

## **Unit Plan Overview**

1. The unit plan is designed for first grade science with a student population which is predominantly below average on reading and math standardized scales. The content and methods used to achieve learning targets are of high rigor and intended to set and maintain high expectations for learning with accommodations provided for those students still lacking strong reading and writing skills. Connections to literature and the arts are made to increase engagement and demonstrate necessity for learning subjects like reading and math to be successful in science.

2. The theme of this unit is using light and sound to communicate. Connections in early lessons to literature also expose students to the arts and provide greater exposure to build background knowledge while providing a reason for using sound as a communicative tool. Inquiry lessons allow for students to become engaged in their learning by driving instruction and taking ownership of knowledge. Students learn not only about light and sound, their properties and how they can be used but also practical and artistic applications for use outside of a classroom.

3. Overview of Learning Objectives:

- STWBAT define and identify vibration.
- SWBAT describe sound in terms of vibration.
- STWBAT use information about vibration to make predictions about how sound is produced with a variety of objects.
- SWBAT identify sound as vibrations that travel (waves).
- SWBAT identify our ears have parts that vibrate allowing us to hear.
- SWBAT define, in first grade terms, a sound wave as they observe.
- SWBAT plan and conduct investigations and record evidence of their observations.
- SWBAT identify observable means by which they can “see” sound.
- SWBAT identify volume as a measure of how far sound will travel.
- SWBAT use evidence to plan and investigate was to use volume as a means to make sound travel over a distance.
- SWBAT use evidence from prior investigations to design an instrument from recycled materials that can produce high and low pitch and soft and loud volume.
- SWBAT identify the word illumination as a word relating to science of light.
- SWBAT identify ways in which they can investigate light and it’s properties.
- SWBAT determine objects can only be seen when enough light is present to illuminate them.
- SWBAT conduct an investigation and gather evidence about properties of illumination.
- SWBAT identify transparent, translucent, opaque, and reflective.
- SWBAT identify objects that block light create shadows.
- SWBAT identify the how properties of light and objects can be used to communicate.
- SWBAT create a device, using acquired knowledge, that communicates over a distance using light.
- SWBAT plan and create a device used to communicate with sound and/or light across a distance.

4. Teaching Methodologies and Instructional Strategies used in the unit by lesson:

- Lesson 1 How is Sound Made? : Collaborative group work, structured inquiry investigations, video instruction, art integrated STEM instruction
- Lesson 2 How do we hear? : Collaborative group work, direct instruction, video instruction, historical thinking, critical analysis, art integrated STEM, inquiry investigations

- Lesson 3 What is a sound and how can we observe it? : Collaborative group work, inquiry investigations, video instruction, technology applications, impact of science on society through art
- Lesson 4 Communicating with sound: Collaborative group work, inquiry investigations, video instruction, connections to science history/historical thinking, engineering and design process
- Lesson 5 How can we make sound? : Collaborative group work, individual projects, individual presentations, connections to scientific thinking and applications to society through the arts, video instruction, summative assessment through project-based learning
- Lesson 6 How do we communicate with light? : Direct instruction, group discussions, collaborative work, inquiry investigations and questioning
- Lesson 7 Can we see in the dark? : Collaborative group work, direct instruction, video instruction, inquiry investigations, questioning, and connections to science impact on society
- Lesson 8 Understanding translucent, opaque, transparent, and reflective properties: Collaborative group work, direct instruction, video instruction, inquiry investigations, questioning, and connections to science impact on society, engineering and design
- Lesson 9 Communicating with Light? : Collaborative group work, direct instruction, video instruction, inquiry investigations, questioning, and connections to science impact on society, electrical engineering and planning, connections to society through arts
- Lesson 10 Make a device to communicate with light: Collaborative group work, individual projects, inquiry investigations, summative assessment through project-based learning, video instruction
- Lesson 11 Make a device to communicate with light and/or sound: Collaborative group work, individual projects, inquiry investigations, summative assessment through project-based learning, video instruction, connections to engineering and technology

5. The essential features of inquiry are met throughout the unit in the following ways:

- Learner engages in a scientifically oriented question: each lesson starts with a question to which students spend the time during the lesson striving to answer. The KLEWS chart is the driving force behind the essential questions.
- Learner gives priority to evidence in responding to questions: in each lesson students record their evidence collected in their science journals and/or on the KLEWS chart as a whole group while engaging in discussions about how our evidence can become our new knowledge about the subject.
- Learner formulates explanations from evidence: students are asked to demonstrate this in a variety of ways during each lesson whether in it be whole group or small group discussions but most notably when justifying their choices for their engineering design challenges.
- Learner connects explanation to scientific knowledge: students are directed to refer to videos from experts or recall on introductions to lessons prior to connect explanations to scientific knowledge. The teacher also helps draw some connections during observations in inquiry investigations.
- Learner communicates and justifies explanations: Students are required to contribute to daily review on and track our acquired knowledge through the KLEWS chart but also in their presentations for all three engineering design challenges.

6. Adaptations planned for diverse learners:

Since most of the student population is academically low and considering the movement needs for students who endure daily trauma, I incorporated movement and non-traditional methods of instruction throughout the lessons. Additionally, built in provisions for low readers and writers. Including critical analysis along with inquiry promotes visual and auditory literacy skills needed among these populations. Arts integration provide a cultural connection with a point of interest to keep learners with focus and attention difficulties engaged. Hands on experiences offer opportunity for those needing constant movement.

#### 7. Contexts of science:

The history of science is addressed in lessons with engineering design challenges where previous NASA difficulties and failures occurred. Science of the past is addressed when discussing old technologies used to solve problems of communication. Connections to and the reciprocal nature of science and technology are addressed during lessons where students are constructing devices used for a purpose as well as those challenges which include electrical engineering and coding basics.

#### 8. Student Assessment Strategies:

Observation, discussion trackers, and a rubric are use in most lessons to track learning. Journal entries and contributions to collaborative group work are used for others. Summative assessments are PBL and encompass the use of the engineering design process. Rubrics are used a unit of measure throughout.

## NSU Lesson Plan Format

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	How is sound made?
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
<b>Time allotted:</b>	45 min

<p><b>Standards/Performance Indicators/Skills</b></p> <p><i>Identify the state and national standards, addressed by the lesson.</i></p>
<p>State Standards:</p> <p>1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.</p> <p>W.1.7 Participate in shared research and writing projects</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>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.</p> <p>National Standards (Next Generation Science Standards):</p> <p>1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]</p>
<p><b>Learning Objectives/Goals</b></p> <p><i>Describe the lesson's objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i></p>
<p>Lesson's Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i></p> <p>STWBAT define and identify vibration, SWBAT describe sound in terms of vibration, and STWBAT use information about vibration to make predictions about how sound is produced with a variety of objects.</p> <p>Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):</p> <p>Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>
<p><b>Assessment (the type[s] of assessment used throughout the lesson)</b></p>

*Identify the assessment that occurred before, during, and after the lesson.*

Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a document.)

*Pre-Assessment of Student Knowledge & Skills (How will you assess students' prior knowledge and skills before the instruction?):*

Teacher will guide students in creating a KLEWS (Know, Learning, Evidence, Wonder, Science Stuff) with students to discuss what they already know about sound such as those they can hear and what they think makes sound. The chart will be revisited and reused several times over the course of the unit. The essential question for this unit is How can we communicate with light and sound across a great distance? It may be better to divide the unit into two parts and have two different charts that can be combined at the end of the unit to answer the essential question. Break the unit into sound with the focus question: How can we communicate with sound? and light with the focus question: How can we communicate with light? In the Science Stuff portion of the chart write the key terms for science learning; sound will have vibration or vibrate, wave, volume, pitch and light will include opaque, transparent, translucent, reflective, illuminate.

*Formative Assessment (How will you monitor students' understanding during/throughout instruction?):*

Using discussion trackers and a rubric teacher will use equity sticks and proximity to listen to conversations and contributions to discussion as a measure of learning during several of the brain storming events and the small group presentations.

*Post Assessment (How will you assess students' understanding after the instruction?):*

Students will add to the KLEWS chart with what they have learned, evidence collected, and the nature of science encountered during the lesson. Contributions will be added to the formative assessment measures. Additionally, students will be provided a sheet to record a drawing and written statement of the key takeaways from the lesson.

**Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

Students will be provided rulers during a portion of the experiment to be used in a non-conventional way. Students will be instructed about the proper use of the ruler for making a noise: place on a flat surface with about 1/3-1/2 of the ruler sticking off the edge. Using one finger pull down on the ruler until it bends slightly, not too far because the ruler will break and let go in a flicking motion. If the sound is too flat, adjust the length of the ruler hanging off the edge. The rulers will only be used in this manner for this experiment. Teachers will likely also have to state, prior to handing the rulers out, they are to be kept on the table and should not be used to hit/strike flat surfaces like a drum stick nor to strike others. Students will keep the rulers on their desks/floor spaces until it is time to conduct the experiment. When the experiment is over the rulers will be returned to the teacher. Students will also be using their bodies to make sound effects. Students will need to be told or reminded about keeping a proper distance apart and controlling their actions so as not to hurt themselves or others.

*Introduction/Set Induction/Hook (Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.):*

<https://mysteryscience.com/light/mystery-1/sounds-vibrations/105?r=58772804>

Students will be shown the first part of the Mystery Science video asking about funny sounds and highlighting how cartoons rely on people to make the sounds you hear. The video will be played without stopping until the 3:35 mark. Stop the video at this point and refer to the KLEWS chart to engage students in a discussion about how they think these sounds are made. Students should be encouraged to use the information and observations gathered thus far to express their ideas; teachers may need to use questioning to elicit proper pathway. Questions to ask include: what did you see when the spring like moved?, how did the horn make noise?, what did you notice about the sounds the man made that sounded like lasers shooting?, what was happening when the man was making the frog croaking noise?, and how did the men making the sounds of wind and a storm produce those sounds? Be sure to write responses which cite evidence on the KLEWS chart. Note: students do not need to know or use the word vibration at

this point in the lesson but if a student says the word write it on the chart. Students who make note of the process by which the sound engineers came to produce the sounds, such as investigate, test, experiment, ask questions, look for answers (research) should also be included on the KLEWS chart under science stuff to illustrate nature of science and scientific thinking but it is expected they will not be contributing to this portion of the chart until later in the lesson.

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Students will then watch the remainder of the video and complete corresponding activity by which they too will make sound effects for cartoons. Students will be prompted to answer the question: How would you make the sound of rain? Allow 1 minute for discussion and make note of any comments or suggestions which could be added to the chart. Before proceeding let students know they will be making the sound of a rainstorm with their bodies. Review rules and expectations for body movements in the classroom such as proper distance and control of actions. Students will have an opportunity to create the sounds of the storm in time with the cartoon. Students will be prompted with the question: How could you make it sound more like a storm? Allow 1 minute for student brainstorming and depending on time implement some of their ideas. Alternatively, this can be used as an extension whereby students are provided time to create a device used to make the sounds of the storm.

The next question: How would you make a silly “boing” sound for a bouncing ball? Allow student brainstorming for 1 minute before holding up the ruler and asking, could we use this and how? Give students 2-3 minutes to share their thoughts before allowing the video to play explaining how to use the ruler for the boing sound. It will be important to model this for students and explain rules and expectations for use of the ruler in this unconventional way before allowing students the opportunity to conduct this experiment. Once students have been provided opportunity to practice making the sound and adjustments (Step 6 provides instructions and time of 1 minute for experimentation of getting the right “boing” sound) play the portion of the video where they will put the sound to the cartoon. Students will have repeated opportunities to make the sound of the bouncing ball.

Allow for students to be able to keep their rulers during the next slide to answer the questions: what does the ruler do as it makes sound and what happens when you stop the sound? During this time, the teacher will use equity sticks and discussion trackers to complete the post assessment and ensure students understand sound is created by vibration and vibration can occur when things are rubbed together, hitting or flicking, or by shaking; add these observations to the evidence portion of the KLEWS chart. By the end of the lesson students should be able to add the word vibrate to the science stuff portion of the KLEWS chart. Collect the rulers at the end of the post-assessment.

### **Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson’s concepts to previous or future learning. This should be different than the post assessment.*

Included in this Mystery Science lesson is an extension activity for creating sound to accompany a read aloud. Cinderella written by Charles Perrault, translated and illustrated by Marica Brown is used (it is part of the reading curriculum, Wit and Wisdom, used by the Tangipahoa Parish School System) which was read in an earlier reading lesson where characters have already been discussed. If including this book and it has not been read prior to this lesson, the time of the lesson will need to be extended an additional 15 minutes. A read aloud of your choosing can be used where discussion about characters and their emotions could be applied. *Note: in future lessons discussion about negative (bullying) and positive emotions (kindness, hard work) included so your story will need to have evidence of these features.*

During this conclusion activity students are provided handheld instruments to make music which will be used to “show” the emotions of the characters in the book. Instruments include triangles, sand blocks, rhythm sticks, egg shakers, palm pipes, hand drums, small xylophone, and tambourines. Divide students into groups of no more than four and assign each group a character for which they will make a sound effect: stepmother, stepsisters, Prince, fairy godmother, coachmen and attendants, Cinderella, etc. Use as many characters as you have groups; for fewer groups focus on central characters. Alternatively, you can also give the same character to two different groups and have a compare and contrast in interpretation of sounds for the character. Give groups 2 minutes to work

together to develop a sound they think illustrates the characters emotions/personality in the story. Provide each group an opportunity to play their sound effect for their given character. After each group plays ask what emotion or behavior does the character have in the story and how are they producing the sound with their various instruments? Student explanations should include key terms like vibration, shaking, back and forth, hitting, flicking, etc. as discussed during the lesson. Teacher will mark these responses on discussion tracker.

Tell the students they are now an orchestra; another way movies and cartoons add to the story telling is through music. Orchestras follow a conductor that tells them when to play and how loud or soft, fast or quiet. Tell students you are the conductor and show them how a conductor lets the orchestra know when each section is to play and how. Practice a few times letting each group get ready then play both loud and soft. Tell students during the read aloud tomorrow their groups will be able to play their sound effect as each character enters the story. Collect the instruments and provide each student a copy of the assessment included with the Mystery Science activity. The assessment allows for students to draw a picture and then write about two ways people can make sound effects for a cartoon. Answers can include voice/talking and music in addition to the ways in which students made the effects for the cartoons in the video. Students should include in their illustrations or explanations evidence of how sound is made via vibrations.

### **Resources and Materials**

*List the materials used to plan and deliver the lesson.*

Smartboard/Brightbox, rulers, discussion rubric, discussion tracker, handheld instruments (triangles, sand blocks, rhythm sticks, tambourines, palm pipes, egg shakers, hand drums, small xylophone) assessment sheet, pencils, large chart paper, marker, conductors stick or pointer, book “Cinderella” or a read aloud of your choosing.

<https://mysteryscience.com/light/mystery-1/sounds-vibrations/105?r=58772804>

<https://mysteryscience.com/docs/328>

[https://www.youtube.com/watch?v=5vGL10sWP\\_g](https://www.youtube.com/watch?v=5vGL10sWP_g)

**Attachments included below:** Discussion rubric and tracker; to be used for multiple lessons

### **Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

Brightbox, like a SmartBoard, is used to access the internet and play the Mystery Science video for the lesson.

