

## Bottle Music

**Objective:** To demonstrate how frequency affects the pitch of sound.

### Materials

- Water
- 2-liter soda bottles (4 per child or per group)

### Procedure

*Prior to the program decide whether you will break the children into small groups for this experiment or have each child conduct the experiment individually. It is more fun for the participants if they each have their own “set” of soda bottles. We suggest you fill the bottles with water prior to the program – otherwise it can get very messy! An alternative is to have a small group of children designated to blow on the bottle with the least amount of water, another group blows on the bottles filled half-way with water, and the final group blows on the bottles with the most water. This technique allows you to experiment with making music as a group after the experiment is over. This is very popular with the children!*

- 1) For each set of 4 bottles, fill one bottle to the 1-quarter point with water.
- 2) Fill another bottle to the half-way point with water.
- 3) Fill a third bottle to the 3-quarter point.
- 4) Leave the last bottle empty.
- 5) Discuss pitch with the children. Ask them what they know about pitch? How does it relate to sound?
- 6) Instruct the children to blow across the bottle with the least amount of water. Hint: We suggest you demonstrate how to “blow” across the bottle prior to conducting this experiment. You want to place your lips close to the side of the bottle **not** directly over it or covering the top and blow gently. Give the children a chance to practice this technique using the empty bottle.
- 7) Now ask them to blow across the bottle that is half filled with water.
- 8) What did they observe about the sound? Is it the same or different from the sound made by the other bottle? How so?
- 9) Finally, ask the children to blow on the bottle with the most water. What did they observe about the sound this bottle made? Is it different than the other two bottles? How so?

### Results

The bottles with the most water had the lowest pitch and the bottles with the least amount of water had the highest pitch.

### Explanation

At this point in the program, the children already know that sound is created by vibrations. The number of times an object vibrates is called frequency. As the frequency increases, the pitch of the sound is higher. The bottles with the most water had the least amount of air, so the pitch of the sound is lower (the sound waves travel through the air and there is not as much air in these bottles). The soda bottles with the least amount of water have the greatest amount of air, so the pitch is higher – the sound waves are able to travel at a higher frequency through the air.