Anoka Hennepin K-12 Curriculum Unit Plan

Department: Science **Course/Grade Level: 3rd**
Unit Title: Sound and Light **Number of Lessons/Days: 16 one-hour days or 32 half-hour days**

Unit Summary: In the Sound and Light unit, students experiment with how light and sound travel. Students will conduct experiments to support the claim that light travels in a straight line until interrupted. They discriminate between sounds generated by dropped objects, how sounds can be made louder and softer and higher or lower, how sounds travel through a variety of materials and how sounds get from a source to a receiver. Using simple tools, students explore the natural and human made worlds by observing and manipulating materials to create and change sound and light. These experiences provide an opportunity for students to explore the relationship between the forms of energy, sound and light.

DESIRED RESULTS (STAGE 1)

Program Understandings

- III. Students will understand that scientists use the properties and interactions of energy and matter to explain how the physical world works.
- V. Students will understand that the process of inquiry is the collection of information verified through observation and experimentation, which allow scientists to critically analyze, draw conclusions and make inferences about the natural world.
- VI. Students will understand that scientists use various communications to share knowledge and promote understanding about our natural world.
- VIII. Students will understand scientists use and design technology to answer questions, share information and solve problems.

Minnesota State/Local/Core Standards and Technology Standard(s) and Benchmarks addressed:

- 3.1.1.1 Scientists work as individuals and in groups, emphasizing evidence, open communication and skepticism.
  - 3.1.1.1.1 Provide evidence to support claims other than saying "Everyone knows that," or "I just know," and question such reasons when given by others.
- 3.1.1.2 Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.

- 3.1.1.2.1 Generate questions that can be answered when scientific knowledge is combined with knowledge gained from one's own observations or investigations.
- 3.1.1.2.2 Recognize that when a science investigation is done the way it was done before, even in a different place, a similar result is expected. *For example:* Investigate the sounds produced by striking various objects.
- 3.1.1.2.3 Maintain a record of observations, procedures and explanations, being careful to distinguish between actual observations and ideas about what was observed. *For example:* Make a chart comparing observations about the structures of plants and animals.
- 3.1.1.2.4 Construct reasonable explanations based on evidence collected from observations or experiments.

- 3.1.3.4 Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise do.
  - 3.1.3.4.1 Use tools, including rulers, thermometers, magnifiers and simple balances, to improve observations and keep a record of the observations made.
- 3.2.3.1 Energy appears in different forms, including sound and light.
  - 3.2.3.1.1 Explain the relationship between the pitch of a sound, the rate of vibration of the source and factors that affect pitch. *For example:* Changing the length of a string that is plucked changes the pitch.
  - 3.2.3.1.3 Describe how light travels in a straight line until it is absorbed, redirected, reflected or allowed to pass through an object. *For example:* Use a flashlight, mirrors and water to demonstrate reflection and bending of light.

Overarching Understanding(s) from Curriculum Map/Course Understandings: ***Students will understand that…***	**Essential Question(s) from Curriculum Map. Course Essential Questions:** ***To understand, students will need to consider such questions as....***
• energy appears in different forms, including sound and light, which have unique properties/characteristics • scientific investigations require us to ask questions, make observations, plan and create tests to verify predictions with evidence and data, and generate further questions • scientists use a variety of written and oral communication skills to supports and discuss their	• What is energy? • Where does energy come from and where does it go? • How do I use observations to construct reasonable explanations? • How do scientist share what they know with others?

<table>
<tr>
<td>findings
• scientists work individually and collaboratively to understand the natural world and learn from one another
• engineers and scientists design and apply technology either as a produce or a process to accomplish a task
Topical Understanding(s) Specific to Unit:
Students will understand that…
• sound is a form of energy
• sounds are vibrations that vary and travel
• light is a form of energy
• a relationship exists between the physical properties of a sound source and the sound it makes.
• scientists observe the world around them, ask questions and plan investigations to gather evidence to support claims and generate further questions
• the practice of science and/or engineering involves many different kinds of tools and technology in order to answer questions and draw conclusions</td>
<td>Topical Essential Questions for Unit:

• Where does sound come from?
• How does sound travel?
• How do the properties of objects affect sound?
• How is sound used in communication?
• How does light travel?
• How are light, energy, and sound related?
• What do I do with my questions?</td>
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<tr>
<td colspan="2">To understand, students will need to…</td>
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<td>know… Students will need to know the following in order to… (e.g. facts, concepts, generalizations, rules, theories, principles)
• that sound originates from a source that is vibrating, travels through a medium and is detected at a receiver.
• the relationship between a sound and the physical properties of the sound source.</td>
<td>be able to… (Students will be able to DO.. skills, procedures, processes
• investigate how sounds are made when objects vibrate.
• compare the frequency of vibrations made by different sound sources creating different pitches.
• compare and record how sound travels through different materials.</td>
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• that sound travels through the mediums of solids, liquids and air.
• a sound source is an object that is vibrating.
• a sound receiver detects sound vibrations.
• the intensity of the vibration determines the volume.
• objects can be identified by the sound they make when dropped.
• light can be reflected, absorbed, and redirected
 	
ESSENTIAL VOCABULARY
Note: A vocabulary sheet is available to use, if desired. Found in resource section.
 	
• **MCA Essential Vocabulary**
  • **energy-** any source of power
  • **pitch** – how high or low a sound is (*high* = squeaks, screech and *low* = rumbles, growls)
  • **absorb** - to take in or soak up into another material
  • **redirect** – to direct to a different place or by a different path
  • **reflect** – to bounce back from a surface
  • **factor** - something that can change what happens
  • **sound source** – where a vibration starts
  • **vibration** – a shaking back and forth movement
• <u>Sound & Light Essential Vocabulary</u>
  • sound discrimination – the ability to identify sounds and tell sounds apart
  • property – how an object looks, smells, sounds, feels,
	• conduct investigations to test ways to increase and decrease the amount of sound received.
	• test and identify an object based on its sound
	• communicate with others using sound
	• explain how light travels

and tastes
- sound receiver – something that detects, responds to, or hears a sound
- volume – how loud or soft a sound is
- amplify – making sound louder
- frequency – how fast or slow something is vibrating
- medium – something that a force passes through
- tension – act of stretching or being strained
- hertz - unit of measurement for pitch
- decibel – a unit used to measure a sound's volume; measures sounds volume
- periscope- a tool used for looking over the top of something

Everyday Science Vocabulary (Used in all units)

*Resource sheet for students found in resource section.

- **Inquiry** – a process of asking questions to seek information
- **Investigation** - observe or study by close examination
- **Procedures** – a series of steps that must be taken in order to do something
- **Evidence** – something that gives proof or a reason to believe
- **Investigable Question**- a question or idea that can be tested and measured; how does X affect Y, or how does A compare to B (This term should also be referred to as a testable or experimental question because this concept is presented using various terms on the MCA.)
- **Reasonable-** using clear sense or clear thinking
- **Comparisons**- to look at two or more things to determine similarities and differences
- **Prediction**- a thought about what might happen, using what you

know

Common misunderstanding(s):

- An object (not the vibration) makes sound.
- Sound is released from an object when it is hit.
- Pitch and volume are the same.
- There is sound in space.
- Sound travels in a continuous straight line.
- Light can change direction all by itself
- Sound will not travel to the ear if the listener does not want to hear it.
- Sound needs an unobstructed line of sight to get to an ear.