### **Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students’ learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

During the lesson students are engaged in a variety of activities allowing for movement (attention and kinesthetic needs), collaboration (diversity and language), discussion (diversity and language, oral/auditory learners), and varied ways to express their knowledge and understanding of the material through drawing, discussion, and small group presentations (adaptations, modifications, diversity and language). Teachers should be aware of, when selecting groups, those students needing support and place them in partnerships that will assist in providing such support including being sensitive to culture and gender needs. Example: Latino and Hispanic learners will need to be in same gender groups to ensure every member of the group speaks. Indigenous learners provided time and opportunity to present with other students who are more reserved rather than boisterous. The addition of the KLEWS provides rigor as students are going to visually and orally connect their discussions to prior and future learning. Connections to literary elements and speaking and listening goals build on student knowledge and illustrate interconnected concepts across content areas.

**Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students who complete the written assessment early will be provided the opportunity to design, using materials from the classroom, a way to make a sound effect for a cartoon. The student will need to demonstrate how the device/instrument works, why it works for the sound it is meant to produce, explain the process of conducting the sound (vibrations), and draw a cartoon character/setting meant for the sound. The students will need access to things like paper clips, string, tape, cardboard pieces and/or tubes, rubber bands, etc.

**Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

This lesson, and unit, is meant to be taught in tandem with a literary unit. The content is intended to be cross content and arts integrated STEM inquiry. The elements about literary devices can be left out and the use of a read aloud only included in the lessons: How is Sound Made and How do We Hear?

Parts of this lesson were taken and adapted from this lesson [https://betterlesson.com/lesson/631404/now-hear-this?from=mtp\\_lesson](https://betterlesson.com/lesson/631404/now-hear-this?from=mtp_lesson) on Better Lesson, as well as, this lesson <https://educationcloset.com/2011/06/24/the-glass-slipper-bullies-arts-integration-lesson-plan/> from Institute for Arts Integration and STEAM.

	<b>UNSATISFACTORY</b>	<b>COMPETENT</b>	<b>PROFICIENT</b>	<b>DISTINGUISHED</b>
<b>Technique / Concepts</b>	Statements lack understanding of concepts, materials, and skills.	Statements show some understanding of concepts, materials and skills.	Statements reflect understanding of concepts and materials, as well as use of skills discussed in class.	Statements show a mastery of skills and reflects a deep understanding of concepts and materials.
<b>Habits of Mind</b>	Student passively attempts to engage in discussion without much thought or exploration of possibilities. Student refuses to explore more than one idea.	Developing exploration of possible solutions and innovative thinking. Student often repeats what another has stated without attempting original thought.	Student explores multiple solutions and innovative thinking develops and shares with respect but may need some prompts to wait for turn to speak.	Consistently displays willingness to try multiple solutions and ask thought provoking questions, leading to deeper, more distinctive discussions.
<b>Reflection &amp; Understanding</b>	Student shows little awareness of their contribution to classroom discussions. Student replies, "I agree with her/him" without expanding upon the idea or concept or repeating the statement with which student agrees.	Student demonstrates some self-awareness of contributions to classroom discussions. Student requires prompt to repeat statements with which there is agreement but readily recalls the other student's statement.	Student shows self-awareness. Discussion demonstrates understanding of content and most decisions are conscious and justified.	Work reflects a deep understanding of the complexities of the content. Every decision is purposeful and thoughtful.
<b>Craftsmanship</b>	Student does not ask questions for clarification or to gain understanding.	Questions are asked but not always on topic and tends to detract somewhat from overall discussion.	Questions are well thought and deepen understanding of topic for individual student	Questions are exceptional and build the knowledge of the individual student and the class as a whole.
<b>Effort</b>	Student contributions are entirely teacher directed and many prompts to gain attention to discussion are required	Student contributions can be improved with a little effort. Student does just enough to meet requirements.	Participation in discussions are above average in manner, yet more could have been done. Student needs to go one step further to achieve excellence.	Participates in discussions with excellence and exceeded teacher expectations. Student exhibited exemplary commitment to the discussion.

RL.1.1: Asks and answers questions about key details in the text and

RL.1.3: Describe characters, settings, and major events in a story, using key details

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.

a. Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion).

b. Build on others' talk in conversations by responding to the comments of others through multiple exchanges.

Student Name

Comments

Comments

1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				

## NSU Lesson Plan Format

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	How Do We Hear?
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
<b>Time allotted:</b>	45 min.

<b>Standards/Performance Indicators/Skills</b>
<i>Identify the state and national standards, addressed by the lesson.</i>
<p>State Standards:</p> <p>1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.</p> <p>W.1.7 Participate in shared research and writing projects</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>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.</p> <p>National Standards (Next Generation Science Standards):</p> <p>1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]</p>
<b>Learning Objectives/Goals</b>
<i>Describe the lesson's objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i>
<p>Lesson's Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i></p> <p>SWBAT identify sound as vibrations that travel (waves). SWBAT identify our ears have parts that vibrate allowing us to hear.</p> <p>Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):</p> <p>Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>
<b>Assessment (the type[s] of assessment used throughout the lesson)</b>
<i>Identify the assessment that occurred before, during, and after the lesson.</i>
<p>Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a document.)</p>

Pre-Assessment of Student Knowledge & Skills (*How will you assess students' prior knowledge and skills before the instruction?*):

Using the KLEWS chart from the previous lesson, ask students how do we hear? Many will answer with our ears but, utilize questioning to elicit thinking about a connection between the vibrations of sound and our ears. Questions could include, but not limited to, how does the sound get to our ears, what is inside our ears, how do our ears know there is sound to be heard, or what happens to the vibrations of the instrument? Record responses in either knowledge or wonder as appropriate.

Formative Assessment (*How will you monitor students' understanding during/throughout instruction?*):

Journal entries as evidence for their investigations. Teachers may also want to continue using discussion trackers to continually assess contributions to discussions.

Post Assessment (*How will you assess students' understanding after the instruction?*):

Revisit the KLEWS chart to add to the learning, evidence and science sections. Student journal entries can also serve as a post assessment of this lesson.

### **Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

Students will again be using instruments to further explore the sounds they are creating for the accompaniment of the read aloud, Cinderella. Students may need revisiting of the routines and expectations for the use of instruments. Additionally, review the roles of conductor and orchestra.

Introduction/Set Induction/Hook (*Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.*):

Instruct students today they are going to use their sense of hearing to plan and conduct investigations. First, they are going to be listening to a bit of music and critically analyze the music. Note: Teachers should familiarize themselves with this process, while it is not unlike a KLEWS chart, there is a process and timeline for revelation of author of materials used and their purpose. Tell students, "today's music is a little different from music you may have heard in the past but listen carefully. We will listen to some of the music silently, then I will allow you to tell me what you heard, and we will listen to the music again as we talk." Play a short portion of the classical piece "Cinderella Waltz" by Sergi Prokofiev. <https://www.youtube.com/watch?v=YOv7yWEv54o> Using the critical analysis tool record students observations about the music, next engage students in thinking about why, who, and for what purpose this music was created. Do not reveal the artist, name of the piece or the reason for its creation until the closing portion of the lesson. Once students have created the observe and reflect portions of the critical analysis tool guide students in answering the question, "how do we hear?", on the KLEWS chart.

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Once the pre-assessment, asking "how do we hear?", is completed engage students in a discussion about how we would seek to find the answers to some of the wonders and questions we have created today. Student answers can vary from using the internet, watching a video, reading a book, etc. Students in my class had grown accustomed to me answering their questions with a question, "I don't know how would we find that out? Ok, let's Google it!" So, their answer was to look for information on the internet. I use a BrightBox, like a SmartBoard, that is large enough for the whole class to see the list of results and as a group they decide which links to click on (of course, I Google this before the class period and make sure what sites are going to pop up to know what to avoid, as well as, have some planned back up pictures and videos). Students selected a diagram of an ear. As the ear is discussed students record what they see in their journals. Allow 5 minutes of discussion about the various parts of the ear making sure to focus on the ear drum. I read the information about the anatomy of the ear from WebMD, where we found the diagram of the ear, directly to students. <https://www.webmd.com/cold-and-flu/ear-infection/picture-of-the-ear#1>

Student questions about the ear drum will lead to another opportunity to ask how would we find this information? Again, my students turned to the internet, but books, videos, and other sources are viable options. To illustrate how an ear drum worked students watched a man play timpani drums on YouTube <https://www.youtube.com/watch?v=40k3AAbA7tM> skipping the talking and going to the portions where the drums are played, about 30-40 seconds total. Choosing this illustration was a connection between what we are learning about sound, the ear, and orchestra. The main idea is to have a visual of a mallet hitting a drum. Next, students will/should ask how the drum in our ear gets “hit”. Play the video from PBS about sound waves <https://www.pbslearningmedia.org/resource/phy03.sci.phys.mfe.ztunefork/sound-and-solids-visualizing-vibrations/> Engage students in discussion (3 minutes) about their knowledge of sound is vibration adding in the new knowledge those vibrations travel in waves. Next tell the students there are two videos that show how the ear really works but they will have to choose which one is going to be better for gaining an understanding. Play 30-40 seconds of each video and allow for a 1minute discussion to decide which video to use as the “expert” in finding out how the ear works. Students will be attracted to the video aimed at children as the explanations are easier to understand and the video moves at a faster pace. Some students may want to see the other video in full, allow for this as an extension activity. The two videos are here: [https://www.youtube.com/watch?time\\_continue=9&v=HMx0HKwWmU8&feature=emb\\_title](https://www.youtube.com/watch?time_continue=9&v=HMx0HKwWmU8&feature=emb_title)

And [https://www.youtube.com/watch?time\\_continue=20&v=p3Oy4lodZU4&feature=emb\\_title](https://www.youtube.com/watch?time_continue=20&v=p3Oy4lodZU4&feature=emb_title)

Instruct students to draw or write how the ear works in their journal as they watch the video. Pause the video to point out the key details and prompt/remind students of the importance of the detail they might want to make this a drawing or write the word in their journal. Once finished refer back to the KLEWS chart, using equity sticks and discussion trackers, have students contribute to the chart the information and knowledge gained from today’s lesson as the post assessment. Students should put their journals away and get their instruments from yesterday to complete the conclusion activity. Remind students instruments are not heard until the conductor gives the signal to pick up the instruments and then to play. Students should move to their groups from yesterday with their instruments.

### **Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson’s concepts to previous or future learning. This should be different than the post assessment.*

Pull out the critical analysis tool and redirect students back to the music to which we listened earlier. Briefly recall student observations and reflections then reveal the artist, name of the piece and reason for its creation. An explanation, with music theory is included here <https://pianistmusings.com/2018/02/20/cinderellas-waltz-from-prokofievs-ballet/>. All students really need for this is a summary of the emotions meant to be felt during the waltz as Cinderella is excited about dancing with the Prince, doesn’t want to be discovered by her family, and has to dash out the door at the end. Prokofiev created the music for a ballet of the classic story because he liked the magic of the story during a time when the world was a war and a very scary place. Ask students to recall the characterizations they made yesterday and then to think about how each of these characters behaves toward Cinderella. How does Cinderella react? Provide students 1 minute to work with their group to change or revise their emotion noting “what is it you want the audience to hear?” Should the music be angry, mean, sad, excited, happy and how loud or soft are each of those emotions? Instruct the “orchestra” that each section is now to play their music, again following the guidance of the conductor. Before each section plays allow for the group to briefly explain how the sound is going to be traveling from the instrument to the listener and what the audience needs to do to be sure they hear the music. Answers should include vibrations, waves, and electric impulses to name a few. The conclusion activity is a great time to review/reteach listening skills connected to how we hear; i.e., if you’re talking and causing your eardrum to vibrate can the vibrations from the instrument really travel down the ear canal, hit the drum, vibrate the ossicles and set into motion the liquid and hairs in the cochlea? or will the cochlea be too busy with the vibrations of your voice?

### **Resources and Materials**

*List the materials used to plan and deliver the lesson.*

BrightBox/SmartBoard, KLEWS chart/large chart paper, marker, critical analysis teacher information and kid friendly analysis tool, science journals for each student/alternatively booklet for recording information from lessons in light and sound unit, discussion tracker and rubric, handheld instruments (triangles, sand blocks, rhythm sticks, tambourines, palm pipes, egg shakers, hand drums, small xylophone), pencils, conductor baton/pointer stick

<https://www.youtube.com/watch?v=YOv7yWEv54o>

<https://www.webmd.com/cold-and-flu/ear-infection/picture-of-the-ear#1>

<https://www.youtube.com/watch?v=40k3AAAbA7tM>

<https://www.pbslearningmedia.org/resource/phy03.sci.phys.mfe.ztunefork/sound-and-solids-visualizing-vibrations/>

[https://www.youtube.com/watch?time\\_continue=9&v=HMXoHKwWmU8&feature=emb\\_title](https://www.youtube.com/watch?time_continue=9&v=HMXoHKwWmU8&feature=emb_title)

[https://www.youtube.com/watch?time\\_continue=20&v=p3Oy4lodZU4&feature=emb\\_title](https://www.youtube.com/watch?time_continue=20&v=p3Oy4lodZU4&feature=emb_title)

<https://pianistmusings.com/2018/02/20/cinderellas-waltz-from-prokofievs-ballet/>

**Attached below:** teacher critical analysis information and kid friendly critical analysis tool

**Attached above:** discussion tracker and speaking/listening rubric

**Additional Resources:**

Why do Mosquitoes Buzz in People's Ears by Verna Aardema

The Ear Book by Al Perkins

Ears Are for Hearing by Paul Showers

How Does the Ear Hear? or Now Hear This by Melissa Stewart

- [American Speech Language Hearing Association](#) (geared for adults)
- [Kid's Health](#) (this one is great for kids and will also read it to them)
- [The Hearing Foundation of Canada](#) (The website doesn't tell you in text, but there is a great video!)

<https://thelistenersclub.com/2014/02/17/prokofievs-cinderella/>

**Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

BrightBox/SmartBoard and internet required to access information from the internet for purposes of conduction research and citing evidence.

**Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

During the lesson students are engaged in a variety of activities allowing for movement (attention and kinesthetic needs), collaboration (diversity and language), discussion (diversity and language, oral/auditory learners), and varied ways to express their knowledge and understanding of the material through drawing, discussion, and small group presentations (adaptations, modifications, diversity and language). Teachers should be aware of, when selecting groups, those students needing support and place them in partnerships that will assist in providing such support including being sensitive to culture and gender needs. Example: Latino and Hispanic learners will need to be in same gender groups to ensure every member of the group speaks. Indigenous learners provided time and opportunity to present with other students who are more reserved rather than boisterous. The addition of the KLEWS provides rigor as students are going to visually and orally connect their discussions to prior and future learning. Connections to literary elements and speaking and listening goals build on student knowledge and illustrate interconnected concepts across content areas. Adding the musical art component provides opportunities for students who have difficulty understanding or connecting to science concepts an alternative path for increasing knowledge by utilizing background, or prior, knowledge.

**Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students who finish early could watch the longer video explanation about the ear. Student could be provided a diagram of the ear to fill in when finished. Alternatively, such as with a Montessori setting, a work or center activity whereby the names of the ear parts are provided, and the student matches the names to the parts on a diagram.

**Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

This lesson, and unit, is meant to be taught in tandem with a literary unit. The content is intended to be cross content and arts integrated STEM inquiry. The elements about literary devices can be left out and the use of a read aloud only included in the lessons: How is Sound Made and How do We Hear?

Parts of this lesson were taken and adapted from this lesson [https://betterlesson.com/lesson/631405/investigating-how-we-hear?from=mtp\\_lesson](https://betterlesson.com/lesson/631405/investigating-how-we-hear?from=mtp_lesson) on Better Lesson, as well as, this lesson <https://educationcloset.com/2011/06/24/the-glass-slipper-bullies-arts-integration-lesson-plan/> from Institute for Arts Integration and STEAM.

Teacher's Guide

Analyzing Primary Sources

Adapted for use in word from original PDF located on loc.gov

Observe	Reflect	Question
<p><b>Ask students to identify and note details.</b></p> <p>Sample Questions: What do you notice first? • Find something small but interesting. • What do you notice that you didn't expect? • What do you notice that you can't explain? • What do you notice that you didn't earlier?</p>	<p><b>Encourage students to generate and test hypotheses about the source.</b></p> <p>Where do you think this came from? • Why do you think somebody made this? • What do you think was happening when this was made? • Who do you think was the audience for this item? • What tool was used to create this? • Why do you think this item is so important? • If somebody made this today, what would be different? • What can</p>	<p><b>Invite students to ask questions that lead to more observations and reflections.</b></p> <p>What do you wonder about... who? • what? • when? • where? • why? • how?</p>

Below is the kid friendly analysis tool to post for students to add their thinking via writing directly on the form, adding sticky notes to a poster version, or you can recreate on a white board (you will have to take a picture of the white board to use for recall later in the lesson.) Brightbox has a white board feature that allows you to save as does the Smart Board.

**observe**



**What do you notice?**

I notice...

**reflect**



**What do you think?**

I think...

**question**



**What do you wonder?**

I wonder...



## NSU Lesson Plan Format

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	What is a sound and how can we observe it?
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
<b>Time allotted:</b>	45 min

<p><b>Standards/Performance Indicators/Skills</b> <i>Identify the state and national standards, addressed by the lesson.</i></p>
<p>State Standards:            1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.            W.1.7 Participate in shared research and writing projects            W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.            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.            National Standards (Next Generation Science Standards):            1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]</p>
<p><b>Learning Objectives/Goals</b> <i>Describe the lesson’s objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i></p>
<p>Lesson’s Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i>            SWBAT define, in first grade terms, a sound wave as they observe. SWBAT plan and conduct investigations and record evidence of their observations. SWBAT identify observable means by which they can “see” sound.             Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):            Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>
<p><b>Assessment (the type[s] of assessment used throughout the lesson)</b> <i>Identify the assessment that occurred before, during, and after the lesson.</i></p>
<p>Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a document.)</p>

Pre-Assessment of Student Knowledge & Skills (*How will you assess students' prior knowledge and skills before the instruction?*):

Students will revisit KLEWS chart to review knowledge gained from last lesson. Students will answer the questions what is sound and how can we observe it; putting responses in wonder, learning, and evidence as applicable. Students should be suggesting ways in which we can approach investigating this topic.

Formative Assessment (*How will you monitor students' understanding during/throughout instruction?*):

Conversations in stations using discussion tracker and rubric, as well as, the sound recording sheets for students to track data collected from each station.

Post Assessment (*How will you assess students' understanding after the instruction?*):

Students will add, where applicable, to the KLEWS chart to reaffirm learning, move wonder and learning items to knowledge based on evidence.

### **Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

Students will be using the internet and a computer simulation in one of the labs. Students will need to be reminded of computer use and internet safety rules as well as digital citizenship. Students will be working with limited instruments, moving parts, and water while in the other lab. Teachers will need to address procedures for conducting experimentation such as in stations where paper/beans are to be used to "see" vibrations are properly used; demonstrate appropriate force used to conduct experiment. Small children will tend to misuse items such as these if clear expectations and rigid adherence to time limits are not followed. Students will need to be familiar with rotation procedures and call to attention techniques prior to this lesson. Students will also have water and an evidence tracking sheet; rules and expectations will need to be reviewed prior to start of experiment to ensure students know the procedure for keeping their evidence tracking sheet dry. Teachers may choose to have students keep their sheets in a folder or to have the recording happen at a close by, but different, table from the station with water and tuning fork. Additionally, the tuning fork station will be messy so prepare for water protection of surface and have paper towels ready for clean up as each group leaves. Students should be responsible for the cleanup and return of station items to ready as the leave each station.

Introduction/Set Induction/Hook (*Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.*):

Students will be shown a video of a guitar being played from the inside with the iso on the video slowed just enough to be able to see the vibration in the strings. <https://www.youtube.com/watch?v=INqfM1kdfUc> Ask the students what they observe in this video and attempt to elicit responses about vibration and sound but also about the shape and pattern of the strings as they vibrate. Teacher may be required to ask/prompt what do you see the strings doing, are they moving in a way different than you expected, or why do you think the strings are moving the way they are? Students need to be thinking about looking at observing sound and how to write/draw those observations.

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Prior to the start of the lesson, which can be divided into two days if needed, the second set of stations will need to be set up for rotations. Each station is as follows: drum(s), tuning forks, tambourines, tissue box guitar, drum(s) with beans, tuning forks and cups of water, tissue box guitar with paper, and voice boxes (students hold their hands on their throat). The stations should be set up so that there is a first round of observations and a second round. Depending on your class size there may need to be more than one of each station to accommodate having groups of no more than four at each station. The students will be experimenting with just the instruments in the first round of observations at static stations (students look just at the one instrument and stay in that station).

Explain today and tomorrow we are going to observe sound, your goal is to record on your sheet(s) the sounds you hear and think about how you are going to record the sound.

Day one: Before beginning the hands-on lab students will work with PhET simulations: Wave Interference. In first grade it is not necessary to go into depth about frequency and amplitude but for the purpose of this lab it may be necessary to vaguely define the concepts for students after their explorations in the simulation although it is possible students will associate frequency with pitch and amplitude with volume after the simulation. Reserve explanations for after completion of the simulation. Allow students time to observe and ask questions about the components of the simulation. In the simulation you will be given choices to observe waves from a waterspout, speaker, and laser beam. There are also simulations for interference and diffraction that should not be used for this lab as the purpose is to simply observe sound waves. The tape measure, stopwatch and pressure detector will not be needed for students this young but questions about these tools should be answered. The math required to be able to properly use the tools is beyond first grade but can be discussed. The lab allows for students to visually see sound waves and adjust pitch (frequency) and volume (amplitude) to see their effects on the waves. Students using this lab in first grade should be able to make inferences about their adjustments and the length and/or depth of the waves observed. Instruct and help students select the speaker and show students on the Brightbox how to operate the speaker; making sure to check the box for sound. Show students how to manipulate the frequency and amplitude slides. Explain on the sheet provided students will draw what they see when they observe the sound from the speaker. Allow for students to manipulate the frequency and amplitude. Students may also discover they can choose to see the effects of sound on particles. If students choose this to observe assist in making sure they understand how to record what they see on their data sheets. Students may also discover the graph function to show the sound wave; assist students in recording the graph if this is the way in which they choose to observe sound waves for this lab. Students should select one setting to draw on their recording sheet and make note of the pitch and volume. Students will then answer the questions on the recording sheet using the simulation. Ask students to share observations and make adjustments to the simulation on the Brightbox for the whole class to see. Students should begin to show understanding of wave movement being related to pitch and volume. Ask students if they think the waves would be able to move objects and ask them to explain their answers. Students will then need to revisit the KLEWS chart to add their evidence and review to see if any of the questions from the start of class have been answered. Collect all student data sheets.

Day two: Provide students the evidence tracking sheet and read the questions with them. Tell students they are going to have 5-7 minutes to conduct their investigations. At the three to four-minute mark teachers may find it helpful to remind students, as a group, to be making their observations on the evidence sheet provided. Once students have finished the first round of observations ask for a few to share their evidence. Teachers may choose to use the discussion tracker and rubric during sharing of observations, but it is not necessary as you will collect their evidence tracking sheets today. Using a chart, whiteboard, or BrightBox/SmartBoard record some student responses as a visual tracker to revisit later. Explain to students in the second round of investigations they will be looking at sound again but this time using other objects to measure and observe the sound. In this round of investigations students will rotate from station to station in four-minute intervals. Review with students the procedures for station rotations and expectations for treatment of materials. Review with students that, as before, they will need to record their observations noting what is making sound and what is vibrating. Students may write and draw their observations. Once all groups have been to all stations ask, again, for students to share their observations and record on the chart. Students will then need to revisit the KLEWS chart to add their evidence and review to see if any of the questions from the start of class have been answered. Collect all student data sheets. Note: For me it is easier to have the sheets printed front and back for keeping track of the paper and less for students to have to keep track of in this busy lesson.

### **Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson's concepts to previous or future learning. This should be different than the post assessment.*

The teacher again show the video of the guitar and ask what the students notice differently than before. Do you notice the way in which the strings traveled? They almost look like waves, right? What could we see about waves in the computer simulation? Allow for a brief moment of student wonder and discussion/reflection on their investigations today. Next grab the tuning fork, drum, and a student volunteer to make sounds while using an oscilloscope (apps for pc, iPhone, and Android work fine for this). Allow students to view the waves made by each instrument and the student voice. Allow for student questions, some may be added to the KLEWS chart. Ask students to think about how we would use this information to help us know more about sound, what happened to

the waves as each instrument/voice was played, were some waves smaller or larger, why? Students should suggest volume, if they do not ask more questions about the size of the waves and the loudness or softness of the sound. Ask, why is volume important for communicating with sound? This question sets up learning for the next lesson and wonders and knowledge should be added to the KLEWS chart.

### **Resources and Materials**

*List the materials used to plan and deliver the lesson.*

BrightBox/SmartBoard, internet, pencils, tracking sheet and rubric for discussions, evidence sheets for students, drum(s), tuning forks, tambourines, tissue box guitar, paper, cups, water, beans, paper towels, oscilloscope or app on phone or pc, phone/tablet/pc, chart paper markers

<https://www.youtube.com/watch?v=INqfM1kdfUc>

[https://phet.colorado.edu/sims/html/wave-interference/latest/wave-interference\\_en.html](https://phet.colorado.edu/sims/html/wave-interference/latest/wave-interference_en.html)

Evidence tracking sheets can be found to download from Better Lesson in the following lesson links:

[https://betterlesson.com/lesson/631406/what-makes-sound?from=mtp\\_lesson](https://betterlesson.com/lesson/631406/what-makes-sound?from=mtp_lesson) and

[https://betterlesson.com/lesson/631407/investigating-sound?from=mtp\\_lesson](https://betterlesson.com/lesson/631407/investigating-sound?from=mtp_lesson)

### **Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

BrightBox/SmartBoard and internet required to access information from the internet for purposes of conduction research and citing evidence. Tablet/phone/pc for use with oscilloscope app or an oscilloscope itself to be used to show students sound waves and the connection to volume and pitch.

### **Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

During the lesson students are engaged in a variety of activities allowing for movement (attention and kinesthetic needs), collaboration (diversity and language), discussion (diversity and language, oral/auditory learners), and varied ways to express their knowledge and understanding of the material through drawing, discussion, and small group presentations (adaptations, modifications, diversity and language). Teachers should be aware of, when selecting groups, those students needing support and place them in partnerships that will assist in providing such support including being sensitive to culture and gender needs. Example: Latino and Hispanic learners will need to be in same gender groups to ensure every member of the group speaks. Indigenous learners provided time and opportunity to present with other students who are more reserved rather than boisterous. The addition of the KLEWS provides rigor as students are going to visually and orally connect their discussions to prior and future learning. Connections to literary elements and speaking and listening goals build on student knowledge and illustrate interconnected concepts across content areas. Adding the musical art component provides opportunities for students who have difficulty understanding or connecting to science concepts an alternative path for increasing knowledge by utilizing background, or prior, knowledge.

### **Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students may take questions from the wonder portion of the KLEWS chart to explore independently via books on the subject of sound included in the classroom or school library.

**Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

This unit, is meant to be taught in tandem with a literary unit. The content is intended to be cross content and arts integrated STEM inquiry. The elements about literary devices can be left out and the use of a read aloud only included in the lessons: How is Sound Made and How do We Hear?

Parts of this lesson were taken and adapted from these lessons

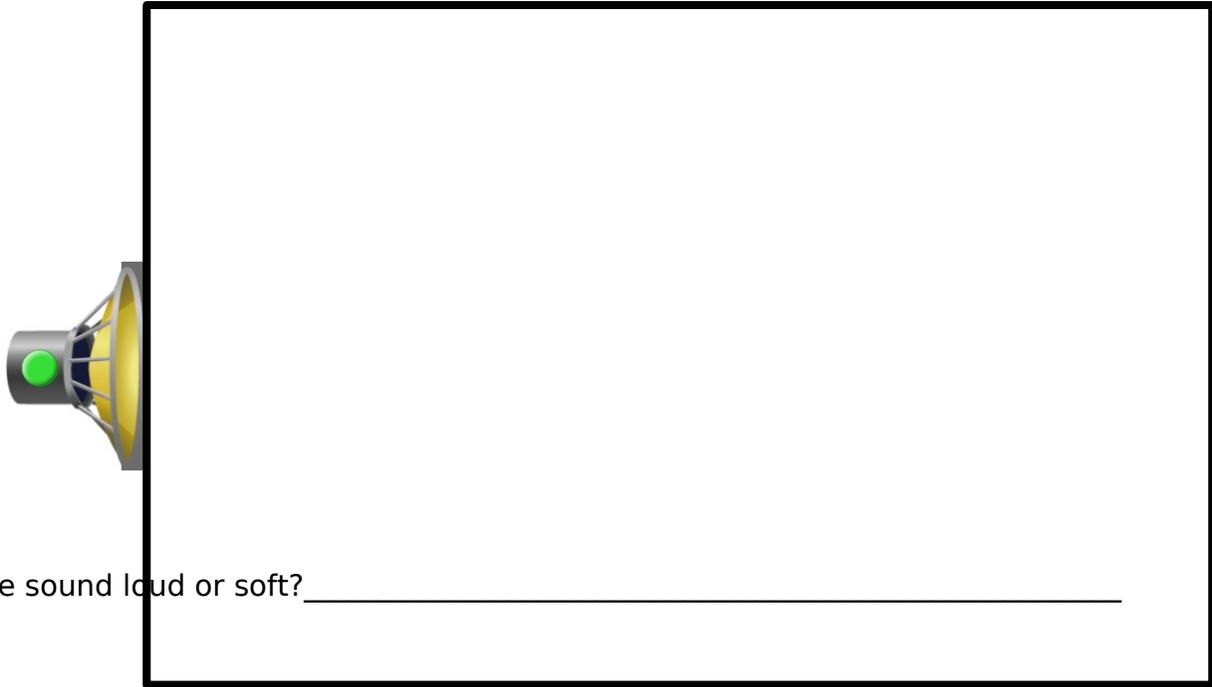
[https://betterlesson.com/lesson/631406/what-makes-sound?from=mtp\\_lesson](https://betterlesson.com/lesson/631406/what-makes-sound?from=mtp_lesson) and

[https://betterlesson.com/lesson/631407/investigating-sound?from=mtp\\_lesson](https://betterlesson.com/lesson/631407/investigating-sound?from=mtp_lesson) on Better Lesson.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Observe sound waves in the simulation and draw what you see here.



