1st Grade Unit 3 - The Secret Language of Light and Sound

Content Area: **Science**
Course(s):
Time Period: **MP3**
Length: **24 days**
Status: **Published**

NJSLS - Science

1-PS4-1	Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
1-PS4-2	Make observations to construct an evidence-based account that objects can be seen only when illuminated.
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.
1-PS4-3	Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
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.

Science and Engineering Practices

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)

Developing and Using Models

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

Disciplinary Core Ideas

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)

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)

Crosscutting Concepts

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)

Structure and Function

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

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

People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

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)

Rationale and Transfer Goals

In this unit, students will explore the foundational concepts of light and sound and discover how they are used to communicate over distances. Students begin by investigating sound, discovering through interactive experiments that vibrating materials create sound, and that making sounds can, in turn, cause materials to vibrate.

Next, they shift their focus to light. Students will investigate how objects can only be seen when illuminated by an external light source or if they give off their own light. Through guided exploration, they will observe how light behaves when it interacts with various materials, categorizing objects as transparent, translucent, opaque, or reflective, and discovering how shadows are formed when light is blocked.

Culminating their learning, students will apply these scientific concepts to a real-world engineering challenge. They will design and test a device, such as a string telephone, a flashlight code system, or a drum signal, that uses light or sound to solve the problem of communicating over a distance.

Enduring Understandings

Sound is caused by vibration.

Light is necessary for sight.

Materials interact with light in predictable ways.

People use light and sound as tools to communicate.

Essential Questions

How is sound made?

Why do we need light to see?

What happens when light hits different objects?

How can we use light and sound to send messages to someone far away?

Content - What will students know?

- Sound is created by vibrations.
- When a sound stops, the vibration stops.
- Sound can make other materials vibrate.
- Objects can only be seen when light is shining on them.
- Some objects give off their own light.
- Other objects can only be seen because light reflects off them.
- In complete darkness, it is impossible to see anything.
- Light travels in a straight line until it hits an object.
- Different materials react to light in different ways: Some materials let light pass straight through (transparent / clear). Some materials let only some light pass through (translucent / blurry). Some materials block all light (opaque), which creates a shadow. Some materials redirect light (reflective / mirrors).
- People use technology and devices to send messages over long distances.
- Both light signals (e.g., traffic lights, lighthouses, flashlights) and sound signals (e.g., sirens, alarms, whistles) can be used as codes to communicate information.

Skills - What will students be able to do?

- Generate sounds using various classroom materials (e.g., plucking rubber bands, tapping tuning forks, hitting drums) to observe and describe vibrations.
- Demonstrate how sound can cause materials to move (e.g., making rice dance on top of a drum membrane by clapping nearby).
- Conduct an experiment to observe what happens to an object in a completely dark space versus an illuminated space.
- Classify everyday objects into categories based on how they interact with light.
- Manipulate a light source to create, change, or disappear a shadow.
- Design and build a simple, working device that uses either light or sound to send a message across the classroom.
- Test and refine their communication device, explaining to peers how it works using the concepts of light or sound.

Activities - How will we teach the content and skills?

- Mystery Science Lights & Sounds Anchor Phenomenon
- Mystery Science Lights & Sounds Lesson 1
- Mystery Science Lights & Sounds Lesson 2
- Mystery Science Lights & Sounds Lesson 3
- Mystery Science Lights & Sounds Lesson 4
- Mystery Science Lights & Sound Lesson 5
- Mystery Science Lights & Sound Lesson 6

Formative Assessments

- Mystery Science Lights & Sounds Lesson 1 Assessment
- Mystery Science Lights & Sounds Lesson 2 Assessment
- Mystery Science Lights & Sounds Lesson 3 Assessment
- Mystery Science Lights & Sounds Lesson 4 Assessment

- Mystery Science Lights & Sounds Lesson 5 Assessment
- Mystery Science Lights & Sound Lesson 6 Assessment
- Teacher Observation
- Student projects/models
- Individual and Group Participation
- Exit Tickets

Summative Assessments

- Tests/Quizzes
- Mystery Science Lights & Sounds Performance Task
- Grade 1 Science Unit 3 Benchmark

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
Discover how sound can make matter vibrate, and vibrating matter can make sound. Students will play with string phones to learn that sound can be transferred into vibrations and back into sound. Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. Plan and conduct investigations to determine the effect of placing	This is the first formal opportunity for students to engage with the disciplinary core ideas. Many students do not believe that their eyes receive light when they look at an object. Students' conceptions of vision vary from the notion that light fills space ("the room is full of light") and the eye "sees" without anything linking it to the object to the idea that light illuminates surfaces that we can see by the action of our eyes on them. The conception that the eye sees without anything linking it to the object persists after traditional instruction in optics.	Read-Alouds Modeling/Think Alouds Experimentation Multi Media Study Jams String Phone Sound Waves Lab Building Instruments Lab Sight Waves and Light Waves Unit Resources Mystery Science Assessing Light Knowledge Communication Over Distances

objects made with different materials in the path of a beam of light. Find out how light travels. Identify the differences between a natural light source and an artificial light source.		

Career Readiness, Life Literacies, & Key Skills

9.1.2.CAP.1	Make a list of different types of jobs and describe the skills associated with each job.
9.1.2.CR.1	Recognize ways to volunteer in the classroom, school and community.
9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
9.1.2.CR.2	List ways to give back, including making donations, volunteering, and starting a business.
9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
9.4.2.IML.3	Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults (e.g., 6.3.2.GeoGI.2, 6.1.2.HistorySE.3, W.2.6, 1-LSI-2).

Interdisciplinary Connections

RI.CR.2.1	Ask and answer questions to demonstrate understanding of key details in an informational text, referring explicitly to the text as the basis for the answers.
W.IW.1.2	With prompts and support, write informative/explanatory texts to examine a topic and convey ideas and information.
W.WR.1.5	With prompting and support, generate questions through shared research about a topic and determine possible sources to obtain information on that topic.
W.SE.1.6	With guidance and support from adults, gather and select information from multiple sources to answer a question or write about a topic.
SL.PE.1.1	Participate in collaborative conversations with diverse partners about grade 1 topics and

	texts with peers and adults in small and larger groups.
W.SE.2.6	Prioritize information provided by different sources on the same topic while gathering ideas and planning to write about a topic.
SL.UM.2.5	Use multimedia; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.