Unit 2: Waves (Sound)

Content Area: **Science**
Course(s): **Science 1**
Time Period: **Marking Period 2**
Length: **MP2**
Status: **Published**

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Lesson 1: Anchoring Phenomenon- How do sounds help us communicate?

- Phenomenon- People use sound signals to communicate.
    - Connect to experiences with sound and sound signals.
    - Read about using sound signals to communicate.
    - Notice and wonder about a clocktower and its bells.
    - Explore with handbells and add to our Notice and Wonder chart.
    - Create a class model to record initial ideas about how the clocktower makes and sends sound signals.

Lesson 2: Investigation- How does a triangle make sound?

- Phenomenon- Objects, like a triangle, can make sound and not make sound.
    - Read an informational text about how scientists make, record, and use observations to answer scientific questions.
    - Plan and carry out an investigation to make observations when a triangle is making sound and when it is not.
    - Create Our Growing Ideas chart to record what we figure out about how triangles make sound.

Lesson 3: Investigation- How do other objects make sound?

- Phenomenon- Many different objects/instruments make sound and do not make sound.
    - Investigate making sounds with different instruments.
    - Use our observations to identify what causes instruments to make sounds.
    - Identify a cause-and-effect pattern that moving/shaking instruments make sounds.
    - Read an informational text about vibrations causing sound in other objects and materials.

Lesson 4: Investigation- How can we know sounds travel and are received?

- Phenomenon- We can hear sounds made somewhere else.
    - Plan and carry out an investigation using our senses to make observations, providing evidence that sounds travel and are received.

- Co-design a data table to organize our observations and use it to analyze data and notice a cause-and-effect relationship.
- Engage in a read-aloud connecting our observations with experiences of others.

Lesson 6: Anchoring Phenomenon- What messages do people communicate using sound signals?

- Phenomenon- People communicate messages using sound signal devices.
  - Organize sound signal devices based on the type of message they send.
  - Identify needing a way to communicate good news across our classroom as an engineering problem we want to solve.
  - Read a newspaper article to connect with students and engineers.

Lesson 7: Investigation- How can we plan to make our sound signal devices?

- Phenomenon- Designs show how a solution will look and work.
  - Read a book about how engineers plan to solve engineering problems.
  - Gather information by using familiar parts.
  - Draw and write individual designs for our sound signal devices and work with a partner to make a shared design.

Lesson 8: Investigation- How can we use materials and our drawn designs to build our sound signal devices?

- Phenomenon- Different materials can be used to build.
  - Read a book to find out how engineers use their drawn designs to gather materials and build devices.
  - Use materials and our drawn designs to build sound signal devices that will solve our engineering problem.

Lesson 9: Investigation- How can we find out how well our sound signal devices work?

- Phenomenon- Designs can work as planned, yet sometimes do not.
  - Read a book to find out how engineers test their designs.
  - Make a plan and test and record observations of our sound signal devices.
  - Analyze our data to figure out how well our sound signal devices work.
  - Give and receive feedback about our designs and consider improvements.

Essential Questions

- What is sound?

- What causes sound?
- Why do things only make sounds sometimes?
- What devices are used to communicate long distances?
- What tools can be used to design or build a device that uses light or sound to solve a problem of communicating over a distance?
- How do objects make and use sound to communicate?

Big Ideas

In this unit, students investigate light sounds. They explore how materials vibrate and how vibrating materials can make sounds. They will use those investigations to create simple devices that allow them to communicate across a distance. This unit begins with a shared experience of observing a clocktower (dong! dong!) making and sending a sound signal that people use to communicate the time. In the first lesson set (Lessons 1-5), students plan and conduct investigations to produce evidence to answer their questions about how objects make sounds and how we can know that sounds travel and are received. Through these investigations, students gather evidence that vibrating objects make sound and sound can make other objects vibrate. They use this evidence to develop a model for how the clocktower makes and sends sound that people can hear. In the second lesson set (Lessons 6-10), students identify messages people send using sound signals in their communities and decide that they want a better way to send good news messages across their classroom. Students then engineer their own sound signal devices by planning, building, and testing designs they can use to communicate good news to all of their classmates!

