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| Sound and Music |
| Physical Science, Pre-K  (Revised July 2018) |
| **Standards addressed in this unit:**  **PreK-PS4-1(MA).** Investigate sounds made by different objects and materials and discuss explanations about what is causing the sounds. Through play and investigations, identify ways to manipulate different objects and materials that make sound to change volume and pitch.  **PreK-LS1-3(MA).** Use their five senses in their exploration and play to gather information. |
|  |
| Students engage in a number of investigations and activities to explore how sound is produced, manipulated to change volume and pitch, and experienced through their senses. Students learn different strategies to produce sound, including by striking, plucking and blowing, and in each case how to make louder or softer sounds, and higher and lower sounds. Throughout the unit students dictate and draw to explain what they are learning and to ask and answer questions about sound. |

*This Model Curriculum Unit is designed to illustrate effective curriculum that lead to expectations outlined in the 2016 Science and Technology/Engineering Curriculum Frameworks (*[*www.doe.mass.edu/STEM/STE*](http://www.doe.mass.edu/STEM/STE)*) as well as the MA Curriculum Frameworks for English Language Arts/Literacy and Mathematics. This unit includes lesson plans, a Curriculum Embedded Performance Assessment (CEPA), and related resources. In using this unit it is important to consider the variability of learners in your class and make adaptations as necessary.*

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# Table of Contents

[Unit Assumptions and Comments on Sequence 4](#_Toc9247057)

[Unit Plan 6](#_Toc9247058)

[Lesson #1: Introducing Sound: Punchinello 10](#_Toc9247059)

[Lesson #2: Making Loud and Soft Sounds 14](#_Toc9247060)

[Lesson #3: Hearing Sound 19](#_Toc9247061)

[Lesson #4: Sound Vibrations 23](#_Toc9247062)

[Lesson #5: Making High and Low Sounds by Striking 29](#_Toc9247063)

[Lesson #6: Making High and Low Sounds by Plucking 34](#_Toc9247064)

[Lesson #7: Making High and Low Sounds by Blowing 39](#_Toc9247065)

[Curriculum Embedded Performance Assessment (CEPA) 44](#_Toc9247066)

[Unit Resources 47](#_Toc9247067)

# Unit Assumptions and Comments on Sequence

This unit assumes that students have a basic understanding of the difference between properties of an object and its materials, which contributes to understanding the relationship of an instrument and how it produces sound in this unit. Students should also have some skill with writing and/or drawing materials that they can employ to convey information throughout this unit. Mastery of the science standards in this unit contribute to subsequent learning in Grade 1 on sound and signals.

Strand maps for standards PreK-LS1-3(MA), PreK-PS4-1(MA).

PreK-LS1-3(MA)
 - Prior standards: None
 - Following standards: PreK-PS4-1(MA), 1-PS4-1, 1-PS4-4

PreK-PS4-1(MA)
 - Prior standards: PreK-PS1-3(MA), PreK-LS1-3(MA)
 - Following standards: 1-PS4-1, 1-PS4-4

General advice when teaching preschool science:

Help children figure out what is happening though guided inquiry and open-ended questions. Encourage careful observation, experimentation, and putting their hypotheses and conclusions into words. Limit the extent that you solve the problems for them or tell them the answer. It is more important that they systematically explore and problem-solve than it is for them to “know” the scientific answer. One way to extend and deepen children’s explanations and help them focus on the variables affecting the sounds they are producing is to engage in parallel play: Ask an experimenting child if you can join him or her. You can think out loud:

* “I wonder what will happen if I try doing this?”
* “What do you think will happen if I do it like this?”
* “I wonder if I can make it do that again?”
* “I wonder why it did that?”

In other words, you are trying to encourage *explanation* and *prediction*, rather than them simply having a good time. It is important for the children to think of themselves as *scientists* and what they are doing as *science*, and for us as a group to periodically discuss what that entails – specifically, that scientists:

* ask questions;
* are careful observers;
* enjoy what they are doing without being silly;
* experiment and predict;
* try to understand what they are experiencing;
* keep themselves and others safe.

In having children share their observations with you and each other, encourage them to use the vocabulary provided, and help them translate the words they use in their explanation to the target vocabulary, using indirect correction (e.g., “Yes, you did make that sound by hitting the drum, or *striking* it.” Sometimes they need to hear you using the language (receptive language), but you’re trying to move them to where they can comfortably use the words themselves (expressive language).

If your school or center has multiple classrooms, it makes sense for not all classrooms to be doing this unit at exactly the same time. That way, teachers can collaborate on making and collecting the needed resources. Then when one classroom has moved past that phase of the unit, the materials are available for use in another classroom.

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| Unit Plan **Stage 1 Desired Results** | | |
| **ESTABLISHED GOALS G**  PreK-PS4-1(MA). Investigate sounds made by different objects and materials and discuss explanations about what is causing the sounds. Through play and investigations, identify ways to manipulate different objects and materials that make sound to change volume and pitch.  PreK-LS1-3(MA). Use their five senses in their exploration and play to gather information.  **Literacy Standards**  PreK.W.MA.2. Use a combination of dictating and drawing to supply information about a topic.  PreK.SL.MA.3. Ask and answer questions in order to seek help, get information, or clarify something that is not understood. | ***Transfer*** | |
| ***Students will be able to independently use their learning to…* T**  **T1. Engage in sustained, complex and successful scientific inquiry.**  **T2. Analyze mechanisms of cause and effect in natural and designed systems based on physical and chemical principles.** | |
| ***Meaning*** | |
| **UNDERSTANDINGS U**  ***Students will understand that…***  **U1. Sound is initiated by rapidly vibrating objects and stops when those objects stop vibrating.**  **U2. Sounds are initiated by different categories of action: striking, plucking, or blowing.**  **U3. Sounds can differ in loudness (*volume*).**  **U4. Sounds can differ in how high or low they are (*pitch*).**  **U5. Science requires that we ask and answer questions and convey our thinking clearly to others.**  **U6. Sound is experienced and can be investigated using multiple senses.** | **ESSENTIAL QUESTIONS Q**  **Q1. How can we make different sounds?**  **Q2. What makes sounds different?** |
| ***Acquisition*** | |
| ***Students will know…* K**  **K1. Sound is the perception of vibrations in materials.**  **K2. Choice of materials affects the sound produced.**  **K3. The sound produced by a material can be changed in predictable ways.**  **K4. Longer or thicker materials tend to produce lower sounds; shorter or thinner materials tend to make higher sounds.**  **K5. Classification of sound sources or musical instruments: by striking (percussion), by plucking (string), by air rushing through a tube or past a vibrating reed (woodwind) or lips (brass).** | ***Students will be skilled at…* S**  **S1. Explaining why a material is or is not making the sound it is.**  **S2. Differentiating sounds that are higher and lower (pitch).**  **S3. Differentiating sounds that are louder and softer.**  **S4. Predicting how to change their action on a material to produce a different sound.**  **S5. Using multiple senses to investigate sound.**  **S6. Using drawings and scientific words to explain sound.**  **S7. Asking questions about sound and providing thoughtful answer to them.** |
| **Stage 2 - Evidence** | | |
| **Evaluative Criteria** | **Assessment Evidence** | |
| **See CEPA Rubric**   * Can produce sound by striking, plucking and blowing * Can adjust volume and pitch of sounds * Can explain information about sound | **CURRICULUM EMBEDDED PERFORMANCE ASSESSMENT (PERFORMANCE TASKS) PT**  **Sound Effects Boss**  **Goal:** Interview with the director for an upcoming production where you will be the Sound Effects Boss!  **Role:** A Sound Effects Boss!  **Audience:** The Director  **Situation:** The Director wants to make sure you are ready to produce a variety of sounds on three different apparatus (using striking, plucking and blowing) and can change the volume and pitch of sounds.  **Product:** During your interview, you will be asked to make sound from instruments and make those sounds louder/softer and higher/lower. | |
|  | **OTHER EVIDENCE: OE**  Completed drawings and sentence frames  Demonstrations of producing loud/soft and high/low sounds  Dictation and drawings explaining information about sound | |
| **Stage 3 – Learning Plan** | | |
| ***Summary of Key Learning Events and Instruction***  **(8) 30-minute lessons (each lesson can be distributed into several 15-minute sections during a day)**  **Lesson 1: Introducing Sound: Punchinello**  This is the introduction to the theme of sound. The class sings the adapted version of the song Punchinello. Students are introduced to the concept that sounds can be made by different objects and different materials. Using materials/items from a provided bin, children “make noise” and identify how they made the sound: striking (hitting, banging), plucking (picking), and blowing (blowing into). This lesson also teaches children how to share information through speaking and drawing.  **Lesson 2: Making Loud and Soft Sounds.**  This lesson is a carry-over from the introduction on the concept of sound. Children continue to explore sounds by using different objects and materials. They make connections to how sound is created and how they can affect or change the sound being made. Children answer specific questions in order to help clarify their understanding of what is happening.  **Lesson 3: Hearing Sound**  Children experience how their ears “collect” sound and the shape of the ear affects the sound loudness of sounds heard from different locations in the environment.  **Lesson 4: Sound Vibrations**  Children explore creating sounds by plucking and connect the sounds produced to the concept of vibration. They classify sounds as high or low. They experiment with starting and stopping vibrations and with varying the length of vibrating rubber bands, connecting high sounds with shorter lengths and low sounds with longer lengths.  **Lesson 5: Making High and Low Sounds by Striking**  Children experience how the sounds produced by striking objects can vary in pitch, and the pitch is affected by the length or circumference of the vibrating surface. Children continue to think about how sound is created and how they can affect or change the sound being made with different materials and different approaches.  **Lesson 6: Making High and Low by Plucking**  Children experience how the sounds produced by plucking can vary in pitch and volume through manipulating a “slide guitar”. They use multiple senses to describe and explain differences in the plucked string and relate those to higher or lower sounds. They ask questions and think about answers to questions as they experiment.  **Lesson 7: Making High and Low Sounds by Blowing**  Children experience how the sounds produced by blowing and manipulating the length of tubes can vary the pitch of sound. Children continue to think about how sound is created and how they can affect or change the sound being made with different materials and different approaches.  **CEPA: Sound Effects Boss**  Students play the role of preparing for an upcoming production in which they are the designated “Sound Effects Boss”. The Director wants to ensure the Sound Effects Boss is ready to produce a variety of sounds on three different apparatus (using striking, plucking and blowing) and can change the volume and pitch of sounds. | | |
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# Lesson #1: Introducing Sound: Punchinello

