use, teachers should choose some that allow all light to pass through (transparent), some that allow only a portion of the light to pass through (translucent), some that do not allow any light to pass through (opaque), and some that redirect the beam of light (reflective). Examples could include clear plastic, glass, wax paper, thin cloth, cardboard, construction paper, shiny metal spoons, and mirrors.

As students observe the interaction between light and various materials, they should notice that when some or all of the light is blocked, a shadow is created beyond the object. If only a portion of light is blocked (translucent materials), a dim shadow will form, and some light will pass through the object. If all the light is blocked (opaque materials), students will see only see a dark shadow beyond the object. They will also observe that shiny materials reflect light, redirecting the beam of light in a different direction. Students should use their observations as evidence to support their explanations of how light interacts with various objects.

After investigating light energy, students continue to plan and conduct investigations to develop an understanding of some basic properties of sound. Students can use a variety of objects and materials to observe that vibrating materials can make sound and that sound can make materials vibrate. Students need multiple opportunities to experiment with a variety of objects that will make sound. Some opportunities could include:

- Gently tapping various sizes of tuning forks on a hard surface.
- Plucking string or rubber bands stretched across an open box.
- Cutting and stretching a balloon over an open can to make a drum that can be tapped.
- Holding the end of a ruler on the edge of a table, leaving the opposite end of the ruler hanging over the edge, and then plucking the hanging end of the ruler.
- Touching a vibrating tuning fork to the surface of water in a bowl.
- Placing dry rice grains on a drum's surface and then touching the drum with a vibrating tuning fork or placing the drum near the speaker of a portable sound system.
- Holding a piece of paper near the speaker of a portable sound system.

As students conduct these simple investigations, they will notice that when objects vibrate (tuning forks that have been tapped and string, rubber bands, and rulers that have been plucked), sound is created. They will also notice that sound will cause objects to vibrate (sound from a speaker causes rice grains to vibrate on the surface of a drum, the vibrating tuning fork causes ripples on the surface of water, and sound from the speaker also causes paper to move). Students should use these types of observations as evidence when explaining the cause and effect relationship between sound and vibrating materials.

Suggested Mystery Science Lessons:

Lights and Sound: Properties of Light and Sound

Mystery 1: Sounds and Vibrations (*How do they make silly sounds in cartoons?)*

Mystery 2: Sounds and Vibrations (Read Along: *Where do sounds come from?)*

Mystery 3: Light, Materials, Transparent and Opaque (*What if there were no windows?)*

Mystery 4: Illumination *(Read Along: Can you see in the dark?)*

Suggested BetterLesson Units:

Sound Unit

1. Listen! Listen! *SWBAT identify that sound are everywhere*.
2. SHH! Did You Hear That? *SWBAT identify that sound is a form of energy that travels in waves.*
3. Va-Va-Vibrations *SWBAT describe how different wave vibrations can change sound.*
4. Shakin' and Movin' *SWBAT explain ways that sound can make matter vibrate.*
5. Wiggle it. Just a Little Bit! *SWBAT describe ways that sound makes matter move.*
6. What's the Matter? *SWBAT test and analyze how sound waves travel through solids, liquids and gases as well as share which type of matter carries the sound waves the best.*
7. Let's Chat *SWBAT build and explore how Cup Telephones allow us to communicate over a distance.*
8. STEM and Sound: Day 1 (Performance Task) *SWBAT to identify a communication problem and research possible solutions.*
9. STEM and Sound: Day 2 (Performance Task) *SWBAT to plan, design and build a device that solves a communication problem.*

Light Unit

1. Let's Observe like a Scientist: What do I See? *SWBAT analyze and interpret a photograph of light waves and use their observations to create scientific drawing with precision and perseverance.*
2. Are You Afraid of the Dark? *SWBAT discover that objects need light to be seen.*
3. Light it Up! *SWBAT identify different light sources.*
4. Let's Explore Light Sources *SWBAT identify which light sources are natural or man-made.*
5. Translucent, Transparent, Opaque OH MY! *SWBAT conduct an investigation to find out what happens when you put an object in the beam of light.*
6. Shadows, Shadows, Shadows! *SWBAT investigate how shadows change shape, size and color.*
7. Mirror, Mirror on the Wall *SWBAT discover ways that mirrors can redirect a light beam.*
8. STEM and Light: Day1 *SWBAT to identify a communication problem and research possible solutions.*

9. STEM and Light: Day 2 *SWBAT to plan, design and build a device that solves a communication problem.*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting concepts
Planning and Carrying Out Investigations ● Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) **Constructing Explanations and Designing Solutions** ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) ● Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) - ***Connections to Nature of Science*** **Scientific Investigations Use a Variety of Methods** ● Science investigations begin with a question. (1-PS4-1) ● Scientists use different ways to study the world. (1-PS4-1)	**PS4.A: Wave Properties** ● Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1) **PS4.B: Electromagnetic Radiation** ● Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2) ● Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3) **PS4.C: Information Technologies and Instrumentation** ● People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)	**Cause and Effect** ● Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3) - **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science, on Society and the Natural World** ● People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

