Sparking Discovery in the Classroom

TRAVELING SCIENCE WORKSHOPS

DISCOVERY MUSEUM

Sound

Teacher Resource Guide

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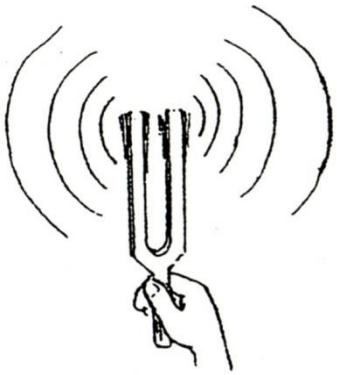
Sound

Sound is vibration. This is the most important concept for students to understand. The activities in this guide reinforce the concept of sound as vibration. Students will make a number of sound toys to explore, and in so doing reinforce the process skills of the scientific method. This is an ideal way to teach science to students, as toys are meant for play. Play demands activity, which in turn leads to observation and questions. Students make predictions to explain their observations, and further play tests these predictions. Play, therefore, promotes the best kind of science.

With these activities, the discoveries that come with play can be focused to reinforce the basic lesson. In each activity, asking the students what is vibrating to make sound will encourage them to play until that question is satisfied.

Tuning Fork Activity

When a tuning fork vibrates, it makes sound. You can feel the vibrations with your fingers. The vibrations push air in small bursts into your ear. The rhythm of the bursts determines what tone you hear and the strength of the bursts determines the volume. Vibrations can travel through objects as well as through air. Put the stem of a vibrating tuning fork against the table and put your ear or hand to the table for a surprise!



Materials

tuning fork
soft object* for striking tuning fork (large eraser, rubber mouse pad, pencil with rubber grip)
*tuning forks will be damaged if hit on a hard object

Procedure

1. Strike one tine of the tuning fork on the striker before each step.
2. Look at the tuning fork.
3. Listen to the tuning fork.
4. Touch the tuning fork with your finger to feel it vibrating.
5. Place the handle of the tuning fork (the single-pronged side) against a table.
6. Place the handle against objects made of various materials (wood, metal, paper, or plastic).
7. Place the handle against your jawbone (just below your ear).
8. Place the handle against your pointy elbow bone, and put your finger in your ear.
9. Place the handle against the table, and put your ear to the table.

In all of these experiences, students can feel, see, and hear the resulting vibrations.

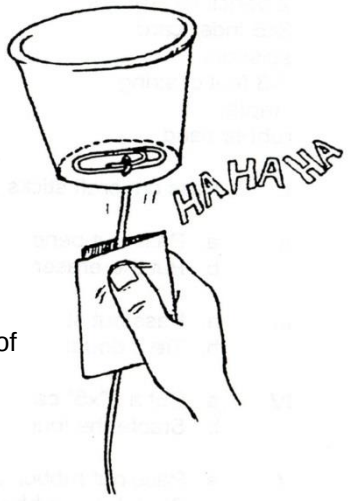
Laughing Cup Activity

Laughing cups put a twist on the ideas of vibrations traveling through strings, as the vibrations in this activity begin in the string. By pulling along the string with a wet paper towel, an intermittent slip-grab-slip-grab rhythm creates vibrations. This is the same action that makes chalk squeak on a board. The string's vibration emerges from the cup amplified, much as a cheerleading megaphone concentrates someone’s voice.

Materials

5 oz. paper cup
2-3 foot length of cotton string
paper clip
damp paper towel

Procedure



1. Tie one end of the string to the paper clip with a double knot.
2. Place the cup upside down on a table.
3. Gently, but firmly, push the paper clip through the bottom of the cup.
4. Put your hand inside the cup and gently pull the paper clip so it just hangs over the side of the cup.
5. Slide the knot on the paper clip to the center of the longest side of the paper clip.
6. Pull the string so the paper clip sits on the bottom of the cup.
7. Hold the cup and let the string hang free.
8. Fold a damp piece of paper towel over the string.
9. Pinch the string through the paper towel and pull the paper towel along the length of the string.
10. Pull the paper towel a few inches at a time to simulate laughing sounds.

Extensions

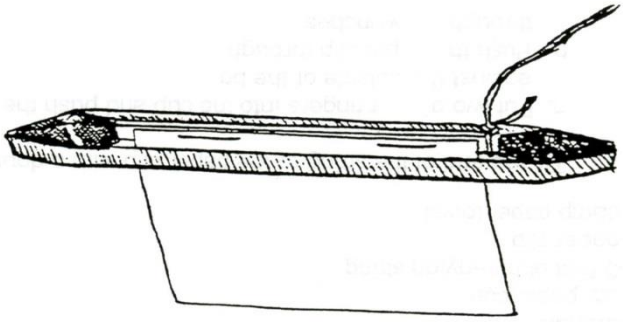
1. Try to make other noises besides laughing.
2. Challenge your students to make the loudest possible laughing cup with different-sized cups, different types of string, etc.

