



Good Vibrations

Suggested Grades: 3-8

Activity Overview

In this activity, you will observe sound vibrations and how the vibrations travel through different mediums (a medium is the material a sound is travelling through).

Steps

Vocal Cords

1. Sound is created when molecules, the particles that make up everything, vibrate. When you make noise by talking, humming, singing, etc., you do so by vibrating your vocal cords. Figure 1 shows where your vocal cords are located.

Time: 30 minutes

Materials

- Rubber bands of various sizes
- Shoe box without a lid
- Tape
- A book
- Four pencils
- Uncooked rice
- Plastic wrap
- Large empty bowl
- Metal baking pan
- Metal spoon

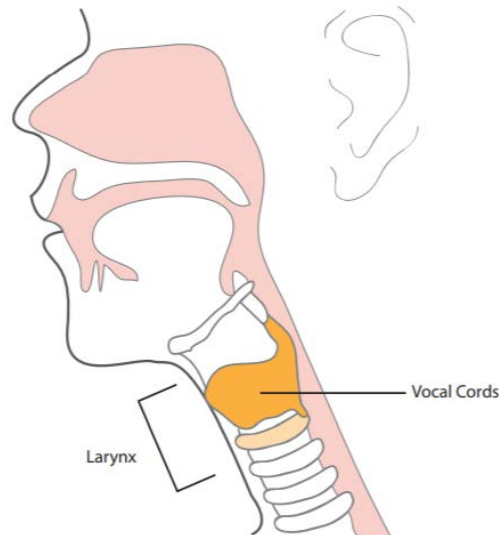


Figure 1. Location of your vocal cords

2. You can feel the vibrations made by your vocal cords when you make a noise. To do this, gently hold your first two fingers (as shown in Figure 2) against the middle of your own throat and talk, sing or hum.



Figure 2. Gently place two fingers over your vocal cords

3. Try making different sounds and see how the vibrations change. How does it feel if you talk louder or quieter? How does a high-pitched noise compare to a low-pitched noise?

Dancing Rice

1. Stretch and pull the plastic wrap tightly over the top of the bowl, securing it with a rubber band if needed.
2. Place 10-20 grains of uncooked rice on top of the plastic.
3. Hold a metal pan upside down and next to, but not touching, the bowl as shown in Figure 3.



Figure 3. Hold the pan near the bowl making sure it's not touching it

4. Hit the metal pan with a spoon and observe what happens to the grains of rice.
5. Remember, sounds are caused vibrations. Knowing this, why do you think the rice moved when you hit the pan?
6. Try hitting the pan harder or softer to change the volume of the sound. How does that affect the way the rice moves?

Shoebbox Strings

1. Place one rubber band around the book and one around the shoebox.
2. Place them on a table, ensuring the shoebox is placed with the open side down.
3. Place two pencils beneath the rubber band on the book, about 4 inches (10 cm) apart and parallel as shown in Figure 4. Do the same on the shoebox.

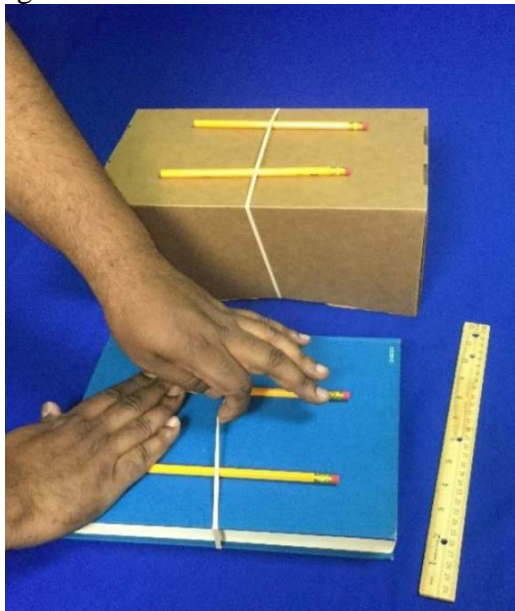


Figure 4. Place the pencils under the rubber band about 4 inches apart

4. Using one hand to keep the pencils in place, pluck the rubber band between the pencils on the book. See Figure 4. What do you feel and hear?
5. Do the same with the rubber band between the pencils on the shoebox. How does it feel and sound? How is this different than the rubber band on the book?

Background Information

What is sound? All sounds are produced by vibrating objects. One of the reasons there are so many different sounds is that there is an endless variety of materials that can vibrate and produce sounds. When you talk or sing, your vocal cords vibrate. Each person has a unique set of vocal

cords and a uniquely designed larynx, which gives rise to the individual character of a person's voice.

There are many properties of sound. Some of these include:

- Frequency and pitch depend on the length of an object that is vibrating; a short string will vibrate faster producing a higher frequency (or pitch) than a long string.
- Volume is a measurement of how loud a sound is. Volume decreases quickly as you move farther from a sound source.
- Multiple sound waves can combine together to create a more powerful sound wave.

Why does NASA care about noise? Noise from aircraft is an increasing problem in our environment. Contributing factors include an increase in air traffic, demand for land in cities, which has pushed business and housing developments closer to airports, larger aircraft which require more powerful engines and louder sounds produced by faster moving airplanes.

In an effort to protect the environment, NASA scientists and engineers are helping develop new methods of reducing the noise produced by aircraft. Lower noise levels are better for both people and animals.