Was the sound loud or soft? \_\_\_\_\_

Was the sound high or low? \_\_\_\_\_

When you make the sound low what happens to the waves?

---

---

—

When you make the sound high what happens to the waves?

---

---

—

When you make the sound loud what happens to the waves?

---

---

—

When you make the sound soft what happens to the waves?

---

Scientist Name: \_\_\_\_\_

What makes sound? | What is a sound wave?

+++++

+++++

+++++

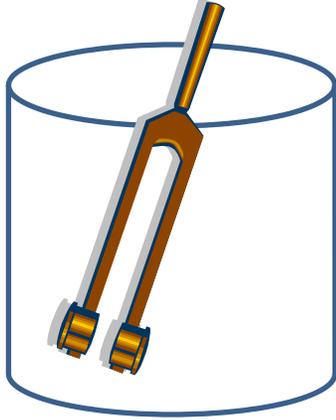
Name: \_\_\_\_\_

# What makes sound? Station Investigation

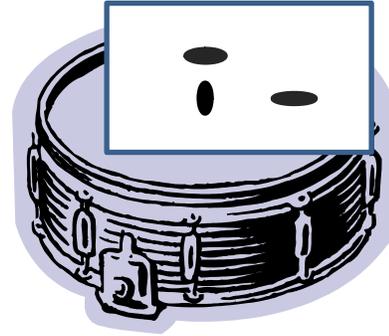
Sound 

Vibration 

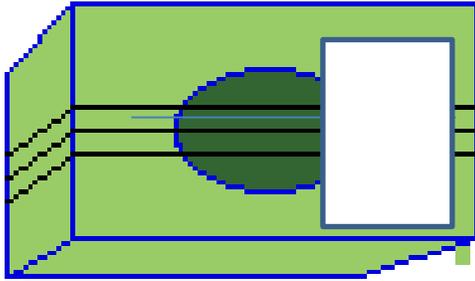
Tuning Forks



Drum, Paper, Beans



Guitar and Paper



Your Voice



## NSU Lesson Plan Format

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	Communicating with Sound
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
<b>Time allotted:</b>	45 min

<p><b>Standards/Performance Indicators/Skills</b></p> <p><i>Identify the state and national standards, addressed by the lesson.</i></p>
<p>State Standards:</p> <p>1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.</p> <p>W.1.7 Participate in shared research and writing projects</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>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.</p> <p>National Standards (Next Generation Science Standards):</p> <p>1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]</p>
<p><b>Learning Objectives/Goals</b></p> <p><i>Describe the lesson's objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i></p>
<p>Lesson's Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i></p> <p>SWBAT identify volume as a measure of how far sound will travel. SWBAT use evidence to plan and investigate ways to use volume as a means to make sound travel over a distance.</p> <p>Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):</p> <p>Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>
<p><b>Assessment (the type[s] of assessment used throughout the lesson)</b></p> <p><i>Identify the assessment that occurred before, during, and after the lesson.</i></p>
<p>Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a document.)</p>

Pre-Assessment of Student Knowledge & Skills (*How will you assess students' prior knowledge and skills before the instruction?*):

Students will review the KLEWS chart and answer the question how do we communicate with sound? Review key points from yesterday's lesson and ask how we might go about investigating ways to best communicate with sound based on the evidence we collected yesterday.

Formative Assessment (*How will you monitor students' understanding during/throughout instruction?*):

Entries into science journals and evidence tracking sheet glued into science journal

Post Assessment (*How will you assess students' understanding after the instruction?*):

Revisit KLEWS at end of lesson to add to knowledge, science stuff, and identify questions answered during today's lesson. Student responses to sentence frames after reading the NASA ebook will also serve as an assessment of understanding.

### **Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

Students will be outside for today's lesson conducting experiments about volume. The students will need to review the rules, procedures, routines, and expectations for working outside noting it is not time to play and run but we are outside for a purpose. Students will have clip boards and pencils so they will need to be incredibly careful when walking and moving. If available students should have on protective eyewear while conducting the outside portion of this experiment.

Introduction/Set Induction/Hook (*Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.*):

Students will learn the song "Sounds" from this unit about sound and light located on page 10.

<https://www.alvordschools.org/cms/lib8/CA01900929/Centricity/Domain/2616/1st%20Grade%20Teachers%20Guide%20Complete.pdf>

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Students will watch the first few seconds (20) of this video about cheerleaders

[https://www.youtube.com/watch?time\\_continue=22&v=We0y1hwWoaU&feature=emb\\_title](https://www.youtube.com/watch?time_continue=22&v=We0y1hwWoaU&feature=emb_title)

Ask students what they observed in the video. What did you hear, how did the cheerleaders communicate with the crowd, were they loud or quiet? Record observations and place wonders on KLEWS chart, as necessary. Show students this page from NASA

<https://spaceplace.nasa.gov/sound-cone/en/> and ask if students see anything similar to what the cheerleaders did in the video. Inform students that today they are going to be conducting investigations about how far sound travels when it is at a soft volume and a loud volume. First, they will need their science journals and evidence recording sheets. Review sheet and expectations for conducting this experiment outside. Next, students will go outside line up in front of the teacher horizontally. As the teacher speaks students will listen as she/he will use a whisper, a normal speaking volume, and a megaphone. After each sound level of communication, they will walk backwards until they can no longer hear their teacher's voice. For instance, in a whisper, students may only take five steps back before they can no longer hear their teacher's voice. Students should be provided time after stopping walking to record their data and step count. Upon returning inside review the evidence collected and add to appropriate sections on KLEWS chart, making note of volume as today's science focus.

**Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson's concepts to previous or future learning. This should be different than the post assessment.*

Divide students into small groups and provide each group with two plastic cups, one paper towel roll, tape, and scissors. Inform the students they will be using the knowledge they gained today plus their knowledge about sound to create a device that will make the volume on a phone louder without touching the volume buttons. Provide students with 10 minutes to complete the activity acknowledging they will not get finished during this time but will present their ideas to the class using evidence from today's lesson as justification. After time has lapsed and students have shared, show students this is a NASA challenge (originally intended for 5-8 grades but adapted here for first by making it a design challenge for only amplifying sound and not addressing the other aspects of wave function discussed in the NASA lesson

[https://www.nasa.gov/sites/default/files/atoms/files/sound\\_effects\\_may508.pdf](https://www.nasa.gov/sites/default/files/atoms/files/sound_effects_may508.pdf)). Explain NASA has, in the past, had to solve big problems with limited resources and little time just as they attempted today. NASA engineers failed many times but kept trying until they got a result that would work. Show students a completed amplifying device and illustrate how it works. Discuss with students the reasons for wanting to make sounds louder or softer citing work from NASA in the document above. Next read the NASA storybook "The Astro-Not-Yets Explore Sound." [https://www.nasa.gov/sites/default/files/atoms/files/astro-not-yets\\_explore\\_sound\\_storybook.pdf](https://www.nasa.gov/sites/default/files/atoms/files/astro-not-yets_explore_sound_storybook.pdf) Explain that beginning tomorrow students will have to use materials from class, recycled objects, and things they bring from home to design a musical instrument. They will have to ask questions, solve problems, and work together to figure out the best way to make an instrument that make both a loud and soft sound and a high and low pitch sound. Provide students with paper to finish the following sentence frames: I will use \_\_\_\_\_ to build my instrument. I will call my instrument a/an \_\_\_\_\_.

IF time allows show this clip of sounds from space to illustrate high and low pitch as well as volume [https://www.nasa.gov/vision/universe/features/halloween\\_sounds.html](https://www.nasa.gov/vision/universe/features/halloween_sounds.html) (Voyager and Saturn are best, clicking 'view track' will open in another window allowing to see the sounds as they play).

**Resources and Materials**

*List the materials used to plan and deliver the lesson.*

SmartBoard/BrightBox, chart paper, marker, scissors, cups, paper towel rolls, tape, scissors, megaphone, internet, science evidence tracking sheet, science journals, plain lined paper

<https://www.alvordschools.org/cms/lib8/CA01900929/Centricity/Domain/2616/1st%20Grade%20Teachers%20Guide%20Complete.pdf>

[https://www.youtube.com/watch?time\\_continue=22&v=We0y1hwWoaU&feature=emb\\_title](https://www.youtube.com/watch?time_continue=22&v=We0y1hwWoaU&feature=emb_title)

[https://www.nasa.gov/sites/default/files/atoms/files/sound\\_effects\\_may508.pdf](https://www.nasa.gov/sites/default/files/atoms/files/sound_effects_may508.pdf)

<https://spaceplace.nasa.gov/sound-cone/en/>

[https://www.nasa.gov/vision/universe/features/halloween\\_sounds.html](https://www.nasa.gov/vision/universe/features/halloween_sounds.html)

evidence tracking sheet found as a download from Better Lesson here:

<https://betterlesson.com/lesson/631408/communicating-with-sound>

**Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

BrightBox/SmartBoard and internet required to access information from the internet for purposes of conduction research and citing evidence. Tablet/phone for use with amplifying device and the connection to volume.

**Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

During the lesson students are engaged in a variety of activities allowing for movement (attention and kinesthetic needs), collaboration (diversity and language), discussion (diversity and language, oral/auditory learners), and

varied ways to express their knowledge and understanding of the material through drawing, discussion, and small group presentations (adaptations, modifications, diversity and language). Teachers should be aware of, when selecting groups, those students needing support and place them in partnerships that will assist in providing such support including being sensitive to culture and gender needs. Example: Latino and Hispanic learners will need to be in same gender groups to ensure every member of the group speaks. Indigenous learners provided time and opportunity to present with other students who are more reserved rather than boisterous. The addition of the KLEWS provides rigor as students are going to visually and orally connect their discussions to prior and future learning. Connections to literary elements and speaking and listening goals build on student knowledge and illustrate interconnected concepts across content areas. Adding the musical art component provides opportunities for students who have difficulty understanding or connecting to science concepts an alternative path for increasing knowledge by utilizing background, or prior, knowledge.

### **Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students can work independently to finish the amplifying machine and/or make modifications to make it reduce volume. Teacher support would be needed to instruct on decreasing volume but can be accomplished with a set of task cards and a brief lesson. These should be prepared in advance.

### **Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

This unit is meant to be taught in tandem with a literary unit. The content is intended to be cross content and arts integrated STEM inquiry. The elements about literary devices can be left out and the use of a read aloud only included in the lessons: How is Sound Made and How do We Hear? In this lesson there is a separate story and writing prompt meant to enhance the engineering design project in the next lesson.

Parts of this lesson were taken and adapted from this lesson

<https://betterlesson.com/lesson/631408/communicating-with-sound> on Better Lesson, as well as, this lesson [https://www.nasa.gov/sites/default/files/atoms/files/sound\\_effects\\_may508.pdf](https://www.nasa.gov/sites/default/files/atoms/files/sound_effects_may508.pdf) from NASA.

# Sound

*to the tune of "London Bridge"*

Sound is made of vibrations,  
vibrations, vibrations

Sound is made of vibrations,  
hmmm, hmmm, hmmm, hmmm.

*(place hand on throat to feel vibration)*

Pitch is either high or low,  
high or low, high or low,  
Pitch is either high or low,  
high or low.

*(Up on tippy-toes, then down to the floor)*

Volume means it's loud or soft,  
loud or soft, loud or soft,  
Volume means it's loud or soft,  
loud or soft.

*(LOUD is said loudly, soft is said softly)*

Sound is made of vibrations,  
vibration, vibrations

Sound is made of vibrations,  
hmmm, hmmm, hmmm, hmmm.

*(place hand on throat to feel vibration)*



### My Sound Data

Sound	#Paces
Whisper 	
Talk 	
Megaphone 	

### My Sound Data

Sound	#Paces
Whisper 	
Talk 	
Megaphone 	

## Background Information

Since the 1960s, NASA engineers have worked to reduce aircraft noise that can be generated from many different sources. Although most of that noise comes from engines, other noise-generating airplane components include the landing gear, where the engines and airframe or body meet, as well as "high lift devices" such as wing flaps.

NASA research has produced a variety of technology solutions, including seamless, acoustic duct liners to keep sound from bouncing off seams inside the engine inlet, and the use of asymmetrical chevrons, scalloped or serrated edges, surrounding the engine core and exhaust. Reducing fan speed and exit velocities on nozzles will also reduce generated noise levels.

The chevron is a noise-reducing technology NASA helped to develop that is now being used on commercial jet engines.

A chevron is a sawtooth shape designed into the ends of the casing around the outside of the jet engine and/or into the interior engine nozzle itself. (See Figure B on first page). The noise we hear from jet engines mainly comes from turbulent air created by two streams of air – one hot and one cold – mixing at the back of the engine. The air coming out of the jet engine itself is extremely hot, while the air flowing around the outside of the engine case is much cooler. When the stream of hot air leaving the inside of the engine meets the stream of cooler air from outside the engine, the air becomes turbulent and noise happens!

NASA discovered that the chevrons can smooth out the point where the two air streams meet, reducing turbulence and therefore the noise.

Since the beginning of chevron development, many different styles and shapes have been tried and used. Earlier chevrons had a more symmetrical shape. As you can see from Figure B the chevron shape looks the same all the way around. However, as chevron technology has matured, some newer designs have a less symmetrical shape. Figure C shows chevrons on the engine casing and the nozzle; the chevrons on the top of the casing are deeper than those on the bottom.

For more information, please visit the following website:  
<https://www.nasa.gov/sites/default/files/atoms/files/chevrons-educator-guide-v5.pdf>

## Silencing the Sound of Supersonic Aircraft

For the first time in decades, NASA aeronautics is moving forward with the construction of a piloted X-plane, designed from scratch to fly faster than sound with the latest in quiet supersonic technologies. This mission – originally known as the Low-Boom Flight Demonstrator, now the X-59 Quiet SuperSonic Technology – will be to demonstrate the ability to fly supersonic, yet generate sonic booms so quiet, people on the ground will hardly notice them, if they hear them at all.

The answer to how the X-plane's design makes a quiet sonic boom is in the way its uniquely-shaped hull generates supersonic shockwaves. Shockwaves from a conventional aircraft design coalesce as they expand away from the airplane's nose and tail, resulting in two distinct and thunderous sonic booms. But the design's shape sends those shockwaves away from the aircraft in a way that prevents them from coming together in two loud booms. Instead, the much weaker shockwaves reach the ground still separated, which will be heard as a quick series of soft thumps – again, if anyone standing outside notices them at all.

