Introduction
General Information

Sara Fallahi

TSL 518

Unit Information:

Lessons #1-3

Title of Unit: Sounds and Vibrations

Grade 3

Mainstream Class with Integrated English Language Learners

Source for Unit:


Reading Materials:


Goals of the Unit:

I want my students to know that sound is caused by vibrations.

I want my students to know that a sound source is an object that is vibrating and a sound receiver detects sound vibrations.

I want my students to know how pitch is how high or low a sound is.

I want my students to know that differences in pitch are caused by differences in the frequency or rate at which objects vibrate.
### Unit Content & Language Objectives:

<table>
<thead>
<tr>
<th>Lesson Number of Unit</th>
<th>Content Objectives</th>
<th>Language Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 1</td>
<td>1. Students will show that sound is caused by vibrations, by striking the tuning fork, touching it to different objects, and making observations in pairs.</td>
<td>1. In pairs, students will read instructions, and record their observations in written sentences.</td>
</tr>
<tr>
<td>Lesson 2</td>
<td>1a. Students will be able to distinguish between a sound source and a sound receiver, after reading and comprehension questions. 1b. Students will be able to recognize the parts of the human ear.</td>
<td>1. Students will read independently and respond to comprehension questions using appropriate vocabulary.</td>
</tr>
<tr>
<td>Lesson 3</td>
<td>1. Students will order bottles from highest to lowest pitch.</td>
<td>1. In pairs, students will read instructions, discuss, and each record their observations in written sentences.</td>
</tr>
</tbody>
</table>
Lesson 1
Lesson #1 Objectives, Performance Indicators & Functional Language Chart

**Learning Objectives:**

*Content Objective:*
1. Students will show that sound is caused by vibrations, by striking the tuning fork, touching it to different objects, and making observations in pairs.

*Language Objective:*
1. In pairs, students will read instructions and record their observations in written sentences.

**Performance Indicators:**

<table>
<thead>
<tr>
<th>Domain/Topic</th>
<th>Bridging/Mainstream Level 5</th>
<th>Intermediate Level 4</th>
<th>Developing Level 3</th>
<th>Early Production Level 2</th>
<th>Pre-Production Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading and Writing</td>
<td>Students will read instructions and write a paragraph of 4 sentences about how they know that the tuning fork is vibrating.</td>
<td>Students will read the instructions and write 3 sentences about how they know that the tuning fork is vibrating.</td>
<td>Students will read the modified instructions (keywords underlined) and write 2 sentences using sentence starters about how they know that the tuning fork is vibrating.</td>
<td>Students will read the modified instructions (with keywords underlined and pictures), draw a picture, and fill in the blanks with the support of a word bank about how they know that the tuning fork is vibrating.</td>
<td>Students will read the labeled picture instructions, draw a picture, and then write 1-2 words from a word bank to explain how they know that the tuning fork is vibrating.</td>
</tr>
<tr>
<td>Speaking</td>
<td>In pairs, students will lead a discussion about their observations of the tuning fork.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discussing their observations</td>
<td>In pairs, students will actively participate in a discussion about their observations of the tuning fork.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>In pairs, using sentence starters and a word bank, students will fully participate in a discussion about their observations of the tuning fork.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>In pairs, students will participate in a discussion about their observations of the tuning fork by using 3-4 short phrases from a word bank.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>In pairs, students will participate in a discussion about their observations of the tuning fork by repeating 2-3 single words from a word bank.</td>
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<td></td>
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</table>

**Functional Language Chart:**

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expressions</th>
<th>Words/Phrases</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propose/Support</td>
<td>Experiment</td>
<td>I know that a tuning fork vibrates because:</td>
<td>1. my cheek, the Ping-Pong Ball, water, paper</td>
<td>Direct</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When the tuning fork touches 1, I can 2</td>
<td>2. see, feel</td>
<td>Objects/Direct</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>3. it, my cheek, the Ping-Pong Ball, the water, the paper</td>
<td>Object Pronouns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>4. moving, vibrating, bouncing</td>
<td>Present tense</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 is 4</td>
<td></td>
<td>Gerunds</td>
</tr>
</tbody>
</table>
Activities:

Materials: tuning fork, chart paper, piece of paper, Ping-Pong ball on a thread, a cup of water, a computer with Internet access, and a projector

Activities:

(text in blue = new, text in black = original)

A. Activating Prior Knowledge and Creating a Shared History: The teacher begins the unit with the students outside.

   i. Creating a List Sounds: She instructs them to write a list (or draw a labeled picture) of all of the sounds they can hear. They can be very loud, such as a fire truck passing by, or more quiet, like a bird chirping. After five minutes, she instructs the students to complete a whip around the classroom in which the students each contribute one sound they heard while they were outside in a share out. The teacher writes the list on chart paper.

   ii. Think-Pair-Share & Things that Make Sound: Next, she displays a picture of a crying baby. She asks, “What is happening in this picture?” Then she prompts students with the question, “Why do you think they baby...
needs to cry/make sound?” Some anticipated student responses include: to get the mom or dad’s attention, the baby is hungry, the baby needs something, the baby is tired/sleepy, the baby is hurt, etc. The teacher will say that sound is important for many reasons. Then, she forms small groups and poses the question: “At each of your tables, there are cards with pictures of things that make sound. Please take a look at each picture. Then, in small groups, answer the question, ‘Why do you think we need each sound?’” (e.g., the baby is hungry, the person is speaking to another person, the dog is close by, the fire truck signals danger, etc.). (The “Things that Make Sound” Picture Cards are included in Supplemental Material #1, pages 12-13). For English language learners operating at levels 1 through 3, she provides a “Things that Make Sound Discussion” guide, complete with sentence starters, visual aides, and a word bank (Supplemental Material #2 “Things that Make Sound Discussion,” page 14-16.)

After the small group discussion and share, the teacher asks the essential question, “Why do you think that sound is important in our lives?” She has students complete the think-pair-share and discuss this question for two minutes. After the think-pair-share, she calls on each group to share out to the whole class (for enjoyment, like music or television, or to tell us an important message). Then, at the end of the discussion, she says that sound is all around us and, for the reasons they stated, is extremely important.

B. The Tuning Fork Experiment:
i. Establishing the Purpose: The teacher explains that, since sound is so important to our lives, we are going to study where it comes from and what creates it. To do this, students will perform an experiment. The teacher will show the equipment briefly but will not actually demonstrate the activities to maintain the element of discovery and surprise.

ii. Establishing Expectations for Activity & Materials: First, the teacher will display the tuning fork. She will show the students how to hold the tuning fork by the stem and strike it on the wood block (or on the bottom of their shoe). Next, after modeling proper use of the equipment, the teacher will set the ground rules for using the equipment during the experiment. She states that striking the tuning fork with excessive force can damage it. Then, after explaining, she shows the differentiated “Tuning Fork” Activity page, assigns pairs and instructs students to complete the activity by reading the steps, following the directions, using the tuning fork, and then writing their observations on the paper.

iii. Completing the Experiment, Reading, & Writing: In this experiment, students must touch the tuning fork to a piece of paper, a Ping-Pong ball hanging from a thread, their own cheek, and a cup of water. After touching each object, the students must wait, watch, and listen to see what happens. To facilitate reading the instructions, modified guides are provided for students at levels 1, 2, and 3 of English proficiency. Supports for each of the English proficiency levels range from underlying keywords to visual aides and simplified language. Then, after
completing the experiment, as a formative assessment, students must write a response to the prompt, "How do you know that the tuning fork vibrates?" In order to answer this question, students must provide evidence from what they observed, saw, or noticed about the tuning fork or the objects throughout the experiment. Thus, to aid ELs in accomplishing the writing objective, various supports, including a phrase/word bank, sentence starters, and visuals, with a lowering of expectations for written output (e.g., at a Level 4 or 5, students are expected to write a paragraph whereas at students at a Level 2 are expected to fill in the blanks with the help of a word bank). In other words, the number and types of supports increase as the English language proficiency of the student lowers (Supplemental Materials #3-6, pages 17-25). A summary of these supports is included in the Performance Indicators Chart below:

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</tr>
</tbody>
</table>
iv. **Speaking:** As students are completing the activity, they are also expected to engage in discussion about what they observe about the tuning fork, the vibration, sound, as well as the objects (e.g., a cup of water, a piece of paper, their cheek, and a Ping-Pong ball on a thread). In order to be able to successfully complete this, English language learners are provided with modifications and varying supports depending on their level of English proficiency (Supplemental Materials #3-6, pages 17-25).

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<th>Intermediate Level 4</th>
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</tr>
</thead>
<tbody>
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<td>Speaking Discussing their observations</td>
<td>In pairs, students will lead a discussion about their observations of the tuning fork.</td>
<td>In pairs, students will actively participate in a discussion about their observations of the tuning fork.</td>
<td>In pairs, using sentence starters and a word bank, students will fully participate in a discussion about their observations of the tuning fork.</td>
<td>In pairs, students will participate in a discussion about their observations of the tuning fork by repeating 2-3 single words from a word bank.</td>
<td>In pairs, students will participate in a discussion about their observations of the tuning fork by repeating 2-3 single words from a word bank.</td>
</tr>
</tbody>
</table>

As evident by the chart, supports include but are not limited to the use of word banks and sentence starters (Supplemental Materials #3-6, pages 17-25). Furthermore, throughout the Tuning Fork activity, the
teacher will circulate around the classroom, making sure to answer any questions as well as assist ELs with any difficult content-specific language or otherwise.

C. Closure/Assessment: The teacher collects the initial observations and written responses as evidence of the student work. She asks students “How did you know that the tuning fork was vibrating?” She tells students, “You are going to show me what the tuning fork looked like. That is your ticket out-the-door!” With this, students will dramatize the vibrating tuning fork by positioning their body in a moving back-and-forth manner. That way, the teacher can ensure that they are at least leaving the lesson and experiment with the knowledge that the tuning fork vibrates.
Supplemental Materials:

1. “Things that Make Sound” Picture Cards (pgs. 12-13)
2. “Things that Make Sound Discussion,” Levels 1-3 (pgs. 14-16)
3. The Tuning Fork, Mainstream Levels 4 & 5 (pg. 17)
4. The Tuning Fork, Level 3 (pgs. 18-19)
5. The Tuning Fork, Level 2 (pgs. 20-22)
6. The Tuning Fork, Level 1 (pgs. 23-25)
"Things that Make Sound" Picture Cards

- a baby
- a fire truck
- an iPhone
- a whistle
- a telephone
- a television
a radio  

a dog  

a bell  

a guitar  

a bird  

an alarm clock
<table>
<thead>
<tr>
<th>When,</th>
<th>we can tell that</th>
</tr>
</thead>
</table>
| a baby cries, | the baby is hungry.  
the baby is sleepy.  
the baby needs something. |
| a dog barks, | a dog is somewhere close.  
the dog is hungry.  
the dog needs something. |
| people laugh, | they are happy.  
they heard a funny joke. |
| we hear a fire truck siren, | there is danger.  
there is a fire.  
there is a fire drill at school. |

1. When __________________________, we can tell that __________________________.

2. When __________________________, we can tell that __________________________.
<table>
<thead>
<tr>
<th>Crying</th>
<th>tells you that __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>the baby is hungry.</td>
<td></td>
</tr>
<tr>
<td>the baby is sleepy.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Barking</th>
<th>tells you that __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>the dog is hungry.</td>
<td></td>
</tr>
<tr>
<td>the dog needs something.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A fire truck siren</th>
<th>tells you that __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>there is a fire.</td>
<td></td>
</tr>
</tbody>
</table>

1. ________________ tells you that ________________

2. ________________ tells you that ________________
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baby crying</td>
<td>hungry</td>
<td></td>
</tr>
<tr>
<td>A truck siren</td>
<td>fire</td>
<td></td>
</tr>
</tbody>
</table>

1. ______________ means ______________.

