2. Drumming on My Ear
BUILD KNOWLEDGE

INTRODUCTION

What Students Do in this Activity

Students learn more about the form that sound waves take and how humans hear sound. They build a model of a human eardrum and see how the model eardrum reacts to sounds.

Objectives

Students will:

- Explore how sound waves move
- Make a model eardrum

Time

30–40 minutes

Materials

for the teacher:

- human ear (in Complete Kit)
- chart paper (optional)
- markers (optional)
- book

for each team:

- 1 bowl
- 1 sheet of plastic wrap (enough to cover top of bowl)
- 1 large rubber band
- ¼ cup of rice
- a Slinky
- tuning fork and tuning fork mallet

for each student:

- Their science journal

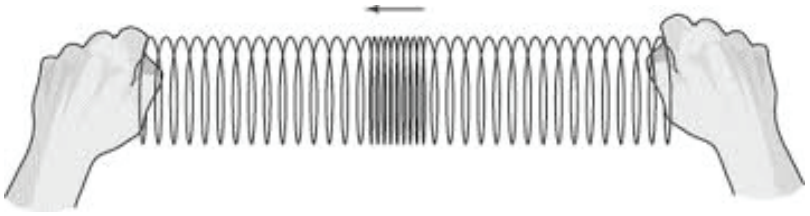
A-Ha

The human ear funnels sound toward the tympanic membrane (eardrum), which vibrates in response to the movement of the air. Movement of the eardrum causes a series of three bones in the middle ear to move. The third bone (the stapes) causes fluid in the cochlea to move and the movement of this fluid causes nervous system receptor cells to fire and stimulate the brain.

CLASSROOM ACTIVITY

Presenting the Activity

1. **Gather students for a class discussion.**
2. **Have students touch their throats and hum. Ask, *"What do you feel?"***
   They should feel vibrations.
3. **Remind students of the tuning forks in the previous activity. Ask, *"How is your voice similar to the tuning forks?"***
   They should notice that both produce sound through vibration.
4. **Tell students to make higher and lower sounds and feel how these change the vibrations they feel.**
   They may or may not be able to distinguish that higher sounds vibrate more quickly.
5. **Pass out a Slinky to each team. Explain that they should pull the Slinky out between them and show them how to make a longitudinal wave by quickly flicking their end of the Slinky toward their partner.**



   Explain that sound waves are very much like the waves that they make on their Slinky.
6. **Discuss what they noticed about they waves the created using the Slinky and how they are different from waves that they see in water.**

Facilitating Student Exploration

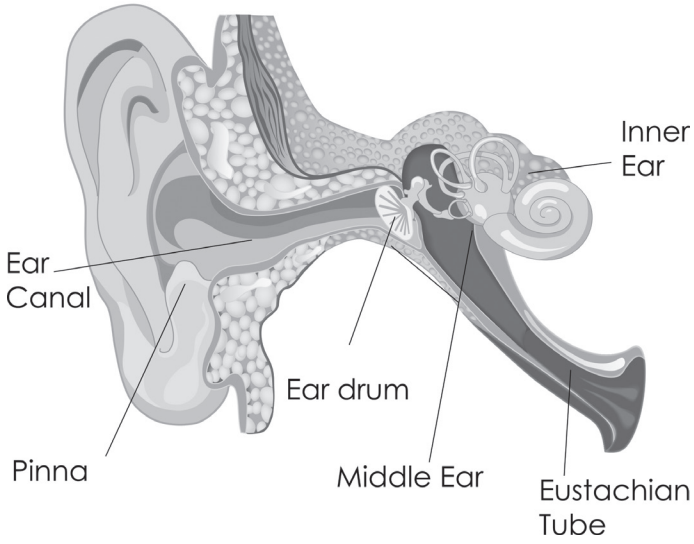
7. **Model the directions on reproducible master #4 with students. Have them write a question in their science journals and predict what they think will happen.**
   Show them the ear drum model from the complete kit and explain how they will do an experiment to see what happens with sounds and their ears.

8. **Pass out the materials for building an eardrum: plastic wrap, bowl, rubber band, and rice. Have students open their journals to page 4.**
   Teams will build a model eardrum.

9. **As teams make their eardrum model, circulate to make sure students remain on task.**

Discussing and Interpreting

10. **Discuss the results of the students' work on making a model eardrum. Ask students, "*What happened when you made a noise near the model eardrum?*"**



Students should have noted that the plastic wrap vibrated in response to the tuning fork.

11. **Ask students, "*What do you know about how our ears work?*"**

12. Gather students as a group and point out the various parts of the human ear.

- Explain that the outer ear (pinnae or auricles) collects the sound.
- Explain that the eardrum vibrates as a result of the movement of air that results from sound waves.
- Ask, "*Why do you think the ear is shaped the way it is?*"

13. Conclude the session by explaining to students that they will be exploring the science of sound to help them design a musical instrument for EarthToy Designs.

14. Finally, have students revisit their KWL of Sound, Reproducible Master 1 to fill in any new information they have learned.

Science Notes

Sound is a type of energy. Vibrating objects cause air particles to vibrate and these vibrating particles bump into other particles, causing sound to travel through the air. These waves travel through the air until the energy dissipates. While sound waves are *longitudinal* waves—waves that compress and expand within a medium—they are not unlike waves caused by an object being thrown into a pool of still water (which are called *transverse* waves).

The human ear is built to collect sounds and direct them to the eardrum where they are turned into electrical signals that can be interpreted by the brain.

Reproducible Master 4

There's a Drum in My Ear?

My name: _____

Materials

- Bowl
- Plastic wrap
- Large rubber band
- Rice
- Tuning fork and mallet

Procedure

1. Tightly stretch the plastic wrap over the top of the bowl.
2. Secure the wrap with a large rubber band.
3. Sprinkle a small amount of rice on the top of the plastic wrap.
4. Strike the tuning fork with the mallet and touch it to the plastic wrap over the bowl.

Describe what happens to the rice. Why do you think this happens?

_____

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