Englewood Public School District
Science
Grade 1
Fourth Marking Period

Unit 5: Communicating with Light and Sound

Overview: 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.
This unit is based on 1-PS4-4, K-2-ETS1-1, and K-2-ETS1-2.

Time Frame: 25 to 30 Days

Enduring Understandings:
The shape and stability of structures of natural and designed objects are related to their function(s).
People also use a variety of devices to communicate (send and receive information) over long distances.

Essential Questions:
How can light or sound be used to communicate over a distance?

Standards	Topics and Objectives	Activities	Resources	Assessment
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**	**Topics** Communicating with Light and Sound Twenty-First Century Themes and Skills include: • Environmental Literacy • The Four C's **Objectives** **<u>Assessing Light</u>**	Assessing Light Knowledge Part One: Students will be given the task and will view the materials options. After viewing, student pairs draw their possible solutions to the problem. (1.G.2) Part Two: After the teacher approves their structure, student pairs build their device with the materials	Assessing Light Knowledge: Student Rubric Teacher Rubric Sound Devices: Engineering Design Worksheet Sound Device Rubric	**Formative Assessments:** 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

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.**	**Knowledge:** The student will design a communication tool, using sound waves, to direct a student to walk forwards and backwards. **Sound Devices** Students will plan a tool to transmit sound during day one. Students will build and investigate with their device. **Cup-A- Phone (page 18):** Students will design an experiment with one variable to transmit sound from one place to another. **Designing a System of Light** Students will design a light system to communicate with others. **A Communication System:** Students will work in groups to design and explain a way of using light to help human communication.	provided. (8.2.2.C.1) Part Three: Students will test their devices in a gym or other large area. Students will present their idea and then test it. The teacher will record this portion of the activity. (1.MD.4, 8.1.2.B.1.) Part Four: Students assess their work using project rubric. (RI.1.1) Sound Devices: Day 1: Students work in pairs or small groups to design a way to talk quietly on a bus. Students reflect on the planning process and make suggestions on how other groups can improve their devices. (6.1.4.B.9, SL.1.1) Day Two: Students build and test their devices. Students create a small presentation which will be recorded. (NJSLSA.R.7) Cup – A – Phone: Students brainstorm different ways that people communicate. Students then explore a typical cup phone	Talking Tubes Video Cup-A-Phone: • Paper cups and Styrofoam cups • Bar of soap • Cotton string (precut into 36 inch pieces) • Paper clips • Fishing line • Scissors **Additional Text:** Sounds All Around (Let's-Read-and-Find-Out Science 1) Light and Its Effects (Science Readers: Content and Literacy) How Sound Moves (Science Readers: Content and Literacy)	simple problem that can be solved through the development of a new or improved object or tool. Multiple choice quiz or test. **Benchmark Assessment**: Exact Path **Summative Assessments:** **Assessing Light Knowledge**: Student Plan Video of Presentation Student Rubric **Sound Devices**: Rubric Student Device Cup-A-Phone: **Cup-A-Phone**: I'm A Scientist Data Sheet **Designing a System of Light**: Student Design Idea Statement **A Communication System:** Student Explanation of how their Light Communication System Works.

		using cotton string with a partner. Students then discuss what makes sounds travel. In pairs, students design a new cup-a-phone with new materials. Students will record their experiment on I'm A Scientist. (9.2.4.A.1) Part 1: Designing a System of Light: Part 1: Students review different ways people communicate with lights. Students choose one light system to focus on and research some facts on it. Part 2: Students share their facts in a small group. Students then begin working on designing a system of light communication to help when power is out. Part 3: Students present their ideas to their peers for feedback. They then place their final idea in their science journal for teacher feedback. (9.2.4.A.3, CRP8, 1.MD.A.1) Part 2: A Communication System: Part 1: Students will review different light communication systems. Part 2: Students take time to redesign their	Video's: https://www.youtube.com/watch?v=Cvu1t327k-w https://www.youtube.com/watch?v=vXAVduzMyO8 https://www.youtube.com/watch?v=fH6SikL0iNU	**Alternative Assessments:** 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. 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 checklist. 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

		communication system. Students then present their ideas to other groups. They receive feedback and can make changes based on peer comments. Students then write a two to three sentence explanation of how their device would work. (1.MD.A.2), (W.1.7), (6.1.4.B.9), (CRP4)	send signals ✓ Paper cup and string telephones ✓ A pattern of drum beats Use rubric to grade project.

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

ELL/ESL students: Students will be supported according to the recommendations for "can do's" as outlined by WIDA – https://www.wida.us/standards/CAN_DOs/
This particular unit has limited language barriers due to the physical nature of the curriculum.

Students at risk of school failure: Formative and summative data will be used to monitor student success at first signs of failure student work will be reviewed to determine support.
This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity in planning and carrying out investigations and analyzing and interpreting data.

English Language Learners	Special Education	At-Risk	Gifted and Talented
• Speak and display terminology • Teacher modeling • Peer modeling • Provide ELL students with multiple literacy strategies • Word walls • Use peer readers • Give page numbers to help the students find answers • Provide a computer for written work • Provide two sets of textbooks, one for home and one for school • Provide visual aides • Provide additional time to complete a task • Use graphic organizers	• Utilize modifications & accommodations delineated in the student's IEP • Work with paraprofessional • Use multi-sensory teaching approaches. • Work with a partner • Provide concrete examples • Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA) • 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) • Shorten assignments to focus on mastery of key concepts	• Using visual demonstrations, illustrations, and models • Give directions/instructions verbally and in simple written format. Oral prompts can be given. • Peer Support • Increase one on one time • Teachers may modify instructions by modeling what the student is expected to do • Instructions may be printed out in large print and hung up for the student to see during the time of the lesson. • Review behavior expectations and make adjustments for personal space or other behaviors as needed • Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community • 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	• Curriculum compacting • Inquiry-based instruction • Independent study • Higher order thinking skills • Adjusting the pace of lessons • Interest based content • Real world scenarios • Student Driven Instruction • 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. • Collaborate with after-school programs or clubs to extend learning opportunities.

		project, journal articles, and biographies)	

Interdisciplinary Connections:

ELA - NJSLS/ELA:
NJSLSA.R7: Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
W.1.7: Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4-4)
RI.1.1: Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
SL.1.1: Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

Social Studies:
6.1.4.B.9: Relate advances in science and technology to environmental concerns, and to actions taken to address them.

Career Ready Practices:
CRP4: Communicate clearly and effectively and with reason.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Mathematics:
1.MD.A.1: Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4)
1.MD.A.2: Express the length of an object as a whole number of length units, by layering 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)
1.G.2: Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, halfcircles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.
1.MD.4: Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

Integration of Technology Standards NJSLS 8:
8.2.2.C.1: Brainstorm ideas on how to solve a problem or build a product.
8.1.2.B.1: Illustrate and communicate original ideas and stories using multiple digital tools and resources.

Integration of 21st Century Standards NJSLS 9:
9.2.4.A.1: Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.
9.2.4.A.3: Investigate both traditional and nontraditional careers and related information to personal likes and dislikes.

Key Vocabulary:
Communicate: to share information or feelings
Observe: to use your senses to get information
Direction: the position (away, towards) something faces
Length: the distance from end to end
Message: a communication from one person to another

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

		solutions to other people. (K-2-ETS1-2)		