Bee-Hummer Activity

The bee-hummer uses wind power to make a rubber band vibrate. The student creates the effect of wind by spinning the project around on a string. The card keeps the wind directed at the rubber band, and it allows the sound to bounce off it, serving as a sounding board.

Materials

craft stick
3”x5” index card (cut the 5” side in half to make two 2.5”x3” pieces)
2-3 foot length of cotton string
2 pencil tip erasers
rubber band
scissors
stapler



Procedure

1. Staple the long edge of the cut index card to the craft stick, at each end.
2. Push an eraser onto each end of the craft stick, so the flat sides of the eraser and craft stick are aligned.
3. Tie the string around the craft stick next to one of the erasers, using a double knot.
4. Stretch the rubber band from one eraser to the other, with no twists.
5. Pull the string out from behind the rubber band.
6. Making sure you have enough room, slowly swing the bee-hummer in a circle.

If your bee-hummer doesn't buzz, check the following:

1. Is the string stuck behind the rubber band?
2. Is the rubber band twisted?
3. Is the cut index card curved or folded?
4. Are the erasers oriented correctly?
5. Try to spin it faster (a longer string may help).

Extensions

1. Can you make a really loud bee-hummer?
2. Modify your materials by using clay or play dough instead of erasers, different types of string, different-sized rubber bands, and cards of various size and shape.

Big Ben Activity

This activity is named after Big Ben, the clock in London, which chimes loudly and regularly. In the experiment, a vibrating coat hanger causes sound to travel through a string to your ears.

Materials
metal coat hanger
2 two-foot lengths of string

Procedure
1. Bend the coat hanger in the middle so it looks like rabbit ears.
2. For safety, bend the hanger's hook into a circle.
3. Tie a piece of string to each corner of the hanger.
4. Tie a loop large enough for your finger in the loose end of each string.
5. Put the loops over your fingers, and then put your fingers in your ears.
6. Lean over very close to a wall or desk and gently swing the coat hanger against it.
7. Stay leaning over and listen carefully. You should be able to hear why this is called the Big Ben activity!

Extensions
1. Try this with other objects like oven racks, silverware, or tools.
2. Try swinging into objects made of different materials.
3. How does the sound change with the above experiments?

Sources of Materials:
Tuning Forks: Music stores or science catalogues (Learning Things, 68 A Broadway, P.O. Box 436, Arlington, MA 02174 617-646-0093
Craft sticks: Amazon or craft stores

Resources:
Lower Elementary (K-3) Print Resources

- *Sounds All Around*, Wendy Pfeffer, HarperCollins, 2017
- *Sound: Loud, Soft, High, Low*, Natalie Myra Rosinsky, Picture Window Books, 2002
- *Science Starters: Sound*, Caroyln Bernhardt, Bellwether Media, 2018
- *Sound*, Cody Crane, Children's Press, 2019
- *Sound*, Andrea Rivera, Abdo Zoom, 2017

Upper Elementary (4-6) Print Resources

- *The Whispering Lake Ghosts: A Mystery About Sound* Graphic Novel, Lynda Beauregard, Graphic Universe, 2013
- *Sound: Shhh… Bang… POP… BOOM!,* Romana Romanyshyn, Chronicle Books, 2020
- *Physical Science: Sound*, Josh Gregory, Children's Press, 2019
- *The Magnificent Makers: Riding Sound Waves*, Theanne Griffith, Random House Books for Young Readers, 2020
- *Music: The Sound of Science*, Margaret Albertson, Rourke Educational Media, 2018

Online Resources

- Sound via DK FindOut!
  - https://www.dkfindout.com/us/science/sound/
- Sound Science Snacks via the Exploratorium: Nearly 30 interesting and unique sound explorations.
  - https://www.exploratorium.edu/snacks/subject/sound
- PBS ScienceTrek: Sound Video
  - https://www.pbs.org/video/sound-the-science-of-sound-syzigg/
- The Science of Sound, lesson plans and activities via Scholastic
  - https://www.scholastic.com/teachers/articles/teaching-content/science-sound/
- Mystery Science Sound
  - https://mysteryscience.com/waves/sound-waves-communication