Minds in Motion

Fabulous Flutes

What's The Plan?

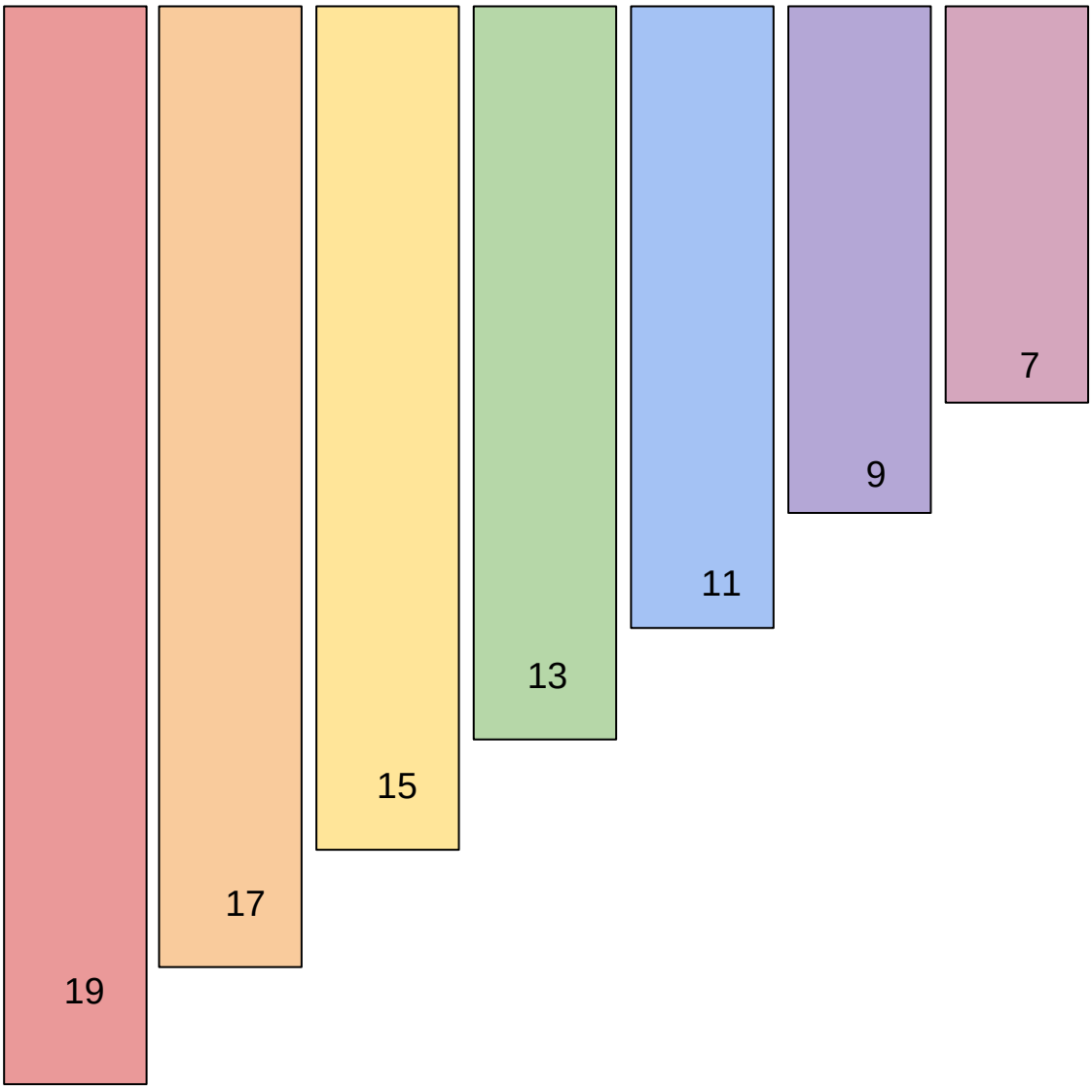
When a fan spins, rain falls, or somebody says your name, all of these sounds enter your ears and you can hear them, but have you ever thought about how this complex process works? How does the sound of rain hitting the ground make its way up to your brain, and why does it sound the way it does? We can explore the specialized structures and processes that help sound waves turn into perceptions of noise in your brain by building a pan flute!

What You'll Need:

- 8 Thick plastic straws or small cardboard tubes
- Masking tape
- Scissors
- Rulers
- Sharpies or markers

What To Do:

1. Use a ruler to measure one of the following lengths onto each straw, and mark the length on each. If you don't have a ruler, you can use the following boxes to measure your straws.



Here's an example of what your pan flute should look like once it's finished!

2. Cut the straws at the points you marked (save the ends you cut off for later in this project).
3. Line up the straws from shortest to longest, and label them 1 (shortest) to 8 (longest) so you don't mix them up.
4. Between each of the numbered straws, place one of the ends you cut off to act as a spacer. Try to arrange the spacers so that they go between the straws and are also shortest to longest.
5. Tape the straws together in order of how they are arranged. It can be helpful to keep all the straws down flat, peel a piece of tape off, and then stick it onto the tops of all of the straws instead of taping them together individually.
6. Tape the other side of the straws so they stay together.
7. Play your flute!- Try blowing in this combination, 333 333 35123 444 4433 3355421. Do you know this song?