For more information please visit the following website:  
<https://www.nasa.gov/lowboom/new-nasa-x-plane-construction-begins-now>

For more information and further activities:

- [www.nasa.gov/X59](http://www.nasa.gov/X59)
- [www.nasa.gov/aeroresearch/stem/X59](http://www.nasa.gov/aeroresearch/stem/X59)
- [www.nasa.gov/stem/nextgenstem/ssgl/](http://www.nasa.gov/stem/nextgenstem/ssgl/)
- [www.nasa.gov/aeroresearch](http://www.nasa.gov/aeroresearch)

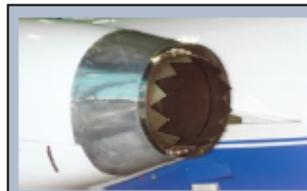


Figure B. An early chevron test article inside an engine nozzle



Figure C. Final asymmetrical shape—in place on engine casing and nozzle.

## Videos Relating to Sound & the X-59

<https://www.youtube.com/playlist?list=PLTUZypZ67cdvZ3TbQbDdqLdOkrcswmkUZ>

## Common Sound Levels

Jet plane at takeoff	110-140dB
Loud rock music	110-130dB
Chain saw	110-120dB
Thunderstorm	40-110dB
Vacuum cleaner	60-80dB
Normal voices	50-70dB
Whisper	20-50dB
Purring cat	20-30dB
Falling leaves	10dB
Silence	0dB

The NASA resource above has been selected because students exploring sound in grade one build a foundation for deeper exploration in waves and energy transfer in grade four and again in middle school. The activity introduces basics of sound, assuming adequate background knowledge, and asks students to use principles of engineering to solve problems related to amplification and muffling of sound. While the activity is suggested for students in grades 5-8 a NSU Lesson Plan Format 34

modification to allow for student creativity and exploration allows students, at this point in this first grade unit, to apply some of their knowledge and gain experience in using limited resources to solve a problem such as they often do within NASA. Eliminating the bulk of the design challenge components, which will later come into play when students build their instruments, and providing time to reflect on the gained background knowledge helps to build confidence in problem solving and critical thinking. While the activity focuses on amplification and muffling of sound, for the purposes of this lesson only the amplification of sound will be used in the activity and a discussion about the need of making sounds quieter will be had, tying together the technologies used by NASA to reduce the sound of aircraft and the story about exploring sound [https://www.nasa.gov/sites/default/files/atoms/files/astro-not-yets\\_explore\\_sound\\_storybook.pdf](https://www.nasa.gov/sites/default/files/atoms/files/astro-not-yets_explore_sound_storybook.pdf). The resource helps students in grade one understand the basic concepts of sound, waves, and how they effect the world around them. Students learning about 1-PS4-1 <https://www.nextgenscience.org/pe/1-ps4-1-waves-and-their-applications-technologies-information-transfer> in first grade will encounter the disciplinary core idea again in fourth grade when studying 4-PS3-1-4 <https://www.nextgenscience.org/dci-arrangement/4-ps3-energy> when students will be discussing the transfer of energies of light, sound, heat, and electricity. The disciplinary core ideas addressed in grade four will again be used when students reach middle school and are then learning about Newton’s laws of motion and energy transfer of objects as well as magnetic and gravitational forces <https://www.nextgenscience.org/dci-arrangement/ms-ps2-motion-and-stability-forces-and-interactions>. The disciplinary core ideas explored in first grade about waves of light and sound have a direct correlation to the study of physics, regarding force and motion, as students progress through the NGSS. The implications for sound and light waves as energy have practical applications in the real world such as when high frequency sound is used to break up kidney stones and in ultrasonic levitation used to manipulate objects inside the body for transfer or removal without using invasive methods (kidney break up: <https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/lithotripsy#:~:text=Lithotripsy%20treats%20kidney%20stones%20by,pass%20through%20the%20urinary%20system>, sound to move and filter things: <https://www.sciencenewsforstudents.org/article/using-sound-to-move-and-filter-things>, and ultrasonic levitation: <https://www.youtube.com/watch?v=6hE6KjLUkiw>). Introducing students to the basics of sound via NASA in first grade will help them to understand the applications of technologies using sound and light waves as forces in a wide variety of areas which will be developed and advanced later in their schooling, particularly as they relate to force and motion in the study of physics. Additionally, introduction of design challenges through NASA and their partners, like PBS kids Design Squad, connect students will with real world technologies while addressing science and engineering practices within the NGSS.

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	Engineering Design Challenge: How can we make sound?
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
<b>Time allotted:</b>	3 – 45 min class periods

<p><b>Standards/Performance Indicators/Skills</b> <i>Identify the state and national standards, addressed by the lesson.</i></p> <p>State Standards:  1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.  W.1.7 Participate in shared research and writing projects  W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.  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.  National Standards (Next Generation Science Standards):  1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]</p>
<p><b>Learning Objectives/Goals</b> <i>Describe the lesson's objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i></p> <p>Lesson's Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i>  SWBAT use evidence from prior investigations to design an instrument from recycled materials that can produce high and low pitch and soft and loud volume.</p> <p>Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):  Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>
<p><b>Assessment (the type[s] of assessment used throughout the lesson)</b> <i>Identify the assessment that occurred before, during, and after the lesson.</i></p> <p>Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a document.)</p>

Pre-Assessment of Student Knowledge & Skills (*How will you assess students' prior knowledge and skills before the instruction?*):

Review KLEWS chart to discuss knowledge obtained thus far. Ask students what is sound, how do you make sound, and how can we observe/measure sound? This is a check for understanding since the end of this lesson the project will serve as a summative assessment for the lessons on sound.

Formative Assessment (*How will you monitor students' understanding during/throughout instruction?*):

Observation of student work, conversations, and collaboration will be used. If there are students whose contributions have been small or of low quality since the start of this unit now is a good time to use the discussion tracker and rubric to fill in any gaps.

Post Assessment (*How will you assess students' understanding after the instruction?*):

Review and close out KLEWS chart for sound. Keep posted in classroom as it will be used in the final lessons of this unit in the summative assessment process. Students will create and present instruments made with the help of their group via feedback, questioning, and testing. Students will work in collaborative groups, but each student will produce an instrument. The group can decide if the instruments will be used to create a band/orchestra. I would not give this as a suggestion but not discourage its discussion amongst students.

### **Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

During these lessons students will be using scissors, tape, glue, strings, rubber bands, hangers, tissue paper, long sticks, popsicle sticks, erasers, a stapler and, possibly, hot glue. Teachers should operate the hot glue guns but go over safety precautions and procedures for using the hot glue gun with teacher support. I allow students to independently use a stapler. Go over safety precautions for use of a stapler, train in how to use properly and tell them to ask for help when need arises for using the stapler in an open position. Protective eyewear, if available, could be used for these lessons. Students will need to be reminded of movement and space requirements for activities requiring them to move or use an instrument that has a big movement.

Introduction/Set Induction/Hook (*Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.*):

Using Mystery Science again, play the video from the lesson "Where do sounds come from?" the interactive book portion only for the start of the lesson. This is basically a review and to get them excited about building their own instrument. <https://mysteryscience.com/light/mystery-2/sounds-vibrations/144?r=58772804#slide-id-0>

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Day 1:

After students finish reading tell them they will be working in groups again to make one of three simple musical instruments. Each group will be responsible for telling the whole group how the instrument makes sound and how we can observe the sound being made. They are the experts! they will take questions from the group and demonstrate how their instrument works and is used. Note: it will be helpful to have kid friendly instructions or task cards for each instrument group as you will be moving around the room to supervise and assist groups but not explicitly teaching how to make each instrument. The idea is to give

students practice learning how to construct and present as it will be a part of their overall project. Based on total number of students you may need to create duplicate stations to keep group size to four. When planning your groups for these lessons be sure to place those together who will be able to work in this manner as a cohesive group over the course of three days. The stations should include the head harp, bee hummer, and secret bells; found here: <https://www.exploratorium.edu/snacks/head-harp>, <https://www.exploratorium.edu/snacks/bee-hummer>, and <https://www.exploratorium.edu/snacks/secret-bells>. Allow for 20-minute construction time and use the sharing/explanations as the closing activity for day 1.

Day 2:

Open today's lesson with this video of a recycled orchestra. Just let them watch the first time and ask what they noticed and wondered about the video. If you choose you can use the critical analysis tool from lesson 2. Reveal it is a group of 300 students from Paraguay who are very poor and make their homes, clothes, and even instruments out of recycled things. Re-watch the video and read for the students the captions. <https://www.youtube.com/watch?v=T8u1qozURG8>

Ask the students to think back on the instruments they have used and made in class. How did each make sound? What parts moved and which stayed still? How did I get the instrument to make a loud or soft sound? How did I get it to make a high squeaky sound or a low sound? Ask students to use this sheet to draw and write about an instrument that makes music <https://mysteryscience.com/docs/49> This can be used as a pre-planning sheet for their project. Students can share, voluntarily, their thoughts on musical instruments. Next, ask students to think back on how we used music to show the emotions of the characters. Did some need to be loud? What about soft? Why? How would a high pitch sound change how we feel about character [insert character name]? What about a low pitch? Why?

Tell students they will work with their groups for the remainder of this lesson and all day tomorrow building and instrument. Although you are working in groups each of you will build your own instrument. Use the members of your group to help you plan, construct and test your instrument. The final product must make loud and soft sounds, as well as, high and low sounds. Provide graph paper to the groups and explain, this is to draw your design and plan for what materials you will need. Note: I typically send home for recycled items at the beginning of each semester based on project needs. I put all items in a central location in the room for students to use as needed. Discussions on fair use and respect for materials may be needed or reviewed prior to this project. Instructions on this engineering design project were taken from [https://pbskids.org/designsquad/pdf/parentseducators/DS\\_TG\\_BuildBand\\_Teach.pdf](https://pbskids.org/designsquad/pdf/parentseducators/DS_TG_BuildBand_Teach.pdf) which has a kid poster here: [https://pbskids.org/designsquad/pdf/parentseducators/DS\\_TG\\_BuildBand\\_Handout.pdf](https://pbskids.org/designsquad/pdf/parentseducators/DS_TG_BuildBand_Handout.pdf). A teaching guide with more information is located here: [https://pbskids.org/designsquad/parentseducators/guides/teachers\\_guide.html](https://pbskids.org/designsquad/parentseducators/guides/teachers_guide.html)

Day 3: Strictly a build day. Allow students to work freely in groups to construct their instruments.

### **Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson's concepts to previous or future learning. This should be different than the post assessment.*

The lesson will conclude with the presentation of each student's instrument and demonstration of how it works. If students run into problems allow for them to work on a redesign as an extension activity. Student presentations should be long enough to demonstrate how their instrument produces the sounds loud, soft, high, and low. Students should explain how their instrument produces these sounds using language obtained in the first half of this unit. If needed presentations can take another day to complete.

### **Resources and Materials**

*List the materials used to plan and deliver the lesson.*

Recycled materials which could include but not limited to cups, paper bags, rubber bands, shoe boxes, tissue boxes, paper towel rolls, coffee pods, coffee containers, egg cartons, wooden spoons, laundry detergent

bottles/tubs, butter tubs, old cookie tins, etc. You will also need items for the instruments to be made: string, index cards, pencil top erasers, popsicle sticks, stapler, wire hangers, scissors, and rubber bands. The music instrument assessment sheet: <https://mysteryscience.com/docs/49>

<https://mysteryscience.com/light/mystery-2/sounds-vibrations/144?r=58772804#slide-id-0>

<https://www.exploratorium.edu/snacks/head-harp>

<https://www.exploratorium.edu/snacks/bee-hummer>

<https://www.exploratorium.edu/snacks/secret-bells>

<https://www.youtube.com/watch?v=T8u1qozURG8>

[https://pbskids.org/designsquad/pdf/parentseducators/DS\\_TG\\_BuildBand\\_Teach.pdf](https://pbskids.org/designsquad/pdf/parentseducators/DS_TG_BuildBand_Teach.pdf)

[https://pbskids.org/designsquad/pdf/parentseducators/DS\\_TG\\_BuildBand\\_Handout.pdf](https://pbskids.org/designsquad/pdf/parentseducators/DS_TG_BuildBand_Handout.pdf)

[https://pbskids.org/designsquad/parentseducators/guides/teachers\\_guide.html](https://pbskids.org/designsquad/parentseducators/guides/teachers_guide.html)

BrightBox/SmartBoard, whiteboard or chart paper, markers, pencils, graph paper, possibly critical analysis tool from lesson 2.

**Attached below:** Rubric for instrument

### **Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

BrightBox/SmartBoard and access to the internet to play videos and pull resources.

### **Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

During the lesson students are engaged in a variety of activities allowing for movement (attention and kinesthetic needs), collaboration (diversity and language), discussion (diversity and language, oral/auditory learners), and varied ways to express their knowledge and understanding of the material through drawing, discussion, and small group presentations (adaptations, modifications, diversity and language). Teachers should be aware of, when selecting groups, those students needing support and place them in partnerships that will assist in providing such support including being sensitive to culture and gender needs. Example: Latino and Hispanic learners will need to be in same gender groups to ensure every member of the group speaks. Indigenous learners provided time and opportunity to present with other students who are more reserved rather than boisterous. The addition of the KLEWS provides rigor as students are going to visually and orally connect their discussions to prior and future learning. Connections to literary elements and speaking and listening goals build on student knowledge and illustrate interconnected concepts across content areas. Adding the musical art component provides opportunities for students who have difficulty understanding or connecting to science concepts an alternative path for increasing knowledge by utilizing background, or prior, knowledge.

### **Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students may spend additional time working on their instrument and modifying to make different sounds or come up with a different iteration that is an improvement on the original.

### **Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

This unit is meant to be taught in tandem with a literary unit. The content is intended to be cross content and arts integrated STEM inquiry. The elements about literary devices can be left out and the use of a read aloud only included in the lessons: How is Sound Made and How do We Hear?

Parts of this lesson were taken and adapted from this lesson  
[https://betterlesson.com/lesson/631409/sound-devices-planning?from=breadcrumb\\_lesson](https://betterlesson.com/lesson/631409/sound-devices-planning?from=breadcrumb_lesson) and  
[https://betterlesson.com/lesson/633823/sound-devices-building-and-testing?  
from=breadcrumb\\_lesson](https://betterlesson.com/lesson/633823/sound-devices-building-and-testing?from=breadcrumb_lesson) on Better Lesson.