**Brief Overview of Lesson:** This is the introduction to the theme of sound. The class sings the adapted version of the song Punchinello. Students are introduced to the concept that sounds can be made by different objects and different materials. Using materials/items from a provided bin, children “make noise” and identify how they made the sound: striking (hitting, banging), plucking (picking), and blowing (blowing into). This lesson also teaches children how to share information through speaking and drawing.

**Prior Knowledge Required:**

* Use writing/drawing materials (paper, pencils, crayons) for their specific purpose.

**Estimated Time:** 30 minutes

**Resources for Lesson:**

* (See list below)
* Materials become available in centers or on unit shelf for use by children after the lesson and over coming days.

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

* PreK-PS4-1(MA). Investigate sounds made by different objects and materials and discuss explanations about what is causing the sounds. Through play and investigations, identify ways to manipulate different objects and materials that make sound to change volume and pitch.
* PreK.W.MA.2. Use a combination of dictating and drawing to supply information about a topic.

**Essential Question(s) addressed in this lesson:**

* Q1. How can we make different sounds?
* Q2. What makes sounds different?

**Objectives**

* Students will be able to create and replicate a variety of sounds with various objects.
* Students will identify the action they use to produce the sound (strike, pluck, blow)
* Students will produce a drawing/writing of what they did during the lesson and share their drawing by telling about it.

**Language Objectives**

* *Listening*: Students will listen to and replicate a sound made by a classmate
* *Speaking*: Students will explain how they made sound using the academic language to complete a sentence frame

**Targeted Academic Language**

* Sound, strike, pluck, blow

**What students should know and be able to do before starting this lesson:**

* Students will be using prior life experiences to begin this unit.
* Use writing/drawing materials (paper, pencils, crayons) for their specific purpose.

**Anticipated Student Preconceptions/Misconceptions**

* NA

**Instructional Materials/Resources/Tools**

* Lyrics to *Punchinello* (see Unit Resources).
* Bin/basket of materials for children to “make noise”: blocks, shakers, tambourine, sticks, frame with rubber bands stretched across it, toy guitar, paper tubes with wax paper on one end.
* Vocabulary Cards – laminated and available for student (see Unit Resources):
* Premade sentence strip sentence frame for teacher to point to as the children speak:

I made a sound by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (striking, plucking, blowing) my item.

**Instructional Tips/Strategies/Suggestions for Teacher**

* Teacher may want to record or find audio/video of the *Punchinello* song for use at the listening center.
* The song can be introduced and practiced before the lesson in its original format (using actions) so that kids are familiar with it and are able to transfer the idea of making sounds.
* The bin item of items should be available throughout the unit for guided discovery and exploration.
* Vocabulary cards will need to be ready and available.

**Assessment**

* Students will be expected to draw what they did and use the sentence frame when talking to their partner about what they did during the lesson.

**Lesson Details:**

**Lesson Opening**

* Tell the children they will be scientist and learn about sound and how it works. Tell them that part of being a scientist is recording what you discover or learned. Today you will share about what you learned by drawing and writing about sound. During Circle Time introduce the song/game *Punchinello*. Students make a sound and classmates imitate their sound as the group sings the song.

**During the Lesson**

* Children sit in a circle on the rug. Display the bin that contains materials and objects that can be used to make a sound or noise (see materials section for ideas). Take item(s) out of the bin and ask: “How can we make a sound or noise with this (these)?”
* As you get thoughts/ideas from the children have them come up and demonstrate what they would do. As each child demonstrates their sound, note the action that the child is doing to make the sound.
* Introduce the vocabulary cards and have the group decide if the demonstration was done by striking, blowing or plucking the item. It is important for kids to see the difference between striking, plucking or blowing on something in order to get it to produce sound.
* Allow all children time to explore the items in the bin and make different sounds. Teacher should guide students as to how they would produce sounds with questions such as:
  + “What do you think would happen if I blow on that?”
  + “What could I use to strike that?”
  + “Could I pluck that?”
* Have them try using different ways to make sounds (striking, blowing, plucking) using the same material or object.
* Gather the children on the rug and remind them: “Good scientists tell about what they learned or discovered. One way to do that is to draw or write about what happened.” Do a quick sketch of a person demonstrating the use of an object from the lesson. After drawing, the teacher can make a connection of the drawing to the prepared sentence frame:

I made a sound by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (striking, plucking, blowing) my item.

* Tell students that they will start to record what they learn in our lessons. Tell them to make sure their drawing tells about what they discovered during their work. Remind children that drawing/writing and talking about what they learned will help them be better scientists.

**Lesson Closing**

* Children will go to tables and draw themselves making a sound with classroom material. They will share with a partner using the following sentence frame:   
  I made a sound by\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (striking, plucking, blowing) the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (classroom material/object).

# Lesson #2: Making Loud and Soft Sounds

**Brief Overview of Lesson:** This lesson is a carry-over from the introduction on the concept of sound. Children continue to explore sounds by using different objects and materials. They make connections to how sound is created and how they can affect or change the sound being made. Children answer specific questions in order to help clarify their understanding of what is happening.

**Prior Knowledge Required:**

* Students should demonstrate an understanding of vocabulary words from lesson one: strike, pluck, blow.
* Listen to questions and wait for the speaker to finish before answering a question.

**Estimated Time:** 30 minutes

**Resources for Lesson:**

* (See list below)
* Materials become available in centers or on unit shelf for use by children after the lesson and over coming days.

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

* PreK-PS4-1(MA). Investigate sounds made by different objects and materials and discuss explanations about what is causing the sounds. Through play and investigations, identify ways to manipulate different objects and materials that make sound to change volume and pitch.
* PreK.SL.MA.3. Ask and answer questions in order to seek help, get information, or clarify something that is not understood.

**Essential Question(s) addressed in this lesson:**

* Q1. How can we make different sounds?
* Q2. What makes sounds different?

**Objectives**

* Students will be able recognize that different materials or objects make different sounds.
* Students will realize that it is possible to make sounds louder and softer.
* Students will use evidence from their investigations to describe how they created noise with specific objects.

