

Subject: Science **Title:** Sound Explorations

Grade: 4 **Time required:** 2 – 45 minute periods

Benchmarks: Science Sunshine State Standards

SC.4.P.10.1: Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion.

SC.4.P.10.3: Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates.

SC.4.N.1.1: Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

SC.4.N.1.6: Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.

SC.4.N.3.1: Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model.

Key Terminology: scale, ascending, descending, vibration, pitch, air column

Objectives:

1. Students will create an ascending musical scale by filling bottles with various amounts of water.
2. Students will create an ascending musical scale by cutting straws into various lengths and blowing into them.
3. Students will know that the higher the pitch of a note, the more rapid the vibrations of the producing body.
4. Students will know that pitch can be changed by adjusting the air column.

Prelesson:

Students will read a biography of Mary McLeod Bethune and learn how she took her students to area hotels to sing and raise money for her school. They will listen to “Lift Every Voice and Sing” and identify high and low notes.

Lesson: Day One

Divide students into small groups. Each group receives 8 identical bottles, a beaker for pouring, and water. Fill the bottles with varying amounts of water, then blow across the top of the bottles. Listen to the sounds. Identify the bottle that gives off the highest note and lowest note. Arrange the bottles in order to make an ascending musical scale. Adjust the water level as necessary. Play the bottles in ascending and descending order.

In their science journals, have students write their observations and answer these questions:

1. What conclusions can you draw about the length of the air column and the sound it produces?
2. What conclusions can you draw about the relationship between vibrations and pitch?
3. How do you think the results would change if you put the same amount of water in bottles of different sizes?
4. What other containers could you use to make sounds with water?

Have each group present their scale to the class. Once the scale is accurate, put one drop of oil in the bottle to prevent evaporation. Save the bottles for the next day. Discuss the answers to the questions with the whole class. Record the class' conclusions on chart paper.

Lesson: Day Two

Use chart paper to review yesterday's experiment results. Give each child 8 straws and a pair of scissors. Have students pinch one end of each straw, making it flat, and then make two cuts to form a small "v" on the flat end of the straw. They have just made a reed. Have the students practice blowing into the straw to create vibrations and sounds. They will need to experiment to get the proper lip vibration needed to produce sound.

Have students cut their eight straws into different lengths to get different pitches. Arrange them into a musical scale, in ascending order.

In their science journals, students answer the following questions:

1. What is the relationship between the length of the straw and the sound it produced?
2. How are the straws similar to the bottles of water? How are they different?
3. How could you use the straws to play songs?

Share the answers to these journal questions in pairs, then as a whole group.

Post Lesson:

Students can experiment with their straws or yesterday's water bottles by trying to play simple songs. Number the straws from one to eight, with one being the lowest pitch and eight being the highest. Try to play the following songs using the numbers above the words:

3 2 1 2 3 3 3 2 2 2 3 5 5
Mar-y had a lit-tle lamb, lit-tle lamb, lit-tle lamb,

3 2 1 2 3 3 3 3 2 2 3 2 1
Mar-y had a lit-tle lamb, whose fleece was white as snow.

1 1 5 5 6 6 5 4 4 3 3 2 2 1
Twin-kle twin-kle lit-tle star, how I won-der what you are.

5 5 4 4 3 3 2 5 5 4 4 3 3 2
Up a-bove the world so high, like a dia-mond in the sky,

1 1 5 5 6 6 5 4 4 3 3 2 2 1
Twin-kle twin-kle lit-tle star, how I won-der what you are.

Materials Needed:

8 identical bottles for each small group
1 beaker for each group for pouring water
water
8 plastic straws for each student
scissors for each student
science journals and pencils
chart paper and markers
vegetable oil and dropper

Assessment: Science journals, class participation, group presentation

ESOL Strategies:

1. Provide a language rich environment.
2. Use authentic materials
3. Introduce key words with clear definitions and repeat those words as frequently as possible.
4. Present information in small, sequential steps, allowing the student to concentrate on one thing at a time.

ESE Strategies:

1. Use frequent feedback.
2. Use immediate feedback.
3. Use visual and auditory aids.
4. Allow extra time for oral and written response.

Resources:

Carin, Arthur and Robert Sund. *Discovery Activities for Elementary Science*.
Columbus: Charles E. Merrill Publishing Company, 1980.