District/School Formative Assessment Plan	District/School Summative Assessment Plan
Students who understand the concepts can: • Design simple tests to gather evidence to support or refute ideas about cause and effect relationships. • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.	*Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.* **Mystery Science Assessments:** ***(all resources are accessible on google drive)***

• Make observations (e.g., in a completely dark room, using a pinhole box, using video of a cave explorer with a flashlight) to construct an evidence-based account that objects can be seen only when illuminated (from an external light source or by an object giving off its own light). • Design simple tests to gather evidence to support or refute ideas about cause and effect relationships. • Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. • Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light. Materials can be: – Transparent (clear plastic, glass) – Translucent (wax paper, thin cloth) – Opaque (cardboard, construction paper) – Reflective (a mirror, a shiny metal spoon) • Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. • Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. • Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork. Sample Formative Assessments: 1. Now Hear This! Formative Assessment: (Proficiency Scale) 2. Investigating Sound: Foss. The Tuning Fork (Foss: Physics of Sound) (Formative Assessment: Proficiency Scale) 3. Flashlight Investigation (Formative Assessments: Proficiency Scale)	***Mystery 1:*** **Sounds and Vibrations** ***Mystery 2:*** **Sounds and Vibrations** ***Mystery 3:*** **Light, Materials, Transparent and Opaque** ***Mystery 4:*** **Illumination**

Alternative Assessments	
Evaluative Criteria	**Assessment Evidence**
Suggested Performance Rubric: Use the following or similar rubric to evaluate students' performance on lesson assessments:	Suggested Performance Tasks include but are not limited to: **Performance Task:** **STEM and Sound** **This is a BetterLesson resource (see above in suggested lessons)* SWBAT:

4 - Innovating:	Advanced understanding and application of the standard
3 - Applying:	Consistently applies skills independently
2 - Developing:	Progressing towards independent application of skills
1 - Beginning:	Early stages of development, need assistance

-to identify a communication problem and research possible solutions.
-to plan, design and build a device that solves a communication problem.

Performance Task: **STEM and Light**
**This is a BetterLesson resource (see above in suggested lessons)*

SWBAT:
-to identify a communication problem and research possible solutions.
-to plan, design and build a device that solves a communication problem.

District/School Texts	District/School Supplementary Resources
Haddon Heights - Unit Kits for Science Labs and References Lawnside - Houghton Mifflin Harcourt : Science Fusion Merchantville- Exploring Science (National Geographic Learning)	**Suggested Read Alouds** *Rainbows* (RAZ-Kids, level J) *Shadows* (RAZ-Kids, level C) *Sounds All Around* By: Wendy Pfeffer *Sound: Loud, Soft, High and Low* By: Natalie M. Rosinsky *Oscar and the Bat* By: Geoff Waring *All About Sound* By: Lisa Trumbauer *Light is All Around Us* By: Wendy Pfeffer *Moonbear's Shadow* By: Frank Asch *All About Light* By: Rookie Science **Scholastic News** ● Is There a Pot of Gold at the End of the Rainbow? (March 2019) ● The Science of Sound (January 2019)

	BrainPOP Jr. ● Light ● Sound

Interdisciplinary Connections

ELA	**21st Century Skills/Career Education**	**Technology**
To integrate the CCSS for English Language Arts into this unit, students need opportunities to read informational texts in order to gather information about light and sound. With adult guidance, they identify the main topic and retell key details from texts and ask and answer questions about key details. Students should also participate in shared research and writing projects. They can gather information from a variety of preselected, grade-level appropriate texts and resources, and use that information to answer questions about light and sound. In pairs or small groups, students can use pictures and words to create simple books about vibration (sound) and illumination (light). The students' writing should include facts about the topic and have a sense of closure. Throughout the unit of study, students need multiple opportunities to share their experiences with light and sound in collaborative conversations with adults and peers, in small and large group settings.	CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation.	8.1.2.A.4 - Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).