**Language Objectives**

* *Listening*: Students will use nonverbal responses to answer specific guided questions by manipulating their items to make loud/soft sounds.
* *Speaking*: Students will answer questions about how they made noise with their objects using academic language within the sentence frame: “I made noise by \_\_\_\_\_\_\_\_\_\_\_\_ the materials.”
* *Reading*: Use picture cues vocabulary cards from lesson 1 as commands to have children make sounds loud/soft.

**Targeted Academic Language**

* Loud sound, soft sound, strike, pluck, blow

**What students should know and be able to do before starting this lesson:**

* Students should demonstrate an understanding of vocabulary words from lesson one: strike, pluck, blow.
* Listen to questions and wait for the speaker to finish before answering a question.

**Anticipated Student Preconceptions/Misconceptions**

* Students may think that sounds can only be made louder by hitting something harder.
* Students may think that the buzzing feeling they sometimes feel when a vibrating object touches their skin is a sting of some sort. They might interpret it as somehow dangerous or harmful.

**Instructional Materials/Resources/Tools**

* Kazoos: students talk, hum or sing into the tube to create different sounds
  + toilet paper roll
  + tracing paper or wax paper
  + rubber band

Punch hole in side of roll; attach tracing paper/wax paper to end of roll with tape or rubber band. Children can hum, talk, or sing through the open end to create sounds. \*Note: The kazoo should be used practicing proper hygiene. Suggestions: Have each child put tissue around the top of the roll and poke a hole in it, so that kids can put their mouth on the tissue, then discard. Or put tape around the edge of the roll so it can wiped clean using alcohol wipes before and after each student uses it. Or have multiple kazoos available.

* Rain sticks: children shake or move tube to create sound.
  + paper towel roll or cardboard tube
  + toothpicks or skewers
  + dry beans, rice, or corn
  + wire cutters
  + pencil
  + pushpin
  + dot stickers
  + glue
  + colorful paper or other decorating materials
  + scissors
  + rubber bands

It takes about 30 minutes to construct a rain stick, but they can be used throughout the unit and saved for future use. Directions for making a rain stick were adapted from the following website: <http://easypreschoolcraft.blogspot.com/2012/06/rain-stick-music-craft-3.html>:

1. Before you start, mark your cardboard tube with a pencil where the holes will go. You can follow the natural spiral line of the tube.
2. Start holes with a pushpin. Roll the pin around to make the hole bigger.
3. Push toothpicks or skewers into all the holes. Add a drop of glue into each hole.
4. Cut the excess off the toothpicks on the outside with wire cutters. Make them flush as possible.
5. Add some glue to one end of the tube, wrap paper or wax paper around the end, and secure with a rubber band.
6. Put dry beans into the tube, then close the other end.
7. Decorate the outside of the tube with paper. You might want to cover all the holes with dot stickers first. You could also cut a sheet of paper to wrap around the tube, decorate it first, then glue around the tube.

* Set up stations with different materials and objects to produce sounds with.
* Vocabulary cards from Lesson 1 (strike, pluck, blow – See Unit Resources).

**Instructional Tips/Strategies/Suggestions for Teacher**

* Teachers may want to set up each item in different areas of the room and have children rotate through each area with adult supervision. It is important for students to note what they need to do to successfully make a sound, because at times what they do may not always create a sound. Adults should ask guided questions related to making sound:
  + “How did you make that sound?”
  + “Where do you think the sound is coming from?
  + “What did you do differently this time to have it make a sound, where before it didn’t?”
  + “Can you make the sound louder? (Show poster with the word **loud** on it). What did you have to do to get a louder sound?”
  + “Can you make the sound softer? (Show poster with the work **soft** on it). What did you have to do to get a softer sound??
  + “Can you make it so it doesn’t make a sound?”

**Assessment**

* Teacher observation: When given guided questions, can children demonstrate loud/soft sounds with the item?

**Lesson Details:**

**Lesson Opening**

* Gather children in a group and have materials ready for whole group demonstration. Review prior knowledge from previous lesson.
* Say to the children, “We have been learning about sound. We have made sounds for our game *Punchinello*. We also made noise with items from our bin and decided if we had to strike, pluck or blow them to get them to make a sound. (Review vocabulary cards for these words.) Remind students that good scientist record their findings – which is what they did at the end of the prior lesson. Review some drawings from the previous lesson.
* “Today you will continue to explore sound with these.” Show each item: kazoo and rain stick.
* “Scientist often record their findings, and they also ask questions and think about their work. Asking questions and thinking about answers is an important skill to have, so other people can understand what you have done.” Model how to ask and think about answers to specific questions as each item is introduced; for example.
  + Show the kazzo, blow into it, then display the question: **How did I make that sound?**
  + Model the answer for the children, “I made that sound by blowing into the kazoo.”
  + Next display: **Where do you think the sound is coming from?**
  + Model thinking: “Let’s see, when I blow into the tube, I think the sound is coming from inside the tube and out here (pointing to end of tube). So, my answer to the question is: “The sound is coming from inside the tube.”
* Continue this with other objects. Direct children to notice the connection between the question and your verbal response.
* Introduce vocabulary: loud and soft. Demonstrate this using audio of loud and soft music.
* While playing the loud music explain that the sound is loud – show picture vocabulary word (see Loud and Soft in Unit Resources). While playing the soft music explain that the sound is soft – show picture vocabulary word.

**During the Lesson**

* Children go to different stations and make noise with various materials. No more than five minutes is needed per station.
* Teacher should circulate to each workstation, encouraging children to strike, pluck and/or blow the items to identify how to produce sounds. Ask scaffolding questions to help them produce and distinguish between loud and soft sounds:
  + “How did you make that sound?”
  + “Where do you think the sound is coming from?”
  + “What did you do differently this time to have it make a sound, where before it didn’t?”
  + “Can you make the sound louder? (Show poster with the word **loud** on it). What did you have to do to get a louder sound?”
  + “Can you make the sound softer? (Show poster with the work **soft** on it). What did you have to do to get a softer sound?”
  + “Can you make it so it doesn’t make a sound?”

**Lesson Closing**

* Children come back to the rug and share ideas (demonstrate) how they made loud/soft sounds with items from each station.
* Have them respond to the displayed questions:
  + **How did I make that sound?**
  + **Where do you think the sound is coming from?**

And share questions and thoughts they had while making loud and soft sounds.

# Lesson #3: Hearing Sound

**Brief Overview of Lesson:** Children experience how their ears “collect” sound and the shape of the ear affects the sound loudness of sounds heard from different locations in the environment.

**Prior Knowledge Required:**

* Children must be aware of the expectations of good scientists: careful observation, experimenting and noticing effects, keeping themselves and others safe, and wondering “Why?”

**Estimated Time:** 30 minutes

**Resources for Lesson:**

* (See list below)
* Materials become available in centers or on unit shelf for use by children after the lesson and over coming days.

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

* PreK-PS4-1(MA). Investigate sounds made by different objects and materials and discuss explanations about what is causing the sounds. Through play and investigations, identify ways to manipulate different objects and materials that make sound to change volume and pitch.
* PreK-LS1-3(MA). Use their five senses in their exploration and play to gather information.
* PreK.SL.MA.3. Ask and answer questions in order to seek help, get information, or clarify something that is not understood.

**Essential Question(s) addressed in this lesson:**

* Q2. What makes sounds different?

**Objectives**

* Students will be able to explain how channeled into your ear by your outer ear or other “collectors.”

**Language Objectives**

* *Speaking*: Use the terms louder and softer to describe changes in volume.

**Targeted Academic Language**

* Predict, explain, compare, experiment

**What students should know and be able to do before starting this lesson:**

* Little is required in terms of prior skills or knowledge. Children must be aware of the expectations of good scientists: careful observation, experimenting and noticing effects, keeping themselves and others safe, and wondering “Why?”

**Anticipated Student Preconceptions/Misconceptions**

* Students may think that everyone hears sounds the same way and hear all sounds around them equally.

**Instructional Materials/Resources/Tools**

* 6-8 pairs of Styrofoam cups with pieces about 1” in diameter torn out near the base (big enough to fit over a child’s ear, small enough for cups to stay in place once attached).
* Large plastic bleach or milk bottle with bottom cut out, then edges taped to cover rough edges.
* Chart paper and marker.

**Instructional Tips/Strategies/Suggestions for Teacher**

* Emphasize safety:
  + Students should *never* put anything *in* their ears.
  + These experiments will have children listening to sounds going directly into their ears. Emphasize to children that loud sounds can *damage* the ear.

