Western Engineering

Outreach

DIY Musical Instruments

Grade K-2

Meet Today's ENG HERO!

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Kelly Ogden is an assistant professor with the Mechanical and Materials Engineering Department at Western University. She has a Master's in applied mathematics and a PhD from MIT. She conducts research with water. Her research focuses on further understanding mixing, waves and hydraulic processes in coastal flows. To learn more about Dr. Ogden visit:
https://www.eng.uwo.ca/mechanical/faculty/ogden_k/index.html

Learning Goal:

- Students will expand their knowledge of sound.
- Students will learn about the three parts of the ear
- Curriculum Connections: Grade 1 - Materials, Objects, and Everyday Structures

Materials Needed:

- Cardboard tube (preferably paper towel roll length)
- Ziploc bag (two halves)
- Two elastic bands
- 18 inches of string
- Cardboard
- Scissors
- Several small beads
- Two beads

Engineering and Science Connections:

Today, we will learn about sound and the ear. Sounds are just vibrations that pass through the air, into our ears and to our brain to convert into information.

How is Sound Made?

Air is all around you. You cannot see it, but you can feel it when you feel a breeze or the wind. Breezes and wind are moving air. Air is made up of a bunch of tiny particles called molecules. When an object vibrates or moves back and forth quickly, the air molecules around it also vibrate. Each molecule bumps into its neighbours and makes them vibrate. In this way, the vibrations spread! When air molecules vibrate your ear drum, you hear sounds.

What Part of your Body do you use for Hearing?

Your ears! Your ear can be broken into three sections: the outer, middle and inner ear. The outer ear consists of your Pinna (the visible part of your ear) and your auditory canal which sound travels through. The middle ear contains your ear drum and three ear bones. The malleus (hammer), incus (anvil) and stapes (stirrup) are the smallest bones in your body. The inner ear mainly consists of two pieces called your cochlea and semicircular canals. Your cochlea is responsible for helping you hear, while your semicircular canals contribute to your sense of balance. After sound travels through your cochlea, it is transmitted via your auditory nerve to your brain where it is deciphered by your brain and becomes information to process!

Ear Anatomy

http://www.scholastic.com/listencarefully/pdf/starkey_68_imallears.pdf

Mystery Noises

Perform the following actions. See if you or someone else can guess what sounds they are hearing. Try any other actions that you can think of too. Be creative!

1. Shake pennies or other coins
2. Clap hands
3. Clap chalkboard erasers
4. Tap a pencil or pen on a desk
5. Close a book
6. Crumple up paper or foil
7. Stomp on the floor
8. Tear some paper
9. Close a stapler
10. Bounce a ball

Aren't our ears amazing?!

Video Recommendation: *How Your Ear Works*

https://www.youtube.com/watch?v=mptjEoHF2aI

Activity:

Before beginning, think about the following questions:

- What parts of my ear are allowing me to hear this?
- What exactly is sound?
- How does my brain understand vibrations?
- What are the three bones in my ear called?

Rainstick

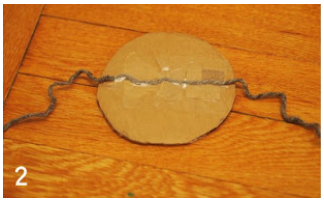
The first instrument the you will be making is a rainstick.

1. Attach one of the Ziploc-halves to one end of the tube. Use a rubber band to secure. Trim the bag as necessary but leave enough of the bag hanging out of the elastic band so that it will not come loose.
2. You can choose from the variety of materials (rice, paper clips, beads) what they would like to add to their rain stick.
3. Secure the second plastic bag to the open end of the tube. Secure with a rubber band.
4. Give the rainstick a try! If the Ziploc bags aren't secure enough, use construction paper to replace the bags.
5. You can now paint/draw/decorate your rainstick(s). They will have time to dry while you are working on your rattle-drums.

When turning over your rain stick slowly, the contents falling inside should sound like rain!

Rattle Drum

1. Cut two circles out of the carboard about 3 inches in diameter. Decorate the two circles using construction paper and/or markers.
2. On the back of one of the cardboard circles, tape the string in the middle. Have roughly even ends of string hanging out on either end.



3. Tape the skewer/paper straw in the middle on the same piece of cardboard so that it is perpendicular to the string.
4. Tape/glue a cardboard square on either side of the straw/skewer. (Optional: cut out 3 smalls squares of cardboard and glue on the circle like the image below)

5. Glue the other piece of cardboard on top of the squares, making sure that the two circles align.
6. Securely tie the large beads to the end of either side of the string. Shorten the string if necessary. Twist the stick in between your hands to make some noise with your rattle drum!

What Did You Learn?

- What are the three parts of the ear?
- What is sound?
- Ear anatomy?

Future Learning

- Turn what you've learned about ears and sound into an experiment! Try playing mystery noises with other people! Try and change the contents of your rain stick to make it sound more realistic.
- Investigate how sound goes around corners? Through water? Through other materials? Does sound move at just one speed? Think about how lightning and thunder works? Is light or sound faster?

Share your creations!

We would love to see what you made. Email as at discover@uwo.ca or tag us on social media.

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Thanks for discovering with us!