T2L Curriculum Unit

Teach To Learn
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Light and Sound  Gr 1
Light and Sound

Physical Science/Grade 1

In this Unit, students will explore the concept of light and sound. This unit builds upon previous experiences in pre-k and kindergarten that focus on using their senses to make observations of the world around them and understanding reasons for change in some common phenomena. In first grade, students begin to identify patterns and use this knowledge to predict future patterns. They will learn that light and sound pass through various materials in different ways and that light and sound can be used to send signals over a distance. (Adapted from NGSS)

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Table of Contents

Unit Plan
Lesson 1: “Sensing Light and Sound” Literacy Lesson (Classroom Teacher)
Lesson 2: Introduction to Sound and Vibration
Lesson 3: “Vibrations Make Sound” Literacy Lesson (Classroom Teacher)
Lesson 4: Visualizing Vibrations
Lesson 5: Creating Vibrations
Lesson 6: Light Investigation (Classroom Teacher and Science Fellow)
Lesson 7: “Playing with Light and Shadows” Literacy Lesson (Classroom Teacher)
Lesson 8: Light Interactions
Lesson 9: Light Art
Lesson 10: “Sending Messages with Light and Sound” Literacy Lesson (Classroom Teacher)
Lesson 11: Sending Messages: Sound
Lesson 12: Sending Messages: Light
Lesson 13: CEPA: Communicating with Light and Sound

Unit Resources
### UNIT PLAN

#### Stage 1 Desired Results

<table>
<thead>
<tr>
<th>STANDARDS</th>
<th>UNDERSTANDINGS</th>
<th>ESSENTIAL QUESTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-PS4-1. Demonstrate 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, a stretched string or rubber band, and a drum head. 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.]</td>
<td><strong>Students will understand that...</strong>&lt;br&gt;• Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1) <strong>Q1: What makes sound?</strong>&lt;br&gt;• Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3) <strong>Q2: How do light and sound travel?</strong>&lt;br&gt;• People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4) <strong>Q3: How can we use light and sound to send messages?</strong></td>
<td></td>
</tr>
<tr>
<td>1-PS4-3. Determine the effect of placing materials that allow light to pass through them, allow only some light through them, block all the light, or redirect light when put in the path of a beam of light. [Clarification Statement: Effects can include some or all light passing through, creation of a shadow, or redirecting light.] [Assessment Boundary: Assessment does not include quantitative measures.]</td>
<td></td>
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<tr>
<td>1-PS4-4. Use tools and materials to design and build a device that uses light or sound to send a signal over a distance.* [Clarification</td>
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| Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats. | **Objectives**

| **Students will be able to:** |
| Science Learning Objectives |
| - Communicate that vibrations make sound |
| - Identify relative pitch and volume of various sound samples |
| - Record observations of vibrations |
| - Demonstrate that vibrations create sound |
| - Make a model to show that a beam of light moves in a straight line. |
| - Demonstrate that when a beam of light is blocked it creates a shadow that is directly related to the shape of the object creating the shadow |
| - Demonstrate that light can pass through some objects and that some objects will stop light completely |
| - Create a device that uses vibration to transmit a message |
| - Explain the path of vibration used in a communication device |
| - Communicate a message using only a light source |

**Literacy Standards**

1.RI.5 Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.

1.RI.6 Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.

**Literacy Learning Objectives**

- Use text features to make predictions before and during reading
- Identify text features in an informational text
- Identify information given in a photograph
- Use headings to make predictions during reading
- Write a sentence that supports the heading
- Draw an illustration that supports the heading
- Write a caption that further explains the photo
• Identify bold face words, headings, and captions in an informational text

<table>
<thead>
<tr>
<th>Evaluative Criteria</th>
<th>Assessment Evidence</th>
</tr>
</thead>
</table>
| CEPA Rubric (see Lesson 13 materials) | CEPA: You are marooned on an island, and want to signal a passing ship that you need HELP. The signal for help is S O S, which is signaled by . . . _ _ _ . . .  
You must create a device that uses light or sound to send your SOS signal. |

**OTHER EVIDENCE:**
Throughout the unit student will complete a variety of end of lesson assessments to assess their progress toward mastery of the lesson objectives

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**Stage 3 – Learning Plan**

**Lesson Sequence**

**Lesson 1: Sensing Light and Sound** This lesson can be integrated into the literacy block or taught in the science block by the classroom teacher. It should be taught in small reading comprehension groups to allow for individual student opportunities in discussion. In order for students to be able to distinguish between fiction and nonfiction they will begin to identify characteristics of nonfiction text. This lesson will introduce key vocabulary in the text, begin using a KWL chart to begin the unit on light and sound, and begin identifying text features using a text feature anchor chart.

**Lesson 2: Intro to Light and Sound** This lesson will serve as an introduction to sound and vibration. This lesson was adapted from the PBS lesson "Sound Vibration". It is designed to help students understand that vibrations are responsible for the sounds we hear. This lesson will be a collaborative effort between the Science Fellows and the students, and the students will be mimicking the demonstrations done by the Science Fellows all together. Throughout this unit, the students will be developing

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their science journals. The classroom teacher should help the students prepare their journals for the lessons ahead of time.

**Lesson 3: Vibrations Make Sound** The lesson should be taught in small reading comprehension groups. It should be integrated into the literacy block or science block when the science fellow is not present. In order for students to be able to distinguish between fiction and nonfiction they will continue to identify characteristics of nonfiction text. This lesson will introduce key vocabulary in the text, integrate a KWL chart and text feature anchor chart, and further identify text features, specifically headings.

**Lesson 4 Visualizing Vibrations** In this lesson, students will be doing a more detailed observation of vibrations. They will observe different forms of vibrations in different stations and jot down their findings in their lab journals. The purpose of this lesson is to give the students a better idea of the relationship between sound and vibrations. This lesson has been adapted from Discovery Education.

**Lesson 5: Creating Vibrations** Students will use previous knowledge they’ve gained of sound and vibrations to make their own musical instruments. Classroom will be broken into stations for making instruments. There must be an adult at each station so there will be as many stations as adults in the classroom. If there are not enough adults choose an instrument to make and do it as a whole group.

**Lesson 6: Light Investigation:** Students will observe and experiment with light using flashlights, lights, and a projector. After completion of lesson they will understand that light moves in a straight line unless blocked. They will understand that when light is blocked it will create a shadow and that the shadow that is created is directly related to the shape of the object that is blocking the light.

**Lesson 7: Playing with Light and Shadows:** The lesson should be integrated into the literacy block or science block before the science fellow arrives. It should be taught in small reading comprehension groups. In order for students to be able to distinguish between fiction and nonfiction they will begin to identify characteristics of nonfiction text. This lesson will introduce key vocabulary in the text, integrate a KWL and text feature chart, and further identify text features, specifically captions.
Lesson 8: Light Interactions: Students will use a light table to explore transparent, translucent, and opaque materials. They will categorize items from transparent to opaque in order.

Lesson 9: Light Art: Students will use the knowledge they’ve gained about light and materials that block light, to make sun catchers with transparent, translucent, and opaque materials.

Lesson 10: Sending Messages with Light and Sound: The lesson should be integrated into the literacy block or in the science block when the fellow is not present. It should be taught in small reading comprehension groups. In order for students to be able to distinguish between fiction and nonfiction they will begin to identify characteristics of nonfiction text. This lesson will introduce key vocabulary in the text, integrate a KWL and text feature chart, and further develop students’ ability to identify text features.

Lesson 11: Sending Messages with Sound: In this lesson students will learn that sound comes from a source and travels. Students will engage in a listening activity that requires them to distinguish the source of the sound. This will lead into a discussion about sounds we hear in school and what sounds are sending us messages (ex. school bell, teachers use of sounds to get students attention, coach whistles etc.) Students will participate in several activities that use sound to send signals for example paper cup and string “telephones,” and a pattern of drum beats”. Students will record in their science journals how sound is made (ie. review of vibration causing sound)

Lesson 12: Sending Messages with Light: Students will build upon their knowledge that light travels in a beam and students will give examples of how we use light to send signals (light house, street lights). Students will use a specific light source to send signals (possible this may be in the form of a cooperative learning game or partner/group activity).

Lesson 13: CEPA: Communicating with Light and Sound: In this lesson, students will work with a partner to construct a communication device using sound or light. Students will be provided with specific materials and will use knowledge from
Lessons 11 and 12 to construct their own communication device.

Adapted from Massachusetts Department of Elementary and Secondary Education’s Model Curriculum Unit Template. Originally based on Understanding by Design 2.0 © 2011 Grant Wiggins and Jay McTighe. Used with Permission July 2012
Lesson 1: “Sensing Light and Sound” (Literacy Lesson)

BACKGROUND

Comprehending informational text is essential to conducting research. An important skill to research is locating key information efficiently. These lessons focus on identifying text features which will build a basis for conducting research later in the year or in later grades. Throughout first grade, students are developing their understanding of genre and the differences between fiction and nonfiction. Identifying text features is a clue to help students distinguish between the two. The following four lessons will provide opportunities to use text features to make predictions and develop an understanding of craft and structure. After these lessons students should have a foundation to begin using the text feature walk technique for information text. These lessons include informational text that cover content which will be taught in the science lesson. This will build background knowledge and exposure to new vocabulary. Due to the small size of the books and the discussion questions included in these lessons it is suggested that they are taught in small reading groups.