As scientists, the children are expected to keep themselves and others safe. Those who get silly and make dangerously loud noises are not showing themselves to be good scientists and will not be allowed to continue experimenting for a while. They will watch their classmates being good scientists.

**Assessment**

* NA

**Lesson Details:**

**Lesson Opening**

* Have children all face you: “Can you hear me?...Okay, now we’re all going to press our hands tightly over our ears, and I’m going to keep talking with my normal voice. When you see me take my hands off my ears you should do that too. So we’re going to start” – give the signal, continue talking, and then give the signal for everyone to remove their hands.

**During the Lesson**

* “So tell me how my voice sounded different.” Call on different children to share. Emphasize how much more muffled your voice sounded.
* “We’re going to do that again, but this time you’re not going to use your hands to cover your ears, but you’re going to cup your hands like this (hold up hands with fingers and thumb together and bent forward) and then hold them against your head right in back of your ears.” Demonstrate, and help those who have difficulty finding the right position.
* “Now I’m talking with my normal voice, and while I keep talking I want you to move your hands out away from your head, then back against your head behind your ears, then out again…” Keep talking, as children keep alternating positions. Also instruct them to turn their bodies away from you as you continue talking, and then turn back towards you.
* “…and now put your hands down in your lap. Tell me how the sound of my voice changed.” Call on different children to share. Emphasize how with the cupped hands made your voice sound louder or closer when they were facing you, and made your voice sound softer or farther away when they faced away from you.
* “We’re going to try one more thing. You’re going to cup your hands again, just like last time, but this time you’re going to face your cupped hands away from me (demonstrate) and then press them against your head right in I of your ears.” Demonstrate, and help those who have difficulty finding the right position. Repeat procedure of continue talking while they move their hands away from their head and back into position, and ask them to discuss what they heard. Emphasize that this time their hands made the sound seem softer or farther away when they faced towards you but louder or closer when they were facing away from you.
* Think aloud: “I wonder why using our hands this way makes a difference?” Remind students, “One way scientist show what they learned is to ask and think about answers to questions.” Display your previous question for the class to see. Scaffold a conversation to answer the question about how our cupped hands are like changing the shape of our outer ears, and that the shape and direction of the “collector” relative to where the sound was coming from made a difference.
* Let the children know you will be adding the following materials to the Science Unit shelf or station: “You can use these kinds of cups that fit over your ears like this” – demonstrate folding outer ear into hole and facing cups forward, backwards, up, or down. “With the cups on your ears listen to each other or listen to other sounds in the room, and see what difference it makes which directions you turn the cups. “You will also find this big cup which I like to call an *Elephant Ear*. You can also experiment with putting this over one of your ears and listening to sounds in the room with it facing in different directions.”
* In all of the centers, scaffold children’s:
  + *experimenting* – using the materials in different ways and observing the effects;
  + *predicting* –telling a peer what they think will happen before they try a variation;
  + *explaining* –sharing their thoughts on why the materials are doing what they’re doing.

**Lesson Closing**

* Keep materials available on the science shelf for further use during subsequent work periods, continuing to scaffold children’s experiments and discoveries. Occasionally you may choose to take a digital photograph of a child’s experiment and add that, with the child’s explanation of what they were doing, to the documentation panel.

# Lesson #4: Sound Vibrations

**Brief Overview of Lesson:** Children explore creating sounds by plucking and connect the sounds produced to the concept of vibration. They classify sounds as high or low. They experiment with starting and stopping vibrations and with varying the length of vibrating rubber bands, connecting high sounds with shorter lengths and low sounds with longer lengths.

**Prior Knowledge Required:**

* That you use your ears to hear sound.
* That you sometimes have to listen very carefully to hear soft sounds.
* Not to make loud sounds directly in their own or a peers’ ears.

**Estimated Time:** 30 minutes

**Resources for Lesson:**

* (See list below)
* Materials become available in centers or on unit shelf for use by children after the lesson and over coming days.

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

* PreK-PS4-1(MA). Investigate sounds made by different objects and materials and discuss explanations about what is causing the sounds. Through play and investigations, identify ways to manipulate different objects and materials that make sound to change volume and pitch.
* PreK-LS-4(MA). Use their five senses in their exploration and play to gather information.

**Essential Question(s) addressed in this lesson:**

* Q1. How can we make different sounds?
* Q2. What makes sounds different?

**Objectives**

* Students will be able to identify that a vibrating object makes a sound.
* Students will relate the movement (vibration) of the material in an object to the sound: When the movement (vibration) stops or is interrupted the sound stops.

**Language Objectives**

* *Listening*: Students will be able to look for and point out specific items in pictures in the book *Sound* during the whole group read aloud
* *Speaking*: Students will use the words start and stop to tell what happens to the sound when they place a pencil at any point on a stretched rubber band.
* *Reading*: Students will be able to match oral language to print.
* *Writing*: Students will be able to draw pictures of what they did to make the sound start/stop.

**Targeted Academic Language**

* Vibration

**What students should know and be able to do before starting this lesson:**

* That you use your ears to hear sound.
* That you sometimes have to listen very carefully to hear soft sounds.
* Not to make loud sounds directly in their own or a peers’ ears.

**Anticipated Student Preconceptions/Misconceptions**

* Students may think that when they no longer hear the sound at a normal listening distance, the sound has stopped.
* Students may think that an object can only make one type of sound.

**Instructional Materials/Resources/Tools**

* Book: Sound, by Lisa Trumbauer
* Jump rope
* Small, sturdy box (multiple if setting up multiple stations)
* Rubber bands of various lengths and thicknesses
* Pencil/stick longer than the box

**Instructional Tips/Strategies/Suggestions for Teacher**

* Help children see that tightening the rubber bands changes the sound and that inserting a bridge under the rubber band changes the sound (and there is a different sound on either side of the bridge).
* Help children try both plucking and striking.
* Help children explore plucking or striking the rubber band on the side not free to vibrate.
* It may be helpful to watch for or highlight that:
  + Students make a connection to the waves in the jump rope (which is not making a sound) and the blurry vibrating rubber bands.
  + An object will stop vibrating when something is pressed against it.
  + Sound reaches your ear through other media than the air (in fact air is a fairly poor conductor of sound).
* Emphasize the use of multiple senses as they use the rubber bands on the box: look closely, listen, and feel the differences as they pluck the rubber band with different bridge placements.

**Assessment**

* Students will start/stop sounds (vibrations) using the pencil as a bridge at various points on the different rubber bands.

**Lesson Details:**

**Lesson Opening**

* Tell the children they will be continue their work as scientists and learn about sound and how it works. Encourage students to share some things they know that good scientists do. Elicit that good scientists:
  + record what they learn in drawings/writing.
  + answer questions to help people understand their work.

Review the drawings and questions from previous lessons.

* Introduce the book *Sound* by Lisa Trumbauer. Talk about the cover and do a picture walk, noting what might be making sound based on the pictures. (Don’t read the book yet).
* Introduce the word **vibrate**. Provide a kid friendly definition: “Vibrate means to move back and forth quickly or very fast.”
* Tell the children: “Hold your arms out and move them up and down very fast, like you’re trying to fly.” Demonstrate. “Do you hear a humming or buzzing sound?” Elicit responses. “No, you don’t, because you can’t move your arms up and down fast enough to make a sound. But bees, mosquitos, and hummingbirds can, and the sound you hear is from the quick up-and-down movement of their wings creating a **vibration** (optional: show You-tube video where they can hear the sounds).
* Use the word in a simple sentence that indicates the meaning of the word: “The wings of a bee create a buzzing noise, or **vibration**, as it flies around the flowers.”
* Provide a simple demonstration and visual to help them understand what the word means:
  + Display a jump rope. Have two children opposite ends.
  + Ask one child to shake his end of the rope up and down. Ask the group what they see.
  + Tell the children that as the rope moves, we see the “vibration” or up-and-down motion move down the rope in a wave.
  + Have the child shake the rope more rapidly and more slowly. Ask the group what differences they see.
  + Have a third child hold the rope in the middle. Then have the child on the end shake the rope again. Help children see that the wave stops at the point the middle child is holding the rope.
  + Ask if they hear a sound. “No, because \_\_\_\_\_\_ can’t move his end up and down fast enough. If he could, we would hear the rope humming, or **vibrating**.”
* Provide the vocabulary card (see Vibration in Unit Resources):
* Orally provide the children with a sentence frame for them to fill in the word show the picture.
* Now that the word **vibration** has been introduced, it should be integrated into the unit whenever possible. For example:
  + Have them use the term when they are describing an object that hums, buzzes, or rings.
  + Ask them to identify things that vibrate or point out what is vibrating when they make a sound.

