

Secret Bells

Hear Silent Sounds of Vibrating Objects

Recommended Grade Level:
6th -12th grades

NGSS Science & Engineering Practices:

- Asking question sand defining problems
- Planning and carrying out investigations
- Designing solutions
- Obtaining, evaluating, and communicating information

Time: 10 minutes prep, 15 minutes activity

Materials Needed:

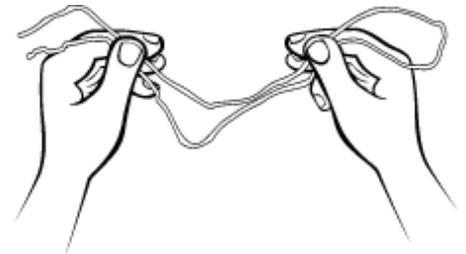
- Scissors
- String
- Wire hanger, and/or spoon, and/or cake rack

Background Information:

You hear sounds when vibrations get inside your ears and stimulate nerves to send electrical signals to your brain.

To Do and Notice:

1. With your scissors, cut a piece of string about 3 to 4 feet long.
2. Hold the two ends of the string in one hand. The rest of the string will make a loop.
3. Lay the loop over the hook part of the hanger. Push the two ends through the loop, and pull them all the way through the other side (this is easier to undo than a knot).
4. Wrap the loose ends of the string two or three times around the first fingers on each hand.
5. Swing the hanger so it gently bumps against the leg of a table, or against a door. What did it sound like? Probably not much.



6. Now put your first fingers over the opening of your ears (don't put your fingers *into* your ear). Lean over and gently bump the hanger again. What did it sound like?

What's Going On?

When you bump the hanger into the wall, the hanger starts to vibrate. The vibrating hanger makes the string vibrate. To reach your ears, the vibrations in the string must push on the air molecules to make sound waves that travel through the air, but the string doesn't push on very many air molecules. So, sound vibrations don't travel easily from the string into the air.

When your fingers are covering your ears, the sound can take a more direct route to your ears. Rather than traveling through the air, the vibrations can travel through your hands and through the bone of your skull directly to the fluid inside your cochlea, in your inner ear. Instead of traveling from solid to air and back to solid, the vibrations move from one solid (the string) to another (your bones), and then into the fluid of your cochlea. As a result the sound you hear is much louder and richer.

Going Further:

Try this with other items from your kitchen or classroom.