Overview of the Lesson

This lesson can be integrated into the literacy block or taught in the science block by the classroom teacher. It should be taught in small reading comprehension groups to allow for individual student opportunities in discussion. In order for students to be able to distinguish between fiction and nonfiction they will begin to identify characteristics of nonfiction text. This lesson will introduce key vocabulary in the text, begin using a KWL chart to begin the unit on light and sound, and begin identifying text features using a text feature anchor chart.
Focus Standard(s)
1.RI.5 Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.
1.RI.6 Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.

Learning Objectives
By the end of this lesson, students will be able to...
1. Use text features to make predictions before and during reading
2. Identify text features in an informational text
3. Identify information given in a photograph

Assessment(s)
• Photograph Sentence writing assignment worksheet (independent)
• Count the features tally chart on the worksheet (partner)

WIDA Language Objectives
FORTHCOMING

Targeted Academic Language/ Key Vocabulary
Tier 1: sound, light
Tier 2: sense, vibration
**RESOURCES AND MATERIALS**

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<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 copies</td>
<td>Book: “Sensing Light and Sound” by Jennifer Boothroyd</td>
<td>Bin</td>
</tr>
<tr>
<td>2</td>
<td>Large chart paper</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Marker</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Family photograph</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Worksheet 1</td>
<td>Binder</td>
</tr>
<tr>
<td>1</td>
<td>Tally Chart</td>
<td>Binder</td>
</tr>
</tbody>
</table>

**Items in bold should be returned to the bin for use next year**

**LESSON DETAILS**

**Lesson Opening/Activator**

Bring in a photo of your family. Explain to students that photographs can give you more information. Tell students that this is a photograph of your family. What other information does this photo show? (For example, how many members you have, if you have a pet dog etc.) Tell students “Now you have more information about me because of a photograph.” Explain that there are others ways to get information from a book besides the ‘regular words’ that we read (or main text), a photograph is one of them and these are called text features.

Tell students they will be learning how to find these text features and use them to get more information. Write the Title “Text Features” on chart paper. Write Photograph on the left side and attach your photo to the other side, you will be adding more text features as the lessons progress and students will be able to refer to the chart as a reference throughout the year.
During the Lesson

1. Prediction: Give each student a copy of the book “Sensing Light and Sound”. Begin by making a prediction. Read the Title and cover photo. What do you think this book is about? Make predictions. Do you think this is fiction or nonfiction? Explain that nonfiction books can teach us or give us information...one clue is there may be real photographs and other text features. Is this a photo or illustration/drawing?

   Turn to a page in the book and cover the main text. Show them that anything else is a text feature. Using think aloud strategy to demonstrate how you would use the photos, and headings to inform your prediction. For example, turn the pages as you would for a picture walk in a narrative text and discuss how the photograph may be connected to the title or topic sound and light. For instance, “When I cover the main text on this page I see these big words (a heading) that says “Seeing Light” and I see a photograph of eyes, I predict this part of the book will teach me about how our eyes see light”.

2. KWL: After making a prediction begin filling out the ‘K’ section of a KWL chart titled *Light and Sound*. Brainstorm what students already know about the topic and record responses in the ‘k’ column. Have students turn and talk with their group about some questions they have about sound and light. Discuss responses and record in the ‘W’. Tell students they will find out answers to their questions in this unit from reading books, making observations, and conducting experiments. *Keep this KWL in the classroom so future lessons can utilize it.*

3. Read: After you have activated prior knowledge and set a purpose for reading using the KWL chart, read the book together with students. On page 4, you will encounter your first bold face word. Explain to students that these words look different because they are usually words we might not know the meaning. Add this to your text feature chart with the image. Be sure to show students the glossary and definitions. Add glossary to your text feature chart with the image. *Note: “Headings” will be added in the next lesson.*
Stop on page 6 and discuss how the photograph reinforces what the author is saying in the main text. For example, “It shows how the boys are using their sense of touch to experience what the animal feels like, their sense of sight to see what the animal looks like/or how it acts, and their sense of hearing to listen to the sounds it makes”. Stop on page 14 and 21 and ask students why the publisher chose that photograph? What does the photograph tell us about sound or light?

4. Writing: Students will need the Worksheet 1, the Tally Chart and the book. Tell students to open to page 19. “Today we have been learning about photographs as a text feature. The photograph can tell us more about the main text. Let’s look at page 19. It says ‘You can feel sound vibrations’. I remember from the glossary that ‘vibration is a back and forth movement’. What is this photograph telling us about feeling vibrations?”. Let’s fill in the blank on our worksheet. Read the sentence starter on the worksheet and let them fill in the blank.
Allow students to work in partners to complete the text feature tally chart. I wonder which text feature is more popular? Have students turn through each page of the book and identify the text features listed in the Tally Chart. Students will mark 1 tally each time they find a text feature.

Lesson Closing
Tell students that this nonfiction book teaches us about light and sound. Turn and talk. Turn to your partner share one thing you learned from this book about light and sound. Add any comments to the KWL chart. Tell students that they will be investigating sound vibrations with their science teachers.

Assessment
Sentence completion on Worksheet 1 (independent)
Count the features tally chart on the Tally Worksheet (partner)
Lesson 2: Intro to Sound & Vibration

BACKGROUND

Overview of the Lesson
This lesson will serve as an introduction to sound and vibration. This lesson was adapted from the PBS lesson “Sound Vibration”. It is designed to help students understand that vibrations are responsible for the sounds we hear. This lesson will be a collaborative effort between the Science Fellows and the students, and the students will be mimicking the demonstrations done by the Science Fellows.

Throughout this unit, the students will be developing their science journals. The classroom teacher should help the students prepare their journals for the lessons ahead of time.

Note: Parts of this lesson should be prepared ahead of time. These parts will be indicated throughout the lesson plan.

Focus Standard(s)
1-PS4-1. Demonstrate that vibrating materials can make sound and that sound can make materials vibrate.

Learning Objectives:
By the end of this lesson, students will be able to...
1. Communicate that vibrations make sound via a KWL chart (group)
2. Identify relative pitch and volume of various sounds
Assessment(s):
• KWL chart (group)
• Pitch and Volume worksheet (individual)

WIDA Language Objectives
FORTHCOMING

Key Vocabulary
Tier 1: sound
Tier 3: vibration, volume, pitch

**RESOURCES AND MATERIALS**

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<th>Item</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Musical Instruments</td>
<td>Music Teacher/Classroom Teacher/Science Fellow</td>
</tr>
<tr>
<td>As available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Plastic straws</td>
<td>Bin</td>
</tr>
<tr>
<td>Class set</td>
<td>Scissors</td>
<td>Classroom Teacher</td>
</tr>
<tr>
<td>1 per student</td>
<td>Pitch and volume worksheet</td>
<td>Binder</td>
</tr>
</tbody>
</table>

*items in bold should be returned to the bin for use next year*
LESSON DETAILS

Lesson Opening/ Activator

Use this lesson activator to get the students excited for the lesson. There are many different ways in which the Science Fellows can begin this lesson. In collaboration with the music instructor at the school, the Science Fellows can use instruments and play them for the students to introduce them to the concept of sounds. The Science Fellows can also play music from a computer or even sing to the students. The important thing is that the students have a medium they're familiar with to ease them into the lesson.

As a pre-assessment tool, and to activate prior knowledge, ask students:

*How do you think sounds are made?*

Use the information to fill in the “K” section of the KWL chart. Then as a class talk about what it is you want to learn about sound, and fill out the “W” section.

**During the Lesson**

1. Demonstrate vibrations by blowing air through your lips and making "car sounds" or a "horse snort". Ask students what is happening with your lips to make that sound. Introduce the word *vibration* and define it: a rapid back-and-forth movement (Note: demonstrate that rapid means fast). Tell the students that we will explore what happens when materials vibrate and what causes it.

2. Ask students to think of other things that vibrate (washing machines, toys, pagers, car engines, and so on).

3. Tell them that the vibrations are what make the sounds. When an object vibrates (moves back and forth), it makes the air around it vibrate. When the air vibrates fast enough, you may hear this movement as sound.
a. Tell the students that sounds come in different forms.
b. Ask the students if they know what pitch means. Introduce the concept of pitch to the students and how it relates to size. Unlike a baseball pitch (which is probably the kind of pitch they are more familiar with) this kind of pitch is different even though the word is the same. Play from your phone or from a computer sounds of dogs (large and small). Ask the student to predict which dog is bigger and which is smaller and why? Explain that bigger “things” usually have a lower pitch (like a big dog) and smaller “things” usually have a higher pitch (like a small dog).
c. Tell the students that alongside pitch, sounds have different volumes. Demonstrate, with your voice, the difference between a loud and soft sound.

Activity:
Now tell the students they will actually make sound with vibration. They will be using straws to create a kazoo and make sounds. [SP2 - Developing and Using models]

The Science Fellows should prepare the next part of this lesson ahead of time. It helps to do the lesson ahead of time as well to be better able to help the students create sound. The Science Fellows should also demonstrate how to make the kazoo before the students do it on their own and should have either a pre-made “kazoo” or a picture available to the students as reference.

1. Grab a straw and flatten one end of it.
2. Cut the flattened end to make a V shape.
3. Open the flattened part of the straw a little bit.
4. Put the V in your mouth and blow.