**During the Lesson**

* Read the book *Sound* to the children. Scaffold discussions of how different things are vibrating in the book, and whether all those vibrations sound the same (refer to the book for specifics). Encourage children to come up with other examples of sounds that they know of that they think are made by vibration.
* Tell students that they will now use a box, elastics and a pencil/stick to create vibrations that make sound.
* Show the box, rubber bands and pencils/sticks. Demonstrate stretching the bands around the box.
* Pass the box around the group, and have each child pluck a rubber band. Draw their attention to how the rubber band looks different (appears to get wider and fuzzier) when they hear the sound.
* Review importance of answering questions. Refer back to previous vocabulary words (blow, strike and pluck). One at a time, have each child answer the following question in a complete sentence:
  + “What did you do to get the rubber band to make a sound?”

Ask: “Why do you think the rubber band looked different when it was making a sound?” See if they connect that to the concept of moving very fast or **vibrating**.

* “Now watch. I’m going to place my hand in the middle of a band and pluck on one side of my hand.” Demonstrate. Allow several children to do this as well, so all can see and hear.
* “How were these sounds different than the sounds we heard before? Did the rubber bands look different as they vibrated each time? How did it feel to pluck the rubber band each time?” Scaffold this discussion and encourage children to hypothesize why having their hand resting on the rubber band made a difference. (This demonstration should allow children to visualize that the starting and stopping of a vibration will cause the sound to start/stop).
* “Now watch. I’m going to place this pencil across the box under this rubber band and then pluck it again. Before I do, listen to the sound the rubber band makes, and remember that sound.” Pluck the rubber band, then create the bridge with the pencil.
* “Before I have someone pluck the rubber band again, do you think the sound will be the same, or do you think the sound will be different?“ Scaffold the conversation, encouraging children to share their reasoning. If they think the sound will change, ask them how they think the sound will be different (many may believe the effect will be like when we placed our hands on top of the rubber band).
* Hand the box around, and let several children pluck the rubber band. Encourage some children to pluck on one side of the rubber band, and some on the other.
* “What happened?” Introduce the terms high and low to describe the different tones and show vocabulary cards (see High and Low in Unit Resources):
* Pluck the rubber band on either side of the bridge and ask children:
  + “Which side was high?” Have them point and hold up the proper vocabulary card.
  + “Which side was low?” Have them point and hold up the proper vocabulary card.
* Scaffold I wonder conversations about why both sounds are higher than the original sound (pull the bridge and let them hear it again). Then move the bridge so one side is even longer, and one side is even shorter and direct student’s attention to the new sounds.
* Remind the children what happened with the rope when a child held it in the middle. Help them see the connection: that the bridge is like that child, and it stops the vibration – only the length of rubber band on that side of the bridge is vibrating and that length of rubber band is shorter than the whole rubber band):
  + “So, the shorter the vibrating band, the higher the sound we hear. The longer the vibrating band, the lower the sound we hear”.
* Tell the children the materials with be on the shelf in the science unit area for them to do their own experiments.
* Provide rubber bands of different thicknesses to experiment with. Show the children that the rubber bands can be stretched across the box’s length or width, as can the bridge.
* Scaffold children’s experiments with:
  + Different rubber bands.
  + Placing the rubber bands in different directions.
  + Making the rubber bands tighter or looser.
  + Using the bridge in different positions.
  + Plucking the bands in other locations, including on the sides and back of the box.
  + Holding their ear against the back of the box and listening to the sound produced.
  + Plucking the stretched rubber bands without using the box.
  + Boxes of different dimensions and made of different materials.
* Scaffold children’s experiments varying conditions, making predictions, and explaining effects.

**Lesson Closing**

* Tell the children that tomorrow/next lesson the class will be making two posters, one labeled High Sounds and one labeled Low Sounds. Tell the children they can draw something in the art area and add it to the appropriate poster. Also tell the children that if they find a picture of something in a magazine at home and their parents will let them cut it out, they can bring that in and add it to the appropriate poster.
* Keep the materials available on the science shelf for children’s use during choice time. Continue scaffolding their use of the materials, introducing varying materials slowly over time with a brief announcement at group time of the new possibilities.
* Make a connection to string instruments. Consider making pictures and names of string instruments available, including instruments from other cultures. Invite children’s families to share string instruments they have with the class.

# Lesson #5: Making High and Low Sounds by Striking

**Brief Overview of Lesson:** Children experience how the sounds produced by striking objects can vary in pitch, and the pitch is affected by the length or circumference of the vibrating surface. Children continue to think about how sound is created and how they can affect or change the sound being made with different materials and different approaches.

**Prior Knowledge Required:**

* The children will already know many objects will make a sound when they are struck (clapping hands; knocking on a door; clapping wood blocks together; striking a tambourine) and those sounds can be made louder or softer by how hard they are struck.

**Estimated Time:** 30 minutes

**Resources for Lesson:**

* (See list below)
* Materials should be available in workstations for multiple days.

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

* PreK-PS4-1(MA). Investigate sounds made by different objects and materials and discuss explanations about what is causing the sounds. Through play and investigations, identify ways to manipulate different objects and materials that make sound to change volume and pitch.
* PreK.W.MA.2. Use a combination of dictating and drawing to supply information about a topic.

**Essential Question(s) addressed in this lesson:**

* Q1. How can we make different sounds?
* Q2. What makes sounds different?

**Objectives**

* Students will be able to describe how to change the pitch of a sound using observations from investigations. Examples:
  + struck tubes that are longer make a lower sound than struck tubes that are shorter.
  + struck surfaces that are stretched looser will make a lower sound than struck surfaces that are stretched tighter.
  + struck surfaces that have a greater surface area will make a lower sound than struck surfaces that have a smaller surface area.
  + if struck materials are not free to vibrate, they will not make a lingering sound.

**Language Objectives**

* *Listening and Speaking*: Use the term striking to orally describe their actions on the materials and use the terms higher and lower to describe changes in pitch.

**Targeted Academic Language**

* Vibration, predict, explain, compare
* Vocabulary needed for comprehension and explanation: striking, mallet, high sound/higher/highest, low sound/lower/lowest, longer/shorter, bigger/smaller, tighter/looser

**What students should know and be able to do before starting this lesson:**

* The children will already know many objects will make a sound when they are struck (clapping hands; knocking on a door; clapping wood blocks together; striking a tambourine) and those sounds can be made louder or softer by how hard they are struck. Here they are looking at another possible percussion effect: that not only the loudness of the sound but the pitch can vary.

**Anticipated Student Preconceptions/Misconceptions**

* Because the terms *higher* and *lower* are first learned as positional terms (e.g., planes flyer higher than birds; cellars are lower than attics), children can easily become confused with using them to describe sounds. As a result, they might use the terms to describe the wrong aspect of what they experience. For example, they might say because a sound is louder it’s higher, or they may say that because the drum is big it makes a louder sound. Use indirect correction to help them master the vocabulary: “Yes, this drum is much *bigger*, and when you strike it makes a *lower* sound.”
* Changes in tightness must be felt. Help children differentiate between the texture of the surface and how tight or hard it feels (“Yes, it is very smooth, and it is stretched very tightly. Feel how hard it is to press your finger down”). Children might not connect how tight the surface felt with the sound they hear, since the two experiences are not simultaneous. Help them recall how it felt, or feel it again.

