Harmonica

Overview: Sound is caused by something vibrating. If you can hear it, you can bet that somewhere, something is vibrating molecules and those molecules are vibrating your eardrums. The sound may be coming from a car, thunder, a balloon popping, clapping hands, or your goldfish blowing bubbles in her tank. However, no matter where it's coming from, what you are hearing is vibrating particles, usually vibrating air molecules.

What to Learn Sound is made by vibrating objects and can be described by its pitch and volume.

Materials

- tongue depressor popsicle sticks (2)
- rubber bands (3, one at least 1/4″ wide)
- paper
- tape
- ruler

Lab Time

1. Rip the piece of paper in half.
2. Stack popsicle sticks on top of each other and loosely wrap the paper around them. This is your first cuff, and it should be loose enough to slide off the sticks.
3. Secure the paper to itself with tape – don't tape it to the sticks.
4. Now follow steps 4 & 5 again to make one more cuff.
5. Put one rubber band along the length of one popsicle stick.
6. Put the cuffs on this stick with the rubber band on it, placing one on each end. Place the other popsicle stick on top of this one.
7. Secure the sticks together by wrapping the two remaining rubber bands around the ends.
8. To play the harmonica, put the sticks up to your mouth and blow. You can vary the sound by moving the cuffs.

Harmonica Data Table

Distance Between Cuffs *(measure in inches or cm)*	**Pitch Observed** *(high, medium, low)*

Reading

What happens if you place an alarm clock in outer space? Will you hear it ring?

When you put an alarm clock in a space without air, no sound can come from the clock. There's nothing to transfer the vibrational energy. It's like trying to grab hold of fog – there's nothing to hold on to.

Sound is a form of energy. Energy is the ability to move something over a distance against a force. What is moving to make sound energy?

Molecules. Molecules are vibrating back and forth at fairly high rates of speed, creating waves. Energy moves from place to place by waves. Sound energy moves by longitudinal waves (the waves that are like a slinky). The molecules vibrate back and forth, crashing into the molecules next to them, causing them to vibrate, and so on and so forth. All sounds come from vibrations.

In this project, the rubber band vibrates as you blow across it to get a sound. The pitch can change by sliding the cuffs (this does take practice). Remember that pitch represents the frequency of sound vibrations.

If you can't get a sound, you may have clamped down too hard on the ends. Release some of the pressure by untwisting the rubber bands on the ends and try again. Also – this one doesn't work well if you spit too much – wet surfaces keep the rubber band from vibrating.

Exercises Answer the questions below:

1. What is sound?

2. What is energy?

3. What is moving to make sound energy?

Answers to Exercises: Harmonica

1. What is sound? (Sound is a form of energy.)
2. What is energy? (Energy is the ability to move something over a distance against a force.)
3. What is moving to make sound energy? (molecules)