An instructional video for how to do this lesson can be found here:
http://www.pbslearningmedia.org/resource/phy03.sci.phys/howmove.zkazoo/pitch-straw-kazoo/
1. Once students are able to make a sound with their kazoo, ask them what they think will happen if the make the kazoo shorter? After predicting have them cut down their kazoons (maybe with one partner leaving it longer so they can compare the pitch).
2. Ask students if they can feel the vibrations on their lips as they play the kazoo and the sound it produces. Then ask them to think of words that describe the vibrations.
3. After the activity, have the students put away their new “kazoo” before you begin the discussion process.
4. Gather the kids and ask them questions about the experiment and what it is they learned from it.

**Lesson Closing**

**Science Fellows should prepare ahead what you are going to use. Come up with six examples.** Play some more sounds for students with either music instruments or music from a computer. Have students complete the high pitch/low pitch, high volume/low volume worksheet. Be sure to do one example from the worksheet together so the students will know how to fill it out.

Finish up the lesson by filling out the “L” section of the KWL chart.

**Assessment**

- KWL chart (group)
- Pitch and Volume Worksheet (individual)
Lesson 3 “Vibrations Make Sound”
(Literacy Lesson)

BACKGROUND

Overview of the Lesson
The lesson should be taught in small reading comprehension groups. It should be integrated into the literacy block or science block when the science fellow is not present. In order for students to be able to distinguish between fiction and nonfiction they will continue to identify characteristics of nonfiction text. This lesson will introduce key vocabulary in the text, integrate a KWL chart and text feature anchor chart, and further identify text features, specifically headings.

Focus Standard(s)
1.RI.5 Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.

Learning Objectives
By the end of this lesson, students will be able to...
1. Use headings to make predictions during reading
2. Write a sentence that supports the heading
3. Draw an illustration that supports the heading

Assessment(s)
Write and draw a picture of a way to make sound that is different from those in the book
WIDA Language Objectives
FORTHCOMING

Targeted Academic Language/ Key Vocabulary (?)
Tier 1: guitar, whistle
Tier 3: vibrate, vibration

RESOURCES AND MATERIALS

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<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 copies</td>
<td>Book : “Vibrations Make Sound”</td>
<td>Bin</td>
</tr>
<tr>
<td>2</td>
<td>Large chart paper (text feature chart and KWL from lesson 1)</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Marker</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1 set</td>
<td>Color images of road signs</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Worksheet 2</td>
<td>Binder</td>
</tr>
</tbody>
</table>

**items in bold should be returned for use next year**

LESSON DETAILS

Lesson Opening/ Activator
Show students images of road signs. Tell them that when we drive there are signs that tell us what is coming up ahead. Discuss the road sign (example slippery road ahead, steep hill ahead etc.) Connect this to learning about headings. Tell students that just like these road signs communicate what is coming next on the road, a book has a special “text feature” to let readers know what they will be learning about next in a book. Tell students that this is called the heading. Write Heading on the text feature chart. We will look for headings while we read, they are very important.
During the Lesson

1. **Prediction:** Give each student a copy of the book “Vibrations Make Sound”. Begin by making a prediction. Read the Title and cover photo. What do you think this book is about? Make predictions. Do you think this is fiction or nonfiction? Review the difference between the two. Do you see an illustration or a photograph? Once they predict the book is nonfiction ask, “What other clues do you think we will find to confirm this is nonfiction? (refer to text feature chart) Students will look at the chart to remember bold face words, a glossary. Now begin the text feature walk. Using think aloud strategy as in lesson 1 to demonstrate how you would use the photos, and headings to inform your prediction.

2. **KWL** After making a prediction. Ask students to remember what they learned about sounds with the Science Fellows. Is there anything they can add to the ‘L’ in the chart? Have students turn and talk with their partner. Depending on student responses add to the appropriate part of the KWL chart( learned or want to know). Tell students they will find out answers to their questions in this unit from reading books, making observations, and conducting experiments.

3. **Read:** After you have activated prior knowledge and set a purpose for reading using the KWL chart, read the book together with students. When you are on page 4 add the image for headings to your text feature chart. As you read page 4-10 discuss how the main text answers the question ‘What is Sound’. As you read pages 11-15 discuss how the main text answers the question of that heading ‘What makes Sound’ etc. If students get confused between captions and headings, explain that the heading tells what the main text will be teaching us and the caption only describes the photograph. Also, point out the size of the heading is usually bigger and a caption is usually placed on a photo or right next to a photo.

4. **Write:** Students will need Worksheet 2 and the book. Tell students to open to page 16. Complete writing prompt ‘Image you are adding a new page to the book. The heading is ‘Can You Make Sound’. Write a sentence that tells another way you
can make sound that is not listed in the book. Remind students of ways they made sounds with their science fellows to help with ideas. Then draw a picture to match your sentence.

**Lesson Closing**
Tell students that this nonfiction book teaches us about sound. Turn and talk answer the essential question, "What makes sound?" Refer to KWL chart and add what students have learned about sound.

**Assessment**
Write and draw a picture of a way to make sound that is different from those in the book - Worksheet 2 - See Step 4 in “During the Lesson” above
Lesson 4: Visualizing Vibrations

BACKGROUND

Overview of the Lesson
In this lesson, students will be doing a more detailed observation of vibrations. They will observe different forms of vibrations in different stations and jot down their findings in their lab journals. The purpose of this lesson is to give the students a better idea of the relationship between sound and vibrations. This lesson has been adapted from Discovery Education.

Focus Standard(s)
1-PS4-1. Demonstrate that vibrating materials can make sound and that sound can make materials vibrate.

Learning Objectives
By the end of the lesson, students will be able to
1. Record their observations of vibrations
2. Communicate the idea that sound is vibrations.

Assessment(s)
Students will record their station observations in their science journals:
• What do you see?
• What do you hear?
• What is making the sound? (This should refer to the vibration not the object)
WIDA Language Objectives
FORTHCOMING

Key Vocabulary
Tier 1: sound
Tier 2: source
Tier 3: vibration

RESOURCES AND MATERIALS

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drums</td>
<td>Music Teacher/Classroom Teacher</td>
</tr>
<tr>
<td></td>
<td>Small Bag of rice</td>
<td>Bin</td>
</tr>
<tr>
<td></td>
<td>Tuning Fork</td>
<td>Bin</td>
</tr>
<tr>
<td></td>
<td>Bowl for water</td>
<td>Bin</td>
</tr>
<tr>
<td>20</td>
<td>Popsicle sticks</td>
<td>Bin</td>
</tr>
<tr>
<td>10</td>
<td>Rubber bands</td>
<td>Bin</td>
</tr>
<tr>
<td>3 sets</td>
<td>Metal fork and spoon</td>
<td>Bin</td>
</tr>
<tr>
<td></td>
<td>Rulers</td>
<td>Classroom Teacher</td>
</tr>
<tr>
<td>1 per student</td>
<td>“Visualizing Vibrations” worksheet</td>
<td>Binder</td>
</tr>
<tr>
<td>1 per student</td>
<td>Science journal</td>
<td>Binder</td>
</tr>
<tr>
<td></td>
<td>Projector</td>
<td>Classroom Teacher</td>
</tr>
</tbody>
</table>

**items in bold should be returned to the bin for use next year**
LESSON DETAILS

Lesson Opening/ Activator
Begin the lesson with this video: [https://www.youtube.com/watch?v=ZxYmPd8EGy4](https://www.youtube.com/watch?v=ZxYmPd8EGy4). Ask the students what they saw in this video that is familiar to them from either background knowledge or the previous lesson. Tell the students that they will be observing some vibrations of their own just like the kids in the video [SP- 3 Planning and carrying out investigations]. Explain to students that they will not be using special glasses like they did in the cartoon, but will be using their senses to observe.

During the Lesson
This lesson will utilize stations, so make sure to prepare them in advance.

1. Divide the students into groups of 3-4 (this number can change as long as there are 6 groups). Tell each group they start at one station and rotate to the others. Give each student a “Visualizing Vibrations” worksheet. **NOTE: Discuss with your classroom teacher ahead of time how best to position the adult in the room to support this activity. An alternative would be to have each adult sit with a group of students to explore two of the “stations” and then rotate the materials rather than the students. [SP2 - Developing and using models]**

2. Tell the students that while they are at each station they should **write or draw** in their science journal: What they see, what they hear and what is the source of the sound (what makes the sound)? You will need to model that this looks like. Perhaps use one of the stations as your model and ask the classroom teacher to model what the students' written work might look like.

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3. The stations

Station 1: Drum with rice on the top. (This can be made with wrapping paper (or Saran Wrap) over a coffee can if you don’t have a real drum available
  Tap on the drum and observe what happens to the rice

Station 2: Tuning fork in water
  Gently strike the tuning fork and then place it in the water

Station 3: Touch side of throat and say ahh
  Place a finger on their throat and say “ahhhh”

Station 4: Rubber band vibration
  Hold popsicle sticks and connect them with a rubber band
  Have another student pluck the rubber band

Station 5: Fork vibration
  Strike a fork with another utensil and bring it close to the ear

Station 6: Yardstick/Ruler vibration
  1. Place a ruler at the edge of a desk
  2. Hold one end of the ruler firmly against the table
  3. Slap the other end that is hanging off the side of the table

Allow 5 to 10 minutes for each of the lab stations, completing their observations/recording at each.
At the end, have each group be in charge of presenting a lab station. Each group will choose a representative speaker and will share the group's findings with the class. **[SP8 - Obtaining, evaluating, and communicating information]**

**Lesson Closing**
Play this video for the students: [https://www.youtube.com/watch?v=ekRXkSe0G7M](https://www.youtube.com/watch?v=ekRXkSe0G7M). Ask them about what they observe and how the video ties into what they just learned about vibrations making sound and sound making vibrations that make things move.