**Instructional Materials/Resources/Tools**

Sets of materials in various lengths or circumferences:

* tuning forks of different sizes/pitches
* plastic or cardboard tubes (e.g., florescent tube protective holders), pvc pipe, or stiff cardboard tubes, cut to different lengths
* xylophone
* wind chime tubes or bars (best if they are disassembled and restrung so they can be held separately)
* bolts of varying lengths, each hung with a sting or monofilament (fishing) line
* small drums made of rubber, leather, or sturdy plastic stretched over cans or tubes of differing circumferences (pairs of types, with one surface stretched noticeably tighter than the other)
* chopsticks, pencils, or wooden spoons to strike with

**Instructional Tips/Strategies/Suggestions for Teacher**

* Through this lesson and others be consistent in promoting vocabulary-building, categorization, and word-recognition.
* Parents are a good resource to help you collect and make different materials for this activity. Don’t feel you have to do all of them or make all of them yourself. You may find suitable substitutes in catalogues, at recycling outlets, or in the school’s music supplies.
* The tuning forks are particularly useful for children to continue to make a connection between vibrations and sound. Not only do longer tuning forks make a lower tone, but children can feel the vibrations by:
  + lightly touching the vibrating tip to their hand, fingertip, or lips.
  + placing the base of the vibrating tuning fork to the top of their head (here they are actually “hearing” the sound being transmitted directly to their inner ear through their vibrating skull!)
* They can also witness the vibrations by:
  + dipping the vibrating tips into a bowl of water.
  + suspending a small paperclip from a string and gently suspending it against the vibrating tips – the tuning fork vibrations will visibly “kick” the paperclip.
* Drums can be made prior to the lesson using a balloon or cellophane. Tightly stretch the balloon/cellophane across the top of the container (securing with a rubber band), allowing for items to vigorously bounce off of it when the drum is struck and the drum makes a higher sound. For other drums place the balloon/cellophane across the top of the container so is flat but not tight – so that items will bounce off of it less vigorously when the drum is struck and the drum makes a lower sound. Directions for making a drum have been adapted from the following website: <http://kidsactivitiesblog.com/14753/teaching-kids-how-sound-is-made>
  + Containers of various sizes (empty tin cans and bowls work well)
  + Cellophane paper, extra large balloons, or sheets of stretchable latex or rubber (for the drumskins)
  + Pair of scissors
  + Rubber bands
  + Chopsticks or spoons to act as drumsticks

**Assessment**

* (See lesson closing below)

**Lesson Details:**

**Lesson Opening**

* “We’re going to explore materials that you can *strike* to make a sound. What does it mean to *strike* something?” Have children discuss. Help them settle on a sense that it involves hitting something or two things hitting against each other. “Sometimes we use other words for striking, like when I *knock* on the door (demonstrate). I could say I am *striking* the door and making a sound.”
* Show the xylophone. Pick up the xylophone mallet. “Sometimes it’s not our hand that strikes something, but another object. For this xylophone, I’m going to use this *mallet* to strike the bars. What do you think will happen when we strike the bar on this end of the xylophone with the mallet?” Let children predict and explain their reasoning. Have a child do it. Discuss the sound produced. “When I struck the door, the sound ended very quickly. Do you notice this sound lasts a while, after I strike the bar?” Do it again, and listen for the lingering tone. Have a child come up close and listen with their ear close to the bar and report on what they hear.
* “Now watch and listen carefully. I’m going to have \_\_\_\_\_\_ strike this bar again with the mallet.” One second after the child strikes the bar, press your finger down on the center of the bar. “What did you observe?” “Why do you think my finger changed how long the sound lasted?”
* “One more time – this time I’m going to have my finger on the bar before \_\_\_\_\_ strikes it. What do you *predict* is going to happen?” Do the experiment. “What happened?”

**During the Lesson**

* “There’s more than one bar on this xylophone. Let’s compare the sounds with the one we’ve been hearing. Here’s the sound of the bar we have been striking…and here’s the sound of this bar on the other end of the xylophone.” Have children compare the two sounds. Introduce the terms *higher* and *lower* to describe the differences in pitch.
* Briefly introduce the other instruments and demonstrate how to strike them to make a sound (the tuning forks are the most important ones to carefully demonstrate – they must be held by the base and hit sharply but not too hard against a hard surface to get a pure tone and to avoid damaging the fork). For each ask:
  + “I am going to strike these two parts/places. How many of you predict this one (point) will make the higher sound?” (count and state results). “And how many of you predict this one (point to other one) will make the higher sound? (count and state results).
  + “So if you thought this one would make the higher sound, you predict this one (point to the other part) will make the ….? (choral response “lower sound!”) “And if you thought this one would make the higher sound, you predict this one (point to the other part) will make the ….? (choral response “lower sound!”)
  + “Let’s hear both sounds.” Either make the sounds or have one of the children do so. Children should discuss the results and compare to their predictions.
  + Repeat with another apparatus.

**Lesson Closing**

* “So let’s think about these instruments and what about them makes a higher or lower sound.” Ask them to draw and discuss any patterns they see across the instruments used. Or have images of each instrument that they can glue to a paper and then label with features they want to highlight. Key Help them make a connection between the length or circumference/tightness and the sound produced.

# Lesson #6: Making High and Low Sounds by Plucking

**Brief Overview of Lesson:** Children experience how the sounds produced by plucking can vary in pitch and volume through manipulating a “slide guitar”. They use multiple senses to describe and explain differences in the plucked string and relate those to higher or lower sounds. They ask questions and think about answers to questions as they experiment.

**Prior Knowledge Required:**

* Sound is produced by materials free to vibrate.
* Some sounds are higher/lower than others.
* Materials can be manipulated to make different sounds.

**Estimated Time:** 30 minutes

**Resources for Lesson:**

* (See list below)
* Materials added to shelves or interest center for further free-choice activity.

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

* PreK-PS4-1(MA). Investigate sounds made by different objects and materials and discuss explanations about what is causing the sounds. Through play and investigations, identify ways to manipulate different objects and materials that make sound to change volume and pitch.
* PreK-LS1-3(MA). Use their five senses in their exploration and play to gather information.
* PreK.SL.MA.3. Ask and answer questions in order to seek help, get information, or clarify something that is not understood.

**Essential Question(s) addressed in this lesson:**

* Q1. How can we make different sounds?
* Q2. What makes sounds different?

**Objectives**

* Students will be able to demonstrate how to make higher and lower pitched sounds with plucked strings. Examples:
  + Plucked strings that are longer make a lower sound than plucked strings that are shorter.
  + Plucked strings that are stretched looser will make a lower sound than plucked strings that are stretched tighter.

**Language Objectives**

* *Listening and Speaking*: Use the term *plucking* to orally describe their actions on the materials and use the terms *higher* and *lower* to describe changes in pitch.

**Targeted Academic Language**

* Demonstrate, predict, explain, cause
* Vocabulary needed for comprehension and explanation: science/scientist, vibration/vibrating, plucking, pitch, high sound/higher/highest, low sound/lower/lowest, longer/shorter, tighter/looser, thicker/thinner

**What students should know and be able to do before starting this lesson:**

* Sound is produced by materials free to vibrate.
* Some sounds are higher/lower than others.
* Materials can be manipulated to make different sounds.

**Anticipated Student Preconceptions/Misconceptions**

* NA

**Instructional Materials/Resources/Tools**

* Monofilament line (i.e., fishing line). 20-pound test or better is good. Sturdy string can be using as an alternative (to be used for slide guitar). Triangular or cylindrical wood blocks to lift the fishing line off the surface and slide along under the line (pencils are probably not thick enough).
* C-clamps or large paper clamps (to clamp the fishing line or other materials to be plucked to the ends of tables).
* Stethoscope (or piece of plastic tubing with funnels on both ends)
* Box with rubber bands stretched over the top (see Lesson 4).

**Instructional Tips/Strategies/Suggestions for Teacher**

* Through this lesson and others be consistent in promoting vocabulary-building, categorization, and word-recognition.
* In this lesson, the focus is on the plucking action, not on a classification into instrumental groups. Several of the materials explored in this lesson can also be made to vibrate by striking or rubbing, rather than by plucking (e.g., slide guitar). And most of them can be set into motion by way of pushing down and releasing, rather than pulling up and letting go. We are treating these actions as equivalent (i.e., both fitting in the category of plucking).
* Set up several slide guitar demonstration tables –clamp one end of the fishing line to table; hang weight from other end, off end of table, to pull the line tight.
* As always, children need to be reminded that scientists are careful in their experiments. The skewers, bicycle spokes, etc. are not to be used for poking or swinging around, only for plucking.
* The same safety caution needs to be made concerning the stethoscope, which amplifies sound. There are fascinating discoveries for children to make by holding the stethoscope near vibrating objects or the surfaces to which vibrating objects are attached. But making loud noises directly into the stethoscope a child is wearing is dangerous and will not be tolerated.
* Help children think of experiments to do: Remind them about being good scientists, encourage them to ask and answer questions about various aspects of the different situations such as:
  + Putting the blocks in different locations and plucking.
  + Moving the blocks after plucking the string, and hearing the sound change.
  + Pushing the string down and letting go, rather than pulling it up.
  + Touching the string after it is plucked and before the sound dissipates.
  + Putting their ear closer to the table, or on the table surface itself; or holding the stethoscope to the table surface.
  + Using other materials to lift the line off the table, rather than the wood blocks.
* Children may not notice things that are affecting the sound they produce:
  + Obstructions touching the vibrating object (including having the object resting on a surface).
  + It is not how long the object is, but the length of the portion that is free to vibrate. Only the section between the supports on which the object rests (i.e., that is the only section that is vibrating) is vibrating.
  + If the object is not pressed tightly against the supports or the contact points are not thin, the pitch will be raspy rather than a pure tone.
* Help children realize sometimes the vibration (and hence the sound) is still continuing even when you cannot hear it at a normal distance. This can be observed by holding your ear very close to the sound source (or against the surface to which the sound source is anchored) or using a stethoscope.
* The box with rubber bands stretched over it was introduced in lesson 4. By including it as one of the options in this lesson, you are making a connection to the prior exploratory activities and discoveries.