2. ______________ means ______________.
THE TUNING FORK - Levels 4 & 5

Materials for a Group
1 tuning fork
1 cup of water
1 Ping-Pong ball on a thread
1 piece of paper

Investigation

1. Dip just the ends of the tuning fork into a cup of water. Watch and listen.
2. Touch the ends of the tuning fork to the edge of a piece of paper. Watch and listen.
3. Touch the ends of the tuning fork to your cheek. Describe what you feel.
4. Hold the thread so the Ping-Pong ball hangs in the air. Touch the tuning fork to the ball. Keep the tuning fork in one position and watch what happens to the ball.

Record

Describe how you know that a tuning fork vibrates.

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

THE TUNING FORK - Level 3

Materials for a Group

| one tuning fork  
  *Bottom of foot. | one cup of water  
  | one piece of paper | One Ping-Pong ball on a thread |

Investigation
1. **Dip** the **tuning fork** into a cup of **water**. **Watch** and **listen**.

2. **Touch** the **tuning fork** to the **paper**. **Watch** and **listen**.

3. **Touch** the **tuning fork** to your **cheek**. **Describe** what you **feel**.

4. **Hold** the **thread** so the Ping-Pong ball hangs in the air. **Touch** the **tuning fork** to the **ball**. **Watch** what happens to the **ball**.

Record

Describe how you know that a tuning fork vibrates.

______________________________________________________________________________________

______________________________________________________________________________________

______________________________________________________________________________________

______________________________________________________________________________________

Sentence Starters for Writing and Discussion:

<table>
<thead>
<tr>
<th><strong>Word Bank</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objects:</strong></td>
</tr>
<tr>
<td>my cheek</td>
</tr>
<tr>
<td>the Ping-Pong ball</td>
</tr>
<tr>
<td>water</td>
</tr>
<tr>
<td>paper</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

1. I know that the tuning fork is vibrating because ________________________________.

2. When the tuning fork touches ____________, I can __________________ that __________________________ is _____________.
   (object)  (sensory word)  (object)  (movement word)
THE TUNING FORK - Level 2

Materials

<table>
<thead>
<tr>
<th>one tuning fork</th>
<th>one cup of water</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Bottom of foot.</td>
<td></td>
</tr>
</tbody>
</table>

| one piece of paper | One Ping-Pong ball on a thread |

Activity

1. Dip into **water**.

2. Touch to **paper**.

3. Touch to your **cheek**.

4. Touch to the **ball**.
Draw the tuning fork vibrating.

When the tuning fork touches _________________.

- the water
- the paper
- the ball
- my cheek

I can ___________________________ it

- see
- feel

- vibrating
- moving
- bouncing
Sentence Starters for Writing and Discussion:

<table>
<thead>
<tr>
<th>I can _____________________________</th>
<th>Word Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>![eyes]</td>
</tr>
<tr>
<td></td>
<td>![hand]</td>
</tr>
<tr>
<td></td>
<td>![glass]</td>
</tr>
<tr>
<td></td>
<td>![paper]</td>
</tr>
<tr>
<td></td>
<td>![ball]</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>![vibrating]</td>
</tr>
<tr>
<td></td>
<td>![moving]</td>
</tr>
<tr>
<td></td>
<td>![bouncing]</td>
</tr>
</tbody>
</table>
### The Tuning Fork - Level 1

#### Materials

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Tuning Fork" /></td>
<td><img src="image" alt="Water" /></td>
</tr>
<tr>
<td>One tuning fork  &lt;br&gt; <em>Bottom of foot.</em></td>
<td>One cup of water</td>
</tr>
<tr>
<td><img src="image" alt="Paper" /></td>
<td><img src="image" alt="Ping-Pong Ball" /></td>
</tr>
<tr>
<td>One piece of paper</td>
<td>One Ping-Pong ball on a thread</td>
</tr>
</tbody>
</table>

#### Activity

1. **Water**

2. **Paper**

3. **Cheek**

4. **Ball**
Write

1. Draw vibrations.

2. Write tuning fork.

3. Write vibrations.

Describe.

<table>
<thead>
<tr>
<th>The water</th>
<th>The paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ball</td>
<td>My cheek</td>
</tr>
</tbody>
</table>

is ________________________.

- vibrating
- moving
- bouncing

Sentence Starters for Writing and Discussion:

is ________________________.

The water
The paper
My cheek
The ball

vibrating
moving
bouncing

I can ________________________

the vibrations.

see
feel
**Reflection of Modifications:** In Lesson #1, a variety of modifications were made to alter the original lesson. First of all, the original lesson had no mention of activating prior knowledge or even discussing why sound is important. Therefore, as a way of creating shared history, I decided to include the Think-Pair-Share activity and discussion centered around things that make sound. In addition, I used gestures - in the form of dramatization - to help students visualize and conceptualize sound! That way, prior to even beginning the unit on sound, the students are reminded that sound is all around them and worthy of exploring! In addition to creating a shared history, I chose to add a variety of guides for the various small group discussions occurring in this first lesson. From the Things that Make Sound Discussion Guide to The Tuning Fork Discussion Guide, I include a multitude of sentence starters, word banks, and visuals to aid English language learners at every proficiency level to access the curriculum and be able to negotiate meaning as well as fully participate in each and every discussion.

Beyond the use of discussion guides, it is important to note that each experiment guide was modified to the specific level of English language proficiency represented within the integrated classroom. From underlining keywords to using of scaffolded language, I was able ensure that ELs could make sense of each step to be able to follow the experimental procedure. However, these changes were not limited to the reading portion of the lesson; rather, in the end of the lesson, the formative written task was leveled appropriately for each level, ranging from the paragraph-long response expected of a Level 4 or 5 (Mainstream EL) to the single words to be written by the Level 1 Pre-Production EL, ensuring success no matter the English proficiency level of each student!
General Information

Sara Fallahi

Dr. Lorrie Stoops Verplaatse

TSL 518

Unit Information:

Lessons #1-3

Title of Unit: Sounds and Vibrations

Grade 3

Mainstream Class with Integrated English Language Learners

Source for Unit:


Reading Materials:


Goals of the Unit:

I want my students to know that sound is caused by vibrations.

I want my students to know that a sound source is an object that is vibrating and a sound receiver detects sound vibrations.

I want my students to know how pitch is how high or low a sound is.

I want my students to know that differences in pitch are caused by differences in the frequency or rate at which objects vibrate.
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<td>1. In pairs, students will read instructions, and record their observations in written sentences.</td>
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| Lesson 2              | 1a. Students will be able to distinguish between a sound source and a sound receiver, after reading and comprehension questions.  
1b. Students will be able to recognize the parts of the human ear. | 1. Students will read independently and respond to comprehension questions using appropriate vocabulary. |
| Lesson 3              | 1. Students will order bottles from highest to lowest pitch.                        | 1. In pairs, students will read instructions, discuss, and each record their observations in written sentences. |
Lesson 2
Lesson #2 Objectives, Performance Indicators & Functional Language Chart

**Learning Objectives:**

**Content Objective:**
1a. Students will be able to distinguish between a sound source and a sound receiver after reading and answering comprehension questions.
1b. Students will be able to recognize the parts of the human ear.

**Language Objective:**
1. Students will read independently and respond to comprehension questions using appropriate vocabulary.

**Performance Indicators:**

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<tr>
<td>Reading and Speaking (Pre-Test with a Partner)</td>
<td>In pairs, students will read 8 statements about sound. Then, in pairs, students will lead a discussion about whether those statements are true or false.</td>
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<td>In pairs, students will read 6 modified statements about sound (with underlined keywords). Then, in pairs, using sentence starters, students will fully participate in a discussion about whether those statements are true or false.</td>
<td>In pairs, students will read 4 modified statements about sound (with captioned pictures). Then, using a word bank and sentence starters, students will participate in a discussion about whether the statements are true or false.</td>
<td>In pairs, students will read 4 modified statements about sound (with captioned pictures). Then, using a word bank and sentence starters, students will participate in a discussion about whether the statements are true or false by repeating one-two word</td>
</tr>
<tr>
<td>Activity</td>
<td>Steps</td>
<td>True or False</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
<td>---------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading the article and color the parts of the ear</td>
<td>Students will individually read the article, “Your Source and Receiver.” Then, students will read and follow the written directions to color all parts of the ear.</td>
<td>Students will individually read and follow the written directions to color all parts of the ear.</td>
<td>In pairs, students will read a modified version of the article, “Your Source and Receiver” (with captioned pictures).</td>
<td>In pairs, students will read a labeled pictures version of the article, “Your Source and Receiver.”</td>
<td></td>
</tr>
<tr>
<td>Writing Comprehension Questions</td>
<td>Individually, students will write responses to 8 comprehension questions using information and vocabulary from the article.</td>
<td>Individually, students will write responses to 8 comprehension questions using information and vocabulary from the article.</td>
<td>Individually, students will write responses to 5 comprehension questions using information from modified text having underlined keywords and simplified text.</td>
<td>Individually, students will write responses to 4 comprehension questions using information from picture-based modified text with a word bank.</td>
<td></td>
</tr>
</tbody>
</table>
## Functional Language Chart:

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expressions</th>
<th>Words/Phrases</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describing/Explaining</td>
<td>Writing</td>
<td>1 make sound.</td>
<td>1. vibrations, our vocal cords, vibrations in our throat</td>
<td>Present Tense</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. vibrations, stomping our foot, tapping our head, our voice, our vocal cords.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. makes sound, is a sound source.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 is part of the ear.</td>
<td>4. outer ear, middle ear, inner ear, auricle, ear canal, eardrum, cochlea, hammer, anvil, stirrup</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. auricle, ear canal, eardrum, cochlea, hammer, anvil, stirrup</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 is part of the ear.</td>
<td>6. outer ear, middle ear, inner ear</td>
<td></td>
</tr>
<tr>
<td>Justifying</td>
<td>Pre-Test with a Partner</td>
<td>I think this is 1 because 2.</td>
<td>1. True, false</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Vibrations are sound, ears hear vibrations, you cannot always see vibrations, the eardrum is in the ear, pitch is high and low sound.</td>
<td>Present Tense</td>
</tr>
</tbody>
</table>
Activities:

(text in blue = new, text in black = original)


A. Activating Prior Knowledge and Creating a Shared History: To begin the second lesson, the teacher states that students are going to continue their study of sound. Thus, in small groups, the students complete the round robin strategy and name one thing they remember about sound from last week.

