

Gr 1. Sound & Light
Unit Overview (Understanding By Design)
Standards, Learning Goals, Essential Questions

Title of Unit	Sound & Light	Grade Level	1
Curriculum Area	Science	Time Frame	5-6 weeks (assuming 2 days a week. 45 minutes a lesson)
Developed By	Needham Science Center		
Identify Desired Results (Stage 1)			
Content Standards			
Massachusetts Science & Technology/Engineering Standards:			
1-PS4-1. Demonstrate that vibrating materials can make sound and that sound can make materials vibrate.			
1-PS4-3. Conduct an investigation to determine the effect of placing materials that allow light to pass through them, allow only some light through them, block all the light, or redirect light when put in the path of a beam of light.			
1-PS4-4. Use tools and materials to design and build a device that uses light or sound to send a signal over a distance.			
Science & Engineering Practices:			
1. Asking questions (for science) and defining problems (for engineering)			
2. Developing and using models			
3. Planning and carrying out investigations			
4. Analyzing and interpreting data			
6. Constructing explanations (for science) and designing solutions (for engineering)			
7. Engaging in argument from evidence			
8. Obtaining, evaluating, and communicating information			

Understandings	Essential Questions
<p>Students will understand that:</p> <ul style="list-style-type: none"> - All sounds come from vibrations (including people’s voices) and vibrations cause all sounds - People use their ears to sense sounds - Light travels in different ways through different materials - Mirrors reflect light - Shadows are created when objects block light - We use our eyes to sense light - Light and sound can be used to send messages across a distance - Light and sound travel across distances 	<ul style="list-style-type: none"> - How do scientists use evidence to understand light and sound? - What makes sound? (people, animals, nonliving things?) - How can you stop or change sound? - How can you make things vibrate? - How can the path of light change? - How are shadows made? What makes shadows change? - What role does sound and light play in people’s lives? - How can we send sound/light over a distance? - Why do people send signals over a distance? - How can we improve our designs?
<p style="text-align: center;">Related Misconceptions</p> <ul style="list-style-type: none"> - Objects make sound (independent of vibrations) - Shadows are creations of their own (not the absence of light) - You can see without light 	
Knowledge Students will know...	Skills Students will be able to...
<ol style="list-style-type: none"> 1. Vibrating objects can make sound (sound cannot be created without vibrations) 2. Light can pass through, be blocked or be redirected by objects 3. Differences between opaque, translucent, transparent 4. Shadows are created by dark areas that result from light being blocked 5. Mirrors reflect light 6. Sound and light is used to send signals and can travel over a distance 7. Engineers are people who use the design process to create things or solve problems. 	<ul style="list-style-type: none"> - observe and record vibrating objects and the behavior of light - test how sounds are created by different materials - share and record observations - communicate ideas, using basic evidence to support their ideas - plan, design and improve a device that sends sound or light over a distance - work together cooperatively, sharing and listening to other’s ideas

Assessment Evidence (Stage 2)	
Performance Task Description	
students apply what they learned about sound and light to send a signal over a distance	
Other Evidence	
-class discussions	
-completed science notebook entries	
Learning Plan (Stage 3)	
Big idea	Activities
Introduction to Unit Approximate time: 30-45 min	Lesson 1- Listening Walk. Teacher leads discussion- how do we use our senses? How do scientists use their senses? Class completes sound idea web (optional). Teacher leads listening walk (connecting to senses) indoors and outdoors. Students record sounds and share their observations. Teacher begins anchor chart- How did we use our senses? ** Teachers will need to plan this lesson carefully- it works best on a day and when students can go outside.
Students will know: vibrating objects can make sound (sound cannot be created without vibrations) Students will be able to: <ul style="list-style-type: none"> - observe and record vibrating objects - test how sounds are created by different materials Approximate time- 3 - 45 min sessions	Lesson 2- Exploring Sound. Students explore sound with rubber bands, cup, tongue depressors. Students record observations in science notebook. Students discuss observations and model how they made sound. Teacher read aloud: <i>Oscar and the Bat</i> Lesson 3- Exploring Sound and Vibrations. Teacher demonstrates how to use tuning fork. Students work in pairs to explore ways to stop/start the sound of the tuning fork, recording their observations in the science notebook. Students use tuning fork to observe its affect on ping pong balls on string and water and noticing vibrations. Teacher leads science talk to review and solidify idea that sound is caused by vibrating objects. Lesson 4- Review with Vibration Stations. Students review and observe how vibrations make sound and how sound is made by vibrations. Students move through five stations (2 kalimbas, 2 monochords, spoon gong, rice and speaker, musical instruments (finger cymbals, toy guitar). Teacher reviews using a variety of resources (<i>FOSS Sound and Light</i> big book, FOSS interactive big

	<p>book, FOSS video and/or brainpop) and how sound is caused by vibrations. Teacher can also use optional student assessments to check for understanding after this lesson concludes.</p>
<p>Students will know:</p> <ul style="list-style-type: none"> - light can pass through, be blocked or be redirected by objects - differences between opaque, translucent, transparent - shadows are created by dark areas that result from light being blocked - mirrors reflect light <p>Students will be able to:</p> <ul style="list-style-type: none"> - observe and record the behavior of light - test how sounds are created by different materials - share and record observations - communicate ideas, using basic evidence to support their ideas <p>Approximate time: 4- 45 minute sessions</p>	<p>Lesson 5: Light experiments Students complete an idea web on light to assess what they know. Teacher introduces terms transparent/translucent/opaque. Students work in pairs to make predictions and test how different materials let light pass through using flashlights.</p> <p>Lesson 6: Mystery Science: What if there were no windows? Students watch a short Mystery Science video that asks students to consider the impact of materials that let light through (aka transparent) like glass. Students observe different types of paper for to see how much light they let pass through. They then use these materials to create paper stained glass windows.</p> <p>Lesson 7: Golf tee shadows Teacher reads FOSS big book or shows interactive ebook <i>Sound and Light</i> introducing shadows and observing how shadows are made. Students work in pairs to explore shadows and how to create shadows with a flashlight and a golf tee. They share their results and observations about how shadows can be made.</p> <p>Lesson 8: Sun Shadows. Students go outside or find indoor sunny area to observe and experiment with shadows. If possible, students draw their shadows at multiple times of the day to see how the sun’s apparent change in the sky can alter shadows. They discuss their results and review with FOSS videos or book: <i>Bear’s Shadow</i> by Frank Asch. NOTE: ** Teachers will need to plan this lesson carefully- it works best on sunny day and when students can go outside more than once during the same day.</p>
<p>Students will know:</p> <ul style="list-style-type: none"> - sound and light is used to send signals and can travel over a distance <p>Time: 1 45 minute session</p>	<p>Lesson 9: Mirrors. Students work in groups to complete challenges with mirrors and see how mirrors can be used to reflect light. To review, teacher reads about reflections in the FOSS big book or ebook- <i>Sound and Light</i>.</p>

ASSESSMENT**Students will be able to:**

- plan, design and improve a device that sends sound or light over a distance
- work together cooperatively, sharing and listening to other's ideas

Time: 2-4 45 minute session**Lesson 10 - Student assessment- Sending signals with light and sound**

Students apply what they learned about sound and/or light to complete a design challenge: Use light or sound to send a signal over a distance (by creating cup-string telephones and/or sending a secret message using flashlights and mirrors). ***This is the culminating project for the unit.**

Teachers can choose if they would like students to do one or both of the design challenges and how much time to devote to the project.