**Assessment**

* See lesson closing.

**Lesson Details:**

**Lesson Opening**

* “We just did a whole series of experiments where we made sounds by striking. Now we’re going to explore materials that you can pluck to make a sound. To pluck a material, we either pull it up or let go or push it down and let go.” Using a slide guitar demonstration table, point to fishing line stretched across table top. “What do you think will happen if I lift the fishing line and let it go?” Let children predict and explain their reasoning. Have a child do it – fishing line will make a dull, short, slapping sound. Ask children if that is what they expected would happen.

**During the Lesson**

*(It is important to continually remind children that scientist answer questions. The teacher’s scaffolding of questions is important in children to develop this skill. )*

* “Now I’m going to change something. Everyone cover up your eyes.” Slip the two wood blocks under the fishing line, several feet apart. “Okay, everybody look. I changed something. Does anyone have an idea what is different?” Scaffold conversation, to help children become aware of the blocks.
* “What do you think will happen if I pluck the string now, with these blocks under the fishing line?” Scaffold comparison of ideas; have a child pluck it, and lead a discussion of the results, focusing on why they think the result was different. Allow select children to come up and observe the line closely after it is plucked, and notice the vibration.
* “Cover your eyes again, because I’m going to make another change.” Move the wood blocks, so they are now only a short distance apart. Go through the same sequence of predicting, discussing, and explaining, helping children through these.
* “What do you think will happen if I hold my hand here (lay it on the line, between the wood blocks) and pluck the line?” Repeat process.
* “I’m going to try one more thing. What will happen if I only put one block under the fishing line?” Repeat process. “ And what will happen if I keep that block there but press my finger down on the fishing line here?” Notice that the sound changes.
* I call this a slide guitar. Do any of you have another name for it?....I’m going to leave this set up on the table, and during work time you might want to try your own experiments and try to explain what happens.” As students work, encourage them to ask questions and engage in careful observations (look, hear—can use the stethoscope, and feel) to think about answers. Refer to the whole class activity/demonstration as a model.

**Lesson Closing**

* Ask students to articulate some of the patterns they observed. Help them make connections between the length of the string and the tightness of the string and how high or low of a sound was produced.

# Lesson #7: Making High and Low Sounds by Blowing

**Brief Overview of Lesson:** Children experience how the sounds produced by blowing and manipulating the length of tubes can vary the pitch of sound. Children continue to think about how sound is created and how they can affect or change the sound being made with different materials and different approaches.

**Prior Knowledge Required:**

* The children have explored changes in pitch and volume and learned the vocabulary *higher*, *lower*, *louder*, and *softer*. They also have experienced that some sounds are produced by the action of *blowing*.

**Estimated Time:** 30 minutes

**Resources for Lesson:**

* (See list below)
* Materials become available in centers or on unit shelf for use by children after the lesson and over coming days.

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

* PreK-PS4-1(MA). Investigate sounds made by different objects and materials and discuss explanations about what is causing the sounds. Through play and investigations, identify ways to manipulate different objects and materials that make sound to change volume and pitch.
* PreK.W.MA.2. Use a combination of dictating and drawing to explain information about a topic.

**Essential Question(s) addressed in this lesson:**

* Q1. How can we make different sounds?
* Q2. What makes sounds different?

**Objectives**

* Students will be able to explain how to produce higher and lower pitched sounds when blowing into an instrument. Examples:
  + When blowing, something needs to vibrate (reed; lips) for a sound to be produced.
  + A sound traveling through longer tubes will make a lower sound than a sound traveling through a shorter tube.

**Language Objectives**

* *Speaking*: Use of the term *blowing* to orally describe their actions on the materials and use the terms *higher* and *lower* to describe changes in pitch.

**Targeted Academic Language**

* Predict, explain, compare

**What students should know and be able to do before starting this lesson:**

* The children have explored changes in pitch and volume and learned the vocabulary *higher*, *lower*, *louder*, and *softer*. They also have experienced that some sounds are produced by the action of *blowing*.

**Anticipated Student Preconceptions/Misconceptions**

* Children may not realize that when they blow between thin strips of material they can cause those materials to vibrate rapidly (i.e., act as a *reed*). It is even harder, say in a corrugated tube, whistle, or flute to understand that the shape of the wind tunnel can set up a vibration pattern in the passing air (like when you whistle, or when you blow into a soda bottle to make a sound).

**Instructional Materials/Resources/Tools**

* Balloon (teacher demonstration)
* Alcohol wipes
* Sets of “straw whistles” – a set is 4-5 of different lengths. To make a straw whistle:
  + Flatten one end of the straw and make a diagonal cut from both sides to make a V-shaped end. Put cut end of straw in your mouth, with lips past the V-cut, and blow hard. To make a higher tone:
  + Method A: Cut the straw to a shorter length.
  + Method B (“straw clarinet”): Pinch the straw somewhere along the length and cut a little wedge in the side of the straw. When you cover the hole with your finger and blow, you will get the original tone. When you leave the hole uncovered, you will get a higher tone. Multiple wedges can be cut, to create more notes from the same straw.
* Paper towel “trombone”. To make the trombone:
  + Cut a slit in one of the paper towel tubes that runs the entire length. Separate the two edges about a quarter-inch and run several lengths of tape along the slit, making a tube that has a slightly larger circumference than a regular tube. Slide a regular tube inside this modified tube.
  + The end that children will put lips on is covered with tape such that is easily sanitized.

**Instructional Tips/Strategies/Suggestions for Teacher**

* Through this lesson and others be consistent in promoting vocabulary-building, categorization, and word-recognition.
* Ideally you have enough recyclables to make an instrument for each child. Put their name on them and they can keep them – this is a great way for them to share at home what they’ve been studying at school. If there is not enough, make sure children faithfully remember to use the alcohol wipes before and after they use one of the instruments they put their lips on.
* Some of these instruments can make pretty loud noises. Make sure children realize they must not make these noises directly into another child’s ear – that loud noises can cause serious, permanent damage. If you have a place outside the classroom that you can still properly monitor, you may want to suggest that children making loud noises do their experimenting there.
* Often, children have very high expectations for their instruments and may be disappointed if “It doesn’t work.” Have scientific discussion with the students, explaining, “It didn’t do what you expected it to do.” Encourage them to think about why it may not have “worked” and what they could change to get a different result. When children do succeed, help them verbalize what they did. In doing so you are helping them focus on *control of variables* – a key aspect of the science! This also instills the process of asking and answering questions about what they learned.
* Don’t worry about them understanding the sound source precisely. Help them identify what is different between when they are able to make a sound from when they aren’t. This is particularly true of the straw whistles. Sometimes when they blow through them (or attempt to make their own), they will produce the desired sound, and sometimes they will not. The important thing is for them continue experimenting, and to think about what was different in their different experiments.
* It is often helpful for children to document their discoveries to remember and share what they learned. Periodically suggest to children that they draw a picture of their discovery, then take dictation from them of what the picture shows.

**Assessment**

* Shown a picture of a pan flute, the child will be able to point to the whistle or end that will make a *higher* sound and the one that will make a *lower* sound.

