

## Membranophone

*Build a Water Bottle Membranophone*

**Recommended Grade Level:**  
6<sup>th</sup> to 12<sup>th</sup> grade

**Time:** 20 minutes prep, 30 minutes activity

### Materials Needed:

- A clean empty water bottle, any size
- (bottles with ridges are best)
- Scissors
- Latex, rubber, or vinyl gloves
- Rubber band
- Hole punch
- 1 straw
- Construction paper

### Background Information:

In this activity, you'll use a water bottle and a paper tube to make an instrument.

### To Do and Notice:

1. Cut the bottle in half, about 3 inches from the top. Make sure to cut evenly along the edges, and trim off any bumpy ridges.
2. You will be working with the top half. Take your hole punch and punch a hole close to the rim
3. Put the straw through the hole to test the size; it should be a tight fit. If the hole isn't large enough for the diameter of the straw, re-punch the hole in nearly the same spot, making it slightly larger. Remove the straw (temporarily).
4. Cut the fingers of the glove. The glove should now look like a wide tube.
5. Cut the top open to form a sheet of pliable material, or a membrane.



6. Stretch the membrane over the opening, making sure the punched hole on the side of the bottle isn't hidden by the excess glove material.
7. Attach the membrane to the bottle with a rubber band. Wrap the rubber band around the bottle several times, making sure the membrane is taut.
8. Twist off the bottle top. Roll a piece of construction paper into a tube on a flat surface. Make the tube as tight and as straight as possible.
9. Put the rolled tube into the large open hole on the bottle where the cap had been. Let go of the tube when it barely touches the bottom of the membrane. It should fit securely in the hole.
10. Insert the straw in the hole on the side of the bottle and blow into the straw; your bottle membranophone should play!
11. Try adjusting the position of the paper tube. Find a position you like and tape the paper tube so it stays in place.

### **What's Going On?**

As you blow into the straw, you're creating a lot of pressure in the space between the outer wall of the construction-paper tube and the inner wall of the water bottle. That pressure forces the membrane to rise, allowing air to flow into the top of the tube and escape out the bottom. As the air escapes, the membrane returns to its initial position. But you're continuing to blow air into your membranophone, so the membrane rises and falls very rapidly over and over. If you place your finger over the top of the membrane, you can feel it vibrate. These vibrations produce sound.

### **Going Further:**

To make different sounds, add finger holes. To do this, pinch the paper tube slightly and cut out a diamond shape; repeat to make more finger holes. Opening or covering the finger holes changes the pitch of the sound because opening a hole has the same effect as shortening the length of the pipe. The "shorter" the pipe, the higher the pitch.