   i. Pre-Test with a Partner: After the quick share about what the students remember, the teacher explains that the class is going to continue learning more about the ear and sound during the next two lessons! First, she wants to see what the students think about the ear and sound. So, in pairs, students will 1) read the statements, 2) discuss whether they think that the statement is true or false, and 3) circle true or false on their papers. The teacher is sure to explain that their answers are only predictions from what they think! Then, at that time, the teacher distributes the modified Pre-Test with a Partner to Levels 4 & 5 (Mainstream), Level 3 ELs, and Levels 1 and 2 ELs. Modifications to this assignment include: pictures, abridged directions, and keywords in bold print as well as sentence starters, sentence frames, and a word or phrase bank depending on the level (Supplemental Materials #1-3, pages 39-43). This way, students of a variety of English proficiency levels may participate in the discussion and Pre-Test with a Partner activity.
<table>
<thead>
<tr>
<th>Domain/Topic</th>
<th>Bridging/Mainstream Level 5</th>
<th>Intermediate Level 4</th>
<th>Developing Level 3</th>
<th>Early Production Level 2</th>
<th>Pre-Production Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading and Speaking (Pre-Test with a Partner)</td>
<td>In pairs, students will read 8 statements about sound. Then, in pairs, students will lead a discussion about whether those statements are true or false.</td>
<td>In pairs, students will read 8 statements about sound. Then, in pairs, students will actively participate in a discussion about whether those statements are true or false.</td>
<td>In pairs, students will read 6 modified statements about sound (with underlined keywords). Then, in pairs, using sentence starters, students will fully participate in a discussion about whether those statements are true or false.</td>
<td>In pairs, students will read 4 modified statements about sound (with captioned pictures). Then, using a word bank and sentence starters, students will participate in a discussion about whether the statements are true or false.</td>
<td>In pairs, students will read 4 modified statements about sound (with captioned pictures). Then, using a word bank and sentence starters, students will participate in a discussion about whether the statements are true or false.</td>
</tr>
</tbody>
</table>

ii. Take a Stand Strategy: After providing time for students to think of the answers to their questions, the teacher brings the class back for a Take a Stand activity. Next, the teacher chooses one statement to say to the class and then instructs students to stand holding the True or False sign to show the class their predictions from the Pre-Test with a Partner activity (Supplemental Material #4, page 44). She then calls on one student who predicts “True” for the statement and another who predicts “False” for them to justify their answer. For this follow up question, the teacher is sure to differentiate her levels of questioning as well as her expectations for responses based on the individual English proficiency level of the students.

Levels 4 or 5: Why do you think statement #2 is false?
Level 3: Is statement #2 false because your ears hear sound, see sound, or feel sound? (use with gestures)

Levels 1 & 2: Ears and vibrations (Elicit repetition from student using gestures.)

After each question, the teacher pauses and has the students discuss for a minute or so using their sentence starters and word banks for levels 1 through 3 (Supplemental Materials #2-3, pages 40-43). Then, she says that the predictions are interesting and in the video and reading from today, we will see if our predictions were correct or not.

iii. Stop that Video Strategy: Next, the teacher shows the SciShow Kids “What is Sound?” video from https://www.youtube.com/watch?v=3-xKZKxXuu0. While displaying the clip, the teacher will employ the Stop that Video-DVD strategy, being sure to pause and/or replay the video at key points, allowing students time to process the information. During these pauses in the videoclip, the teacher will ask students to show her their gesture/movement for “vibrations” from last class. The class will also jointly brainstorm and perform actions for “ear drum,” “ear,” “sound,” and “message to brain.”

iv. Sound 6-Square: Finally, after the video, the teacher will pass out a Sound 6-Square handout to each student (Supplemental Materials #9 Sound 6-Square, page 68). As a class, they will write the word “sound” within the box entitled, “word;” draw a picture to show sound or vibrations in the “picture” box; write an explanation of the concept of “sound,” in “In your own words?”; write a few examples of sound (either from the video or from their own experiences) in “Examples of Sound;” and finally, write the words that are associated with sound and parts of the ear in the final 2 boxes. Since students will be co-generating the responses with the teacher (and the teacher will be posting those responses on the classroom whiteboard), all members of the classroom will use the same template; with that said, however, the level of production of notes may differ from student to student based on English proficiency level.
B. Reading the Article “Your Source and Receiver”: The teacher explains that students will be reading to learn a little more about sound and our human bodies.

i. Demonstration: She asks students if they know what makes sound in the body. (She expects students to state “the vocal cords.”) She points to her throat and explains that your vocal cords are right there. You can feel them vibrate when you make sound. She then prompts students to touch their throat and to say a little sentence, like “Hi, my name is __________.” to their partner, all the while touching their throat. She asks students if they feel the vibration. Then, she asks students what part of our body takes in or hears sound. (She expects the students to reply with “the ears.”) She finally asks students which would be their sound source (the part of the body that makes sound) and which would be their sound receiver (the part of the body that takes in/hears sound).

ii. Previewing the Text Strategy: It is at that point that the teacher distributes the article “Your Source and Receiver” (Supplemental Materials #5-8, pages 45-67). She explains that the article talks about the voice (vocal cords) and parts of the ear. There are comprehension questions for students to answer based on what they read in the text. Next, she mentions that the text is set up with headings for those topics, has a few diagrams and visuals, and then the questions. She prompts students to take a look through the packet to see each of these components (e.g., headings, diagrams, visuals, and questions).

iii. Reading the Article: After the preview, she prompts students to begin reading the article. Then, when they reach the third section, they should follow the instructions to color the parts of the ear. For instance, if the text says, “Please color the eardrum red,” then students would take do as such on the diagram located within their packet. Modifications to the article
include simplified language, the use of a word bank, and underlined key words and/or phrases. Each of the students has their own individual packet complete with modifications according to their level of English language proficiency:

<table>
<thead>
<tr>
<th>Domain/Topic</th>
<th>Bridging/ Mainstream Level 5</th>
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<th>Early Production Level 2</th>
<th>Pre-Production Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading the article and color the parts of the ear</td>
<td>Students will individually read the article, “Your Source and Receiver.” Then, students will read and follow the written directions to color all parts of the ear.</td>
<td>Students will individually read the article, “Your Source and Receiver.” Then, students will read and follow the written directions to color all parts of the ear.</td>
<td>Students will individually read a modified version of the article, “Your Source and Receiver” (with simplified text and underlined keywords). Then, students will read and follow the written directions to color all parts of the ear.</td>
<td>In pairs, students will read a modified version of the article, “Your Source and Receiver” (with captioned pictures).</td>
<td>In pairs, students will read a labeled pictures version of the article, “Your Source and Receiver.”</td>
</tr>
</tbody>
</table>

iv. Answering Comprehension Questions: Then, after reading and coloring the parts of the ear, students are to individually (with the exception of level 1 which may work in pairs) write short responses to varying numbers of comprehension questions (either 8 questions for levels 4 and 5, 5 questions for levels 2 and 3, and 4 questions for level 1). Modifications to these questions include the support or use of a word bank as well as sentence starters (Supplemental Materials #5-8, pages 45-67).
<table>
<thead>
<tr>
<th>Domain/Topic</th>
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<td>Individually, students will write responses to 8 comprehension questions using information and vocabulary from the article.</td>
<td>Individually, students will write responses to 5 comprehension questions using information from modified text having underlined keywords and simplified text.</td>
<td>Individually, students will write responses to 5 comprehension questions using information from modified text having underlined keywords and 1-2 words from a word bank.</td>
<td>In pairs, students will write responses to 4 comprehension questions using information from picture-based modified text with a word bank.</td>
</tr>
</tbody>
</table>

**C. Formative Assessment & Exit Slip:** Once the students have completed the comprehension questions, the teacher collects the packets. She plans to view their progress and responses to adjust her instruction for Lesson #3 and determine whether or not a review of the concepts of “sound source” and “sound receiver” is required. To close the lesson, she asks the students why they think it is important to know how the ear works and what parts make up the ear. She instructs them to think about that question as they complete their exit slip. She instructs the students to choose 5 words that they feel are important vocabulary from today’s lesson (Supplemental Materials #5-8, pages 45-67). For Level 3, she provides a word bank; and for Levels 1 & 2, she provides the assistance of a picture word bank as well as lessens the expectations to only 3 words. Thus, to finish, students must write and turn in their 5 (or 3) words!
Supplemental Materials:

1. Pre-Test with a Partner, Levels 4 & 5 (page 39)

2. Pre-Test with a Partner, Level 3 (pages 40-41)

3. Pre-Test with a Partner, Levels 1 & 2 (pages 42-43)

4. True or False (page 44)

5. Your Source and Receiver and Exit Slip, Levels 4 & 5 (pages 45-48)

6. Your Source and Receiver and Exit Slip, Level 3 (pages 49-53)

7. Your Source and Receiver and Exit Slip, Level 2 (pages 54-60)

8. Your Source and Receiver and Exit Slip, Level 1 (pages 61-67)

9. Sound 6 Square, Mainstream (page 68)
Pre-Test with a Partner - Levels 4 & 5

WHAT IS SOUND?

Directions: Is it true or false? Read each statement with a partner and make your best guess! Good luck!

1. Sound is made from vibrations. TRUE FALSE
2. Your ear cannot hear vibrations. TRUE FALSE
3. You can always see vibrations. TRUE FALSE
4. The eardrum is one part of the ear. TRUE FALSE
5. Your vocal cords make sound. TRUE FALSE
6. Big musical instruments make slower vibrations. TRUE FALSE
7. Small musical instruments make faster vibrations. TRUE FALSE
8. Pitch is how high or low the sound is. TRUE FALSE
Pre-Test with a Partner - Level 3

WHAT IS SOUND?

Directions: Is it true or false? Read and make your best guess! Good luck!

1. Sound is made from vibrations. TRUE FALSE

2. Your ear cannot hear vibrations. TRUE FALSE

3. You can always see vibrations. TRUE FALSE

4. The eardrum is one part of the ear. TRUE FALSE

5. Your vocal cords make sound. TRUE FALSE

6. Pitch is high or low sound. TRUE FALSE
**Sentence Starter for Pre-Test with a Partner:**

I think this is _______ 1 ________

because _______ 2 ________.

1. 
   - true
   - false

2. 
   - vibrations are sound.
   - ears hear vibrations.
   - you can't always see vibrations.
   - the eardrum is in the ear.
   - pitch is high and low sound.
WHAT IS SOUND?

Directions: Is it true or false? Read and guess!

1. Sound is from vibrations.  
   TRUE ✔  FALSE ✗

2. Ears cannot hear vibrations.  
   TRUE ✔  FALSE ✗

3. The eardrum is in the ear.  
   TRUE ✔  FALSE ✗

4. Pitch is high or low sound.  
   TRUE ✔  FALSE ✗
### Sentence Starter for Pre-Test with a Partner:

<table>
<thead>
<tr>
<th>I think this is ______ 1 _______</th>
<th>1. true</th>
<th>false</th>
</tr>
</thead>
<tbody>
<tr>
<td>because ______ 2 ________</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. vibrations are sound.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ears hear vibrations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the eardrum is in the ear.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pitch is high and low sound.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
True
False
Directions: Please read the paragraphs and answer the comprehension questions.

What Makes Sound?

Every sound you hear has a source. And all the source of every sound is something that vibrates. Vibration creates sound. Vibrations are rapid back-and-forth movements that can travel through air, liquids, and solids. Sometimes you can see such vibrations. When someone plucks a guitar, you see the string move. But sometimes the vibrations are so fast that you can't detect them with your eyes.

Like other animals, you have a sound source and receiver. You actually have many sources, since you can use different parts of your body to make sounds. Stomping your foot makes a sound. Tapping your head makes another sound. But the source you use most is your voice. You also have two sound receivers. These are your ears.

Let's Talk

Your vocal cords are in your throat. Air from your lungs makes your vocal cords vibrate. The vibrations from these cords then move up your throat and come out your mouth.