**Assessment**
Students will record their station observations in their science journals (can be written or drawn):
- What do you see?
- What do you hear?
- What is making the sound? (This should refer to the vibration not the object)
Lesson 5: Vibration Creation

BACKGROUND
Overview of the Lesson
Students will use previous knowledge they've gained of sound and vibrations to make their own musical instruments. [SP-2 Developing and using models]. Classroom will be broken into stations for making instruments. There must be an adult at each station so there will be as many stations as adults in the classroom. If there are not enough adults choose an instrument to make and do it as a whole group.

Focus Standard(s)
1-PS4-1. Demonstrate that vibrating materials can make sound and that sound can make materials vibrate.

Learning Objectives
By the end of the lesson, students will be able to:
- Demonstrate that vibrations make sound

Assessment(s)
- Students will use their knowledge of sound and vibration to create their own instrument and make sounds.
- Students will describe (orally) how their instrument makes a sound. (i.e. what is vibrating to make the sound)

WIDA Language Objectives
FORTHCOMING
Key Vocabulary
Tier 1: sound
Tier 2: vibration, volume

RESOURCES AND MATERIALS

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>samples</td>
<td>Homemade musical instruments</td>
<td>Science Fellows/Bin</td>
</tr>
<tr>
<td>2-3</td>
<td>Staplers</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td></td>
<td>Crayons</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>10</td>
<td>Any cylindrical container with a top</td>
<td>Bin</td>
</tr>
<tr>
<td>2/child</td>
<td>Pencils</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>A pack</td>
<td>Construction paper</td>
<td>Bin</td>
</tr>
<tr>
<td>10</td>
<td>Small boxes with or without lids</td>
<td>Bin</td>
</tr>
<tr>
<td>1 bag</td>
<td>Rubber bands of assorted sizes</td>
<td>Bin</td>
</tr>
<tr>
<td>1 bag</td>
<td>Dried beans</td>
<td>Bin</td>
</tr>
<tr>
<td>1 roll</td>
<td>Plastic Wrap</td>
<td>Bin</td>
</tr>
<tr>
<td>several</td>
<td>Rulers</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>5 rolls</td>
<td>Masking tape</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Projector</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>Assorted</td>
<td>Other materials for making instruments available in the classroom</td>
<td>Classroom teacher</td>
</tr>
</tbody>
</table>

** items in bold should be returned to the bin for use next year**
LESSON DETAILS

Lesson Opening/Activator

Play iPhone video of guitar: https://www.youtube.com/watch?v=INqfM1kdfUc. Show students samples that have been made of musical instruments. **SCIENCE FELLOW SHOULD CREATE THESE AHEAD OF TIME. SEE SUGGESTIONS IN THE BINDER.** Allow the elementary students to play with them a bit to get them excited. Shake them, strum them, hit them, to make vibrations and noise. Ask students what they feel when the instruments are making noise (vibrations). Why is the instrument vibrating?

During the Lesson

*This lesson will utilize stations, so make sure to prepare them in advance.*

1. Divide the classroom into three stations. Each stations will get an assortment of materials and a teacher to guide the students

2. Evenly distribute the shoe boxes, cylindrical containers, rulers, marbles, rubber bands, and pencils amongst the three stations.

3. Tell the students that they will use the materials at each station to create their own station. Tell the students that there are only a limited number of items at each station, so it is very important to share and work with each other to successfully create instruments. Emphasize that not everyone is going to make the same instrument nor use the same materials and that is ok and even encouraged.
   a. The teachers can decide how they want the students to use the materials. The teacher can either assign numbers and have them choose a material in order or have them all, in an appropriate and safe fashion, choose materials at the same time.
4. Tell the students that when they are done with their instrument they will have to make sound with it. Once done explaining the lab, divide the students into three stations and have each teacher supervise a station.

5. While in the station
   a. The teachers should periodically throw out ideas that can help the students create their instruments.
   b. Tell the students that there are many ways they can make sound through instruments, so they should take that into account when making them.
   c. Review with the students the different ways sound is made with instruments: via plucking, strumming, hitting, vibrating, blowing, etc.
   d. If students are having difficulty creating an instrument, help them brainstorm ideas.
   e. The different instruments that can be made with these materials include (but are not limited to) a drum, a guitar, and a pseudo-tambourine (place the marbles in a can and shake it).
   f. Once the students have completed their instruments, go around the station and have them play it a bit for you. After this, have the students put their instruments away and gather them for a discussion.

6. After the activity, enter into a discussion about sound and vibrations.
   a. Ask the students about the instruments they made. Ask them what their thought process was and if they encountered any difficulties.
   b. Using the new vocabulary words they learned, ask the students to give you an explanation for the sounds they made and heard.
Lesson Closing
Give students time to play with their instruments, play each other’s instruments. Have them make noise and have them feel for the vibrations. Ask them what is happening.

Assessment
Students will use their knowledge of sound and vibration to create their own instrument and make sounds. Students will describe (orally) how their instrument makes a sound (i.e. what is vibrating to make the sound).
Lesson 6: Light Investigation

BACKGROUND

Overview of the Lesson
Students will observe and experiment with light using flashlights, lights, and a projector. After completion of lesson they will understand that light moves in a straight line unless blocked or redirected. They will understand that when light is blocked it will create a shadow and that the shadow that is created is directly related to the shape of the object that is blocking the light.

Focus Standard(s)
1-PS4-3.Determine the effect of placing materials that allow light to pass through them, allow only some light through them, block all the light, or redirect light when put in the path of a beam of light.

Learning Objectives
1. Make a model to show that a beam of light moves in a straight line.
2. Make a model to show that some material can redirect a beam of light.
3. Demonstrate that when a beam of light is blocked it creates a shadow that is directly related to the shape of the object creating the shadow.

Assessment(s)
• Students will complete “Using A Periscope” worksheet (Note this worksheet assesses students’ knowledge on what an object’s shadow will look like)
• Students will complete “Block the Light” Worksheet (Worksheets can be pasted into students science journals or used in addition to the journal).
• OPTIONAL: You may also ask students to draw a person, a sun, and the person’s shadow on their science journal.

WIDA Language Objectives
FORTHCOMING

Key Vocabulary
Tier 1: light, straight, line, shadow
Tier 2: object, source, redirect
Tier 3: light beam

RESOURCES AND MATERIALS

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Book: Bear Shadow by Frank Asch</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Glass Aquarium (one per building – shared with other T2L classes at grade level)</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Small carton of milk from cafeteria</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>12</td>
<td>Small flashlights - check batteries prior to use</td>
<td>Bin</td>
</tr>
<tr>
<td>12 sets</td>
<td>3 Index cards with holes punched in middle</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Lump of clay (enough to make stands for the index cards)</td>
<td>Bin</td>
</tr>
<tr>
<td>12</td>
<td>Safety mirrors</td>
<td>Bin</td>
</tr>
<tr>
<td>12</td>
<td>Index cards</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Dog worksheet (classroom teacher to copy prior to lesson)</td>
<td>Binder</td>
</tr>
<tr>
<td>1 per child</td>
<td>Science journals</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Projector</td>
<td>Classroom teacher</td>
</tr>
</tbody>
</table>
**LESSON DETAILS**

**Lesson Opening/ Activator By Classroom Teacher**

This activator is a whole class read aloud to be done by the classroom teacher before the Science Fellows arrive to teach Lesson #5 Light Beam. It should be incorporated into the science block and read before the science fellows begin their lesson. The purpose of this read aloud is to create student wonder and help students think more deeply about the topic of light and shadows and build background for the science lesson.

Tell students you will be reading *Bear Shadow* by Frank Asch. Show them the front cover and ask them, “Do they think this fiction with a character and a problem or does it look like this book is nonfiction that will teach us about bears?” If students are unsure, “Remember what we learned about photographs?” “Does this book look like it has a drawing/illustration showing something made-up or a photograph showing something real. Once students conclude that it is fiction, point out that they probably won’t find bold face words, or headings in this book but we may discover that our character has a problem or a wish.

Activate knowledge - “This book is called Bear Shadow” Ask students “What are shadows?” When do you have a shadow? Make predictions - “What do you think Bear’s problem or wish will be?”

Read Aloud - Ask guiding questions during read aloud. “What scared the fish away?” “What is making Bear’s shadow?” What does Bear want?” (problem/wish)”Why can’t Bear see his shadow when he is standing behind a tree?” “What will happen if Bear steps out from behind the tree?” Why” “How does it feel to be annoyed?” “Tell about a time when you were annoyed.”

---

**1** | **Bin**
-----|-----
1 | Bag of objects to try shadows with - some should be patterned - wooden or plastic toys & blocks

**1** | **Binder**
-----|-----
1 | “Using A Periscope” worksheet per student

**1** | **Binder**
-----|-----
1 | “Block the Light” worksheet per student

**items in bold** should be **returned to the bin** for use next year**
"Do you think digging a hole will work?" “Hmm, I wonder why the shadow is changing?” “Why isn’t the shadow scaring away the fish?”...the sun has moved, the light from the sun is causing Bear’s shadow. Today you will investigate light and shadows with your science teachers.

By Science Fellow
Review and discuss “Bear Shadow” book, if it was not read just prior to the science lesson
• Where did the Bear’s shadow come from?
• Was he able to get rid of his shadow?
• Discuss that the sun is a light source and tell students that we will be exploring how light works.

During the Lesson
This lesson will be divided into two sections. The first half will prove to students that light travels in a straight line, and the second half will require the students to experiment with shadows in groups.

