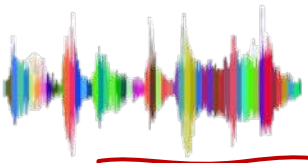

Make Sprinkles Dance

REMEMBER BEFORE YOU START TO

1. Label Laboratory Notebook with the title of experiment & date you perform it
2. Gather all your materials
3. Read the CAUTIONS
4. Read ALL Methods
5. Write **predictions** in your Laboratory Notebook
6. Wear your goggles, gloves, and lab coat

GOAL: Learn about sound waves

Materials

Cup or bowl
Rubber band that fits around the cup or bowl
Plastic wrap
Colored sprinkles
Cookie tray

⚠ CAUTION

You may want to do this in a cookie tray to keep the sprinkles from scattering

Methods

1. Stretch a piece of plastic wrap across the top of the bowl.
2. Use a rubber band to hold the plastic wrap in place.
3. Adjust the plastic wrap so it is as tight and as flat as possible with no wrinkles.
4. Put the bowl onto the tray to catch any sprinkles that fall off.
5. Bring your lips very close to the edge of the bowl without touching it. **What do you think will happen when you hum closely to the plastic wrap? Write your predictions in your Laboratory Notebook.**
6. Try humming loudly, and watch the plastic wrap closely. **What happens? Can you see anything? Write your observations in your Laboratory Notebook.**
7. Add some sprinkles to the top of the plastic wrap. **What do you think will happen when you hum closely to the plastic wrap this time? Write your predictions in your Laboratory Notebook.**
8. Try humming again. Watch the sprinkles closely. **What happens? Can you see anything? Write your observations in your Laboratory Notebook.**
9. Try humming louder. **What happens? Can you see anything? Write your observations in your Laboratory Notebook.**
10. Try varying the pitch of your humming (higher or lower). **What happens? Can you see anything? Write your observations in your Laboratory Notebook.**
11. **What happens after you stop humming? Write your observations in your Laboratory Notebook.**
12. **Extra:** Try the activity with different-size granular materials. For example, what happens if you use tiny, spherical sprinkles versus bigger oblong ones, or "jimmies"? What about salt or grains of rice?

CONTINUE TO NEXT PAGE

13. **Extra:** Try the activity with different size, shape and material containers. Can you find the best material or shape that carries sound waves at different pitches?
14. **Extra:** Try putting the bowl in front of a speaker and playing music. What happens?
15. **Extra:** Search for a "tone generator" app or Web site on your phone, and try playing a continuous tone near the bowl. Some tones can hurt your ears, so start with the volume very low.

What's Happening?

- Sound waves are created by vibrating objects that bump into adjacent air molecules. These air molecules bump into other nearby air molecules and so on, transmitting the vibration through the air to our ears. Sometimes these vibrations are easy to see (for example, when you pluck a rubber band) but most times the vibrations are too small or too fast for us to see (when you knock on a door it makes a sound even though you can't see the door vibrate). In the case of the falling tree, the tree will still cause vibrations when it hits the ground—even if there is no one there to hear it.
- So if vibrations cause sounds, can sounds also cause vibrations? It turns out that it works both ways, and this is what allows us to hear. Your eardrums are tiny membranes inside your ears (and maybe an adult told you not to poke anything tiny or sharp into your ears because you could damage them). When vibrating air molecules hit the membrane they cause it to vibrate. These vibrations are converted into electrical signals that are sent to your brain. In this activity you made a model of your eardrum, and watch how sounds can make it vibrate!

Who Uses This in Real Life?

Acoustical engineers are concerned with the management and application of sound-producing vibrations in real-world situations. Many **acoustical engineers** work with architects to help design buildings in order to control sound diffraction, refraction, absorption and reverberation.

Susan Rogers is an American professor, sound engineer and record producer best known for being Prince's staff engineer during his commercial peak, including albums like Purple Rain, Around the World in a Day, Parade, Sign o' the Times, and The Black Album."