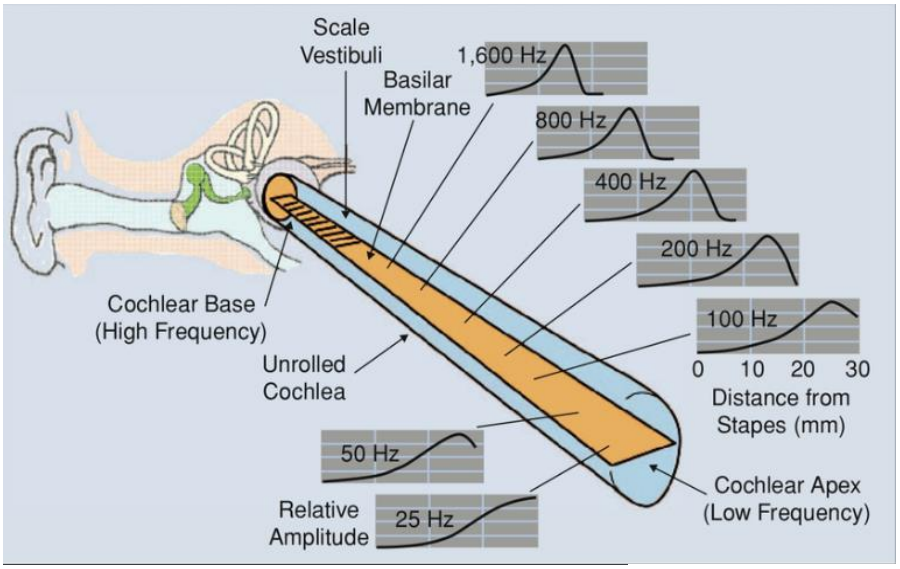
Why Did We Do It?

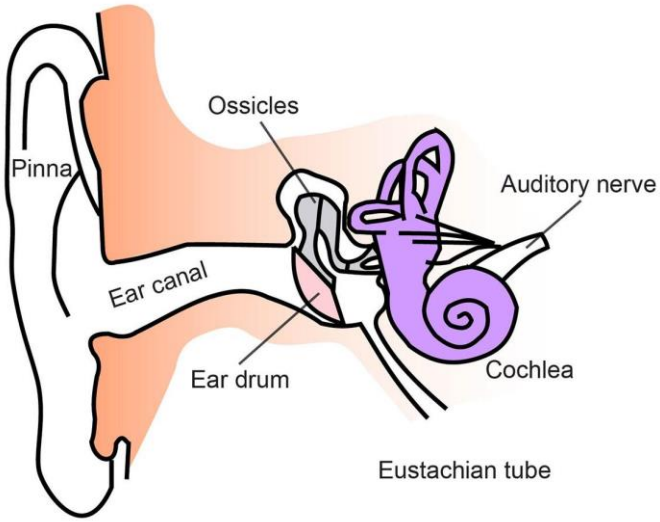
Here is a list of important words we use during the project! Check out the diagram below of an ear and its parts!

- *Soundwave*: Sound moves through the air as a wave, and different sounds have different frequencies when they move. Sounds that sound low pitched have a low frequency, and their waves are very far apart. Sounds that have a high pitch have a high frequency, and their waves are very close together.
- *Pinna*: The pinna is the outside part of the ear, it acts as a funnel for sound, directing it into the ear canal and towards the eardrum.
- *Eardrum:* The eardrum separates the outer ear and the middle part of the ear. When sound waves hit the eardrum, it vibrates at the same frequency as the sound wave that caused it.
- *Ossicles*: The eardrum will cause the ossicles, which are tiny bones inside of the ear, to vibrate at the same frequency as the original sound.
- *Cochlea*: Located at the very inner part of the ear, the cochlea is filled with fluid, so when vibrations caused by sound reach it, they go from being waves in air to being waves in fluid. The fluid in the cochlea vibrates at the same frequency as the sound it came from.
- *Basilar Membrane*: Wraps around the cochlea on the inner part of the ear. The basilar membrane has something called a tonotopic map, which means that the different parts of the basilar membrane correspond to different sound frequencies. Depending on what the frequency of the sound is, different parts of the

basilar membrane will vibrate and this is how our ear knows exactly what the sound that entered it was like.

- The base of the basilar membrane is narrow and thick, and vibrates at high frequencies. Think about the length of your flute tubes, did the long ones or short ones vibrate at a higher frequency and sound higher pitched?
- The top of the basilar membrane is wide and thin, and vibrates at a lower frequency. Think about the length of your flute tubes. Did the long ones or the short ones vibrate at a higher or lower frequency and sound higher or lower pitched?





- *Auditory Nerve*: The auditory nerve is connected to the cochlea. It receives the vibrations from the basilar membrane, and takes the information all the way up to our brain, where we perceive the sound.

How Did It Go?

We'd love to hear about all the amazing STEM projects you're doing! Show us your finished projects on any of the following social media platforms by tagging us!

Twitter: @MyMindsInMotion
Facebook: @mindsinmotion2014 || @ucactiveliving
Instagram: @ucalgaryactive

SCAN ME

Let us know how you felt about the project! Please click here or scan the QR code above to fill out a short survey!