Students will participate in a demonstration using an aquarium of milky water and a flashlight. Students will diagram the light beam in their science journals.
1. Glass aquarium is filled ¾ full with water. 1 carton of milk is poured into water. Students are given flashlights to point into the aquarium to see how the beams move in a straight line. (This will work better closer to the side of the aquarium.)

2. Teacher will lead students through a second investigation to show that light moves in a straight line with a demonstration using 3 index cards with a hole punched in the middle, standing in clay in a row, and a flashlight.
Note: The candle should be replaced with a flashlight.

- 3 index cards are hole punched with a hole in the card (at the same height from one side, but not in the same place right to left). Cards are stuck in clay and put on a table. The student’s task is to get the light to be visible through the three cards. Have students work in pairs to see what happened when the put one card, then two, then three between the flashlight and their partner’s eyes. In a straight line so the holes line up. A flashlight is shone through the holes, demonstrating the light moving in a straight line. You will have to demonstrate the set up/task without showing the “solution”

- Ask students what they observed. What happened with the holes were not lined up exactly? Was the light able to bend around to find the hole in each card? What does this tell you about how light travels?

1. Explain that we just saw that light could pass through the index cards if the holes were all lined up. Ask students what happens to the light if they shine it at an index card without any holes. Darken the room and have them try it and report. Now ask them to predict what will happen if they shine the flashlight at a mirror. Have them shine the flash light right at
the mirror (one partner can hold the light and one the mirror upright on the desk. Where does the light go? Have them try it at different angles of incidence. Where does the light go? Explain that some object, like mirrors, can redirect a beam of light, both others like the index card, can just block its path. Ask students to draw a model of what happened when the light hit the mirror in their science journals.

2. Explain that now we know that light beam move in a straight line, we're going to learn about shadows. **Pre-Assessment:** Students will be given a picture of a dog with eyes and spots and a sun and they are to draw in a shadow as they think it will look.

3. As a class, the teacher should call on student volunteers to choose an object from the bag of various objects and use the projector to create a shadow of the object. After each showing, have the students “Think, Pair, Share" with their partner about why the shadows appear without color, but maintain the general shape of the object.

4. Science fellow asks students:
   a. What shape is the object? What shape is the shadow?
   b. What color is the shadow? Does the shadow show any pattern (e.g different shades of lighter and darker)?

5. Have students hypothesize what shadows will look like for different objects and have them test their hypothesis.

6. Give students time to test a variety of objects.

**Lesson Closing**
- Using light or projector show students simple hand puppets
- Have them play around with them and see what they can come up with - Explore!
Assessment

- Students will complete “Using A Periscope” worksheet
- Students will complete “Block the Light” Worksheet
- OPTIONAL: You may also ask students to draw a person, a sun, and the person’s shadow in their science journal
Lesson 7 “Playing with Light and Shadows”  
(Literacy Lesson)

BACKGROUND

Overview of the Lesson
The lesson should be integrated into the literacy block or science block before the science fellow arrives. It should be taught in small reading comprehension groups. In order for students to be able to distinguish between fiction and nonfiction they will begin to identify characteristics of nonfiction text. This lesson will introduce key vocabulary in the text, integrate a KWL and text feature chart, and further identify text features, specifically captions.

Focus Standard(s)
1.Ri. 5 Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.

Learning Objectives
By the end of this lesson, students will be able to...
1. Use text features to make predictions
2. Write a caption that further explains the photo

Assessment(s)
Write a caption for the photo on p. 21 of the text (Worksheet 3)
WIDA Language Objectives
FORTHCOMING

Targeted Academic Language/ Key Vocabulary (?)

Tier 2: object, shadow, material, form
Tier 3: opaque, translucent, transparent

RESOURCES AND MATERIALS

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<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 copies</td>
<td>Book : “Playing with Light and Shadows”</td>
<td>Bin</td>
</tr>
<tr>
<td>2</td>
<td>Text feature chart and KWL chart from lesson 2</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Marker</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Worksheet 3</td>
<td>Binder</td>
</tr>
<tr>
<td>1</td>
<td>Activator photograph</td>
<td>Classroom teacher</td>
</tr>
</tbody>
</table>

**items in bold should be returned for use next year**

LESSON DETAILS

Lesson Opening/ Activator

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Bring in another photograph as you did with lesson 1. Discuss the photograph and what additional information students get from that photo about you. Tell students, “Sometimes an author wants to make sure you understand the information the photo is showing - and so they will write a word or sentence on or near the photograph, this is called a caption. Use a post-it to write a short sentence that gives specific information in the photo. Add ‘caption’ to the text feature chart, the photograph and caption.

During the Lesson

1. **Prediction**: Give each student a copy of the book “Playing with Light and Shadows”. Begin by making a prediction. Read the title and cover photo. What do you think this book is about? Make predictions. Do you think this is fiction or nonfiction? Review the difference between the two. Have students refer to text feature chart to predict what text features they will find if they are reading nonfiction. Using think aloud strategy as in lesson 1 to demonstrate how you would use the photos, captions and headings to inform your prediction, and model a text feature walk.

2. **KWL** After making a prediction. Ask students to remember what they learned about light with the science fellows. Is there anything they can add to the ‘L’ in the chart? Have students turn and talk with their partner. What did they learn about light? What do they want to know? Depending on student responses add to the appropriate part of the KWL chart (learned or want to know). Tell students they will find out answers to their questions in this unit from reading books, making observations, and conducting experiments.

3. **Read**: After you have activated prior knowledge and set a purpose for reading using the KWL chart, read the book together with students. When you get to page 7 add the image example for caption to your text feature chart. Give students an opportunity to make predictions using headings and identify bold face words, use the glossary and emphasize how the captions specifically describe the photo. Give students an opportunity to come up with captions for pages that don’t have one.
4. **Write:** Students will need their book and worksheet 3. Explain that they will be writing a caption for the photo on page 21. What is the photograph of? Students may draw the photograph in the box provided on the worksheet. Have students write their caption in the space provided.

**Lesson Closing:**
Tell students that this nonfiction book teaches us about light. Turn and talk to your partner about one thing you learned about light. Add responses to KWL chart.

**Assessment**
Write a caption for the photo on p. 21 of the text.
Lesson 8: Light Interactions

BACKGROUND

Overview of the Lesson
Students will use a light table to explore transparent, translucent, and opaque materials. They will categorize items from transparent to opaque in order.

Focus Standard(s)
1-PS4-3.Determine the effect of placing materials that allow light to pass through them, allow only some light through them, block all the light, or redirect light when put in the path of a beam of light.

Learning Objectives
By the end of this lesson, students will be able to...

Demonstrate that light can pass through some objects and that some objects will stop light completely

Assessment(s)
Students will categorize materials from translucent to opaque on a worksheet

WIDA Language Objectives
Level 1-2: Students will sort objects to match the illustrated labels transparent, translucent, opaque.
Level 3-4: Students will complete the Transparent/Translucent/Opaque worksheet using an item name word bank.
Key Vocabulary
Tier 1: light
Tier 2: source, material
Tier 3: translucent, transparent, opaque

RESOURCES AND MATERIALS

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<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Light table – 4 per school to be shared among T2L classrooms at grade level</td>
<td>Bin</td>
</tr>
<tr>
<td>4 bags</td>
<td>Assorted pieces of tissue paper, construction paper, clear plastic</td>
<td>Bin</td>
</tr>
<tr>
<td>4 bags</td>
<td>Pieces of transparent, translucent, &amp; opaque materials (well known classroom and household items, toys, recycled materials, scraps)</td>
<td>Bin</td>
</tr>
<tr>
<td>1 per student</td>
<td>Transparent/Translucent/Opaque Worksheet</td>
<td>Binder</td>
</tr>
<tr>
<td>1</td>
<td>Large blow up of Transparent/Translucent/Opaque Worksheet</td>
<td>Bin</td>
</tr>
<tr>
<td>3 colors</td>
<td>Dry eraser markers</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1 per student</td>
<td>“Just Passing Through” worksheet</td>
<td>Binder</td>
</tr>
</tbody>
</table>

**items in bold should be returned to the bin for use next year**

LESSON DETAILS

Lesson Opening/Activator
Revisit previous lesson. Ask students:
   a. How does light travel? (in a straight line)
   b. Can it go around corners? (no)
c. What happens when light is blocked? (creates a shadow)
d. Does everything block light?
e. Can light go through a wall? A window?

Explain that we are going to investigate what kinds of things light can go through using our super cool light table. Show them how it works by putting a material on the table.

**During the Lesson**

1. **Explain- Use large laminated blow up of Transparent/Translucent/Opaque worksheet and dry eraser markers for explanation**

   a. Explain that some items light can go completely through, these items are what we call transparent. Have the students work with each other to come up with a list of three things which are transparent. Talk as a group and make a list of things we think are transparent on the large worksheet on the board with dry eraser marker.

   b. Explain that some items light cannot go through at all and we call them opaque. Light is completely blocked. These are the kinds of things that make a shadow. Have the students work with each other to come up with a list of three things which are opaque. Talk as a group and make a list of things we think are opaque on the large worksheet on the board with dry eraser marker.

   c. Explain that some items allow some light to go through but not all of it. We can’t see all the way through them and we call these translucent. Have the students work with each other to come up with a list of three things which are translucent. Talk as a group and make a list of things we think are translucent on the large worksheet on the board with dry eraser marker.
2. Investigation
Split the students into four groups, and provide a light table to each group. Explain that students will be using the light table to sort items that are transparent, translucent, and opaque. Distribute the bags with the tissue, paper and plastic. Let them experiment with these items and sort them into the three categories. You can demo this on an overhead projector as they do it at their light tables. Talk to them as they are doing this.