Muscles make the space between the vocal cords bigger or smaller. The bigger the space between them, the lower the sound you make. That is why an adult's voice is deeper than a child's voice. An adult's vocal cords are larger. They create a bigger space when they move apart.
Let's Listen

Directions: Please read the paragraphs below. As you are reading, please follow the directions and color each part of the ear. Then, answer the comprehension questions.

The human ear is divided into three main parts. These are the outer ear, the middle ear, and the inner ear. Sound passes through all three parts on its way to the brain.

The outer ear includes the auricle and a tube called the ear canal. Please color the ear canal blue. The auricle is the fleshy piece of your ear on the side of your head. It collects the sounds created by people, animals, and other sound sources. Then it guides the sounds into the ear canal. Also, please color the auricle yellow. The sounds pass through the canal into the eardrum. Please color the eardrum red. Sound makes the eardrum vibrate like the top of a drum. Even quiet sounds cause tiny movements in the eardrum.

Next the vibrations from the eardrum enter the middle ear. The middle ear has three tiny bones. They are called the hammer, the anvil, and the stirrup. These bones transfer the vibrations to the inner ear. Please color the three bones green.

The inner ear is spiral-shaped like a snail's shell. It is called the cochlea, which is the Latin word for “snail.” The cochlea is filled with liquid and a strip of small hairs. Please color the cochlea purple. The strip is called the organ of Corti. When vibrations make the hairs move, they send an electric signal to your brain. The signal is sent along the auditory nerve to the brain. Please color the auditory nerve orange.
<table>
<thead>
<tr>
<th><strong>Comprehension Questions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. What are some of the ways you can make sound?</strong></td>
</tr>
<tr>
<td><strong>2. What are your sound receivers?</strong></td>
</tr>
<tr>
<td><strong>3. At the source of every sound is __________________.</strong></td>
</tr>
<tr>
<td><strong>4. What makes your vocal cords vibrate?</strong></td>
</tr>
<tr>
<td><strong>5. Why is an adult’s voice deeper than a child’s?</strong></td>
</tr>
<tr>
<td><strong>6. What does the auricle do?</strong></td>
</tr>
<tr>
<td><strong>7. The three bones of the middle ear are called __________________, __________________, and __________________.</strong></td>
</tr>
<tr>
<td><strong>8. What is the shape of the inner ear?</strong></td>
</tr>
</tbody>
</table>
Exit Slip

What we learned today in 5 words...

________________________

________________________

________________________

________________________

________________________
YOUR SOURCE AND RECEIVER

Directions: Please read the paragraph and answer the comprehension questions.

Every sound you hear has a source.

And at the source of every sound is something that vibrates.

Vibration makes sound.

You have a sound source and receiver.

Your main source is your voice.

Your ears are your two sound receivers.

Comprehension Questions

1. What is your sound source?
   Your sound source is ____________________.

2. What are your sound receivers?
   Your sound receivers are ____________________.

3. At the source of every sound is ____________________.
Let's Talk

Your vocal cords are in your throat.

Air from your lungs makes your vocal cords vibrate.

The vibrations from these cords then move up your throat

and come out your mouth.

<table>
<thead>
<tr>
<th>Comprehension Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Where are your vocal cords?</td>
</tr>
<tr>
<td>Your vocal cords are in _________________.</td>
</tr>
<tr>
<td>5. What makes your vocal cords vibrate?</td>
</tr>
<tr>
<td>___________________________ makes your vocal cords vibrate.</td>
</tr>
</tbody>
</table>
Let's Listen

Directions: Please read the paragraphs below and then follow the directions and color each part of the ear. Then, answer the comprehension questions.

The human ear has 3 main parts: the outer ear, the middle ear, and the inner ear. The outer ear has a tube called the ear canal. Please color the ear canal blue.

The outer ear also includes the auricle, the soft part of your ear on the side of your head. The auricle takes in sounds from people, animals, and other sound sources. Please color the auricle yellow.

The sound passes through the canal to the eardrum. Sound makes the eardrum vibrate like the top of a drum. The eardrum passes the vibrations to the middle ear. Please color the eardrum red.

The middle ear has 3 bones: the hammer, the anvil, and the stirrup. These bones transfer the vibrations to the inner ear. Please color the three bones green.

The inner ear is called the cochlea and is in the shape of a spiral like a snail’s shell. The cochlea has liquid and small hairs. Please color the cochlea purple. When vibrations make the hairs move, they send an electric signal to your brain using the auditory nerve. Please color the auditory nerve orange.
### Comprehension Questions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6. What does the auricle do?</strong></td>
<td></td>
</tr>
<tr>
<td>The auricle</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>7. The three bones of the middle ear are called</strong></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>8. What is the shape of the inner ear?</strong></td>
<td></td>
</tr>
<tr>
<td>The shape of the inner ear is a</td>
<td></td>
</tr>
<tr>
<td>Exit Slip</td>
<td>Word Bank</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>What we learned today in 5 words...</td>
<td>the outer ear</td>
</tr>
<tr>
<td></td>
<td>the middle ear</td>
</tr>
<tr>
<td></td>
<td>the inner ear</td>
</tr>
<tr>
<td></td>
<td>vibrations</td>
</tr>
<tr>
<td></td>
<td>vocal cords</td>
</tr>
</tbody>
</table>
**YOUR SOURCE AND RECEIVER**

*Directions: Please read and answer the comprehension questions.*

<table>
<thead>
<tr>
<th>Vibration makes sound.</th>
</tr>
</thead>
<tbody>
<tr>
<td>You have a <strong>sound source</strong> and <strong>receiver</strong>.</td>
</tr>
<tr>
<td><strong>Your sound source</strong> is your <strong>voice</strong>.</td>
</tr>
<tr>
<td><strong>Your sound receivers</strong> are your ears.</td>
</tr>
<tr>
<td>Comprehension Questions</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
</tbody>
</table>
| **1. What is your sound source?**  
Your sound source is  
____________________. | your ears |
| **2. What are your sound receivers?**  
Your sound receivers are  
____________________. | your voice |
Let's Talk

Your **vocal cords** are in **your throat**.

Air from your lungs makes your **vocal cords vibrate**.

<table>
<thead>
<tr>
<th>Comprehension Questions</th>
<th>Wordbank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3. Where are your vocal cords?</strong></td>
<td></td>
</tr>
<tr>
<td>Your vocal cords are in</td>
<td><strong>air from your lungs</strong></td>
</tr>
<tr>
<td>________________</td>
<td></td>
</tr>
<tr>
<td><strong>4. What makes your vocal cords</strong></td>
<td></td>
</tr>
<tr>
<td>vibrate?</td>
<td></td>
</tr>
<tr>
<td>________________ makes your</td>
<td></td>
</tr>
<tr>
<td>vocal cords vibrate.</td>
<td></td>
</tr>
</tbody>
</table>
Let's Listen

Directions: Please read below. Then, color each part of the ear. Next, answer the questions.

The human ear has 3 main parts:

- **the outer ear**,

- **the middle ear**, and

- **the inner ear**.

---

The outer ear has a **tube** called the **ear canal**.

Please color the ear canal **blue**.

---

The outer ear also has the **auricle**.

It is on the **side of your head**.
The auricle takes in sounds.

Please color the **auricle** yellow.

The sound goes to the **ear drum**.

Please color the **ear drum** red.

**The middle ear** has 3 bones.

Please color the three bones **green**.

<table>
<thead>
<tr>
<th>Comprehension Question</th>
<th>Word Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. The three main parts of the ear are called</td>
<td>the outer ear, the middle ear, the inner ear</td>
</tr>
<tr>
<td>______________________</td>
<td></td>
</tr>
<tr>
<td>______________________</td>
<td></td>
</tr>
<tr>
<td>and __________________</td>
<td></td>
</tr>
<tr>
<td>Exit Slip</td>
<td>Word Bank</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>What we learned today in 3 words...</td>
<td>the outer ear</td>
</tr>
<tr>
<td></td>
<td>the middle ear</td>
</tr>
<tr>
<td></td>
<td>the inner ear</td>
</tr>
<tr>
<td></td>
<td>vibrations</td>
</tr>
<tr>
<td></td>
<td>vocal cords</td>
</tr>
</tbody>
</table>
YOUR SOURCE AND RECEIVER

Directions: Please read and answer questions.

Vibrations (sound)

Your voice is a sound source.

Your ears are sound receivers.
<table>
<thead>
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<th>Word Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ____________________</td>
<td>your ears</td>
</tr>
<tr>
<td>_____ is a sound source.</td>
<td></td>
</tr>
<tr>
<td>2. ____________________</td>
<td>your voice</td>
</tr>
<tr>
<td>_____ are sound receivers.</td>
<td></td>
</tr>
</tbody>
</table>
Let's Talk

Your vocal cords are in your throat.

Your vocal cords vibrate.

Comprehension Questions

3. Your vocal cords are in ____________.

4. Your vocal cords ________________.

Word Bank

vibrate

your throat
Let's Listen

Directions: Please read, color the ear and answer questions.

The ear has 3 parts:

the outer ear,

the middle ear,

and the inner ear.

The outer ear has the ear canal. Please color the ear canal blue.

The auricle is on your head.
Please color the **auricle** yellow.

The sound goes to the **ear drum**.

Please color the **ear drum** red.

**The middle ear** has 3 bones.

Please color the **three bones** green.

<table>
<thead>
<tr>
<th>Comprehension Question</th>
<th>Word Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. The three main parts of the ear are called</td>
<td>the outer ear</td>
</tr>
<tr>
<td></td>
<td>the middle ear</td>
</tr>
<tr>
<td></td>
<td>the inner ear</td>
</tr>
<tr>
<td>and ____________________</td>
<td></td>
</tr>
<tr>
<td>Exit Slip</td>
<td>Word Bank</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>What we learned today in 3 words</td>
<td>the outer ear</td>
</tr>
<tr>
<td></td>
<td>the middle ear</td>
</tr>
<tr>
<td></td>
<td>the inner ear</td>
</tr>
<tr>
<td></td>
<td>vibrations</td>
</tr>
<tr>
<td></td>
<td>vocal cords</td>
</tr>
<tr>
<td>Word</td>
<td>In your own words?</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><strong>Sound</strong></td>
<td>Things you hear</td>
</tr>
<tr>
<td></td>
<td>Vibrations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Picture</th>
<th>Examples of sound</th>
<th>Parts of the ear:</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Sound" /></td>
<td>Popcorn goes pop</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fireworks go boom</td>
<td></td>
</tr>
</tbody>
</table>
**Reflection of Modifications:** I chose to make a myriad of modifications to this lesson as a result of the number of English language learners of a variety of English proficiency levels present within this integrated classroom. Perhaps the most important of modifications is activating prior knowledge and creating a shared history through the use of strategies, namely Pre-Test with a Partner and Take a Stand. These strategies allowed for students to work in pairs and negotiate meaning prior to even viewing the written material to be read. This way, it focused student attention on the concepts, formulating a prediction, as well as increasing motivation prior to reading. In addition, the Take a Stand strategy does not require a great deal of language, thereby providing ELs the opportunity to successfully participate without the additional stress of deciphering new content-specific language on their own.

