

UNIT 4: Light and Sound

Unit Summary:

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.

Concepts & Vocabulary:

Key vocabulary may include but are not limited to: Sound, Vibrating materials, Cause and Effect, Darkness, Illumination, Appearance (e.g. visible, not visible, somewhat visible), Light, [External light source (e.g. sun, flashlight), Internal light source (e.g. light bulb, glow stick)], Object, Beam of Light, Materials [Transparent (e.g. clear plastic), Translucent (e.g. wax paper), Opaque (e.g. cardboard), Reflective (e.g. mirror)]

Stage 1 – Desired Results

Performance Expectations: (PE) (Established Goals / Content Standards)

- 1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. **Clarification Statement: 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.**
- 1-PS4-2: Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. ○ **Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.**
- 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. ○ **Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [Assessment Boundary: Assessment does not include the speed 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. **[Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]**
- K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Enduring Understandings

Essential Questions

<p>Students will understand that:</p> <ul style="list-style-type: none"> • Understand the relationship between sound and vibrating materials. • Understand the relationship between the availability of light and the ability to see objects. • Understand that light and sound can be used to communicate over a distance. <p>Possible Misunderstanding(s):</p> <ul style="list-style-type: none"> • How vibration connects to making a sound. • Different materials affect if light can travel through it. 	<ul style="list-style-type: none"> • Where do sounds come from? • What is light? • How can sound and light help people communicate with one another? • What is communication?
--	---

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> • Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> • 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) <p>-----</p> <p>Connections to Nature of Science</p> <p>Scientific Investigations Use a Variety of Methods</p> <ul style="list-style-type: none"> • Science investigations begin with a question. (1-PS4-1) • Scientists use different ways to study the world. (1-PS4-1) 	<p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> • Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1) <p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> • 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) <p>PS4.C: Information Technologies and Instrumentation</p> <ul style="list-style-type: none"> • People also use a variety of devices to communicate (send and receive information) over long 	<p>Cause and Effect</p> <ul style="list-style-type: none"> • 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) <p>-----</p> <p>Connections to Engineering, Technology, and Applications of Science</p> <p>Influence of Engineering, Technology, and Science, on Society and the Natural World</p> <ul style="list-style-type: none"> • People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

distances. (1-PS4-4)

Stage 2 – Model Assessments

Transfer Task(s)

- Create a unique sound device where students can find partners in a crowded room. (1-PS4-4)
[Activity: Sound Cups](#)
 - Have students test their devices to compare the strengths and weaknesses of how each performs. (K-2-ETS1-3)
- Students bring various materials from home to create a unique sound device where they can find their partner in a crowded room. (1-PS4-4)
- [1-PS4-1 Assessment - Sound Performance Assessment](#)

Formative Evidence:

- Slide Diagnostic Questions
- Oral Comprehension Checks
- Teacher Observation
- Class Discussion/Anecdotal Notes
- [1-PS4-2 Performance Assessment](#)
- [Mystery Science Assessments - Light & Sound](#)
- [Light Through Objects](#)
- [Communicate with Light or Sound](#) (#11-12)

Stage 3 – Learning Plan Resources and Activities

Suggested Resources for Planning:

[Mystery Science](#)
[Mystery Science Supply List](#)
[Grade 1 Mystery Science Planning Guide](#)
[New Jersey Center for Teaching & Learning](#)
[Wonders of Science](#)

Standard Based Grading:

[1-PS4-1 Analysis Chart](#)
[1-PS4-2 Analysis Chart](#)
[1-PS4-3 Analysis Chart](#)
[1-PS4-4 Analysis Chart](#)

Learning Activities:

1-PS4-1:

- [Mystery 1: How do they make silly sounds in cartoons?](#)
- [Mystery 2 Read Along: Where do sounds come from?](#)
- [Making A Band - Building Instruments](#)
- [String Phone Lab](#)

1-PS4-2

- [Mystery 4 Read Along: Can you see in the dark?](#)

- [What Can You See?](#)
- [Light Cave Explorer Investigation](#)

1-PS4-3

- [Mystery 3: What if there were no windows?](#)
- [What Happens When Light Hits Certain Objects?](#)

1-PS4-4

- [Mystery 5: How could you send a secret message to someone far away? \(K-2-ETS1-2\)](#)
- [Mystery 6 Read Along: How do boats find their way in the fog?](#)
- [Communicating With Light and Sound](#)
- [Get Us Out of Here Lab](#)
- [STEM and Sound - Day 1](#)
- [STEM and Sound - Day 2](#)

Additional Phenomena Videos:

- [Using Light and Sound to Communicate](#)

NEWSELA:

- [New York City Siren Sounds Could Change](#)
- [What is Light? New Science Exhibit Shows and Tells](#)

Suggested Methods: (The following methods anchor learning with a purpose, mitigating the “why do I need to know this” questions.)

- Phenomena based learning
- Problem Based Learning (PBL)
- Inquiry-Based Learning
- Case studies
- Engaging in Argument w/ evidence