Properties of Sound

Companion Text: Night Symphony, written by Lara Binn, and illustrated by Valia Ovseyko
Subject Area & Grade Level: Science, 2nd Grade
Materials: Radio, straws (5 per student), popsicle sticks (1 per student), scissors, glue, guitar (optional)

Objectives

After this lesson, students will be able to:

- Describe sounds in terms of pitch and volume
- Explain the relationship between sound and vibration

Staging Activity

Read the story once through without stopping. Then, ask students to mimic the sound on each page after you say it. After completing the book the second time through, ask students if they noticed anything about how loud or soft each sound in the book was. (Students are usually eager to be heard during the second read-through, and tend to have shown little variation in volume from page to page.) Point out that not all sound are the same "volume," and that most things that make sound have a range of volume, which means they can be louder or softer at different times. Tell the students you are going to read the book one more time, and this time, they should watch the height of your arm to see if they should make the sound loud, soft, or in-between. Demonstrate the range of your hand's height, and point out that this is the range of volume you'll be using. You might want to specify that the top of the range is not screaming, just a loud speaking voice, and the bottom of the range is a whisper-level voice. Then, read the story a third time, having students vary their volume for each new sound (Monday, Tuesday, and Friday are somewhere mid-range; Wednesday & Sunday are quiet; and Thursday and Saturday are loud.)

Core Activity

Gather students around a radio in a circle. Shred a piece of paper into tiny bits, and sprinkle the bits on the top of the radio's speaker (you may need to turn the radio so that the speaker is facing up). Turn the radio on and ask students to point out what happens to the papers. (They should move; if not, find a song on the radio with a strong base line.) Ask: Why does this happen? What is making the papers move? Explain that sound is caused by vibrations. Ask students to hum quietly and to try to notice the vibrations made by softly tapping their top and bottom teeth together while humming. If they can't notice the vibrations that way, have them hold a hand on their throats while humming.

Extension

Explain that different vibrations cause different sounds, and that students will now try an experiment to see if they can figure out the relationship between vibrations and what musical note an instrument hits. Give each student 5 straws, and have them cut the tip of each straw into a point. Next, have them cut the non-pointy ends of 4 of the straws to 4 different lengths, and then glue all 5 straws in a row onto a popsicle stick, with the pointy ends on the same side. In

order to make the “straw flutes” make music, tell students they must flatten the pointy ends of their straws in their mouths. Then, have students blow through their straws and practice making different sounds. After giving students some time to try their straw flutes, ask them if they were able to notice any connection between how long a straw is and the kind of sound it makes when you blow through it. Point out that we call these differences in high and low sounds “pitch.” Lead students to describing what they experienced with their straw flutes in terms of pitch, i.e., the pitch is higher in shorter straws and lower in longer straws. Explain that the reason longer straws have lower pitch is because there is more room in longer straws for the vibration to spread out, and the more a vibration spreads out, the lower-pitch a sound is.

If you have access to a guitar, it can be used as another example of how pitch changes as the length of a vibrating string changes. Demonstrate this by plucking one string, and then plucking it a few more times in succession while holding your finger down at increasing points on the neck of the guitar. Point out that the pitch of the string is higher as it “gets shorter,” when your finger blocks off more and more of the vibration. The same strength of vibration over a shorter distance will cause a higher pitch.