



Curiosity Guide #302

Sound Resonance

Accompanies Curious Crew, Season 3, Episode 2 (#302)

Making a Membranophone

STEM Challenge

Description

Create a unique musical instrument!

Materials

- Ridge-sided empty water bottles
- Latex gloves
- Scissors
- Paper punch
- Rubber band
- Straws. Have extra so that different musicians can play the instrument.
- 20-inch construction paper
- Tape

Procedure

- 1) Use the scissors to cut off the bottom half of the bottle. Try to make the edge as smooth as possible.
- 2) Recycle the bottom half of the bottle.
- 3) Slide the paper punch over the top half of the bottle's cut edge.
- 4) Slide the punch as far in as possible and punch a hole.
- 5) The straw should fit snugly through the cut hole.
- 6) Use the scissors to cut off the fingers and thumb from a latex glove. Discard the fingers and thumb.

- 7) Cut the remaining latex tube open so that the tube forms a rectangular membrane.
- 8) Lay the latex membrane over the cut opening of the bottle and secure it in place with the rubber band. You may need to twist and wrap the rubber band a second time to get it secure.
- 9) Untwist the cap of the bottle.
- 10) Tightly roll the construction paper into a tube that can snugly be inserting into the cap of the bottle.
- 11) Slide the paper tube up so that the tube barely touches the latex membrane.
- 12) Add clear tape to the mouth of the bottle to keep the paper tube in place.
- 13) Blow into the straw. What do you notice?

My Results

Explanation

Membranophones are singing membranes that produce a sound from a vibrating material. Drums are a kind of membranophone that vibrate when struck.

In this example, when you blow air into the bottle, the air forces the latex glove upward. Then the air can pass through the paper tube and out of the instrument. As the air comes out of the instrument, the membrane falls again and hits the paper tube. As the membrane vibrates up and down, it produces sound vibrations that travel through the air tube below the membrane and become amplified. The combining waves become resonant. By cutting small finger holes in the paper tube below the bottle, it is possible to change the pitch of the sound produced. The shorter the pipe, the higher the pitch.

Think about this: So, we know drums use membranes to resonate, but what about other musical instruments? In brass instruments, an air tube curves around. When the musician buzzes his or her lips on the mouthpiece, the air tube produces many different frequencies. When the sound waves match the natural frequency of the air inside the tube, the waves are amplified, making a loud sound. In woodwinds, there are reeds that vibrate the air in the instrument to do the same thing. Instruments sure can look different, but they all take advantage of resonance!

Parents and Educators: use **#CuriousCrew**
#CuriosityGuide to share what your Curious
Crew learned!



Curious Crew is a production of Michigan State University.

Learn more at WKAR.org.

© MSU Board of Trustees. All rights reserved.