Modifications and Accommodations

Special Education Students	**English Language Learners**	**Students at Risk of School Failure**
Small group Direct instruction restate/rephrase graphic organizers modified assignments chunking	Labels word banks visuals student friendly definitions extended time chunking	leveled text graphic organizers modified assignments kinesthetic activities restate/rephrase chunking

leveled text intentional grouping read text extended time breaks Teacher records/ student dictates	intentional grouping	intentional grouping
Gifted and Talented extension project leveled text leadership roles intentional grouping Targeted learning from assessment	**Students with 504 Plans** breaks chunking preferential seating visual reminders restate/rephrase check-in/check-out system visual time Teacher records/ student dictates	
Unit Duration: 20 days		

STANDARD:
1-PS4 Waves and their Applications in Technology for Information Transfer

1-K-ETS1 Engineering Design

Unit 5: Communication with Light and Sound

ESTABLISHED GOALS (INDICATOR #)	TRANSFER (How will this apply to their lives?)	
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. **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.	*Students will be able to independently use their knowledge to…* ● Collect data about a problem that can be solved with the use of a new object of tool ● Communicate over a distance by creating a device that uses light or sound.	
	MEANING	
	UNDERSTANDINGS: ● The shape and stability of structures of natural and designed objects are related to their function(s). ● People depend on various technologies in their lives; human life would be very different without technology. ● People also use a variety of devices to communicate (send and receive information) over long distances. ● 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. ● Designs can be conveyed through sketches, drawings, or physical models. These	ESSENTIAL QUESTIONS: ● *How can light or sound be used to communicate over a distance?*

	representations are useful in communicating ideas for a problem's solutions to other people.	

Unit 5: Grade 1 - Lessons

Students continue to develop their understanding of the relationship between sound and vibrating materials as well as between the availability of light and the ability to see objects. Students will apply their knowledge of light and sound to solve a simple problem involving communication with light and sound.

During this unit, students learn that people depend on various technologies in their lives, and that life would be very different without technology. Technology plays an important role in the development of devices that allow us to communicate (send and receive information) over long distances. Engineers design and build many kinds of devices, such as those used for communication. Like engineers, students engage in the engineering design process in order to design and build a device that uses light or sound to communicate over a distance.

This process should include the following steps:

- ✓ Students brainstorm a list of ways that people communicate over a distance. Some examples include telephones, cellular phones, email, and video conferencing (by computer).
- ✓ Ask students, "How would we communicate over a distance without the use of any of the devices that people currently use?"
- ✓ Use that question to guide the class to define the problem: Design and build a device that allows us to communicate over a distance.
- ✓ As a class, determine the criteria that will be used to evaluate the design solutions. One criterion MUST be that the device uses either light or sound.
- ✓ Also as a class, determine possible constraints, such as available materials and amount of time allotted for designing and building the device.
- ✓ Small groups conduct research, looking for examples of devices that use light or sound to communicate over a distance.
- ✓ Small groups can then use tools and materials to design and build their devices. Examples could include a light source that sends a signal, paper cup and string telephones, or a pattern of drum beats.
- ✓ Groups should prepare a sketch or drawing of their device. They should label the components and describe, in writing, how each component relates to the function of the device.
- ✓ Groups should present their devices to the class, demonstrating how they work.
- ✓ Students then determine which devices work as intended based on the criteria, using data as evidence to support their thinking.

Students should ask questions, make observations, gather information, and communicate with peers throughout the design process. Guidance and support from the teacher is also a critical part of the design process.

Suggested Mystery Science Lessons:

Lights and Sounds: Properties of Light and Sound

Mystery 1: Engineering and Communications *(How could to send a secret message to someone far away?)*

Mystery 2: Lights, Sounds and Communication *(How do boats find their way in the fog?)*

Better Lessons Suggested Units:

Communicating With Sound

1. Communicating With Sound *SWBAT describe how sound travels over a distance.*
2. Sound Devices: Planning *SWBAT plan a tool to transmit sound.*
3. Sound Devices: Building and Testing *SWBAT plan a tool to transmit sound.*
4. Animals Communicate with Sound *SWBAT retell key details about how animals communicate with sound over distances.*
5. Interviewing an Expert *SWBAT ask questions about sound.*

Communicating With Light

1. Communicating With Light: People *SWBAT explain devices that people use light to communicate.*
2. Communicating With Light: Animals *SWBAT retell key details about how animals communicate with light.*
3. Communicating With Light: A Fiction Connection *SWBAT identify words and phrases that suggest feelings and appeal to the senses.*
4. Communication With Light and Sound: FIRE!! *SWBAT retell key details about how we communicate with light and sound.*
5. Communication Devices: Planning *SWBAT plan a tool to communicate over a distance utilizing light and/or sound.*
6. Communication Devices: Revising Plans *SWBAT plan a tool to communicate over a distance utilizing light and/or sound.*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting concepts
.Planning and Carrying Out Investigations ● Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) **Constructing Explanations and Designing Solutions** ● Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) **Asking Questions and Defining Problems** ● Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) ● Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) **Developing and Using Models**	**PS4.C: Information Technologies and Instrumentation** ● People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) **ETS1.A: Defining and Delimiting Engineering Problems** ● A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1) ● Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) ● Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1) **ETS1.B: Developing Possible Solutions**	**Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2) ***Connections to Engineering, Technology, and Applications of Science*** **Influence of Engineering, Technology, and Science, on Society and the Natural World** ● People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

● Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)	● Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2	

District/School Formative Assessment Plan	District/School Summative Assessment Plan
Students who understand the concepts can: ● Describe how the shape and stability of structures are related to their function. ● Ask questions based on observations to find more information about the natural and/or designed world. ● Define a simple problem that can be solved through the development of a new or improved object or tool. ● Ask questions, make observations, and gather information about a situation people want to change in order to define a simple problem that can be solved through the development of a new or improved object or tool. ● Develop a simple model based on evidence to represent a proposed object or tool. ● 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. ● Use tools and materials provided to design a device that solves a specific problem. ● Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. Examples of devices could include: ✓ A light source to send signals ✓ Paper cup and string telephones ✓ A pattern of drum beat	*Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.* **Mystery Science Assessments:** ***(all resources are accessible on google drive)*** ***Mystery 1:*** Engineering and Communication ***Mystery 2:*** Lights, Sounds and Communication

Alternative Assessments

Evaluative Criteria	Assessment Evidence
Suggested Performance Rubric: Use the following or similar rubric to evaluate students' performance on lesson assessments: **4 - Innovating:** Advanced understanding and	Suggested Performance Tasks include but are not limited to: **Performance Task:** Communication Devices **This is a BetterLesson resource (see above in suggested lessons)* SWBAT: plan a tool to communicate over a distance utilizing light and/or sound.

	application of the standard
3 - Applying:	Consistently applies skills independently
2 - Developing:	Progressing towards independent application of skills
1 - Beginning:	Early stages of development, need assistance

Performance Task: STEAM-"School bus drivers often complain about how noisy the bus is. But, you want to talk to your friends, and sometimes your friends are a few seats away. How can we design a device (other than a cell phone!) to communicate without having to yell?

District/School Texts	District/School Supplementary Resources
Haddon Heights - Unit Kits for Science Labs and References Lawnside - Houghton Mifflin Harcourt : Science Fusion Merchantville- Exploring Science (National Geographic Learning)	**Suggested Read Alouds** *Sending Messages with Light and Sound* by: Jennifer Boothroyd *Edison's Inventions* (RAZ-kids; Level J) *Garret Morgan and the Traffic SIgnal* (RAZ-kids; Level J) *The LIttle Red Light and the Great Gray Bridge* By: Hildegard H. Swift **Scholastic News** ● Fire Dog! (October 2018) **BrainPOP Jr** ● Safety Signs

Interdisciplinary Connections

ELA	Math	Technology
Students will participate in shared research and writing projects as they engage in engineering design. Students can use text and media resources to first gather information about	Students need opportunities to use tools to for a variety of purposes as they design and build devices for communicating with light or sound. They can use objects such as interlocking cubes	8.1.2.A.4 - Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).

devices that use light or sound to communicate over a distance. They can demonstrate an understanding of key details in a text by asking and answering questions during class and small-group discussions. In addition, students recall information from experiences or gather information from provided sources to support their thinking as they design and build their device. As students complete their devices, they prepare a sketch or drawing of their device, label the components, and describe, in writing, how each component relates to the function of the device and how their communication device works. Students can also write a "how-to" book describing how to use tools and materials to build their design. Students can also use drawings or other visual displays to accompany their writing in order to describe their thought process and clarify their ideas. Adult support should be provided throughout the process	or paper clips to measure length in nonstandard units, expressing their measurements as whole numbers. Students can also use indirect measurement (i.e., compare the lengths of two objects indirectly by using a third object) to order three objects by length. For example, they might compare the lengths of string used for paper-cup telephones and observe and describe the relative effectiveness of each length of string. Students can also use graphs to organize data, such as the number of drum beats, and then analyze the data to find a pattern. Students will reason abstractly and quantitatively as they organize data into graphs, analyze the data, and use it to solve simple put-together, take-apart, and compare problems.	
21st Century Skills/Career Education CRP2. Apply appropriate academic and technical skills. CRP6. Demonstrate creativity and innovation.		
Modifications and Accommodations		
Special Education Students Small group Direct instruction restate/rephrase graphic organizers modified assignments chunking leveled text intentional grouping read text extended time breaks Teacher records/ student dictates	**English Language Learners** Labels word banks visuals student friendly definitions extended time chunking intentional grouping	**Students at Risk of School Failure** leveled text graphic organizers modified assignments kinesthetic activities restate/rephrase chunking intentional grouping

Gifted and Talented extension project leveled text leadership roles intentional grouping Targeted learning from assessment	**Students with 504 Plans** breaks chunking preferential seating visual reminders restate/rephrase check-in/check-out system visual time Teacher records/ student dictates	
Unit Duration: 25 days		