	<b>UNSATISFACTORY</b> 1	<b>COMPETENT</b> 2	<b>PROFICIENT</b> 3	<b>DISTINGUISHED</b> 4
<b>Technique / Concepts</b>	Student made little to no effort to plan for a design that incorporated loud/soft and high/low pitch sounds.	Student made some attempt to plan for a design that incorporated loud/soft and high/low pitch sounds. Instrument can produce a high but not low pitch or vice versa; can produce loud but not soft and vice versa.	Student has planned for a design that incorporated loud/soft and high/low pitch sounds. Instrument can produce at least high and low pitch or soft and loud sounds but not both.	Work shows a mastery of skills, the plan for a design incorporated loud/soft and high/low pitch sounds is accomplished. The instrument functions as intended making high/low pitch and soft/loud sounds.
<b>Habits of Mind</b>	Student passively attempts to fulfill assignment without much thought or exploration of possibilities. Student refuses to explore more than one idea.	Developing exploration of possible solutions and innovative thinking. Student has more than one idea but does not pursue.	Student explores multiple solutions and innovative thinking develops and expands during project.	Consistently displays willingness to try multiple solutions and ask thought provoking questions, leading to deeper, more distinctive results. Student fully explores multiple ideas and iterations
<b>Reflection &amp; Understanding</b>	Student shows little awareness of their process. The work does not demonstrate understanding of content. Student is unable to identify how to accomplish making high/low pitch and soft/loud sounds.	Student demonstrates some self-awareness. Work shows some understanding of content, but student cannot justify all of their decisions. Student can identify only high/low pitch or soft/loud sound; requires prompts to explain how sounds are made. Instrument construction is not fully realized; parts may be missing or not simply not attached as planned.	Student shows self-awareness. Work demonstrates understanding of content and most decisions are conscious and justified. Student can identify how high/low pitch is accomplished as well as soft/loud even if instrument is unable to produce correct sounds. Artwork reflects an instrument that is fully intact.	Work reflects a deep understanding of the complexities of the content. Every decision is purposeful and thoughtful. Student identifies pitch and volume and why. Artwork is detailed and student is able to clearly identify the portions of the instrument that function to produce desired sounds.
<b>Craftsmanship</b>	Work is messy and craftsmanship detracts from overall presentation.	Work is somewhat messy and craftsmanship detracts somewhat from overall presentation.	Work is neat and craftsmanship is solid.	Work is impeccable and shows extreme care and thoughtfulness in its craftsmanship.
<b>Effort</b>	Work is not completed in a satisfactory manner. Student shows minimal effort. Student does not use class time effectively.	Work complete but it lacks finishing touches or can be improved with a little effort. Student does just enough to meet requirements.	Completed work in an average manner, time management was metered by teacher not student. Student generated questions and answers but did not contribute to overall class conversation.	Completed work with excellence and lead class discussions. Student exhibited exemplary commitment to the project by displaying time management skills.

## NSU Lesson Plan Format

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	How Do We Communicate with Light?
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Make observations to construct an evidence-based account that objects can be seen only when illuminated.
<b>Time allotted:</b>	45 min

<p><b>Standards/Performance Indicators/Skills</b> <i>Identify the state and national standards, addressed by the lesson.</i></p>
<p>State Standards:            1-PS\$-2: Make observations to construct an evidence-based account that objects can be seen only when illuminated.            W.1.7 Participate in shared research and writing projects            W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.            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.</p> <p>National Standards (Next Generation Science Standards):            1-PS4-2. Make observations to construct an evidence-based account that objects in darkness 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.]</p>
<p><b>Learning Objectives/Goals</b> <i>Describe the lesson's objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i></p>
<p>Lesson's Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i>            SWBAT identify the word illumination as a word relating to science of light. SWBAT identify ways in which they can investigate light and it's properties.</p> <p>Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):            Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>
<p><b>Assessment (the type[s] of assessment used throughout the lesson)</b> <i>Identify the assessment that occurred before, during, and after the lesson.</i></p>
<p>Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a document.)</p>

Pre-Assessment of Student Knowledge & Skills (*How will you assess students' prior knowledge and skills before the instruction?*):

Construct a new KLEWS chart with the essential question How can we communicate with light? Ask students to state the things they know about light. How is this essential question different or similar to the essential question we just answered about sound?

Formative Assessment (*How will you monitor students' understanding during/throughout instruction?*):

For this lesson the formative assessment will be the contributions to the KLEWS chart and list of materials/ideas we will be using to investigate light.

Post Assessment (*How will you assess students' understanding after the instruction?*):

Review the list of materials and ideas for investigations. Set up the question for the next investigation Can we see in the dark? Highlight, circle or write on a separate paper the things you will need to investigate seeing in the dark. If students have listed a way to make complete darkness offer the question, how do we work to block out all the light in our room so we have complete darkness? Is there a way to make a sort of cave?

### **Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

Today's lesson is simply a conversation. Review the rules for civil discourse and contribution to classroom ideas. You may also want to discuss what types of safety ideas you will need to have for upcoming investigations.

Introduction/Set Induction/Hook (*Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.*):

As students enter for class or just before science lessons are to begin turn off all the lights in the room. Have a flashlight ready to be able to shine around the room and use for the introduction of the lesson. Once you have student attention shine the flashlight on students to answer what are you observing right now? Which of your senses are you using? How is this different from our studies on sound? Turn the lights back on and engage in the rest of the lesson.

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Students will be constructing with you a brand new KLEWS chart to focus our investigation on light. We will be conducting a series of investigations to help students understand more about light. Tell the students another way to talk about light is with the word illumination. Have you heard this word before? What do you think it means? Explain illumination is another word for light or to make something be seen using light. Students will need to be thinking about ways to use light: what can a flashlight tell up about how light travels? How do we make shadows? Are there objects through which light can be seen? Are there objects that block light? Develop a list of tools and resources to use for the investigations. Guide students to think about ways in which to block out all light: Was the room completely dark when we turn off the lights? Where and how was light getting in? What can we do to create a space free of light?

### **Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson's concepts to previous or future learning. This should be different than the post assessment.*

Using the list generated, have students gather the material for tomorrow's investigation. While students gather materials, gather some of your own. In preparation for tomorrow's investigation you will need to review the Mystery Science Lesson Can We See in The Dark? and construct three to four larger than pictured in the activity (think Ulta or small Amazon box) dark box for the investigations. Also prepare the "dark box" messages.

<https://mysteryscience.com/docs/191>

### **Resources and Materials**

*List the materials used to plan and deliver the lesson.*

Chart paper, marker, flash light,

[https://betterlesson.com/lesson/632317/science-of-light?from=breadcrumb\\_lesson](https://betterlesson.com/lesson/632317/science-of-light?from=breadcrumb_lesson)

objects from around the classroom gathered by students, bins for objects

### **Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

Flashlight used to demonstrate for the hook of the lesson

### **Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

Today's lesson is an engaging conversation and discussion about the subject material with time allocated for movement. Students will be able to think about a larger, broader topic and we will scale it back to look at each piece before making connections thereby helping students understand the material in different way than they are usually used to looking. Letting students have the lead allows them to take an interest in their learning. Students will receive help and insight from classmates and become experts themselves.

### **Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students can continue to add to the knowledge about light or the objects they think would be good when used to investigate. They can also read books from classroom library or school library about light.

### **Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

Parts of this lesson were taken and adapted from this lesson

[https://betterlesson.com/lesson/632317/science-of-light?from=breadcrumb\\_lesson](https://betterlesson.com/lesson/632317/science-of-light?from=breadcrumb_lesson) on Better Lesson.



## NSU Lesson Plan Format

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	Can We See in the Dark?
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Make observations to construct an evidence-based account that objects can be seen only when illuminated
<b>Time allotted:</b>	45 min

<p><b>Standards/Performance Indicators/Skills</b> <i>Identify the state and national standards, addressed by the lesson.</i></p>
<p>State Standards:            1-PS\$-2: Make observations to construct an evidence-based account that objects can be seen only when illuminated.            W.1.7 Participate in shared research and writing projects            W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.            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.</p> <p>National Standards (Next Generation Science Standards):            1-PS4-2. Make observations to construct an evidence-based account that objects in darkness 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.]</p>
<p><b>Learning Objectives/Goals</b> <i>Describe the lesson's objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i></p>
<p>Lesson's Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i>            SWBAT determine objects can only be seen when enough light is present to illuminate them. SWBAT conduct an investigation and gather evidence about properties of illumination.</p> <p>Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):            Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>
<p><b>Assessment (the type[s] of assessment used throughout the lesson)</b> <i>Identify the assessment that occurred before, during, and after the lesson.</i></p>
<p>Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a document.)</p>

Pre-Assessment of Student Knowledge & Skills (*How will you assess students' prior knowledge and skills before the instruction?*):

Students will review the knowledge and wonder from KLEWS chart from yesterday. How did we answer the questions can you see in the dark and how can we make the room completely dark? Students should record their ideas in their science journals for reference later in the lesson

Formative Assessment (*How will you monitor students' understanding during/throughout instruction?*):

Entries into science journals about the messages they were able to read, how they were able to read them. Making sure some of the shapes and patterns are brightly colored or use reflective material.

Post Assessment (*How will you assess students' understanding after the instruction?*):

Bring students back to the KLEWS chart and add evidence to the chart. Discuss what was learned and review illumination. Students should be guided to determining the next question/investigation about the objects they gathered. Ask what did you notice about some of the objects you looked at today? What happened to the light when it illuminated the objects?

### **Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

Students will be using flashlights and moving around today. Explain the construction of the dark boxes and how to move objects in and out without tearing the box apart. Review procedures for recording observations in their science journals. Review rules and expectations for turn taking.

Introduction/Set Induction/Hook (*Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.*):

Begin with the interactive book from Mystery Science lesson Can you see in the dark?

<https://mysteryscience.com/light/mystery-4/light-illumination/137?r=58772804#slide-id-0>

Stop the video at the end of the book. We have modified the rest of the corresponding activity to better suit our inquiry needs for this lesson that will also lead into the next lesson.

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Show students the larger dark boxes you have made. The boxes should be large enough with a hole in the front big enough for a child to comfortably stick his/her head in and move objects in and out of the box. Use a piece of dark cloth hot glued to the top of the box, in the front, to act as a curtain that will drape over the child's head to make the interior as dark as possible. Students will work in groups using the basket of gathered items and the messages you prepared to place in the box. First, they will look inside the dark box and determine if they can see what is inside. Note: you will need to tell students this is like a guessing game where students will take turns hiding objects in the box while others do not look until told to do so and then switch roles. Next, they will shine a flashlight into the box and discover what it was they were trying to see. Students should record the view in the box before and after the flashlight is used. Provide students with 10 – 15 minutes for investigations, stopping periodically to ensure students are asking questions and making recordings in their journals.

When students have completed the investigations have them gather back at the KLEWS chart to add their evidence and learning. Review illumination and how their investigations helped them to understand what it means to have something illuminated.

### **Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson's concepts to previous or future learning. This should be different than the post assessment.*

Turn off the classroom lights and grab the flashlight. Ask students if they have ever made shadow puppets? Ask why do you think putting your hand in front of the flashlight makes a shadow on the wall? Allow for students to volunteer to come make a shadow puppet. End the lesson with observations about what they think our hands are doing to the light. Ask can light shine through our hands? This sets the stage for using the same materials from today's lesson in tomorrow's lesson on how object do or do not block a beam of light.

### **Resources and Materials**

*List the materials used to plan and deliver the lesson.*

BrightBox/SmartBoard, cardboard boxes, black or dark cloth, hot glue and gun, objects from around the classroom gathered by students, bins for objects, interactive book from Mystery Science

<https://mysteryscience.com/light/mystery-4/light-illumination/137?r=58772804#slide-id-2911>

flashlights, science journals, secret messages found here: <https://mysteryscience.com/docs/191>

### **Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

BrightBox/SmartBoard, flashlights, and internet all used to access resources or materials used for the lessons activities.

### **Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

During the lesson students are engaged in a variety of activities allowing for movement (attention and kinesthetic needs), collaboration (diversity and language), discussion (diversity and language, oral/auditory learners), and varied ways to express their knowledge and understanding of the material through drawing, discussion, and small group presentations (adaptations, modifications, diversity and language). Teachers should be aware of, when selecting groups, those students needing support and place them in partnerships that will assist in providing such support including being sensitive to culture and gender needs. Example: Latino and Hispanic learners will need to be in same gender groups to ensure every member of the group speaks. Indigenous learners provided time and opportunity to present with other students who are more reserved rather than boisterous. The addition of the KLEWS provides rigor as students are going to visually and orally connect their discussions to prior and future learning. Connections to speaking and listening goals build on student knowledge and illustrate interconnected concepts across content areas.

### **Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students who would like to spend more time investigating the dark box and use the materials as a center or Montessori activity, but paper or journal must be used to record observations. Encourage students doing so to look at what happens to the light when it hits the object.

### **Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

This unit is meant to be taught in tandem with a literary unit. The content is intended to be cross content and arts integrated STEM inquiry. The elements about literary devices can be left out and the use of a read aloud only included in the lessons: How is Sound Made and How do We Hear?

Parts of this lesson were taken and adapted from this lesson

[https://betterlesson.com/lesson/635196/communicating-with-light-people?from=breadcrumb\\_lesson](https://betterlesson.com/lesson/635196/communicating-with-light-people?from=breadcrumb_lesson) on Better Lesson, as well as, this lesson <https://docs.google.com/document/d/1vSxtQatuD9PHrSHkaTrIZAfkf3hiZ-HMoSiSx3UDDro/edit?ts=5eae079b> from NextGen Science Storylines Journal.

## NSU Lesson Plan Format

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	Understanding translucent, opaque, transparent, and reflective properties
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
<b>Time allotted:</b>	45 min

<p><b>Standards/Performance Indicators/Skills</b> <i>Identify the state and national standards, addressed by the lesson.</i></p>
<p>State Standards:</p> <p>1-PS4-3: Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.</p> <p>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).</p> <p>W.1.8. With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>National Standards (Next Generation Science Standards):</p> <p>1-PS4-3. Plan and conduct investigations 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.]</p>
<p><b>Learning Objectives/Goals</b> <i>Describe the lesson’s objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i></p>
<p>Lesson’s Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i></p> <p>SWBAT identify transparent, translucent, opaque, and reflective. SWBAT identify objects that block light create shadows.</p> <p>Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):</p> <p>Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>
<p><b>Assessment (the type[s] of assessment used throughout the lesson)</b> <i>Identify the assessment that occurred before, during, and after the lesson.</i></p>
<p>Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a document.)</p>

Pre-Assessment of Student Knowledge & Skills (*How will you assess students' prior knowledge and skills before the instruction?*):

Students should review with you the KLEWS chart for light. Look at the questions generated about light and objects and shadows. Students should be working today to answer the question: what happens when we put objects in the path of light? Our light source is a flashlight again for this lesson.

Formative Assessment (*How will you monitor students' understanding during/throughout instruction?*):

Student entries in their journals using the investigation sheet from Better Lesson  
[https://betterlesson.com/lesson/632318/flashlight-investigation?from=mtp\\_lesson](https://betterlesson.com/lesson/632318/flashlight-investigation?from=mtp_lesson)

Post Assessment (*How will you assess students' understanding after the instruction?*):

Students add to KLEWS evidence and learning to knowledge about light. Discuss observations gathered today as evidence collected to support our learning. It is during this time translucent, transparent, opaque and reflective need to be added to science stuff as we discuss what happened to the light when objects were placed in its path.

### **Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

The room will be dark today, review the rules and procedures for moving carefully around the room in the dark.

Introduction/Set Induction/Hook (*Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.*):



Copy this image to a larger source like a word document or Google Slide to show large enough for all to see. Ask, what do you observe? What is different about the two objects? What do you think is happening with the light? Today you will be placing objects in front of a light source to see how the light reacts.