- Can you see light through that object?
- A little light or all the light? If a little light, discuss the fact that it is translucent.
- If you hold the object up to your light can you see clearly through it? If you can see all the way through it discuss the fact that it is transparent.
- If no light can come through it - What would happen if I put this object in front of the projector? (it will create a shadow)

3. Categorize
   a. Give students individual worksheets and the bags with several different types of materials (must have several from each category)
   b. Have students test the materials and put them onto their worksheets in the correct sections. Provide a word bank to students who need it. For students with limited language skills, have them sort the objects rather than writing the names of the objects (see WIDA Language Objectives).

Lesson Closing
Revisit our original master worksheet on the board with our class hypotheses. Are there some items we need to move? Discuss the ones that weren't correct. How do we know they need to be moved?

Assessment
Students will complete “Just Passing Through” worksheet. Ask them to think of other items in the classroom or at home. Have them draw or write the name of the objects they can think of for each of the three categories.
Lesson 9: Light Art

BACKGROUND

Overview of the Lesson
Students will use the knowledge they've gained about light and materials that block light, to make sun catchers with transparent, translucent, and opaque materials.

Focus Standard(s)
1-PS4-3. Determine the effect of placing materials that allow light to pass through them, allow only some light through them, block all the light, or redirect light when put in the path of a beam of light.

Learning Objectives
Demonstrate that light can pass through some objects and that some objects will stop light completely

Assessment(s)
Students will create a suncatcher using their knowledge of light and materials that let light through them.

WIDA Language Objectives
FORTHCOMING

Key Vocabulary
Tier 1: light, shadow
Tier 2: source, material
Tier 3: translucent, transparent, opaque
**RESOURCES AND MATERIALS**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Model Sun Catcher</td>
<td>Bin</td>
</tr>
<tr>
<td>1 Roll</td>
<td>Wax Paper (return leftovers) – Divide into sheets about the size of an 8 ½ x 11 piece of paper</td>
<td>Bin</td>
</tr>
<tr>
<td>1/child</td>
<td>Blank 8 ½ x 11 sheets of paper</td>
<td>Classroom Teacher</td>
</tr>
<tr>
<td>1 jug</td>
<td>Liquid Starch (return leftovers)</td>
<td>Bin</td>
</tr>
<tr>
<td>1/child</td>
<td>Paint brush</td>
<td>Art teacher/Classroom teacher</td>
</tr>
<tr>
<td>Selection</td>
<td>Multiple colors of tissue paper (return leftovers)</td>
<td>Bin</td>
</tr>
<tr>
<td>1 spool</td>
<td>String or yarn</td>
<td>Bin</td>
</tr>
<tr>
<td>1/child</td>
<td>Scissors</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1-2</td>
<td>hole punchers</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1-2</td>
<td>scotch tape</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Light Table from previous lesson</td>
<td>Bin</td>
</tr>
</tbody>
</table>

*items in bold should be returned to the bin for use next year*

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**LESSON DETAILS**

**Lesson Opening/ Activator**

Tell the students that they will be using their knowledge of light, shadows, transparency, translucency, and opaqueness (refer to the “Word Wall” at this point to remind students the meaning of the vocabulary words) to create a suncatcher. Show students a model suncatcher, hold it in front of the light. What do they notice? Does all the light come through? Which areas...
are transparent, translucent, and opaque? What happened in areas where there were more than one color overlapping or the paper was thick? (paper becomes opaque) Explain that they will be making their own suncatcher to take home.

During the Lesson
Explore the Materials

Note: Full activity with pictures can be found at: http://artfulparent.com/2010/04/tissue-paper-stained-glass.html

Have them test the tissue paper on the light tables. Can you see light through it? (yes, its translucent) What happens when you put more than one piece on at the same time? (changes color, lets less light through - still translucent) How many pieces will make opaque?

Make the Sun catcher

1. Explain that in making their suncatcher they should have some parts that are transparent, some that are translucent, and some that are opaque. Explain the steps below and post them in the front of the room.

2. Choose colors - Have students choose their colors and rip up the tissue paper into smaller pieces. (They may go back to the light table to see what the colors will look like.)

3. Plan - Have students arrange the tissue paper on their blank write paper to demonstrate how they can arrange their pieces of tissue paper to create the three types of light filters (transparent, translucent, and opaque). Have an adult check each design when students have completed it and discuss the three types of light filters – THIS IS YOUR ASSESSMENT OF THE LEARNING OBJECTIVE.

Starch colors

Give each student a small cup of liquid starch and a paintbrush. Demonstrate how you put a piece of tissue paper down on the wax paper and brush some liquid starch over it. Have them try it. Keep adding more colors making sure to leave some areas open. Remind them that if they want opaque areas, the colors will have to be overlapped.
Hang - Hole punch 2 holes near top and string a string through, knotting at 2 holes. Lie flat to dry, can be hung in windows when completely dried.

Lesson Closing
As the suncatchers dry, use this time to review all that they have learned about light, revisiting the KWL chart.

Assessment
Students will create a suncatcher using their knowledge of light and materials that let light through them. Discussion with each student during the planning phase will serve as the assessment. Students should be able to indicate the places in their design which will be transparent, translucent, and opaque and explain what those terms mean.
Lesson 10 “Sending Messages with Light and Sound” (Literacy Lesson)

BACKGROUND
Overview of the Lesson
The lesson should be integrated into the literacy block or in the science block when the fellow is not present. It should be taught in small reading comprehension groups. In order for students to be able to distinguish between fiction and nonfiction they will begin to identify characteristics of nonfiction text. This lesson will introduce key vocabulary in the text, integrate a KWL and text feature chart, and further develop students’ ability to identify text features.

Focus Standard(s)
1.RI.5 Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.

Learning Objectives
1. Identify bold face words, headings, and captions in an informational text.
2. Use text features to make predictions.

Assessment(s)
Worksheet 4
WIDA Language Objectives
FORTHCOMING

Targeted Academic Language/ Key Vocabulary
Tier 2: message, information, distance

RESOURCES AND MATERIALS

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<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 copies</td>
<td><strong>Book : “Sending Messages with Light and Sound”</strong></td>
<td>bin</td>
</tr>
<tr>
<td>2</td>
<td>large chart paper (text feature chart and KWL from lesson 2)</td>
<td>classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Marker</td>
<td>classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>worksheet 4</td>
<td>bin</td>
</tr>
</tbody>
</table>

**items in bold should be returned for use next year**

LESSON DETAILS

Lesson Opening/ Activator
Ask for a volunteer. Tell the student that when they hear one bell ring ( or hand clap if you don’t have a bell) they should jump, if they hear 2 bells ring they should hop on one foot continuously. Ring the bell with either one or two rings. Play with this idea a few times. Tell students that you were using the bell or a sound to send a signal. We’ve discovered many things about light and sound. Now we will be learning about how we use light and sound to send messages or signals.
During the Lesson

1. **Prediction:** Give each student a copy of the book “Sending Messages with Light and Sound”. Begin by making a prediction. Read the Title and cover photo. What do you think this book is about? Do you think this is fiction or nonfiction? Review the difference between the two. Using think aloud strategy for a text feature walk as in previous lessons to demonstrate how you would use the photos, captions and headings to inform your prediction. (Now that students have had several opportunities to see you model a text feature walk, consider giving them practice by making predictions with a partner at times to begin releasing responsibility).

2. **Read:** Read the book together with students. On page 4 make sure students use the glossary to read the definition of the bold face words. Add ‘messages’ and ‘information’ to the word wall. On page 5 ask students what the author means by “over a distance”. On page 10 ask, “What message do those traffic lights tell drivers”. On page 12 point out the new heading and remind students that, “All of the following sentences should tell us about using sound to tell messages instead of light. Let’s see if the author did a good job choosing a heading?” Discuss how the main text of that section relates back to the heading. On page 15 ask, “How do you talk over a distance?” On page 22, you may ask students “If you were the author what caption would you put on this page?”

3. **Assessment:** Give students the text feature worksheet. Give students oral directions as they circle the appropriate text feature. For example, ‘Circle the heading on page 8 in blue crayon, the boldface word in green, circle the caption on page 9 in red etc. Where students able to find the text features?

Lesson Closing
What else did we learn today about light and sound? Add to the KWL chart as well. Tell students that they will be learning more about sending messages with light and sound during their science lessons.

Assessment
Text Feature worksheet 4
Lesson 11: Sending Messages with Sound

BACKGROUND

Overview of the Lesson
In this lesson students will review that sound comes from a source and travels and is created through vibration. The teacher will create various sounds using various tools, and ask the students where the sound originated from. This will lead into a discussion about sounds we hear in school and what sounds are sending us messages (ex. school bell, teachers use of sounds to get students attention, coach whistles etc.) Students will create paper cup “walkie talkies” to communicate with each other. Students will record in their science journals how sound can be used to communicate a message.

Focus Standard(s)
1-PS4-1. Demonstrate that vibrating materials can make sound and that sound can make materials vibrate.
1-PS4-4. Use tools and materials to design and build a device that uses light or sound to send a signal over a distance.

Learning Objectives
By the end of this lesson, students will be able to...
1. Create a device that uses vibration to transmit a message to their partner.
2. Explain the path or vibration used in their communication device.

