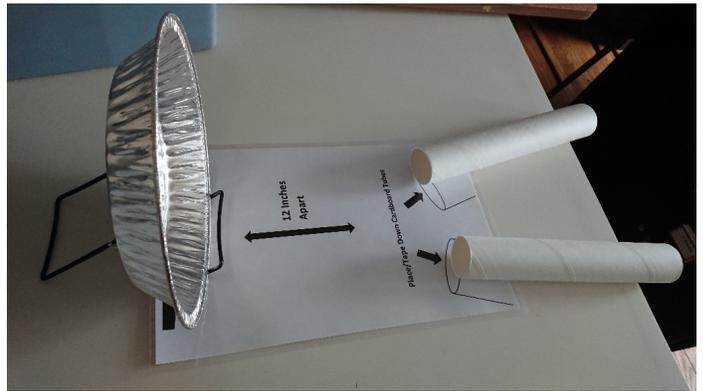


Bat Biology: Echolocation Activity

The Movement of Sound

Materials:

- 1, aluminum foil pie plate
- 2, cardboard tubes, ~10 inches long
- Tape
- What do you hear? Half-sheet



Instructions:

1. Have students get into groups of 2. Make sure students are sitting at tables or desks for this activity.
2. Tape two cardboard tubes onto a table at an angle, facing the area where the pie plate will rest. The end of the tubes should not touch, but can be placed at different angles facing the pie plate. They should be no more than 2 inches apart from each other.
3. Place the pie plate upright at least 12 inches away from the cardboard tubes. The pie plate can rest on a wall, and or can be propped up. Make sure the cardboard tubes are still angled towards the pie plate.
4. One student is designated as the “sound maker”, or the bat producing the sound waves. The other student will be the “listener”, or will be listening for the echo of the sound the first student produced.
5. Have students do three rounds each, where the sound maker will whisper one word through one of the cardboard tubes. Then, the listener has to try and guess what word was said. To keep track, have the listener write down what word they think they heard onto the “What do you hear?” half-sheet. After three rounds, have students switch roles, and see if the same results can be repeated.
6. Extension: This activity can also be done with the cardboard tubes facing other solid objects, like walls or doors, as long as students keep the tubes at an angle, and are at least 1 foot away from the solid surface.

Reflection: What’s Happening?

The mechanism of when a student’s sound hits the pie pan is the same idea when bats echolocate. Bats emit a **high-frequency** sound, which allow bats to gain more information about what the sound hits (length, distance, speed of object). When a bat emits a call, the sound travels through the air until it hits a solid object (like a tree or insect). Then, those sound waves are **reflected** back towards the bat, and the bat processes the **echo** of its own call. The echo the bat listens for is far softer than the call it emits, so bats that utilize echolocation have very acute hearing to listen to the softest sounds. Their incredible hearing also allows them to listen for their call over ambient noises around them.

Sound Terminology:

Frequency: The number of times a vibrating object (sound) moves back and forth (oscillates). Faster moving sound produces a higher frequency, which correlates with a high pitch or tone.

Reflection: The bouncing back of wave energy from either light or sound.

Echo: Reflections or repetitions of sound waves.

What Do You Hear?

Record the word or sound you hear reflected off the pie pan, and into your cardboard tube. After three rounds, you and your partner switch, and see if they can hear the same words or sounds too!

Word/ Sound	Round 1	Round 2	Round 3

What Do You Hear?

Record the word or sound you hear reflected off the pie pan, and into your cardboard tube. After three rounds, you and your partner switch, and see if they can hear the same words or sounds too!

Word/ Sound	Round 1	Round 2	Round 3

Extension Activity: Cardboard Tubes and Pie Pan Uses

Want to use the above materials for future activities? Try these experiments or activities below to reuse cardboard tubes and pie pans for other STEM-related needs!

1) Create a Seed Starter Planter

- a. Materials: Cardboard Tubes, Pie pan, potting soil, native plant seeds, water
- b. Directions: Cut cardboard tubes into smaller sections, and arrange inside pie pan. Add soil into each tube, and then place seeds inside tubes. Just add water and sunlight, and watch what plants grow first, how fast they grow, and how they develop and mature over time!



2) Cardboard Binoculars

- a. Materials: Cardboard tubes, yarn, hole punch, markers or stickers, tape or glue, colored paper
- b. Directions: glue two cardboard tubes together. Then, glue or tape colored paper around the tubes. Allow students to be creative in decorating their binoculars with markers or stickers. Hole punch two holes, one in each tube, and run yarn through to create a strap. Then, take students outside, and let them explore the natural surroundings around your school, seeing what they can find with their binoculars!



3) Create an electric charge

- a. Materials: Pie plate, styrofoam cup, wool piece of fabric, tape, optional: pencil
- b. Directions: Place foam plate on solid surface. Tape the styrofoam cup to the center of the pie plate to use as a handle when moving the pie plate. Rub the wool fabric on the foam plate for at least one minute. Then, while holding the foam cup, place the aluminum plate on top of the foam plate. Using your finger, or the metal tip of a pencil, touch the pie plate, and you'll see, and maybe feel, an electric spark!