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Provide students with the bin/basket of materials from yesterday's lesson. Explain today we will be placing the objects in the beam of light and observe if the light passes through the object, if the object blocks the light and what happens when the light is shone on the mirror. Students will work on this investigation for 20 minutes testing and recording what happens with the materials. Be sure to move around the room to monitor recording in journals and monitor discussions. Ask questions! At the end of investigation time call students back to KLEWS chart to discuss evidence. Discussions should provide students with the science terms for today's lesson and be added to the science stuff portion of the KLEWS chart.

### **Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson's concepts to previous or future learning. This should be different than the post assessment.*

Review again today's science terms and evidence to support. Show students this video as a review and setting them up for creating a way to communicate with light.

<https://www.youtube.com/watch?v=YuUJCNzfoBw>

You will need to add to the discussion about the video reflective since this video does not address reflective.

### **Resources and Materials**

*List the materials used to plan and deliver the lesson.*

BrightBox/SmartBoard for displaying photo and playing video, bins with objects (be sure to add mirrors if not already in there), flashlights, science journals, investigation sheets, chart paper, markers, pencils

[https://betterlesson.com/lesson/632318/flashlight-investigation?from=mtp\\_lesson](https://betterlesson.com/lesson/632318/flashlight-investigation?from=mtp_lesson)

<https://www.youtube.com/watch?v=YuUJCNzfoBw>

### **Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

BrightBox/SmartBoard, internet to access materials and flashlights to conduct investigations.

### **Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

During the lesson students are engaged in a variety of activities allowing for movement (attention and kinesthetic needs), collaboration (diversity and language), discussion (diversity and language, oral/auditory learners), and varied ways to express their knowledge and understanding of the material through drawing, discussion, and small group presentations (adaptations, modifications, diversity and language). Teachers should be aware of, when selecting groups, those students needing support and place them in partnerships that will assist in providing such support including being sensitive to culture and gender needs. Example: Latino and Hispanic learners will need to be in same gender groups to ensure every member of the group speaks. Indigenous learners provided time and opportunity to present with other students who are more reserved rather than boisterous. The addition of the KLEWS provides rigor as students are going to visually and orally connect their discussions to prior and future learning. Connections to speaking and listening goals build on student knowledge and illustrate interconnected concepts across content areas.

### **Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students may conduct their own research on light via classroom or school library or watch the Mystery Science on light and objects then do the corresponding activity. <https://mysteryscience.com/light/mystery-3/light-materials-transparent-opaque/106?r=58772804#slide-id-0>

**Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

This unit is meant to be taught in tandem with a literary unit. The content is intended to be cross content and arts integrated STEM inquiry. The elements about literary devices can be left out and the use of a read aloud only included in the lessons: How is Sound Made and How do We Hear?

Parts of this lesson were taken and adapted from this lesson

<https://betterlesson.com/lesson/632318/flashlight-investigation> on Better Lesson.

# Light investigation

Materials:

---

---

---

---

---

---

Which objects made a shadow?



Name: \_\_\_\_\_

Did the light go through any objects?



What happened when light hit the mirror?



## NSU Lesson Plan Format

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	Communicate with Light?
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Make observations to construct an evidence-based account that objects can be seen only when illuminated and plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
<b>Time allotted:</b>	45 min

<b>Standards/Performance Indicators/Skills</b> <i>Identify the state and national standards, addressed by the lesson.</i>	
<p>State Standards:</p> <p>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</p> <p>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).</p> <p>W.1.8. With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>National Standards (Next Generation Science Standards):</p> <p>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.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]</p>	
<b>Learning Objectives/Goals</b> <i>Describe the lesson’s objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i>	
<p>Lesson’s Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i></p> <p>SWBAT identify the how properties of light and objects can be used to communicate.</p> <p>Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):</p> <p>Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>	
<b>Assessment (the type[s] of assessment used throughout the lesson)</b> <i>Identify the assessment that occurred before, during, and after the lesson.</i>	
<p>Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a document.)</p>	

Pre-Assessment of Student Knowledge & Skills (*How will you assess students' prior knowledge and skills before the instruction?*):

Students review what was added to the KLEWS at the end of yesterday's lesson and attempt to answer the question: how do we use light to communicate? Student responses should be recorded in wonder and know as appropriate.

Formative Assessment (*How will you monitor students' understanding during/throughout instruction?*):

Student entries into science journals and discussions.

Post Assessment (*How will you assess students' understanding after the instruction?*):

Revisit the KLEWS chart adding to the chart the evidence collected in their journals from investigations carried out during today's lessons.

### **Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

Today students will work with paper circuitry. While this is not dangerous discussions need to be had about electricity and respect for its power. Students will need to be incredibly careful in working with the copper tape as it tears easily. As always review scissor safety.

Introduction/Set Induction/Hook (*Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.*):

Play this 6 second video <https://www.youtube.com/watch?v=Lzq-wRHCTKc> and ask students what they think is going on? What is glowing? Why? What is moving? Why does the light move? Explain: today we will be observing things around our world that use light to communicate. You will be recording those observations and then we will create a message of our own using light.

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Students will need their science journals and recording sheet found from Better Lesson here: [https://betterlesson.com/lesson/635196/communicating-with-light-people?from=breadcrumb\\_lesson](https://betterlesson.com/lesson/635196/communicating-with-light-people?from=breadcrumb_lesson)

Students will watch clips of three videos in which light is used to communicate.

Lighthouse: <https://www.youtube.com/watch?v=x6O9FdyQjPE> play the whole thing it is only a little over a minute long

Morse Code: <https://vimeo.com/81420294> stop at the 1:40 mark, roughly after C

Light Show: [https://www.youtube.com/watch?v=QBRNgXNuR\\_U&feature=emb\\_title](https://www.youtube.com/watch?v=QBRNgXNuR_U&feature=emb_title) stop at around 1:21 mark just after the insane rapping

Students will use the investigations prompts to make their own notes in their notebooks. Students may draw pictures to accompany the words they write in their journals to describe how light is being used to communicate in each video. The students will briefly share their observations after all three videos are played. Engage in a discussion about the ways in which the communication was the same and different and what they noticed about the communication styles and reasons for communicating. What materials were used?

Go back to the bioluminescent plant video, explain the plant is trying to communicate it is not a plant to be eaten by the caterpillar. It is trying to scare the caterpillar away. Look at some of the ways you stated we use sound to communicate around our school, home and community. Today you will create a message that has a light in it. We are going to use a light source similar to the flashlight. We will be making

something call paper circuits. <https://www.makerspaces.com/paper-circuits/> Using copper tape, mini led lights, and a battery we will create a work of art with a light to send a special message to someone you love or care for!

Instruct students on the method for creating the paper circuits. I created task cards so students could have a visual reminder of the steps as the worked in groups.

<https://drive.google.com/file/d/15GRKK5LeeoApzKxkq-zWVmmHoDwKzymbB/view?usp=sharing>

Note: if you buy the lights with the alternating diodes then you will need to make sure the positive diode is connected to the positive side of the coin battery and vice versa for negative or the light will not work! Once instructions are complete allow students to go to groups to create. Provide 15 – 20 minutes for creating the artwork and building the circuits. This also allows time for troubleshooting.

Once students have completed their illuminating artwork, return to the KLEWS chart to add to our knowledge and evidence about communicating with light. Adding bioluminescent to our science vocabulary.

### **Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson's concepts to previous or future learning. This should be different than the post assessment.*

As a review of bioluminescent and how our world uses light to communicate show this video about lightening bugs!

[https://www.youtube.com/watch?v=QCWkzQqO7Ro&feature=emb\\_title](https://www.youtube.com/watch?v=QCWkzQqO7Ro&feature=emb_title)

Stop the video to discuss/review what we have learned about communicating with light.

### **Resources and Materials**

*List the materials used to plan and deliver the lesson.*

BrightBox/SmartBoard, science journals, journal prompt, internet, chart paper, markers, cardstock, crayons/colored pencils, tape, copper tape, 3v coin batteries, mini dual diode LED lights, patience, task cards

<https://www.youtube.com/watch?v=Lzq-wRHCTKc>

[https://betterlesson.com/lesson/635196/communicating-with-light-people?from=breadcrumb\\_lesson](https://betterlesson.com/lesson/635196/communicating-with-light-people?from=breadcrumb_lesson)

<https://www.youtube.com/watch?v=x6O9FdyQjPE>

<https://vimeo.com/81420294>

[https://www.youtube.com/watch?v=QbRNgXNuR\\_U&feature=emb\\_title](https://www.youtube.com/watch?v=QbRNgXNuR_U&feature=emb_title)

. <https://www.makerspaces.com/paper-circuits/>

**Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

BrightBox/SmartBoard, internet, paper circuit materials for electrical engineering/coding basics

**Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

During the lesson students are engaged in a variety of activities allowing for movement (attention and kinesthetic needs), collaboration (diversity and language), discussion (diversity and language, oral/auditory learners), and varied ways to express their knowledge and understanding of the material through drawing, discussion, and small group presentations (adaptations, modifications, diversity and language). Teachers should be aware of, when selecting groups, those students needing support and place them in partnerships that will assist in providing such support including being sensitive to culture and gender needs. Example: Latino and Hispanic learners will need to be in same gender groups to ensure every member of the group speaks. Indigenous learners provided time and opportunity to present with other students who are more reserved rather than boisterous. The addition of the KLEWS provides rigor as students are going to visually and orally connect their discussions to prior and future learning. Connections to speaking and listening goals build on student knowledge and illustrate interconnected concepts across content areas.

**Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students can work together to create a lighted mural combining art and light for a class display. Have students choose a theme to communicate a message like kindness or Happy Earth Day!

**Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

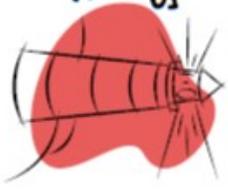
Parts of this lesson were taken and adapted from this lesson

[https://betterlesson.com/lesson/635196/communicating-with-light-people?](https://betterlesson.com/lesson/635196/communicating-with-light-people?from=breadcrumb_lesson)

[from=breadcrumb\\_lesson](https://betterlesson.com/lesson/635196/communicating-with-light-people?from=breadcrumb_lesson) and this one [https://betterlesson.com/lesson/635297/communicating-with-light-animals?from=breadcrumb\\_lesson](https://betterlesson.com/lesson/635297/communicating-with-light-animals?from=breadcrumb_lesson) on Better Lesson

How can we communicate with light?

- Lighthouses
- Morse code
- Spotlights



• \_\_\_\_\_

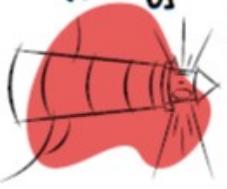
• \_\_\_\_\_

• \_\_\_\_\_

• \_\_\_\_\_

How can we communicate with light?

- Lighthouses
- Morse code
- Spotlights



• \_\_\_\_\_

• \_\_\_\_\_

• \_\_\_\_\_

• \_\_\_\_\_

How can we communicate with light?

- Lighthouses
- Morse code
- Spotlights



• \_\_\_\_\_

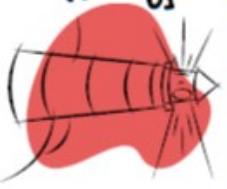
• \_\_\_\_\_

• \_\_\_\_\_

• \_\_\_\_\_

How can we communicate with light?

- Lighthouses
- Morse code
- Spotlights



• \_\_\_\_\_

• \_\_\_\_\_

• \_\_\_\_\_

• \_\_\_\_\_

## NSU Lesson Plan Format

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	Engineering Design Challenge: Make A Device to Communicate with Light
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
<b>Time allotted:</b>	3 - 45 min class periods

<p><b>Standards/Performance Indicators/Skills</b> <i>Identify the state and national standards, addressed by the lesson.</i></p>
<p>State Standards:</p> <p>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</p> <p>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).</p> <p>W.1.8. With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>National Standards (Next Generation Science Standards):</p> <p>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.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]</p>
<p><b>Learning Objectives/Goals</b> <i>Describe the lesson’s objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i></p>
<p>Lesson’s Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i></p> <p>SWBAT create a device, using acquired knowledge, that communicates over a distance using light.</p> <p>Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):</p> <p>Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>
<p><b>Assessment (the type[s] of assessment used throughout the lesson)</b> <i>Identify the assessment that occurred before, during, and after the lesson.</i></p>
<p>Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a</p>

document.)

Pre-Assessment of Student Knowledge & Skills (*How will you assess students' prior knowledge and skills before the instruction?*):

Students will review the KLEWS chart to check for understanding and clear up and misconceptions. Allow students to ask and answer questions about all the evidence collected thus far.

Formative Assessment (*How will you monitor students' understanding during/throughout instruction?*):

Observations of group work and discussions will serve as formative assessments for these lessons

Post Assessment (*How will you assess students' understanding after the instruction?*):

The completed project is a summative assessment of the lessons on communicating with light for this unit.

### **Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

Students will be working with tape, glue, markers and scissors (possibly a stapler). Review procedures, policies, and routines before lesson. They will also be engaging in a movement activity, reminders on spacing and controlling your body will need to be reviewed.

Introduction/Set Induction/Hook (*Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.*):

Begin with the first part of the video from the Mystery Science lesson on light and communicating. Watch only the first portion of the video about communication with light.

<https://mysteryscience.com/light/mystery-5/light-communication-engineering/131?r=58772804#slide-id-0>

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Day 1:

Engage students in a discussion about the ways in which we have already learned to communicate with light. Play the second part of the video which begins the process for creating a way to use light to communicate. The second portion of the video contains a movement activity to get students inspired to learn about using light to communicate. Stop the video at the section where students will be using the provided communication planning sheet from Mystery Science

<https://mysteryscience.com/docs/138>. The remainder of the activity will look a little different.

Provide students with markers and the communication planning sheet but have them work in groups again as they did for the sound challenge. In groups of 4 it will be easy for them to partner off and switch partners. Have each person decided what their colors are and what they mean. Provide 2 flashlights to each group and allow them to try and communicate with their partners in the group. Next, have students review the KLEWS chart to see if they need to add any more information about their observations and discoveries to the chart. Review key terms and discuss how using the paper, dark marker colors, and light match up with what they have learned about different materials and light. Finally, conclude the lesson with the last portion of the wrap up video in the Mystery Science lesson.

Day 2:

Reshow the last portion of the Mystery Science wrap up video. Provide students with graph paper and allow them to collaborate with their groups on a design for using light to communicate using classroom materials, colors, flashing patterns, and flashlights as their source of light. Allow students to pick from recycled materials as well as classroom items that can be used for this purpose, meaning they might be damaged or unable to be used in the same way after this. So, missing parts, lost part of a set of something

– reuse it here! After collaboration with groups bring students back together to share their ideas with one another. Allow for students to ask and answer questions about their designs to think through how they will or will not work. As before, although they are working in groups each student will need to create their own device.

Day 3: build day! Students will work on their designs all day.

### **Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson's concepts to previous or future learning. This should be different than the post assessment.*

Students will present their devices, method for design and demonstrate how the communication device works. The presentation is for sharing the knowledge gain throughout the lessons. The device itself will be graded with the rubric provided as the assessment for learning.

### **Resources and Materials**

*List the materials used to plan and deliver the lesson.*

BrightBox/SmartBoard, chart paper, markers, recycled materials, classroom rejects that can be used for the construction of devices, rubric, color code sheet from Mystery Science

<https://mysteryscience.com/light/mystery-5/light-communication-engineering/131?r=58772804#slide-id-0>

<https://mysteryscience.com/docs/138>

**Attached at bottom:** rubric

### **Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

BrightBox/SmartBoard, internet for presenting lesson components. Flashlight for completion of lesson requirements.

