

Quinton Township School
First Grade
Science - Unit 5

Grade 1 Science Unit 5: Communicating With Light and Sound

Key: Careers Technology Interdisciplinary Studies

Unit Summary - Marking Period 4 15 Days

In this unit of study, 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 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 *structure and function and 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 understanding of the core ideas.

Student Learning Objectives

- Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. (1-PS4-2)
- Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light. (1-PS4-3)
- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. (1-PS4-1)
- Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)
- Make observations to construct an evidence-based account that objects can be seen only when illuminated. (1-PS4-2)



Objectives Aligned with National Geographic Resources: Approximate Time Frame: 15 days

Day 1

- Identify that light makes it possible to see objects.
- Classify the sun as an object that gives off its own light.

Day 2

- Recognize that objects that give off light can be used to help us see.

Days 3-4

- Observe evidence that objects can be seen only where there is light.
- Use their observations to construct an evidence-based account that objects can be seen only when illuminated.

Day 5

- Define clear as the ability of a material to allow light to pass through it.
- Classify some materials as clear.

Days 6-7

- Describe materials that allow only some light to pass through them.

Days 8-9

- Describe materials that block all light.

- Define shadow.

Day 10

- Describe how some materials redirect a beam of light.

Day 11

- Work with a group to plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
- Explain their results and conclusions to others.

Day 12

- Describe how people communicate.
- Identify devices that enable people to communicate over long distances.

Day 13

- Observe and record evidence that information can be communicated using devices.

Day 14

- Used tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
- Test and revise the Prototype device based on results and feedback.
- Use the device to explain how people can use sound or light to communicate.

Day 15

- Relate a photographer's job to the science of light.

Unit Sequence:

<i>Part A:</i> How can light or sound be used to communicate over a distance?	
Concepts	Formative Assessments

<ul style="list-style-type: none"> · People depend on various technologies in their lives. · Human life would be very different without technology. 	<p><i>Students who understand the concepts can:</i></p> <ul style="list-style-type: none"> • Make observations to construct an evidence-based account that objects 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.] • Plan and conduct an investigation 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.] • 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
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beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]

- Exit Tickets
- Journal Responses
- End of Unit Assessment

Common Core State Standards/Learning Targets: 1-PS4-4, K-2-ETS1-1, and K-2-ETS1-2, W.1.2, W.1.7, W.1.8, SL.1.1, MP.5, 1-MD.A.1, 1-MD.A.2, 8.1, 8.2, 9.2.4.A.1, 9.2.4.A.3, 9.2.4.A.4

Modifications

(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.)

- 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 principals (http://www.cast.org/our-work/about-udl.html#VXmoXcfD_UA).

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p data-bbox="281 285 600 347">Planning and Carrying Out Investigations</p> <p data-bbox="218 358 661 776">Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1),(1-PS4-3)</p> <p data-bbox="256 821 625 883">Constructing Explanations and Designing Solutions</p> <p data-bbox="218 894 661 1385">Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena 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)</p>	<p data-bbox="703 297 1283 394">PS4.A: Wave Properties Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)</p> <p data-bbox="703 407 1308 829">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)</p> <p data-bbox="703 837 1234 971">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)</p>	<p data-bbox="1482 233 1751 261">Crosscutting Concepts</p> <p data-bbox="1356 297 1556 321">Cause and Effect</p> <p data-bbox="1335 358 1850 464">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 data-bbox="1341 537 1885 605">Connections to Engineering, Technology, and Applications of Science</p> <p data-bbox="1335 643 1839 708">Influence of Engineering, Technology, and Science, on Society and the Natural World</p> <ul data-bbox="1383 740 1892 849" style="list-style-type: none"> ● People depend on various technologies in their lives; human life would be very different without technology. (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)