**Lesson Details:**

**Lesson Opening**

Balloon:

* Blow up the balloon. Ask: “What will happen if I stop pinching the neck of the balloon?” Children make their predictions. Let the air escape rapidly, without letting go of the balloon. Have children evaluate their predictions. “Did it make a sound?...Okay, everyone take a deep breath and hold it…Now blow it all out….Did your blowing make the same sound?...Why not?”
* “This time I’m not going to let go of the neck of the balloon to let the air out, I’m going to stretch the end between my fingers, like this (demonstrate). What do you think will happen this time?” Take predictions.
* Blow up balloon, pinch top tightly, start releasing air, and stop. “So what did it sound like? Why do you think the sound was different this time than last time?”
* “Okay, this time I’m going to first stretch my fingers far apart, then not so far apart, then far apart again. Listen.” Demonstrate, and have children discuss findings.
* “Let’s try one more thing: I want you to take a deep breath, hold it, then press your lips together really tight while you blow your air out. Ready? Go!”
* “What sound did you hear? What did you feel your lips doing? What’s similar between what you just did and what I did with the balloon?” Help them see the connection between their vibrating lips and the vibrating plastic in the neck of the balloon.
* “Did you know you have two tightly stretched muscles in your neck that are like the lips of the balloon? They are called vocal chords. When you talk, you are forcing air between those two muscles and making them vibrate. That’s how we talk. Place two fingers and press them against your neck, like this (demonstrate), and talk. Do you feel the vibration? That’s your vocal chords vibrating.”

**During the Lesson**

* Demonstrate the 2 instruments:

Paper towel tube trombone:

* Pull out paper towel tube trombone. “Here I have a paper towel tube inside another tube. I’m going to put my lips to this end, that has the tape on it, and blow through the tube. But before I do that, I want to make sure there are no germs on the tube that will make me sick.” Demonstrate pulling an alcohol wipe and wiping the taped end of the tube.
* “Remember what you did with your lips a little while ago? I can do that too (make the raspberry sound with your lips). This time I’m going to do it into the paper towel tube. “Ready? Listen….What did you hear?” Have children briefly discuss. “As you use the trombone you can slide the outer tube out so the tube is longer.”

Straw whistles:

* “Here’s a straw whistle. One end has been cut to come to a point. I’m going to clean this one (do), and now put this one in my mouth and blow hard.” Briefly discuss what might be causing it to make sound. Point to the point and how flexible it is – it vibrates when you blow on it. “Those of you who choose this instrument will have a set of straws of different lengths.”
* Station or independent work:
* “These materials will be out for you to experiment with. If you need my help, let me know.” As children work, circulate to assist them, encourage them to try different variations, have them predict what the apparatus will do before trying, and use the vocabulary higher and *lower*.

**Lesson Closing**

* Have children discuss the results. Help them make a connection between the pitch of the tone and the length of the tube.
* Do assessment, once children have had enough experience with the materials.
  + Shown a picture of a pan flute, the child will be able to point to the whistle or end that will make a *higher* sound and the one that will make a *lower* sound.

# Curriculum Embedded Performance Assessment (CEPA)

Sounds Effects Boss

Students play the role of preparing for an upcoming production in which they are the designated “Sound Effects Boss”. The Director wants to ensure the Sound Effects Boss is ready to produce a variety of sounds on three different apparatus (using striking, plucking and blowing) and can change the volume and pitch of sounds.

Explanation of CEPA

* **Goal:** Interview with the director for an upcoming production where you will be the Sound Effects Boss!
* **Role:** A Sound Effects Boss!
* **Audience:** The Director
* **Situation:** The Director wants to make sure you are ready to produce a variety of sounds on three different apparatus (using striking, plucking and blowing) and can change the volume and pitch of sounds.
* **Product:** During your interview, you will be asked to make sound from instruments and make those sounds louder/softer and higher/lower.

**CEPA Instructions:**

* Explain purpose and roles to children and allow them to familiarize themselves with the equipment.
* “Show me what you might use to make a \_\_\_\_\_\_\_ sound.” [*striking; plucking; blowing*] .
* Prediction: “What could you do to make the sound \_\_\_\_\_\_\_?” [*higher; lower; louder; softer*] “Why do you think that will work?”
* “Show me.”
* “Did it make the sound \_\_\_\_\_\_?” [*higher; lower; louder; softer*].
* (If sound doesn’t match prediction):
  + “Why do you think that didn’t make the sound \_\_\_\_\_\_?” [*higher; lower; louder; softer*]
  + “Is there anything else you could try that you think might work?”
  + “Why do you think might work?”
  + “Show me.”
  + “Did it work the way you predicted? etc.
* Move on to next apparatus and repeat, ensuring that each of the 3 methods and 4 changes to sound are addressed.

**Materials:**

* Percussion apparatus (e.g., a set of drums of different pitches; like those made in Lesson 5).
* String apparatus (e.g., an elastic stretched over a hollow container that can be pulled looser or tighter; like those made in Lesson 4).
* Wind apparatus (e.g., straw slide whistle with first straw cut in reed fashion—like those made in Lesson 7—with a second straw slightly wider so it fits over the first; like the paper tube trombone made in Lesson 7).

**Instructional Tips/Strategies/Suggestions for Teacher:**

* These interviews don’t need to happen all at once or all on the same day. Do with individual children when you have time and they have finished their investigations.
* Make sure other children are not listening in or carefully observing your interviews, so when you get to them they will answer from their own perspective, not based on what they saw another child do.
* For students how need language support, make sure the child understands the terminology before prompting them to produce an effect on the apparatus. For example, if a child doesn’t understand what *higher sound* means, demonstrate using your voice – first talking normally, then switching to a higher-pitched voice.
* Confine the children’s demonstrations to the action being investigated with each apparatus. For example, with the string instrument you are interested only in the action of plucking the string, not striking the instrument, rubbing it, etc. If a child shows you a different way of making sounds, accept their response, then redirect them by repeating the interview question.
* If child is unable to think of a strategy for altering the sound or says an action had the desired effect when it did not, do not belabor the point or hint at the solution; move on.

**CEPA Rubric**

Rate child’s performance as:

5 –predicts and produces accurately on first try.

4 – predicts wrong on first try but recognizes after tries that was wrong and predicts and produces accurately on second attempt.

3 – predicts wrong on first and second try, but eventually produces desired outcome and knows it is right.

2 – predicts and produces accurately but doesn’t recognize it was right and continues to change answer.

1 – unable to predict, produce, or decide whether sound produced was the one asked for.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CHILD | APPARATUS | make  LOUDER | make  SOFTER | make  HIGHER | make  LOWER | SCORE  (out of 20) |
|  | striking |  |  |  |  |  |
| plucking |  |  |  |  |
| blowing |  |  |  |  |
|  | striking |  |  |  |  |  |
| plucking |  |  |  |  |
| blowing |  |  |  |  |
|  | striking |  |  |  |  |  |
| plucking |  |  |  |  |
| blowing |  |  |  |  |
|  | striking |  |  |  |  |  |
| plucking |  |  |  |  |
| blowing |  |  |  |  |
|  | striking |  |  |  |  |  |
| plucking |  |  |  |  |
| blowing |  |  |  |  |
|  | striking |  |  |  |  |  |
| plucking |  |  |  |  |
| blowing |  |  |  |  |
|  | striking |  |  |  |  |  |
| plucking |  |  |  |  |
| blowing |  |  |  |  |

# Unit Resources

* Book: Sound by Lisa Trumbauer
* Suggested Book: Loud, Soft, High and Low Sound by Natalie M. Rosinskly
* Lyrics to Punchinello
* Vocabulary cards (that should be trimmed and laminated)

**Puchinello  
Written By: Unknown  
Copyright Unknown  
(to hear tune, go to www.Youtube.com/watch?v=n9rAUqvisKo)**

**TO START:**  
Children form into a circle,  
with one child in center as 'Punchinello.'  
  
**VERSE 1:**  
('Punchinello' makes a sound – clapping, stomping, noise with mouth – etc.)  
What can you do,  
Punchinello, funny fellow?  
What can you do,  
Punchinello, funny you?  
  
**VERSE 2:**  
(Children in circle copy the sound that Punchinello is doing and sing)   
We can do it, too,  
Punchinello, funny fellow,  
We can do it, too,  
Punchinello, funny you!  
  
**VERSE 3:**  
(Punchinello selects another child as Punchinello, then takes that child's place in the circle. While the group sings)  
You choose one of us,  
Punchinello, funny fellow,  
You choose one of us,  
Punchinello, funny you!

person plucking a guitar string.

 pluck

several people striking drums.
strike

child blowing a tube instrument.

blow

 high

 low

|  |
| --- |
| child holding earphones with a pained look. loud |
| woman giving quiet sign.   soft |

two sine waves - one high pitch, one low pitch.

vibration

D