Beyond the pre-reading modifications, I was also sure to incorporate various during-reading strategies, including but not limited to: motions (touching vocal cords), 6-square vocabulary for *sound*, and an exit slip. First, especially since the topic related to students own sound source and receiver, I could effectively engage students by having them actually touch their ear and throat. This was much more personal and thought-evoking - as opposed to merely showing students a picture - because it allowed them to become agents in their own learning and form a personal connection to the material with the use of very specific academic vocabulary (e.g., throat, voice, sound, vibrations, etc.).
Furthermore, from chunked text and headings to bolded and underlined keywords and visuals, the text implemented was highly modified. In each of these modifications, I was able to engage students in reading a dense text through a condensed presentation of content using highly structured grammar phrases and visuals, thereby creating much more manageable chunks of text and content for students to unpack.
Lesson 3
General Information
Sara Fallahi
Dr. Lorrie Stoops Verplaetse
TSL 518

Unit Information:
Lessons #1-3
Title of Unit: Sounds and Vibrations
Grade 3
Mainstream Class with Integrated English Language Learners

Source for Unit:

Reading Materials:

Goals of the Unit:
I want my students to know that sound is caused by vibrations.
I want my students to know that a sound source is an object that is vibrating and a sound receiver detects sound vibrations.
I want my students to know how pitch is how high or low a sound is.
I want my students to know that differences in pitch are caused by differences in the frequency or rate at which objects vibrate.
**Unit Content & Language Objectives:**

<table>
<thead>
<tr>
<th>Lesson Number of Unit</th>
<th>Content Objectives</th>
<th>Language Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 1</td>
<td>1. Students will show that sound is caused by vibrations, by striking the tuning fork, touching it to different objects, and making observations in pairs.</td>
<td>1. In pairs, students will read instructions, and record their observations in written sentences.</td>
</tr>
<tr>
<td>Lesson 2</td>
<td>1a. Students will be able to distinguish between a sound source and a sound receiver, after reading and comprehension questions. 1b. Students will be able to recognize the parts of the human ear.</td>
<td>1. Students will read independently and respond to comprehension questions using appropriate vocabulary.</td>
</tr>
<tr>
<td>Lesson 3</td>
<td>1. Students will order bottles from highest to lowest pitch.</td>
<td>1. In pairs, students will read instructions, discuss, and each record their observations in written sentences.</td>
</tr>
</tbody>
</table>
Lesson #3 Objectives, Performance Indicators & Functional Language Chart

Learning Objectives:

Content Objective:
1. Students will order bottles from highest to lowest pitch.

Language Objective:
1. In pairs, students will read instructions, discuss, and each record their observations in written sentences.

Performance Indicators:

<table>
<thead>
<tr>
<th>Domain/Topic</th>
<th>Bridging/ Mainstream Level 5</th>
<th>Intermediate Level 4</th>
<th>Developing Level 3</th>
<th>Early Production Level 2</th>
<th>Pre-Production Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading, Writing, &amp; Ordering bottles by pitch</td>
<td>Students will read instructions and write a paragraph of 3 sentences about what they observed about pitch and the waterphone.</td>
<td>Students will read the instructions and write 2 sentences about what they observed about pitch and the waterphone.</td>
<td>Students will read the modified instructions (with keywords underlined) and write 2 sentences using sentence starters about what they observed about pitch and the waterphone.</td>
<td>Students will read the modified instructions (simple language with pictures) and fill in the blanks with the support of a word bank about what they observed about pitch and the waterphone.</td>
<td>Students will read the labeled picture instructions, draw the pictures to show what they observed about pitch and the waterphone, and then circle and label the highest and lowest pitched bottles.</td>
</tr>
<tr>
<td>Speaking Discussing their observations</td>
<td>In pairs, students will lead a discussion about what they observed</td>
<td>In pairs, students will actively participate in a discussion about</td>
<td>In pairs, using sentence starters and a word bank, students will fully</td>
<td>In pairs, students will participate in a discussion about what they</td>
<td>In pairs, students will participate in a discussion about what they observed about</td>
</tr>
</tbody>
</table>
### Functional Language Chart:

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expressions</th>
<th>Words/Phrases</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordering/Comparing</td>
<td>Experiment</td>
<td><strong>1</strong> has a <strong>2</strong> pitch than <strong>1</strong>.<strong>1</strong> has a <strong>3</strong> pitch. There is a <strong>2</strong> pitch when there is <strong>4</strong> water in the bottle.<strong>1</strong> has the <strong>5</strong> pitch.</td>
<td>1. Bottle #1, 2, 3, 4, 5</td>
<td>Comparatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Higher, lower</td>
<td>Superlatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. High, low</td>
<td>Present Tense</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. More, less</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Highest, lowest</td>
<td></td>
</tr>
</tbody>
</table>
Activities:

(text in blue = new, text in black = original)

Materials: 5 bottles of water, 1 mallet per group, computer with Internet access, projector, individual whiteboards, dry erase markers, and erasers

Activities: A. Activating Prior Knowledge and Creating a Shared History: The teacher begins by helping to create shared history. To do this, she plays the Vibration Science Video (https://www.youtube.com/watch?v=VOnwW6TTTT4). This video speaks to how sound is created by vibrations, a topic that was explored in the previous two lessons. It also introduces students to the idea of pitch and how pitch can be controlled by either shortening or lengthening vibrations. After the video, the teacher asks students what they know about pitch. Then, she has the students complete a K-W-L chart as a class (please see Supplemental Materials KWL Chart, Mainstream on pg. 94). For this activity, each student receives 2 sticky notes for them to each write either something they know (or an example of something that has pitch - high, low, or otherwise) or a wonderment they have about “pitch.” After each student writes either a piece of prior knowledge or a question, they place the sticky note under the appropriate column on the collective class KWL chart at the front of the classroom. Then, the teacher summarizes and lists some of the responses that students wrote on the KWL chart. She is sure to mention that as a class, students will be exploring and learning more about pitch in today’s experiment.
B. Setting Up the Materials: Fill five 12-oz. Glass soda or juice bottles with varying amounts of water. The bottle with the least amount of water should contain at least 3 cm of water. Tap under the water line of the bottles to determine whether they produce pitches that are recognizably different. When the bottles are “tuned,” screw on the caps and place them in six-pack carriers or in large plastic bags. These are the Waterphones.

B. Completing the Waterphone Activity:

i. Modeling: The teacher should choose one bottle. She taps the bottle and asks, “Is this a high sound or a low sound?” Then, she selects a different bottle, taps it, and asks, “Is this a high sound or a low sound?” She explains that this is “pitch” (how high or low the sound is). The students repeat the word, “pitch,” after her. Then, in order to illustrate the word “pitch,” she points her forefinger on both of her hands upwards and downwards. Then, she gestures “high pitch” by placing the palm of her hand upwards and then gestures “low pitch” by placing the palm of her hand downwards. She has the students perform the gestures after her. Then, she engages them in the chant: “Pitch - is - high - or - low. High pitch, high sound; low pitch, low sound.” The students chant with her.

Then, she says that the class is going to complete the activity as a whole group. She passes a whiteboard, dry erase marker, and eraser to each student. Next, she chooses two bottles with water at different levels. She explains that, in a moment, she will lightly tap the bottle just below the waterline. Then, she asks, “When I tap this bottle, do you think that the sound will have a high pitch or a low pitch?” She explains that the whiteboards are for students to write their predictions to the question. They write their predictions on the whiteboards. Then, she taps the bottle, they listen to the sound that is made, and then they determine if it is a “high pitch” or a “low pitch.” Finally, she asks students to give her a thumbs-up if their
prediction on their whiteboard was correct or a thumbs-down if it was incorrect. She is sure to explain that, during the experiment, it is important to make a prediction before they hear the sound so that they can try to figure out the pattern and make observations just in the way that scientists do!

Then, she brings a third bottle, strikes each of them with the mallet, and asks the students, “Which bottle has the highest pitch?” and “Which bottle has the lowest pitch?” She is sure to draw the students’ attention to the “-er” ending and the “-est” ending, noting that “-er” (lower and higher) is used when you are comparing two bottles and “-est” (lowest and highest) is used when you are comparing three or more bottles. Throughout this explicit modeling, the teacher would refer to the examples indicated on Supplemental Material Comparatives and Superlatives (Levels 1-4) on pages 92-93.

ii. Experiment: After demonstrating the activity, the teacher has each group read the directions on the “Waterphone Mini-Activity.” Modified instructions (adapted from Full Option Science System. (2005). Physics of Sound: Teacher Guide. Lawrence Hall of Science: Berkeley, CA) are included for English proficiency levels one through three (please see Supplemental Materials #2-4 on pages 82-91):

<table>
<thead>
<tr>
<th>Domain/Topic</th>
<th>Level 5</th>
<th>Level 4</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading the instructions</td>
<td>Students will read instructions.</td>
<td>Students will read the instructions.</td>
<td>Students will read the modified instructions (with keywords underlined).</td>
<td>Students will read the modified instructions (simple language with pictures).</td>
<td>Students will read the labeled picture instructions.</td>
</tr>
</tbody>
</table>

Next, during the experiment, the students work in pairs in order to complete the process as outlined by the instructions:

Each student chooses two bottles. Then, students write their predictions on the whiteboards about which bottle will have
higher or lower pitch. Then, everyone listens and sees whose prediction was correct. As they are performing the experiment, students will interact and make observations aloud with their partners. Modifications, such as sentence starters and a word bank, are provided for English proficiency levels one through three (please see Supplemental Materials #2-4 on pages 82-91) for the discussion portion of the activity:

<table>
<thead>
<tr>
<th>Domain/Topic</th>
<th>Level 5</th>
<th>Level 4</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaking</td>
<td>In pairs, students will lead a discussion about what they observed about pitch and the waterphone.</td>
<td>In pairs, students will actively participate in a discussion about what they observed about pitch and the waterphone.</td>
<td>In pairs, using sentence starters and a word bank, students will fully participate in a discussion about what they observed about pitch and the waterphone.</td>
<td>In pairs, students will participate in a discussion about what they observed about pitch and the waterphone by using one-two word responses from a word bank.</td>
<td>In pairs, students will participate in a discussion about what they observed about pitch and the waterphone by repeating short phrases.</td>
</tr>
</tbody>
</table>

Specifically, when voting, students must write and share their prediction using the sentence starters on the individual whiteboards (I think that Bottle#_____ will have a higher/lower pitch than Bottle#______). This way, the whiteboards allow them time to think individually prior to sharing with their partner and testing their theory by tapping the bottles.

iii. Ordering the Bottles by Pitch & Writing: Finally, the teacher instructs the students to arrange the bottles from highest to lowest pitch. For this step, students are expected to arrange the bottles, draw the waterline, and then write their observations about pitch.
Thus, based on the English proficiency of the students, the writing instructions of the Waterphone activities include various scaffolds, especially for levels one through three (please see Supplemental Materials #1-4 on pages 81 through 91).