### **Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

During the lesson students are engaged in a variety of activities allowing for movement (attention and kinesthetic

needs), collaboration (diversity and language), discussion (diversity and language, oral/auditory learners), and varied ways to express their knowledge and understanding of the material through drawing, discussion, and small group presentations (adaptations, modifications, diversity and language). Teachers should be aware of, when selecting groups, those students needing support and place them in partnerships that will assist in providing such support including being sensitive to culture and gender needs. Example: Latino and Hispanic learners will need to be in same gender groups to ensure every member of the group speaks. Indigenous learners provided time and opportunity to present with other students who are more reserved rather than boisterous. The addition of the KLEWS provides rigor as students are going to visually and orally connect their discussions to prior and future learning. Connections to speaking and listening goals build on student knowledge and illustrate interconnected concepts across content areas.

**Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students can work independently to create brand new devices or expand upon their designs.

**Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

Parts of this lesson were taken and adapted from this lesson [https://betterlesson.com/lesson/635312/communication-devices-planning?from=breadcrumb\\_lesson](https://betterlesson.com/lesson/635312/communication-devices-planning?from=breadcrumb_lesson) on Better Lesson.

	<b>UNSATISFACTORY</b> 1	<b>COMPETENT</b> 2	<b>PROFICIENT</b> 3	<b>DISTINGUISHED</b> 4
<b>Technique / Concepts</b>	Student made little to no effort to plan for a design that incorporated light for communication.	Student made some attempt to plan for a design that incorporated light for communication but design and end product do not reflect concept is mastered.	Student has planned for a design that incorporated communicating with light Device can be used but one component does not work as intended.	Work shows a mastery of skills, the plan for a design incorporated light as a communication device. The device functions as intended.
<b>Habits of Mind</b>	Student passively attempts to fulfill assignment without much thought or exploration of possibilities. Student refuses to explore more than one idea.	Developing exploration of possible solutions and innovative thinking. Student has more than one idea but does not pursue.	Student explores multiple solutions and innovative thinking develops and expands during project.	Consistently displays willingness to try multiple solutions and ask thought provoking questions, leading to deeper, more distinctive results. Student fully explores multiple ideas and iterations
<b>Reflection &amp; Understanding</b>	Student shows little awareness of their process. The work does not demonstrate understanding of content. Student is unable to identify how to accomplish communicating with light.	Student demonstrates some self-awareness. Work shows some understanding of content, but student cannot justify all of their decisions. Student can identify only source of light or code planned to use but does not know why these are related. Device construction is not fully realized; parts may be missing or not simply not attached as planned.	Student shows self-awareness. Work demonstrates understanding of content and most decisions are conscious and justified. Student can identify how light is used to communicate. Work reflects an device that is fully intact.	Work reflects a deep understanding of the complexities of the content. Every decision is purposeful and thoughtful. Student identifies light source and multiple ways to communicate. Work is detailed and student is able to clearly identify the portions of the device that function to produce desired effect.
<b>Craftsmanship</b>	Work is messy and craftsmanship detracts from overall presentation.	Work is somewhat messy and craftsmanship detracts somewhat from overall presentation.	Work is neat and craftsmanship is solid.	Work is impeccable and shows extreme care and thoughtfulness in its craftsmanship.
<b>Effort</b>	Work is not completed in a satisfactory manner. Student shows minimal effort. Student does not use class time effectively.	Work complete but it lacks finishing touches or can be improved with a little effort. Student does just enough to meet requirements.	Completed work in an average manner, time management was metered by teacher not student. Student generated questions and answers but did not contribute to overall class conversation.	Completed work with excellence and lead class discussions. Student exhibited exemplary commitment to the project by displaying time management skills.

## NSU Lesson Plan Format

<b>Candidate Name:</b>	Kelly Perry
<b>Date:</b>	May 4, 2020
<b>Lesson Title:</b>	Engineering Design Challenge: Create a Device to Communicate Using Light and/or Sound
<b>Grade Level:</b>	1
<b>Subject:</b>	Physical Science: Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
<b>Time allotted:</b>	3 - 45 min class periods

<p><b>Standards/Performance Indicators/Skills</b> <i>Identify the state and national standards, addressed by the lesson.</i></p>
<p>State Standards:</p> <p>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</p> <p>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).</p> <p>W.1.8. With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>National Standards (Next Generation Science Standards):</p> <p>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.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]</p>
<p><b>Learning Objectives/Goals</b> <i>Describe the lesson’s objectives and the learning outcomes that are appropriate for meeting curricular/classroom needs.</i></p>
<p>Lesson’s Objective(s) <i>Explain in your own words, using measurable goals, what you want your students to know and be able to do after instruction:</i></p> <p>SWBAT plan and create a device used to communicate with sound and/or light across a distance.</p> <p>Unit Learning Goal (If applicable, unit to which this lesson relates such as a unit that would last a few days to a week):</p> <p>Lesson is part of Light and Sound Unit consisting of 11 lessons stretching over the course of 4 weeks. SWBAT define, plan, and construct a device to communicate over a distance using light or sound.</p>
<p><b>Assessment (the type[s] of assessment used throughout the lesson)</b> <i>Identify the assessment that occurred before, during, and after the lesson.</i></p>
<p>Examples of assessments are: Pre-test, Observation, Peer Evaluation, Checklist, Portfolio, Journals, Essay, Exam, Group Presentation, Concept Mapping, Rubric, Scored Discussions, Oral Presentations, etc. (This should be a document.)</p>

Pre-Assessment of Student Knowledge & Skills (*How will you assess students' prior knowledge and skills before the instruction?*):

Review KLEWS charts from both sound and light. Check for student understanding and review key terms. Review instruments and light communication devices made by students.

Formative Assessment (*How will you monitor students' understanding during/throughout instruction?*):

Observations of work and conversations

Post Assessment (*How will you assess students' understanding after the instruction?*):

Rubric for grading finished project: Communication device using light and/or sound. This is a summative assessment of the entire unit

### **Lesson Structure and Procedures**

*Describe the sequence of events of the lesson elements, including the before and during the lesson (i.e., the engagement/opening, the procedures used, the activities for guided practice).*

Safety:

Students will be working with recycled materials, staplers, tape, copper tape, binder clips, batteries and lights. Added to this lesson is copper wire and wire cutters which, like the glue gun, will require adult assistance. Lessons on safety with these items from previous lessons will need to be reviewed.

Introduction/Set Induction/Hook (*Describe how you will interest, engage, and involve your students so that they are motivated to learn. This should be different than your pre-assessment.*):

Have students watch this video on the engineering process. Discuss way in which they have already demonstrated they are engineers. Show the engineering design process poster and review with student the ways in which we have been engineers in this classroom.

[https://www.youtube.com/watch?time\\_continue=145&v=wE-z\\_TJyziI&feature=emb\\_title](https://www.youtube.com/watch?time_continue=145&v=wE-z_TJyziI&feature=emb_title)

Instructional Procedures and Learning Activities (*Describe the instructional strategy that will be used to provide the learning opportunities. Describe what the teacher and students will actually DO as they engage in learning. Make sure they are aligned with the specific lesson objective(s) and the standard(s).*):

Day 1:

Show students examples of how and why we use light and sound to communicate by showing these to videos, or portions of them.

[https://www.youtube.com/watch?time\\_continue=12&v=QlIQ6TmXII&feature=emb\\_title](https://www.youtube.com/watch?time_continue=12&v=QlIQ6TmXII&feature=emb_title)

[https://www.youtube.com/watch?v=ZGYq2\\_W7AyU&feature=emb\\_title](https://www.youtube.com/watch?v=ZGYq2_W7AyU&feature=emb_title)

Tell students they are going to make a device that will use sound or light or both to communicate with someone from a distance. Why would you need to talk with them? What are you trying to communicate? Think about times, like when we are on the playground and you are trying to tell me or a classmate something important, like someone is hurt. What will your device communicate and how?

Explain that unlike in the last design they used an already made flashlight, today they will be making their own flashlight to use in their device if they choose. Show the video and instruct students on completion of their LED flashlights. <https://www.instructables.com/id/LED-Popsicle-Flashlight/>

Next, allow students to go with their groups and, with provided graph paper, make a plan for their device including the list of parts to be used from classroom supply, Note: your recycled materials may need replenishing prior to this lesson, check for low supplies and send a list to fellow teachers or to parents willing to donate their trash.

Days 2 and 3 need to be dedicated to the build and engineering design process. Students should collaborate within their groups to provide feedback and support on their individual devices.

### **Lesson Conclusion Activity**

*Include the conclusion activity, review activity, summarize the lesson, and/or help students connect the lesson's concepts to previous or future learning. This should be different than the post assessment.*

Students present their devices to the class; this is not part of the assessment process but a part of the engineering design process whereby experts share their work for peer review and feedback. This process may take longer than a day. If time and attention allow show students historical references where light and sound were used to communicate such as in the underground railroad and Paul Revere.

### **Resources and Materials**

*List the materials used to plan and deliver the lesson.*

BrightBox/SmartBoard, chart paper, markers, crayons, colored pencils, tissue paper, cardstock, copper tape, copper wire, small binder clips, popsicle sticks, 3v coin batteries, mini dual diode LED lights, recycle materials and classroom lost items, tape, scissors, glue, hot glue and gun, wire cutters, staplers, string

[https://www.youtube.com/watch?time\\_continue=12&v=QlIQ6TmXII&feature=emb\\_title](https://www.youtube.com/watch?time_continue=12&v=QlIQ6TmXII&feature=emb_title)

[https://www.youtube.com/watch?v=ZGYq2\\_W7AyU&feature=emb\\_title](https://www.youtube.com/watch?v=ZGYq2_W7AyU&feature=emb_title)

[https://www.youtube.com/watch?time\\_continue=145&v=wE-z\\_TJyziI&feature=emb\\_title](https://www.youtube.com/watch?time_continue=145&v=wE-z_TJyziI&feature=emb_title)

<https://www.instructables.com/id/LED-Popsicle-Flashlight/>

### **Technology**

*Describe the instructional and/or assistive technology incorporated into the lesson to enhance instruction and student learning.*

*Describe the technology used to support and advance instruction, for example, SmartBoard, iPad, cell phones, Distance Learning, Webcast, Digital Camera/Video, CD, DVD, Internet, Assistive Technology, robotics, calculator, etc.*

BrightBox/SmartBoard, internet for accessing lesson instructions and materials; flashlight materials: copper wire and tape, LED bulbs, binder clips, popsicle sticks, and batteries to make flashlight

### **Differentiation/Accommodations/Modifications/Increases in Rigor**

*Describe the modifications made to meet the needs of all learners and to accommodate differences in students' learning, culture, language, etc.*

*Discuss how different learning needs are met, such as, learning styles, exceptionalities, diversity and language needs, adaptations, modifications, 504, IEP, etc.*

During the lesson students are engaged in a variety of activities allowing for movement (attention and kinesthetic needs), collaboration (diversity and language), discussion (diversity and language, oral/auditory learners), and varied ways to express their knowledge and understanding of the material through drawing, discussion, and small group presentations (adaptations, modifications, diversity and language). Teachers should be aware of, when selecting groups, those students needing support and place them in partnerships that will assist in providing such support including being sensitive to culture and gender needs. Example: Latino and Hispanic learners will need to

be in same gender groups to ensure every member of the group speaks. Indigenous learners provided time and opportunity to present with other students who are more reserved rather than boisterous. The addition of the KLEWS provides rigor as students are going to visually and orally connect their discussions to prior and future learning. Connections to speaking and listening goals build on student knowledge and illustrate interconnected concepts across content areas.

### **Extensions**

*Describe the activities for early finishers that extends the students' understanding of and thinking about the learning objectives/goals by having them apply their new knowledge in a different way.*

*When students complete the required activity/assignment, what will they do to stay engaged and challenge their learning? (This is not required for all students, but an extension for those students who finish quickly.)*

Students may have extra time to improve or modify their designs after they have been evaluated.

### **Additional Information**

*If applicable, identify any area or lesson component that was not covered by this lesson plan format but that you feel is vital to include in a description of the lesson.*

Parts of this lesson were taken and adapted from this lesson  
[https://betterlesson.com/lesson/635309/communicating-with-light-and-sound-fire?from=breadcrumb\\_lesson](https://betterlesson.com/lesson/635309/communicating-with-light-and-sound-fire?from=breadcrumb_lesson) on Better Lesson.

	<b>UNSATISFACTORY</b> 1	<b>COMPETENT</b> 2	<b>PROFICIENT</b> 3	<b>DISTINGUISHED</b> 4
<b>Technique / Concepts</b>	Student made little to no effort to plan for a design that incorporated either light or sound for communication.	Student made some attempt to plan for a design that incorporated light and/or sound for communication, but design and end product do not reflect a problem was solved or question answered.	Student has planned for a design that incorporated communicating with light and/or sound. Device clearly demonstrates and answer to a problem or question answered.	Work shows a mastery of skills, the plan for a design incorporated light and sound as a communication device. The device functions as intended having solved the problem addressed in planning.
<b>Habits of Mind</b>	Student passively attempts to fulfill assignment without much thought or exploration of possibilities. Student refuses to explore more than one idea.	Developing exploration of possible solutions and innovative thinking. Student has more than one idea but does not pursue.	Student explores multiple solutions and innovative thinking develops and expands during project.	Consistently displays willingness to try multiple solutions and ask thought provoking questions, leading to deeper, more distinctive results. Student fully explores multiple ideas and iterations
<b>Reflection &amp; Understanding</b>	Student shows little awareness of their process. The work does not demonstrate understanding of content. Student is unable to identify how to accomplish communicating with light or sound.	Student demonstrates some self-awareness. Work shows some understanding of content, but student cannot justify all their decisions. Student can identify a problem, but device does not offer a solution. Device construction is not fully realized; parts may be missing or simply not attached as planned.	Student shows self-awareness. Work demonstrates understanding of content and most decisions are conscious and justified. Student can identify how light and/or sound is used to communicate. Work reflects a device that is fully intact and solves the problem posed.	Work reflects a deep understanding of the complexities of the content. Every decision is purposeful and thoughtful. Student identifies light and sound source and multiple ways to communicate. Work is detailed and student can clearly identify the portions of the device that function to produce desired effect.
<b>Craftsmanship</b>	Work is messy and craftsmanship detracts from overall presentation.	Work is somewhat messy and craftsmanship detracts somewhat from overall presentation.	Work is neat and craftsmanship is solid.	Work is impeccable and shows extreme care and thoughtfulness in its craftsmanship.
<b>Effort</b>	Work is not completed in a satisfactory manner. Student shows minimal effort. Student does not use class time effectively.	Work complete but it lacks finishing touches or can be improved with a little effort. Student does just enough to meet requirements.	Completed work in an average manner, time management was metered by teacher not student. Student generated questions and answers but did not contribute to overall class conversation.	Completed work with excellence and lead class discussions. Student exhibited exemplary commitment to the project by displaying time management skills.

