

# Sound as Vibration

FRAMEWORK
I. Scientific and Engineering Practices
II. Cross-Cutting Concepts
III. Physical Sciences

SKILLS/OBJECTIVES
<ul style="list-style-type: none"><li>○ The goal of the lesson is to show that our sense of hearing is based on vibrations in the air making it to our eardrum.</li><li>○ Students will use the sense of seeing and the sense of feeling to understand how sound is produced.</li></ul>

MATERIALS
<ul style="list-style-type: none"><li>○ Balloons (25-30)</li><li>○ Radio</li><li>○ A bowl or two</li><li>○ Saran wrap (1 roll)</li><li>○ Rice (uncooked)</li><li>○ Baking Tray</li><li>○ Wooden Spoon</li><li>○ Cardboard paper towel/toilet paper roll</li><li>○ Newspaper</li><li>○ Tape</li></ul>

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## BACKGROUND

- Go over the concept of an eardrum, stating that the air waves vibrate the eardrum, which relays a signal to the brain through the rest of the ear, allowing us to hear the sense of sound.
- The main objective of this experiment is to drive home the phenomenon that sound, and thus our sense of hearing, revolves around the vibration of molecules.
- Allow the students to see and feel the fact that when sound is made, it causes air particles to vibrate, causing sound waves.
- Tell the students that without any medium for the sound to travel in (a vacuum), no sound can be produced. Also, in a medium of solid or liquid, sound is able to travel but is distorted.

For the first two activities, have two different stations for the kids to rotate through. The third activity will be done separately at the end.

Activity #1	<b>See the Vibration</b>
Materials	A bowl, saran wrap, rice, baking tray, wooden spoon
Worksheet	N

- Same principles to be explained as above, but now students will use their sense of sight to reinforce the source of sound.
- **Place saran wrap tightly over the top of the bowl, pour some uncooked rice on the saran wrap**
- **Bang the baking tray hard with the wooden spoon directly over the bowl, causing the rice to move around on the saran wrap.**
- The students should see the rice move and jump around on the saran wrap. Explain that it is the sound waves in the air that hit the rice and the saran wrap and causes the movement they are able to observe.

(Optional):

Activity #2	<b>Feel the Vibration Pt. II</b>
Materials	Cardboard paper towel/toilet paper roll, newspaper, tape
Worksheet	N

- Same principles to be explained as above, but students will use their sense of touch to again reinforce the idea of sound waves.
- **Tape newspaper around the outside of a cardboard roll**
- **Have the student put his/her hand on the outside of the newspaper and talk/sing into the open end.**
- The students should feel the newspaper vibrate, which again shows the fact that sound is caused by vibrations in the air which can be physically felt by the sense of touch.

Activity #3	<b>Feel the Vibration</b>
Materials	30 balloons, a radio
Worksheet	N

- When a sound is made, it causes the air surrounding it to vibrate, which causes a chain reaction, eventually leading to a person's eardrum, causing the eardrum to vibrate as well, and sends a signal to the brain as registered sound.
- **Have students blow up balloons and tie the ends.**
- **Turn on the radio, have the students stand a few inches from the radio, holding the balloon between their hands in front of a speaker.**
- The students should feel the balloon vibrate: tell them this vibration is the same vibration that their eardrum feels, and this allows you to hear the sounds coming from the radio.

## CONCLUSIONS

Sound waves vibrate through a medium (air), and we are able to hear sounds because this chain reaction meets our eardrum and causes the eardrum also to vibrate, sending a signal to the brain, which gives the sensation of sound.

Because sound needs a medium through which to travel and an eardrum to recognize the vibration, does an object (tree) make a noise if nobody is around to hear it (say, in the woods).