<table>
<thead>
<tr>
<th>Domain/Topic</th>
<th>Level 5</th>
<th>Level 4</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing, &amp; Ordering</td>
<td>Students will write a paragraph of 3 sentences about what they observed</td>
<td>Students will write 2 sentences about what they observed about pitch and</td>
<td>Students will write 2 sentences using sentence starters about what they</td>
<td>Students will fill in the blanks with the support of a word bank about</td>
<td>Students will redraw the pictures to show what they observed about pitch and the waterphone, and then circle and label the highest and lowest pitched bottles.</td>
</tr>
<tr>
<td>bottles by pitch</td>
<td>what they observed about pitch and the waterphone.</td>
<td>what they observed about pitch and the waterphone.</td>
<td>what they observed about pitch and the waterphone.</td>
<td>what they observed about pitch and the waterphone.</td>
<td></td>
</tr>
</tbody>
</table>

iv. Assessment & Closure: After the students complete the experiment, the teacher brings the class back together for a quick closure activity. First, to check for understanding, she reveals the order of the bottles by stating, “Bottle #___ has the highest pitch. Bottle #____ has the second highest pitch, etc.” As she reveals the answers, she pauses and asks students to give her a thumbs-up or thumbs-down if the order matches the student’s answer. That way, she can see how the students performed and their level of understanding of pitch. Finally, she instructs students to complete the class KWL chart (Supplemental Materials #6 on page 94) with a final sticky note as their exit slip. For this exit slip, students can refer to the phrase and/or word banks included on their experiment guides. For this, students must state one thing they observed or learned from the lesson.
Supplemental Materials:

1. The Waterphone Activity, Levels 4 & 5 (page 81)

2. The Water Phone Activity and Sentence Starters for Writing & Discussion, Level 3 (pages 82-83)

3. The Water Phone Activity and Sentence Starters for Writing & Discussion, Level 2 (pages 84-87)

4. The Water Phone Activity and Sentence Starters for Writing & Discussion, Level 1 (pages 88-91)

5. Comparatives & Superlatives, Levels 1-4 (pages 92-93)

6. KWL Chart, Mainstream (page 94)
THE WATERPHONE - Levels 4 & 5

Materials for a Group
5 Bottles with Water
1 Mallet

Investigation
1. Choose two bottles. Tap the bottles below the water line. Ask your group to listen with eyes closed and with eyes open. Vote on which bottle has the higher pitch.

2. Take turns. Each player chooses two bottles. Everyone listens. Everyone votes on which bottle has the higher pitch.

3. Arrange the bottles from highest to lowest pitch.

Record

Draw the water level in the bottles to show how you arranged them.

Describe what you observed about pitch and the waterphone.

---

THE WATERPHONE - Level 3

Materials for a Group

| One mallet | Five water bottles |

Investigation
1. Choose two bottles. Tap the bottles below the water line. Which bottle has the higher pitch?
2. Repeat. Choose two bottles. Listen. Which bottle has the higher pitch?
3. Place the bottles from highest to lowest pitch.

Record

Draw the water level in the bottles to show the pitch.

Describe your observations about pitch and the waterphone.
Sentence Starters for Writing and Discussion:

<table>
<thead>
<tr>
<th>Word Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>more water</td>
</tr>
<tr>
<td>less water</td>
</tr>
<tr>
<td>a high pitch</td>
</tr>
<tr>
<td>a higher pitch</td>
</tr>
<tr>
<td>the highest pitch</td>
</tr>
<tr>
<td>a low pitch</td>
</tr>
<tr>
<td>a lower pitch</td>
</tr>
<tr>
<td>the lowest pitch</td>
</tr>
</tbody>
</table>

Bottle #____ has ___________ water than Bottle #_____.

Bottle #1 has ____________________________________.

Bottle #5 has ____________________________________.

Bottle #____ has a ___________________ pitch than Bottle #_____.

Sentence Starters for Exit Slip:

<table>
<thead>
<tr>
<th>Word Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
</tr>
<tr>
<td>low</td>
</tr>
<tr>
<td>more</td>
</tr>
<tr>
<td>less</td>
</tr>
</tbody>
</table>

Bottles with ___________ water had a ___________ pitch.

Pitch is how ___________ or ___________ sound is.
THE WATERPHONE - Level 2

Materials

One mallet
Five bottles

Activity

1. Choose two bottles.

2. Tap the bottles under the water.

3. Listen to the pitch.

4. Which bottle has higher pitch?
5. Repeat the steps.

6. Place bottles from lowest to highest pitch.

Write:

Draw the water in the bottles for pitch.

<table>
<thead>
<tr>
<th>Describe pitch.</th>
<th>Word Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottle #1 has ______________________</td>
<td></td>
</tr>
<tr>
<td>Bottle #5 has ______________________</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a lower pitch</td>
</tr>
<tr>
<td></td>
<td>a high pitch</td>
</tr>
<tr>
<td>Bottle #____ has a __________ pitch</td>
<td></td>
</tr>
<tr>
<td>than Bottle #____.</td>
<td>a low pitch</td>
</tr>
<tr>
<td></td>
<td>a higher pitch</td>
</tr>
</tbody>
</table>

**Sentence Starters for Writing and Discussion:**

<table>
<thead>
<tr>
<th>Word Bank</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>more water</td>
<td>less water</td>
</tr>
<tr>
<td>a high pitch</td>
<td>a low pitch</td>
</tr>
<tr>
<td>a higher pitch</td>
<td>a lower pitch</td>
</tr>
<tr>
<td>the highest pitch</td>
<td>the lowest pitch</td>
</tr>
</tbody>
</table>

Bottle #____ has _________________ water than Bottle #______.

Bottle #____ has _________________ pitch.

Bottle #____ has a _________________ pitch than Bottle #______.

There is a _________________ pitch when there is _________________ water in the bottle.
Sentence Starters for Exit Slip:

<table>
<thead>
<tr>
<th>Word Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>high</td>
</tr>
<tr>
<td>low</td>
</tr>
<tr>
<td>more water</td>
</tr>
<tr>
<td>less water</td>
</tr>
</tbody>
</table>

Bottles with _______________ had a _______________ pitch.

Pitch is how _______________ or _______________ sound is.
**THE WATERPHONE - Level 1**

**Materials**

<table>
<thead>
<tr>
<th><img src="image" alt="One mallet" /></th>
<th><img src="image" alt="Five bottles" /></th>
</tr>
</thead>
</table>

**Activity**

1. Two bottles

2. Tap under water

3. Listen

4. Higher pitch?
5. Repeat

6. Lowest to highest pitch

<table>
<thead>
<tr>
<th>Word Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Ear]!(#) ![Ear]!(#)</td>
</tr>
<tr>
<td>![Down Arrow]!() Lowest pitch ![Up Arrow]!() Highest pitch</td>
</tr>
</tbody>
</table>

1. **Draw the water**.

2. **Circle** highest pitch. **Write** highest pitch.

3. **Circle** lowest pitch. **Write** lowest pitch.

---

Sentence Starters for Writing and Discussion:

<table>
<thead>
<tr>
<th>Word Bank</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>more water</td>
<td>less water</td>
</tr>
<tr>
<td>![Image of bottle with full water]</td>
<td>![Image of bottle with less water]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>high pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>a high pitch</td>
<td>a higher pitch</td>
</tr>
<tr>
<td>the highest pitch</td>
<td>the lowest pitch</td>
</tr>
</tbody>
</table>

Bottle #______ has ____________ water than Bottle #______.

Bottle #______ has _______________ pitch.

Bottle #______ has a _______________ pitch than Bottle #______.
Sentence Starters for Exit Slip:

<table>
<thead>
<tr>
<th>Word Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>high pitch</td>
</tr>
<tr>
<td>low pitch</td>
</tr>
<tr>
<td>more water</td>
</tr>
<tr>
<td>less water</td>
</tr>
</tbody>
</table>

I learned about ____________________________.
### Comparatives and Superlatives

<table>
<thead>
<tr>
<th>Comparing 2 things</th>
<th></th>
<th>Comparing 3 things</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="More water" /></td>
<td><strong>more water</strong></td>
<td><img src="image" alt="The least water" /></td>
</tr>
<tr>
<td><img src="image" alt="Less water" /></td>
<td><strong>less water</strong></td>
<td><img src="image" alt="The most water" /></td>
</tr>
</tbody>
</table>

**Pitch** = frequency of sound vibrations

- ![High pitch](image)
- ![Low pitch](image)
Comparatives:
Comparing 2 things
higher
lower

Superlatives:
Comparing 3 or more things
highest
lowest

low, lower, lowest
Bottle #3 has a lower pitch than Bottle #5.
Bottle #5

high, higher, highest
Bottle #5 has a higher pitch than Bottle #3.
Bottle #1

Bottle #5

Bottle #5 has the lowest pitch.
Bottle #1
<table>
<thead>
<tr>
<th>K</th>
<th>What I Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>What I Wonder</td>
</tr>
<tr>
<td>L</td>
<td>What I Learned</td>
</tr>
</tbody>
</table>
**Reflection of Modifications:** Due to the specific and unique needs of students of varying levels of English language proficiency, various modifications were made to Lesson #3. As an example, in the very beginning of Lesson #3, a more in-depth modeling and discussion of comparatives and superlatives were added. In the original lesson, the teacher was to merely model the activity; however, such a modeling would be insufficient for English language learners. In fact, since this activity requires knowledge of comparatives and superlatives, as a modification, the teacher would include modeling of the language needed to discuss and write about the experiment. In this modeling, the teacher references the Supplemental Material #5 Comparatives & Superlatives (Levels 1-4), which outlines and explains pertinent language along with visuals. This language includes “high” versus “higher” and “highest” as well as “low” as opposed to “lower” and “lowest.” Such explicit modeling would - as a result - equip English language learners in the mainstream classroom with the necessary grammar knowledge to be able to successfully proceed with the activity.

In addition to the explicit modeling and incorporation of a visual reference (Supplemental Material #5 Comparatives & Superlatives), another paramount modification to Lesson #3 was including 4 different Waterphone experiment guides (adapted from Full Option Science System. (2005). *Physics of Sound: Teacher Guide.* Lawrence Hall of Science: Berkeley, CA.) Even though students operating at Levels 4 and 5 will use the original Waterphone Activity (Supplemental Material #1), for Levels 1, 2, and 3, a separate and unique Waterphone Activity is provided, along with scaffolded language complexity, varying use of visual aides, differentiated writing activities, as well as sentence starters and
word banks for the discussion and writing activities. For instance, the Level 3 modifications are apparent in the underlining and boldfacing of keywords in the instructions. Then, moving to Level 2, an increase in supports is evident through the use of visuals for each step of the experiment, a simplification of the language, as well as the inclusion of a pictoral word and phrase bank. Finally, Level 1 shows the highest level of supports with single words or short phrases labeling each visual step as well as highly scaffolded and decreased expectations for the writing steps (e.g., rather than filing in the blanks for Level 2, in Level 1 students are only asked to circle and label the bottles with highest and lowest pitch). The reasons for these modifications are that students at the Pre-Production (Level 1) stage of English proficiency require ample amount of visual supports and reduced expectations to be able to achieve the content and language standards. Similarly though to a lesser degree, students at the Early Production (Level 2) stage of English proficiency also require visuals, but can rely on more tightly structured language to be able to tackle the standards. With these modifications, students at each of the 5 levels of English language proficiency may be expected to successfully achieve the objectives set forth at the beginning of Lesson #3.
Checklists
### Language Function Index

<table>
<thead>
<tr>
<th>Function</th>
<th>Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposing/Supporting/Justifying</td>
<td>Lesson 1</td>
</tr>
<tr>
<td></td>
<td>Lesson 2</td>
</tr>
<tr>
<td>Describing/Explaining</td>
<td>Lesson 2</td>
</tr>
<tr>
<td>Ordering/Comparing</td>
<td>Lesson 3</td>
</tr>
</tbody>
</table>

