# 1st Grade Unit 4 - Light, Sound, & Communication

Content Area: **Science**
Course(s): **Science Grade 1**
Time Period: **MP4**
Length: **22 days**
Status: **Published**

## NJSLS - Science

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| SCI.1-PS4-1 | Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. |
| SCI.1-PS4-2 | Make observations to construct an evidence-based account that objects can be seen only when illuminated. |
| SCI.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. |
| SCI.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. |
| SCI.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

How would we communicate over a distance without the use of any of the devices that people currently use?

In this unit of study, students develop an understanding of the relationship between sound and vibrating materials as well as between the availability of light and the ability to see objects. The idea that light travels from place to place can be understood by students at this level by placing objects made with different materials in the path of a beam of light and determining the effect of the different materials. Students will 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 apply their knowledge of light and sound to engage in engineering design to solve a simple problem involving communication with light and sound. The crosscutting concepts of cause and effect, structure and function, the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in constructing explanations and designing solutions, asking questions and defining problems, and developing and using models. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

## Enduring Understandings

There is a relationship between sound and vibrating materials.

There is a relationship between the availability of light and the ability to see objects.

Light travels from place to place, which can be determined by observing the effect of placing objects made with different materials in the path of a beam of light.

## 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 can light or sound be used to communicate over a distance?

## Content - What will students know?

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

## Skills - What will students be able to do?

- Plan and conduct investigations and make observations about sound and light energy.
- Describe the relationships between sound and vibrating materials and the availability of lights and the ability to see objects.
- Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
- Brainstorm a list of ways that people communicate over a distance. Some examples include telephones, cellular phones, email, and video conferencing (by computer).
- Define a problem: Design a device that allows us to communicate over a distance.
- Conduct research, looking for examples of devices that use light or sound to communicate over a distance.
- Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.

## 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
- Observe a variety of objects in both illuminated and non illuminated settings.
- Explore the interaction of light with a variety of materials, and they should record what they observe with each one.
- Create and explore how shadows are formed and how they move based on light source
- Use a variety of objects and materials to observe that vibrating materials can make sound and that sound can make materials vibrate.

## 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
- Get Us Out of Here Engineering Lab
- Grade 1 Science Unit 4 Benchmark

## Spiraling for Mastery

| Content or Skill for this Unit | Spiral Focus from Previous Unit | Instructional Activity |
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| Discover how sound can make matter vibrate, and vibrating matter can make sound.<br><br>Students will play with string phones to learn that sound can be transferred into vibrations and back into sound.<br><br>Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.<br><br>Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.<br><br>Find out how light travels.<br><br>Identify the differences between a natural light source and an artificial light source. | This is the first formal opportunity for students to engage with the disciplinary core ideas.<br><br>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<br><br>Modeling/Think Alouds<br><br>Experimentation<br><br>Multi Media Study Jams<br><br>String Phone<br><br>Sound Waves Lab<br><br>Building Instruments Lab<br><br>Sight Waves and Light Waves Unit<br><br>Resources<br><br>Mystery Science<br><br>Assessing Light Knowledge<br><br>Communication Over Distances |

## Career Readiness, Life Literacies, & Key Skills

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| PFL.9.1.2.CR.1 | Recognize ways to volunteer in the classroom, school and community. |
| PFL.9.1.2.CR.2 | List ways to give back, including making donations, volunteering, and starting a business. |
| WRK.9.1.2.CAP.1 | Make a list of different types of jobs and describe the skills associated with each job. |
| TECH.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). |
| TECH.9.4.2.CI.2 | Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a). |
| TECH.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). |
| TECH.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). |
| TECH.9.4.2.CT.3 | Use a variety of types of thinking to solve problems (e.g., inductive, deductive). |
| TECH.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/Companion Standards

**NJSLS ELA**

W.IW.1.2. With prompts and support, write informative/explanatory texts to examine a topic and convey ideas and information. (1-PS4-2)

A. Introduce a topic.

B. Develop the topic with facts or other information and examples related to the topic.

C. Provide a conclusion.

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. (1-PS4-1, 1-PS4-2, 1-PS4-3, 1-PS4-4)

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. (1-PS4-1, 1-PS4-2, 1-PS4-3)

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. (1-PS4-1,1-PS4-2, 1-PS4-3)

A. Follow agreed-upon norms for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion).

B. Build on others' talk in conversations by responding to the comments of others through multiple exchanges.

C. Ask questions to clear up any confusion about the topics and texts under discussion.

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. (K-2-ETS1-1)

W.SE.2.6. Prioritize information provided by different sources on the same topic while gathering ideas and planning to write about a topic. (K-2-ETS1-1, K-2-ETS1-3)

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. (K-2-ETS1-2)

**NJSLS Math**

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

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

MP.5 Use appropriate tools strategically. (1-PS4-4)

1.M.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4)

1.M.A.2 Express the length of an object as a whole number of length units, by laying 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)

2.DL.B.4 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, K-2-ETS1-3)