Assessment(s)
1. Science journal entry about their device.
2. Order vibration pictures to show how the walkie talkie works.
WIDA Language Objectives
FORTHCOMING

Key Vocabulary
Tier 1: walkie talkie,
Tier 2: communicate, vibration, message, travel, source

RESOURCES AND MATERIALS

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<th>Item</th>
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</tr>
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<tr>
<td>1</td>
<td>Ball of cotton string (return the extra)</td>
<td>Bin</td>
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<tr>
<td>2</td>
<td>Paper cups per student pair (return the extra)</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Scissors</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Crayons or markers to decorate “walkie talkies”</td>
<td>Classroom Teacher</td>
</tr>
<tr>
<td>1/child</td>
<td>Walkie Talkie worksheet</td>
<td>Binder</td>
</tr>
</tbody>
</table>

**Items in bold should be returned to the bin for use next year**

LESSON DETAILS
Lesson Opening/ Activator
The teacher should begin the lesson by reviewing vibrations, and that sounds are created by vibration. The teacher should lead a group discussion about how sounds can be used to communicate a message. The teacher should give examples like when the school bell rings, that sends students a message which means that school is over/ or that it's time for school to begin. At this point the teacher should ask the students to turn and talk with their partner to come up with their own examples of

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specific sounds which send a message (like a phone vibration for a text, church bells ringing which tells what hour of the day it is, an audience clapping after a performance, etc.) Tell the students that they will be using their prior knowledge of sound and vibrations to construct a “walkie talkie,” using a cup and some string. **(SP 2: Developing and Using Models)**

**During the Lesson**
This activity is adapted from: [http://www.ehow.com/way_6067683_homemade-walkie-talkies.html](http://www.ehow.com/way_6067683_homemade-walkie-talkies.html)

**Preparation:** Poke the holes in the cups ahead of time to ensure that they are not too big. If the hole is too big, the device will not work.

**Create**
1. Demonstrate how to construct the walkie talkie. Pull the string through one cup and tie a knot at the end so it prevents the string from threading completely through. Thread the other side of the string through the second cup and tie a knot at the end. You should have two cups joined by one piece of string.

2. Divide the students into pairs. Distribute the materials and have each pair complete their device. Students may need assistance tying the knot in the string. For fun, allow students to decorate the cups.

**Use**
1. Put your homemade walkie talkies to the test. One participant walks to one end of the room with one cup, while the other participant holds the other cup on the other side. The string must be pulled tightly to ensure that the vibration picks up the sound of students voices.

2. The teacher should propose variations to this like letting students go out in the hall, and seeing if they can still hear each other in different areas, around the a corner, under a desk, etc.
Extension
1. Time permitting, allow the students to construct more devised with differing lengths of string, or different types of cups or string.

Lesson Closing
Discuss students' observations from their exploration. Teacher should assist students in concluding that the sound came from one person's mouth, traveled across the string through vibration, and was then picked up by the cup on the opposite side of the string. Teachers should reinforce here how sound is used to communicate a message. Teachers should also remind students that not only can our voices send a message, but sounds like church bells and clapping transmit messages, too.

Assessment
1. Teacher should have students write about their findings in their journals. Draw a picture of your device and words to describe how it works.
2. Students should each be given a copy of the Walkie Talkie worksheet and instructed to cut up the pictures and place them in the correct order. (If students have trouble cutting, this step can be done ahead of time.)

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Lesson #12: Sending Messages with Light

BACKGROUND
Overview of the Lesson
Students will build upon their knowledge that light travels in a beam and students will give examples of how we use light to send signals (light house, street lights). Students will use flashlights to communicate a message to one another.

Focus Standard(s)
1-PS4-4. Use tools and materials to design and build a device that uses light or sound to send a signal over a distance.

Learning Objectives
By the end of this lesson, students will be able to...

  Communicate a message using only a light source.

Assessment(s)
1. Students will move in the right direction when signaled with the flashlight.
2. Students write science journal entries throughout the lesson.

WIDA Language Objectives
FORTHCOMING
Key Vocabulary
Tier 1: flashlight
Tier 2: Communicate, demonstrate, message

RESOURCES AND MATERIALS

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<th>Source</th>
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</thead>
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<tr>
<td>12</td>
<td>Small flashlights</td>
<td>Bin</td>
</tr>
<tr>
<td>1/child</td>
<td>Science journal</td>
<td>Classroom</td>
</tr>
</tbody>
</table>

**items in bold should be returned to the bin for use next year**

LESSON DETAILS

Lesson Opening/ Activator
The teacher should begin the lesson by reviewing how vibration and sound can be used to communicate a message. The teacher should emphasize that everything they have been learning about light, sound, and how they travel are all really starting to connect here. Have the students review the class KWL chart with a partner, emphasizing what they have “Learned” so far.

After a couple minutes of the students reviewing the KWL charts, cue the students to discuss with their partner different kinds of light which communicate messages. If the students are struggling coming up with ideas, give them some examples (street lights, lighthouses, flashing lights on ambulances/police cars, etc.) Notify the students that they will be getting into groups of two, and using light to communicate a message to their partner.
During the Lesson

This lesson is adapted from “First Grade Next Generation Science Standards”

1. Divide students into groups of three.
2. Each group will get one flashlight.
3. Each group will devise a plan or sequence of light flashes to tell the other group members to come closer to the beam of light, or move further away from it. Examples of this could be one flash is move closer, two flashes is to move further away. Another option would be to use different colored tissue paper to change the color of the light beam (green to move closer and red to move further away, etc.)  

   **Note: At this point the teacher should model a flashing sequence with a student to move closer and further away.**

4. Allow the students to come up with their own sequences, and record them in their science journals.
5. Students should then practice their signals with their group.
6. The teacher will then choose as many groups as he/she pleases to demonstrate their light signals in front of the rest of the class. Have the remaining students in the class guess what each signal is and what it means.
7. Feel free to expand the lesson, and challenge the students to add a third signal which could direct the student to remain in the same spot, sit down, etc.

**Bonus/Challenge:** If there is extra time, students could play the game “telephone” using only their flashlights. Instead of a “move forward” and “move backward” signal, just have the students repeat the sequence to the person next to them. The teacher can come up with the initial pattern and, moving down the line one by one, students can send the signal to the person next to them. The teacher can see if everyone can mimic the same sequence if the signal they received was the same as the original. If they can do it, challenge the students by bringing them into the hall and signaling around corners. *(SP8 - Obtaining, Evaluating, and Communicating Information).*
Lesson Closing
The teacher should review lights can send messages/signals in many ways using color, frequency (amount of times it blinks), etc. Ask the students to write in their journals 3 examples of light sources which send messages.

The teacher should also review that lights can send a message over a long distance, and that light travels in a straight line (using “signaling around the corner” as an example of how light travels in a straight line, where just one partnership wouldn’t be able to signal around a corner, but putting someone at the corner to receive and repeat the light sequence allows students to send a message over a distance.)

Assessment
1. Students will move in the right direction when signaled with the flashlight.
2. Student science journal entries throughout the lesson (recording of their signal code, examples of light sources that send messages).
Lesson 13: Communication Device

BACKGROUND

Overview of the Lesson
The purpose of this lesson is to give the students some creative freedom. The students will be given raw materials which can be used to construct a device that transmits a message using light or sound. Before the students build, they should be shown the materials that will be available to them so they can brainstorm with a pencil and paper to first draw what they would like to create.

Focus Standard(s)
1-PS4-1. Demonstrate that vibrating materials can make sound and that sound can make materials vibrate.
1-PS4-3. Determine the effect of placing materials that allow light to pass through them, allow only some light through them, block all the light, or redirect light when put in the path of a beam of light.
1-PS4-4. Use tools and materials to design and build a device that uses light or sound to send a signal over a distance.

Learning Objectives
By the end of this lesson, students will be able to...
1. Design and construct a device that will create light or sound
2. Produce a message using light or sound

Assessment(s)
1. CEPA work products scored against CEPA rubric
2. Grade_1_LightandSound_Lesson_13_Wksh_Summary worksheet
WIDA Language Objectives
FORTHCOMING

Key Vocabulary
Tier 2: model, message, signal, device, create, design

RESOURCES AND MATERIALS

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<th>Item</th>
<th>Source</th>
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</thead>
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<tr>
<td>1</td>
<td>Large Box of Popsicle Sticks</td>
<td>Bin</td>
</tr>
<tr>
<td>Large bag</td>
<td>Assorted materials</td>
<td>Bin</td>
</tr>
<tr>
<td>12</td>
<td>Safety mirrors</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Paper and Pencil</td>
<td>Bin</td>
</tr>
<tr>
<td>5</td>
<td>Rolls of tape (any kind, the more the better)</td>
<td>Bin</td>
</tr>
<tr>
<td>50</td>
<td>Sheets of colored construction paper</td>
<td>Bin</td>
</tr>
<tr>
<td>10</td>
<td>Flashlights</td>
<td>Bin</td>
</tr>
<tr>
<td>***</td>
<td>Students can use classroom materials if they find them suitable for their project</td>
<td>Classroom</td>
</tr>
</tbody>
</table>

**items in bold should be returned to the bin for use next year**

LESSON DETAILS
Lesson Opening/ Activator
The teacher should begin a class discussion reminding the students about what they had done in the last two lessons (building paper cup walkie talkies, creating light signals with a flashlight). Now, they get to be more creative, and get to build their own...
device/tool/model which sends a message over a distance using light and/or sound. Explain the CEPA task and discuss the SOS signal demonstrating it with clapping and the on/off of a flash light.