### Grammar Index

<table>
<thead>
<tr>
<th>Grammar</th>
<th>Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Objects/Direct Object Pronouns</td>
<td>Lesson 1</td>
</tr>
<tr>
<td>Present Tense</td>
<td>Lesson 1</td>
</tr>
<tr>
<td></td>
<td>Lesson 2</td>
</tr>
<tr>
<td></td>
<td>Lesson 3</td>
</tr>
<tr>
<td>Gerunds</td>
<td>Lesson 1</td>
</tr>
<tr>
<td>Comparatives/Superlatives</td>
<td>Lesson 3</td>
</tr>
<tr>
<td>SHELTERED STRATEGIES</td>
<td>Lesson 1</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>I. Contextualize Lesson</strong></td>
<td></td>
</tr>
<tr>
<td>I. A. Build and Activate Background Knowledge</td>
<td>5-6</td>
</tr>
<tr>
<td>I.B. Develop Vocabulary</td>
<td>9</td>
</tr>
<tr>
<td>I. C. Use extensive Visuals, Realia, Manipulatives, &amp; Gestures</td>
<td>7, 10, 12-13</td>
</tr>
<tr>
<td>I.D. Model (Instructions, Processes)</td>
<td>5-6</td>
</tr>
<tr>
<td>I.E. Create Opportunities To Negotiate Meaning</td>
<td>5-7</td>
</tr>
<tr>
<td><strong>II. Make Text Comprehensible</strong></td>
<td></td>
</tr>
<tr>
<td>II.A. Intentional Use of Graphic Organizers</td>
<td>34</td>
</tr>
<tr>
<td>II.B. Modify Written Text</td>
<td>18, 20-21, 23</td>
</tr>
<tr>
<td>II.C. Amplify Number of Activities per Text</td>
<td>5-7</td>
</tr>
<tr>
<td><strong>III. Make Talk Comprehensible</strong></td>
<td></td>
</tr>
<tr>
<td>III.A. Pace Teacher’s Speech</td>
<td></td>
</tr>
<tr>
<td>III.B. Use of Listening Guides</td>
<td></td>
</tr>
<tr>
<td>III.C. Use of Word Walls</td>
<td></td>
</tr>
<tr>
<td>III.D. Frame Main Ideas</td>
<td>5-7, 14-15</td>
</tr>
<tr>
<td>III.E. Check for Understanding</td>
<td>10</td>
</tr>
<tr>
<td><strong>IV. Change Traditional Classroom Talk</strong></td>
<td></td>
</tr>
<tr>
<td>IV.A. Use Teacher Question and Response Strategies</td>
<td>5-6</td>
</tr>
<tr>
<td>IV.B. Practice Instructional Conversations</td>
<td></td>
</tr>
<tr>
<td><strong>V. Engage at Appropriate Language Proficiency Levels</strong></td>
<td>18, 21, 24</td>
</tr>
<tr>
<td>V.A. Vary Question Techniques based on Student’s Language Proficiency level—in conversations, activities, and assessments</td>
<td></td>
</tr>
<tr>
<td><strong>VI. Give Students Voice</strong></td>
<td></td>
</tr>
<tr>
<td>VI.A. Challenge students to produce extended academic talk</td>
<td>9</td>
</tr>
<tr>
<td>VI.B. Model Language for Oral and Written Production</td>
<td>14-16, 19-22, 24-25</td>
</tr>
<tr>
<td>VI.C. Use Group/Pr. Work to Elicit Student Talk; Students as Researchers</td>
<td>5-7</td>
</tr>
<tr>
<td>VI.D. Respond to Student’s Voice – Writing and Error Correction</td>
<td></td>
</tr>
</tbody>
</table>
Original Lessons
Original Lesson 1

Materials: 1 tuning fork, 1 cup of water, paper towels, and 1 ping-pong ball on a thread per group

Activities:

A. Setting the Purpose: The teacher will explain that the students will be exploring that sound is made by two different objects. The teacher will show the equipment briefly, but will not actually demonstrate the activities.

B. Establishing Expectations for Activity & Materials: First, the teacher will display the tuning fork. She will show students how to hold the tuning fork by the stem and strike it on the wood block (or on the bottom of a sneaker). Next, after showing how to use the equipment, she will set the ground rules for using the equipment during the experiment. She will explain that striking the tuning fork with excessive force can damage it. Then, after explaining, she shows the students "The Tuning Fork" Mini-Activity page, assigns pairs, and instructs students to complete the activity by reading the steps, following the directions using the tuning fork, and then writing their observations on the paper.

C. Students Completing the Activity: After hearing the directions, students will read each step of the activity "The Tuning Fork," and use the materials to complete the activity. They will strike the tuning fork and then touch it to a cup of water, a piece of paper, their cheek, and a ping-pong ball on a thread. During each step, they will listen for the sound and then write their observations on the handout. Throughout this lesson, the teacher will circulate around the classroom as students are completing the mini activity with the tuning fork, making sure to answer any questions that arise.
Original Lesson 2


Activities:

A. Students Reading the Articles “Listen to this” and “Your Source and Receiver”: The teacher will distribute the “Listen to This” article from the book Foss Science Stories: Physics of Sound. She instructs students to read the article.

B. Students Discussing the Articles: The students will have a discussion centered around the following topics/questions:

- What makes sounds?
- Why is sound important?
- What makes sound?
- What is a sound source?
- What is a sound receiver?
- What is your sound receiver?
- What are the parts of the ear?
Original Lesson 3

Materials: 5 bottles of water and 1 mallet per group

Activities:

A. Setting Up the Materials: Fill five 12-oz. Glass soda or juice bottles with varying amounts of water. The bottle with the least amount of water should contain at least 3 cm of water. Tap under the water line of the bottles to determine whether they produce pitches that are recognizably different. When the bottles are “tuned,” screw on the caps and place them in six-pack carriers or in large plastic bags. These are the Waterphones.

B. Completing the Waterphone Activity: The teacher should choose two bottles. She taps the bottles below the water line. Ask the group to listen with eyes closed and with eyes open and then instructs students to vote on which bottle has the higher pitch. After demonstrating the activity, the teacher has each group read the directions on the “Waterphone Mini-Activity.” In this activity, each group should continue this process: Each student chooses two bottles and everyone listens and then votes on which bottle has the higher pitch. Finally, the teacher instructs the students to arrange the bottles from highest to lowest pitch.
Original Lesson 4


Activities:

A. Students Reading the Article “Highs and Lows”: The teacher will distribute the “Listen to This” article from the book Foss Science Stories: Physics of Sound. She instructs students to read the article.

B. Students Discussing the Articles: The students will have a discussion centered around the following topics/questions:

- Which instruments have high pitch and which have low

C. Completing the Response Sheet -- Good Vibrations: Next, students should read the directions on the “Good Vibrations” handout and complete the pitch activity. They will write an H on the instruments that they think can play the highest notes and an L on the instrument that they think can play the lowest notes.
As you go through the day, you constantly hear sounds. Sounds are all around you, and they tell you many things. They help you understand people or locate objects. Sounds can give you warning, and they can give you pleasure, too.

When you hear sounds made by other people, you learn something about them. What can you tell from a baby's cry? Maybe the child is hungry or sleepy. When you hear the cry, you know something may be wrong.

Another sound you often hear is laughter. That sound tells you someone is happy. If you hear a groan, you think someone is in pain. A loud scream could mean someone is angry or frightened. You hear the words other people speak, as well. Words are special sounds that help us communicate with others.

People are not the only living things that make sounds you can hear. When you were younger, you learned that most animals have their own sounds. Now if you hear a "moo," you know a cow is nearby. A barking sound tells you a dog is somewhere close. A purring noise is the sound of a happy cat. Just like people, animals use special sounds to communicate.
When you go outside, you hear the sounds of nature. Wind makes a sound when it blows through the trees. Raindrops tap on the window. Sleet bounces off cars and houses. Thunder booms through the sky.

Not all the sounds around you come from nature or living things. You hear sounds from machines and other objects, too. When you hear a kettle whistle, you know the water is boiling. The sound of a mixer tells you someone is making a meal or a snack. A computer makes sounds to alert you. When you hear a doorbell, you know someone is at the door.

Sounds can also warn you of danger. The beeping of a smoke alarm warns you of possible fire. The screeching of tires tells you a car is stopping in a hurry. The honking of a car horn tells you to get out of the way. Sirens on fire engines, ambulances, and police cars also signal danger.

A blaring horn or siren is not a pretty sound. The sound is supposed to startle you. Sounds can affect you in different ways. Music is another kind of sound that can affect how you feel. When you hear a loud, fast tune, you might want to get up and dance. A soft, slow song might make you feel sleepy. Sounds are a powerful part of your life.
YOUR SOURCE AND RECEIVER

Like other animals, you have a sound source and receiver. You actually have many sources, since you can use different parts of your body to make sounds. Stomping your foot makes a sound. Tapping your head makes another sound. But the source you use most is your voice. You also have two sound receivers. These are your ears.

LET'S TALK

Your vocal cords are in your throat. Air from your lungs makes your vocal cords vibrate. The vibrations from these cords then move up your throat and come out your mouth.

Muscles make the space between the vocal cords bigger or smaller. The bigger the space between them, the lower the sound you make. That is why an adult's voice is deeper than a child's voice. An adult's vocal cords are larger. They create a bigger space when they are moved apart.

LET'S LISTEN

The human ear is divided into three main parts. These are the outer ear, the middle ear, and the inner ear. Sound passes through all three parts on its way to the brain.

The outer ear includes the auricle and a tube called the ear canal. The auricle is the fleshy piece of your ear on the side of your head. It collects the sounds created by people, animals, and other sound sources. Then it guides the sounds
Under Pressure

The pressure of the air around you changes all the time. It changes when you fly in an airplane or ride in an elevator. A sudden change in pressure can hurt your ears. The Eustachian tube prevents ear damage when the air pressure changes. It connects your middle ear to your throat. The Eustachian tube lets air flow between your ear and your throat. This corrects the pressure in your middle ear. When the air flows in or out, it can make your ears “pop.”

Into the ear canal. The sounds pass through the canal into the eardrum. Sound makes the eardrum vibrate like the top of a drum. Even quiet sounds cause tiny movements of the eardrum.

Next the vibrations from the eardrum enter the middle ear. The middle ear has three tiny bones. They are called the hammer, the anvil, and the stirrup. These bones transfer the vibrations to the inner ear.

The inner ear is spiral-shaped like a snail's shell. It is called the cochlea, which is the Latin word for “snail.” The cochlea is filled with liquid and a strip of small hairs. The strip is called the organ of Corti. When vibrations make the hairs move, they send an electric signal to your brain. The signal is sent along the auditory nerve to the brain.

Questions to Explore

- What is your main sound source? What is your main sound receiver?
- How is sound produced?
- How is sound received?
WHEN we talk about a sound, we might say it is high. A small bird’s chirp is a high sound. Other sounds are described as low, or deep. When we talk about how high or low a sound is, we are talking about its pitch.

The pitch of a sound is related to the frequency, or speed, of the vibrations coming from a sound source. High-frequency vibrations move quickly. Low-frequency vibrations move slowly. High-frequency vibrations produce a sound with a high pitch. A sound with a low pitch comes from low-frequency vibrations.

Adjusting a sound source such as a musical instrument to produce a certain pitch is called tuning.

**HIGH FREQUENCY = HIGH PITCH
LOW FREQUENCY = LOW PITCH**

**GETTING IN TUNE**

Most musical instruments make sounds in one of three ways. String instruments such as the guitar or violin make sounds with vibrating strings. Musicians either pluck the strings or move a bow across them. The strings are tightened or loosened with tuning pegs. Each string is tuned to a certain pitch.

Each musical note has a specific frequency. For instance, middle C is 262 vibrations per second. It doesn’t matter what instrument plays the note. The frequency of middle C is always 262 vibrations per second.