Cross-Curricular Integration

Integration Area: English Language Arts

• 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-PS4-1)(1-PS4- 4)

• W.1.8 -With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-1)

• 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. (1-PS4-1)

- CCSS.ELA-LITERACY.RI.1.1- Ask and answer questions about key details in a text.
- CCSS-ELA-LITERACY.RI.1.3- Describe the connection between two individuals, events, ideas, or pieces of information in a text.
- CCSS-ELA-LITERACY.W.1.8- With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

- CCSS-ELA-LITERACY.RI.1.4-Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.
- CCSS-ELA-LITERACY.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.
- CCSS-ELA-LITERACY.SL.1.1B-Build on others' talk in conversations by responding to the comments of others through multiple exchanges.
- CCSS-ELA-LITERACY.SL.1.1C- Ask questions to clear up any confusion about the topics and texts under discussion.
- CCSS-ELA-LITERACY.SL.1.2- Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
- CCSS-ELA-LITERACY.SL.1.3-Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
- CCSS-ELA-LITERACY.SL.1.4- Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.
- CCSS-ELA-LITERACY.L.1.4- Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 1 reading and content, choosing flexibly from an array of strategies.
- CCSS-ELA-LITERACY.L.1.5C- Identify real-life connections between words and their use (e.g., note places at home that are cozy).
- CCSS-ELA-LITERACY.L.1.6- Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships (e.g., because).

Integration Area: Mathematics

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

Science and Engineering Practices

Planning and Carrying Out Investigations

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        Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (INV-P2)

        Make observations (firsthand or from media) to collect data that can be used to make comparisons. (INV-P4)

Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal. (INV-P5)

Constructing Explanations and Designing Solutions

- Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem. (CEDS-P2)
- Generate and/or compare multiple solutions to a problem. (CEDS-P3)

Developing and Using Models

- Develop a simple model based on evidence to represent a proposed object or tool. (MOD-P4)
- Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s). (MOD-P3)

Technology Integration

8.1.2.AP.2: Model the way programs store and manipulate data by using numbers or other symbols to represent information

Activity: Students will use Pebble Go to learn about Sound.

Enduring Understandings

New Jersey State Science Learning Standards

1-PS4- Waves and their Applications in Technologies for Information Transfer

- 1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate
    - PS4.A: Wave Properties Sound can make matter vibrate, and vibrating matter can make sound.
- 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.

Engineering Design Practices

- 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.

- 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)
    - Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2- ETS1-1)
    - Before beginning to design a solution, it is important to clearly understand the problem. (K-2- ETS1-1)
- 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.
    - 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, such as climate change, to other people.
- 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.
    - ETS1.C: Optimizing the Design Solution- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Cross Cutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (CE-P2)

Patterns

- Events have causes that generate observable patterns. (CE-P1)

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (SF-P1)

Focus Areas

Knowledge

- Technology is used to communicate by sending and receiving information.
- All objects that make sound do so by vibrating.
- Some vibrations can only be heard, but some can be seen.

Skills

- Use tools and materials to design and build a device that uses light or sound to solve the problem.
- Investigate vibrations as a source of sounds.
- explore the sounds made by different kinds of instruments, and discover what happens when vibrations start and when they stop.

Understandings

- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
- Everything that has a sound has a vibration from the sounds we hear in cartoons to the sounds of alligators in wetlands.
- You can send a message to someone even when you can’t see them

Resources

Primary Resources

- Mystery Science
- OpenSci Ed

Core

- Sounds and Vibrations: How Do They Make Silly Sounds in Cartoons? (Mystery Science)
- Sounds and Vibrations: Where Do Sounds Come From? (Mystery Science)
- Sounds and Vibrations: What Do We See and Hear in the Everglades at Night? (Mystery Science)

Supplemental

- Instrument Sound Lab