Then show the students the materials they will be using to build their own device, so that they know what they have to build with. Explain that they cannot turn the flashlight on an off to make their signal. They must leave it on as a light source, but could figure out another way to make the SOS pattern using the light.

Distribute and discuss the CEPA rubric so that students will know the criteria for their assignment.

**During the Lesson**
1. Once the students have been shown the materials they can use to build their own device, they must first make a design on paper.
2. It is suggested each student come up with more than one idea on paper, draw a design on paper, and explain how their device will work before actually creating it.
3. Once the students have cleared their design with the teacher, they can start to build their device.
4. Upon completion, each student should draw or write down how their device/model sends its message in their science journals.

**Lesson Closing**
Students can either put their designs on display and visit other students’ stations, or present them individually to the rest of the class (teacher choice).
Review the KWL chart one final time to see if there is anything to add. The “Learning” column should include at least the following:

- Sounds are caused by vibrations – something must be vibrating to make a sound
- A loud sound can make other things vibrate
- Light beams travel in straight lines
- Some things can block light beams either completely (creating a shadow) or partially (letting only a little light through)
- Some things can bend a light beam
- We can use light and sound to communicate across distances

**Assessment**

1. CEPA work products scored against CEPA rubric
2. Grade_1_LightandSound_Lesson 13_Wksht_Summary worksheet
Materials and Resources

NOTE: Item in bold (and all unused consumable supplies) should be returned with the bin.

Lesson 1

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<tr>
<td>8 copies</td>
<td>Book: “Sensing Light and Sound” by Jennifer Boothroyd</td>
<td>Bin</td>
</tr>
<tr>
<td>2</td>
<td>Large chart paper</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Marker</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Family photograph</td>
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<td>1</td>
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Lesson 2

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<td>Plastic straws</td>
<td>Bin</td>
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<td>Class set</td>
<td>Scissors</td>
<td>Classroom Teacher</td>
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<td>1 per child</td>
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<td>Binder</td>
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</tr>
<tr>
<td>2</td>
<td>Large chart paper (text feature chart and KWL from lesson 1)</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Marker</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1 set</td>
<td>Color images of road signs</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Worksheet 2</td>
<td>Binder</td>
</tr>
</tbody>
</table>

### Lesson 4

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3</td>
<td>Drums</td>
<td>Music Teacher/Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Small Bag of rice</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Tuning Fork</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Bowl for water</td>
<td>Bin</td>
</tr>
<tr>
<td>20</td>
<td>Popsicle sticks</td>
<td>Bin</td>
</tr>
<tr>
<td>10</td>
<td>Rubber bands</td>
<td>Bin</td>
</tr>
<tr>
<td>3 sets</td>
<td>Metal fork and spoon</td>
<td>Bin</td>
</tr>
<tr>
<td>4</td>
<td>Rulers</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1/child</td>
<td>&quot;Visualizing Vibrations&quot; worksheet</td>
<td>Binder</td>
</tr>
<tr>
<td>1/child</td>
<td>Science journal</td>
<td>Binder</td>
</tr>
<tr>
<td>1</td>
<td>Projector</td>
<td>Classroom teacher</td>
</tr>
</tbody>
</table>

### Lesson 5

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<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Homemade musical instruments</td>
<td>Science Fellows/Bin</td>
</tr>
<tr>
<td>2-3</td>
<td>Staples</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td></td>
<td>Crayons</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>10</td>
<td>Any cylindrical container with a top</td>
<td>Bin</td>
</tr>
<tr>
<td>2/child</td>
<td>Pencils</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>A pack</td>
<td>Construction paper</td>
<td>Bin</td>
</tr>
<tr>
<td>10</td>
<td>Small boxes with or without lids</td>
<td>Bin</td>
</tr>
<tr>
<td>1 bag</td>
<td>Rubber bands of assorted sizes</td>
<td>Bin</td>
</tr>
<tr>
<td>1 bag</td>
<td>Dried beans</td>
<td>Bin</td>
</tr>
<tr>
<td>1 roll</td>
<td>Plastic Wrap</td>
<td>Bin</td>
</tr>
<tr>
<td>Several</td>
<td>Rulers</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>5 rolls</td>
<td>Masking tape</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Projector</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>Assorted</td>
<td>Other materials for making instruments available in the classroom</td>
<td>Classroom teacher</td>
</tr>
</tbody>
</table>

### Lesson 6

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Book: Bear Shadow by Frank Asch</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Glass Aquarium (one per building - shared with other T2L classes at grade level)</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Small carton of milk from cafeteria</td>
<td>Classroom Teacher</td>
</tr>
<tr>
<td>12</td>
<td>Small flashlights - check batteries prior to use</td>
<td>Bin</td>
</tr>
<tr>
<td>10 sets</td>
<td>3 Index cards with holes punched in middle</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Lump of clay (enough to make stands for the index cards)</td>
<td>Bin</td>
</tr>
</tbody>
</table>
**Lesson 7**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 copies</td>
<td><strong>Book : “Playing with Light and Shadows”</strong></td>
<td>Bin</td>
</tr>
<tr>
<td>2</td>
<td>Text feature chart and KWL chart from lesson 2</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Marker</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Worksheet 3</td>
<td>Binder</td>
</tr>
<tr>
<td>1</td>
<td>Activator photograph</td>
<td>Classroom teacher</td>
</tr>
</tbody>
</table>

**Lesson 8**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Light table – 4 per school to be shared among T2L classrooms at grade level</td>
<td>Bin</td>
</tr>
<tr>
<td>4 bags</td>
<td>Assorted pieces of tissue paper, construction paper, clear plastic</td>
<td>Bin</td>
</tr>
<tr>
<td>4 bags</td>
<td>Pieces of transparent, translucent, &amp; opaque materials (well-known classroom and household items, toys, recycled materials, scraps)</td>
<td>Bin</td>
</tr>
</tbody>
</table>
### Lesson 9

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 per child</td>
<td>Transparent/Translucent/Opaque Worksheet</td>
<td>Binder</td>
</tr>
<tr>
<td>1</td>
<td>Large blow up of Transparent/Translucent/Opaque Worksheet</td>
<td>Bin</td>
</tr>
<tr>
<td>3 colors</td>
<td>Dry eraser markers</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1 per child</td>
<td>“Just Passing Through” worksheet</td>
<td>Binder</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Model Sun Catcher</td>
<td>Bin</td>
</tr>
<tr>
<td>1 Roll</td>
<td>Wax Paper (return leftovers) – Divide into sheets about the size of an 8 ½ x 11 piece of paper</td>
<td>Bin</td>
</tr>
<tr>
<td>1 per child</td>
<td>Blank 8 ½ x 11 sheets of paper</td>
<td>Classroom Teacher</td>
</tr>
<tr>
<td>1 jug</td>
<td>Liquid Starch (return leftovers)</td>
<td>Bin</td>
</tr>
<tr>
<td>1 per child</td>
<td>Paint brush</td>
<td>Art teacher/Classroom teacher</td>
</tr>
</tbody>
</table>

**Selection**

<table>
<thead>
<tr>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple colors of tissue paper (return leftovers)</td>
<td>Bin</td>
</tr>
<tr>
<td>String or yarn</td>
<td>Bin</td>
</tr>
<tr>
<td>Scissors</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>hole punchers</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>scotch tape</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>Light Table from previous lesson</td>
<td>Bin</td>
</tr>
</tbody>
</table>
### Lesson 10

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 copies</td>
<td><strong>Book</strong>: “Sending Messages with Light and Sound”</td>
<td>Bin</td>
</tr>
<tr>
<td>2</td>
<td>large chart paper (text feature chart and KWL from lesson 2)</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>marker</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>worksheet 4</td>
<td>Bin</td>
</tr>
</tbody>
</table>

### Lesson 11

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ball of cotton string (return the extra)</td>
<td>Bin</td>
</tr>
<tr>
<td>2</td>
<td>Paper cups per student pair (return the extra)</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Scissors</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1</td>
<td>Crayons or markers to decorate “walkie talkies”</td>
<td>Classroom teacher</td>
</tr>
<tr>
<td>1 per child</td>
<td>Walkie Talkie worksheet</td>
<td>Binder</td>
</tr>
</tbody>
</table>

### Lesson 12

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Small flashlights</td>
<td>Bin</td>
</tr>
<tr>
<td>1 per child</td>
<td>Science journal</td>
<td>Classroom</td>
</tr>
</tbody>
</table>

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## Lesson 13

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Large Box of Popsicle Sticks</td>
<td>Bin</td>
</tr>
<tr>
<td>Large bag</td>
<td>Assorted materials</td>
<td>Bin</td>
</tr>
<tr>
<td>12</td>
<td>Safety mirrors (see Lesson 6)</td>
<td>Bin</td>
</tr>
<tr>
<td>1</td>
<td>Paper and Pencil</td>
<td>Classroom Teacher</td>
</tr>
<tr>
<td>5</td>
<td>Rolls of tape (any kind, the more the better)</td>
<td>Bin</td>
</tr>
<tr>
<td>50</td>
<td>Sheets of colored construction paper</td>
<td>Bin</td>
</tr>
<tr>
<td>12</td>
<td>Small flashlights (see Lesson 6)</td>
<td>Bin</td>
</tr>
<tr>
<td>***</td>
<td>Students can use classroom materials if they find it suitable for their project</td>
<td>Classroom</td>
</tr>
</tbody>
</table>

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