<table>
<thead>
<tr>
<th>Note (going up the scale)</th>
<th>Frequency (number of vibrations per second)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle C</td>
<td>262 do</td>
</tr>
<tr>
<td>D</td>
<td>294 re</td>
</tr>
<tr>
<td>E</td>
<td>330 mi</td>
</tr>
<tr>
<td>F</td>
<td>349 fa</td>
</tr>
<tr>
<td>G</td>
<td>392 sol</td>
</tr>
<tr>
<td>A</td>
<td>440 la</td>
</tr>
<tr>
<td>B</td>
<td>494 ti</td>
</tr>
<tr>
<td>High C</td>
<td>524 do</td>
</tr>
</tbody>
</table>

The note at the top of the scale has exactly twice the frequency of the note at the bottom. Two notes, one of which has twice the frequency of the other, are said to be separated by an octave.
Winds around the World

We're used to seeing and hearing many wind instruments. Tubas, saxophones, flutes, and clarinets are well known. But there are other wind instruments you may not know about.

Wind instruments all over the world vary in shape and sound. They all use a vibrating column of air to make sound. People throughout the world have tried using different materials to make music. They use what they find in their own lands. That is why many of these instruments work the same way but look different. However, some instruments from different parts of the world look a lot alike, too. Did you know that bagpipes are played in Europe, Asia, and Africa? People have always traded and moved from one country to another. Sometimes this spreads musical instruments to different parts of the world.

The *sheng* is a Chinese wind instrument. It has many pipes and is similar to a harmonica.

The *zurna* is a wind instrument of Turkey. It is similar to an oboe.

The Middle Eastern *nay* and the Swazi *umtshingo* are both types of flutes.

Australian Aborigines play the *digeridoo*. This instrument is a type of trumpet.

Panpipes, shown at right, are played in Latin America, Asia, and the Pacific Islands. The pipes are different lengths and are tied together. Each pipe is a simple flute.

Other pitches can be produced by pressing down on the strings with the fingers. This shortens the strings, making higher pitches.

In wind instruments such as the flute or trombone, sound is produced by a vibrating column of air. Pitch is controlled by varying the length of this column of air.

A flute's pitch is controlled by placing the fingers over the holes in it. This shortens or lengthens the column of air that vibrates inside the flute.
A trombone player's lips vibrate against the mouthpiece when the player blows. The player tenses and relaxes the lips to produce different pitches. The player also controls the pitch by moving a slide back and forth. This changes the length of the column of air inside the trombone.

With percussion instruments such as the kettle drum, sound is made by striking the surface. Pitch depends on the tension (tightness or looseness) of the surface. The kettle drum can be tuned to various pitches. This is done by loosening or tightening the surface of the drumhead.

**BIG SOUNDS, SMALL SOUNDS**

Tuning varies the pitch of sound an instrument makes. But the size of the instrument is important also. Big instruments generally make lower vibrations than small ones. The smaller the instrument, the faster the vibrations and the higher the sound.

Inside a flute, there is a smaller column of air than inside a trombone.

A cello has a bigger body and longer strings than a violin. It also makes a deeper sound.

Bongo drums make higher sounds than bass drums.
# Investigation 1: Dropping In

## Inquiry Questions

### Part 1

**Drop Challenge**
- What are the properties of sounds that make them identifiable?
- Time: 30-40 minutes

### Part 2

**Drop Codes**
- Can you use the discrimination of sounds to make a code for sending messages?
- Time: 50 minutes or two shorter sessions

### Part 3

**Sound and Vibrations**
- How are sounds made?
- Time: 50 minutes or two shorter sessions

## Investigation Summary

Students explore their ability to discriminate sounds. They listen to sounds made by objects dropped into a drop chamber and attempt to identify each object from its sound.

Students develop a code by assigning letters of the alphabet to a selection of objects. Using this sound code, the students send messages to one another by dropping a series of objects into the drop chamber.

## Science Stories

- “Seeing” the world through sound
- Listen to This
- Animal Babble
- Your Source and Receiver

See the Science Stories folio.

## Interdisciplinary Extensions

**Language Extensions**
- Drop multiple-letter objects.
- Send mystery letters.
- Create whole-word codes.
- Drop in other languages.
- Write sound stories with feeling.
- Explore onomatopoeia.
AT A GLANCE

SCIENCE CONTENT

- Sounds have identifiable characteristics.
- Objects can be identified by the sound they make when dropped.

- The identifiable properties of sounds can be used to make a code.
- Sounds can convey information.

- Sound is caused by vibrations.
- A sound source is an object that is vibrating.
- A sound receiver detects sound vibrations.
- The intensity of the vibration determines the volume.

INTERDISCIPLINARY EXTENSIONS

Math Extensions
- Problem of the week.
- Create a number drop.

Science Extensions
- Create a sound-matching game.
- Start a learning center.
- Play Where’s That Sound?

TECHNOLOGY/HOME CONNECTION

FOSS Website  www.fossweb.com
Check the website for interactive simulations, to write questions to a scientist, for teaching tips, and to talk with other classes using FOSS.

Home/School Connection
Students look for the noisiest and quietest spots in their neighborhood. They ask family members about hearing protection or augmentation at the job site and hearing aids.

PHYSICS OF SOUND
MATERIALS
PART 3: SOUND AND VIBRATIONS

FOR EACH GROUP
- 4 Student sheets no. 4 called The Tuning Fork
- 4 Student sheets no. 5 called The Long Gong

FOR THE CLASS
- 8 Large plastic bags
- 1 Door fiddle
- 1 Cord with bead
- 1 Wood block
- 1 Tone generator
- 6 Small beans
- 1 Battery, 9-V
- 1 Meter tape
- 1 Small nail or ice pick *
- 1 Pliers with wire cutter *
- 1 Scissors *
- Tape *
- 4 Plastic cups
- Water *
- 4 Ping-Pong balls
- 4 Threads, 30 cm *
- Paper towels *
- 4 Tuning-fork kits
- 1 Tuning fork
- 1 Wood block
- 4 Sets of long gongs
- 2 Pieces of wire coat hanger, 75 cm *
- 2 Plastic cups
- 2 Pieces of string, about 40 cm

FOR ASSESSMENT
- Assessment Chart for Investigation 1

* Supplied by the teacher
☐ Use the duplication master to make copies.
△ FOSS Measurement kit item
# INVESTIGATION 2: GOOD VIBRATIONS

## INQUIRY QUESTIONS

### PART 1

**VIBRATION AND PITCH**
- How are high and low sounds made?
- Time: 30-40 minutes

### PART 2

**LENGTH AND PITCH**
- How does length affect the rate of vibrations, and therefore the pitch?
- Time: 30 minutes or two shorter sessions

### PART 3

**TENSION AND PITCH**
- How does tension affect the rate of vibration, and therefore the pitch?
- Time: 30-40 minutes

## INVESTIGATION SUMMARY

Using their voices and tongue depressors, students look for evidence that different vibrations produce different pitches of sounds. They revisit the door fiddle and tone generator to look more closely at the vibrations that make high and low pitches.

Students use a waterphone, xylophone, kalimba, and string beam to look at how length affects pitch. They study what happens when the length of the vibrating sound source changes.

Students use a minigutbucket and a FOSS ukulele to look at how tension affects the pitch of a sound. They study what happens when the tension applied to a sound source changes.

## SCIENCE STORIES

- Highs and Lows
- Making Waves
- Sound Off!
- Scoping Out Sound

See the Science Stories folio.

## INTERDISCIPLINARY EXTENSIONS

### Language Extensions
- Research animal sounds.
- Investigate the Adam’s apple.

### Math Extensions
- Problem of the week.
- Notate string-beam music.
### AT A GLANCE

**SCIENCE CONTENT**
- Sound originates from vibrating sources.
- Pitch is how high or low a sound is.
- Differences in pitch are caused by differences in the rate at which objects vibrate.
- Long objects vibrate slowly and have a low pitch.
- Short objects vibrate quickly and have a high pitch.
- With more tension, vibrations are faster and the pitch is higher.
- With less tension, vibrations are slower and the pitch is lower.

**TECHNOLOGY/HOME CONNECTION**

**FOSS Website**  www.fossweb.com
Check the website for interactive simulations, to write questions to a scientist, for teaching tips, and to talk with other classes using FOSS.

**Home/School Connection**
Students and their families assemble a homemade band with pots and pans. If they are able to create a scale, they might play (and record) a few tunes.

### INTERDISCIPLINARY EXTENSIONS

**Music Extensions**
- Sing!
- Show and tell about musical instruments.
- Discuss noise and music.

**Science Extensions**
- Make a duck flute.
- Record sound effects.
- Explore rubber-band guitars.

**ASSESSMENT OPPORTUNITIES**

**Teacher Observation**
- Individual observation
- Assessment checklist for Investigation 2

**Student Sheets**
- Standards: demonstrate their understanding of the relationship between the rate of vibration and pitch.
- The Vibraphone
- The Xylophone
- The Flute
- The String Quartet

**Response Sheet**
- Students respond to another student's thoughts about pitch and how pitch can be changed.
- Response Sheet: Good Vibrations
THE TUNING FORK

MATERIALS FOR A GROUP

1. Tuning fork
1. Cup of water
• Paper towels
1. Ping-Pong ball on a thread

INVESTIGATION

1. Dip just the ends of the tuning fork into a cup of water. Watch and listen.
2. Touch the ends of the tuning fork to the edge of a piece of paper. Watch and listen.
3. Touch the ends of the tuning fork to your cheek. Describe what you feel.
4. Hold the thread so the Ping-Pong ball hangs in the air. Touch the tuning fork to the ball. Keep the tuning fork in one position and watch what happens to the ball.

RECORD

Describe how you know that a tuning fork vibrates.


GO FURTHER

• Hit the tuning fork again. Press the end of the handle down on the table, the floor, a book, and other objects. Listen to the different sounds.

REMEmBER

Strike the tuning fork on the wood or on the bottom of your shoe before doing each step.
THE WATERPHONE

MATERIALS FOR A GROUP
5 Bottles with water
1 Mallet

INVESTIGATION
1. Choose two bottles. Tap the bottles below the water line. Ask your group to listen with eyes closed and with eyes open. Vote on which bottle has the higher pitch.
2. Take turns. Each player chooses two bottles. Everyone listens. Everyone votes on which bottle has the higher pitch.
3. Arrange the bottles from the highest to the lowest pitch.

RECORD
Draw the water level in the bottles to show how you arranged them.

[HIGHEST PITCH] [LOWEST PITCH]

Describe what you observed about pitch and the waterphone.

GO FURTHER
- Try playing a tune your group will recognize.
- Put your ear to the table and have someone else tap the bottles.
11. The five bottles shown below have different amounts of water in them.

![Bottles with different amounts of water]

a. If you tap each one, which will produce the highest pitch?

b. How do you know?

12. Mary had a tuning fork and a bowl full of water. She hit the tuning fork on the table. While the fork was vibrating, she placed the tip of the fork into the water. The water splashed in all directions.

Why does the water splash when the tuning fork touches the water?
15. Directions: Look at the pictures of the wind instruments below and answer the following questions.

(a) How is sound produced by these instruments?

(b) Put an L under the instrument that can play the lowest notes.

(c) Why do you think it can play the lowest notes?

(d) Put an H under the instrument that can play the highest notes.

(e) Why do you think it can play the highest notes?