



# Learning with Multi-sensory Experiences

## Making Music

Inspire learning with music! This fun, hands-on investigation of sound waves and the vibration of matter will engage students as they design and create their own musical instruments.

**Grade Level:** K-4

**Objectives:**

Students will understand that sound waves can travel through different types of matter.

Students will engage in design and investigation challenges that apply the principles of sound.

**Literature Selections:**

*Sound: Loud, Soft, High, and Low* by N. Rosinsky

*The Listening Walk* by Paul Showers

*The Remarkable Farkle McBride* by John Lithgow

**Materials:**

Plastic soda bottle filled two-thirds with water

6 small plastic containers with lids

Student handouts

Elmer's® X-TREME School Glue™

Plastic or paper cups

String

Markers, crayons, scissors, etc.

**Lesson:**

Introduce the lesson with a demonstration. Show the students a plastic soda bottle filled 2/3 with water. Ask them what they think will happen when you blow across the top of the bottle. Blow across the top of the bottle to produce a sound, and ask what they think caused that sound. Explain that sound is a type of energy made when matter vibrates. The vibrations travel away from the bottle in waves through the air. Next, ask them what they think will happen if you pour some of the water out. Will the sound (pitch) be higher or lower? Discuss the scientific principles of sound waves throughout the demonstration.

Next, read the book *The Listening Walk* by Paul Showers aloud to the students. Share the illustrations and discuss the sounds that the characters in the story hear. Continue the discussion by asking students how they know what things sound like. Ask them to close their eyes and guess various noises that you make in the room (i.e., a pencil sharpener, crumpling a piece of paper, moving a chair, etc.). Explain that when we hear noises, the eardrum inside the ear vibrates and a signal is sent to the brain.

### Discover:

Create 5 sound stations using small (opaque) plastic containers with lids. Fill them with various items (i.e., rice, pennies, beans, paper clips, thumbtacks, etc.) and place them in stations around the room. Provide students with a copy of the Sound Station handout to see if they can correctly identify the source of each sound. Take a few moments to explain that the sound waves they hear are produced when the items inside the container vibrate against one another and the container. Explain that harder or larger items create a larger vibration while smaller items create a smaller vibration and produce a softer noise.

### Inquiry-based Exploration:

Explain that students will work in groups of two to plan an experiment to determine if sound waves travel through string (a solid). Provide each student with a copy of the Sound Waves Challenge handout. Distribute 2 cups and 3 yards of string to each group. Instruct them to insert each end of the string into a hole in the bottom of the cup and tie a knot in the end to secure it in place. They will take turns whispering and listening to determine if sound waves travel through solids. Allow enough time for them to design their experiment and test their theories.

### Discussion Questions:

Can you hear your partner whisper quietly into his/her cup?

Does it work better when the string is tight or loose?

Would it make a difference if you used different string (thicker, thinner, yarn, etc.)?

Would it make a difference if you used different cups (larger, smaller, different material, etc.)?

### Arts Integration:

Read *The Remarkable Farkle McBride* by John Lithgow to the class. As you read the story, stop occasionally to reinforce the differences between the three main types of instruments (stringed, wind, percussion) and how each produces sound by creating vibrations. Provide students with the Musical Instrument Challenge handout and instruct them to think about the materials they might want to use to create an instrument. As a class, brainstorm some ideas to get them started. Some suggestions might be a shaker created from a Pringles' can and popcorn kernels, a drum made from a balloon stretched over a coffee can, or a guitar made from a shoe box and rubber bands.

Encourage students to decorate their instruments with crayons, markers, construction paper, etc. Remind them that the embellishments should not interfere with the sound that the instrument makes.

### Standards:

Framework for K-12 Science

Physical Sciences: PS4A: Wave properties

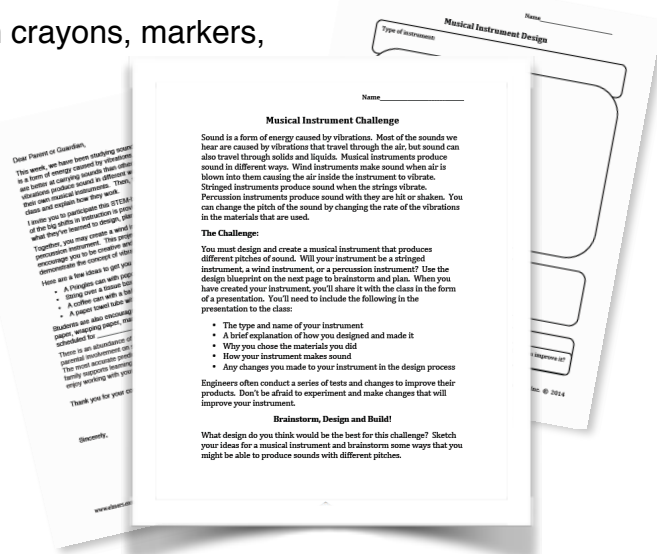
Next Generation Science Standards

K-2-ETS1-2 Engineering Design

Common Core

Reading: Informational Text, Literature

Writing: Text types and purposes



## **Musical Instrument Challenge**

Sound is a form of energy caused by vibrations. Most of the sounds we hear are caused by vibrations that travel through the air, but sound can also travel through solids and liquids. Musical instruments produce sound in different ways. Wind instruments make sound when air is blown into them causing the air inside the instrument to vibrate.

Stringed instruments produce sound when the strings vibrate.

Percussion instruments produce sound when they are hit or shaken. You can change the pitch of the sound by changing the rate of the vibrations in the materials that are used.

### **The Challenge:**

You must design and create a musical instrument that produces different pitches of sound. Will your instrument be a stringed instrument, a wind instrument, or a percussion instrument? Use the design blueprint on the next page to brainstorm and plan. When you have created your instrument, you'll share it with the class in the form of a presentation. You'll need to include the following in the presentation to the class:

- The type and name of your instrument
- A brief explanation of how you designed and made it
- Why you chose the materials you did
- How your instrument makes sound
- Any changes you made to your instrument in the design process

Engineers often conduct a series of tests and changes to improve their products. Don't be afraid to experiment and make changes that will improve your instrument.

### **Brainstorm, Design and Build!**

What design do you think would be the best for this challenge? Sketch your ideas for a musical instrument and brainstorm some ways that you might be able to produce sounds with different pitches.

Name\_\_\_\_\_

## **Musical Instrument Design**

Type of instrument:

Design Blueprint:

What materials can you use to create it?

How does it sound?

Can you improve it?