**Additional activities for the Introduction to waves and Sound unit**

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**Make your own wind instrument: Popsicle stick harmonicas**

**Materials per harmonica:**

* 2 large popsicle sticks
* 1 thick rubber band
* 2 thin rubber bands
* 2 one inch cut straws

**Directions:**

1. Put the thick rubber band around one popsicle stick long-ways.
2. Put one straw under the rubber band, and one on top.
3. Put the second popsicle stick on top.
4. Wrap the thin rubber bands around the popsicle sticks outside of the straws on either end.
5. Blow!

**Explanation:**

When you place the straws close together, the length of the rubber band that actually vibrates is shortened, so that the rubber band will vibrate more quickly. Thus, the sound produced will have a higher frequency, producing a higher pitch. When the straws are farther apart, the length of the rubber band that actually vibrates is lengthened, so that the rubber band will vibrate more slowly. Thus, the sound produced will have a lower frequency, producing a lower pitch.

**Make your own string instrument: Rubber band banjo**

**Materials per banjo:**

* 4 rubber bands of different widths
* 1 wooden stick or pencil
* 1 plastic or cardboard box of small to medium size (such as a tissue box or shoe box)

**Directions:**

1. Make sure the box has a pretty big opening in it. If the box has no lid or top, that's ok.
2. Stretch the rubber bands in order from thinnest to thickest across the opening if there is one, or long-ways across the box if there isn't.
3. Put the wooden stick or pencil under the rubber bands and above the top or sides of the box.
4. Pluck!

**Explanation:**

The thinner rubber bands should have a higher pitch than the thicker ones, since the thinner rubber bands have less mass, meaning they will vibrate faster. If you move the stick or pencil so that the vibrating part of the rubber band is shortened, it will have a higher pitch since shorter rubber bands vibrate more rapidly. If any of the rubber bands are tighter than others (try raising and lowering the lid if there is one, or inserting a nail or thumbtack into one end of the box and tightening the rubber bands further), they will have a higher pitch since tighter rubber bands vibrate more quickly.

**Test your balance: Inner ear balance**

**Part 1:**

**Materials:**

* 1 cup half filled with water

**Directions:**

1. Shake the cup, while its on the table. Ask students what they notice. (They should note that the water keeps moving even after you have stopped shaking the cup.) Ask students how this relates to the ear.
2. Ask your partner or a student to spin and then stop after 10-15 seconds. Students will see that after the person stops spinning, he or she will become dizzy and may even fall. Ask students what they think this has to do with the ear. (Explain to them that sometimes, the liquid in the semicircular canals keep moving after you've stopped moving. The water in the cup was still moving even after you stopped moving the cup. The same thing happens when you spin or go on a fast ride in the park.

**Explanation:**

When you stop spinning or step off a spinning ride, the fluid in the semicircular canals is still moving. The hairs inside the canals are sensing movement even though you're standing still. That's why you isn't feel dizzy - your brains getting two different messages and is confused about the position of your head. Once the fluid in the semicircular canal stops moving, your brain gets the right message and you regain your balance.

**Part 2:**

**Materials:**

* Ear plugs for each participant
* Things to put on students' heads while they attempt to balance

**Directions:**

1. Before beginning, ask students what they think would happen if they put earplugs in their ears and tried to balance on one leg.
2. Have students stand on one foot for 30 seconds while holding their left finger on their noses.
3. Put earplugs in ears \*and only ear plugs in ears\* and try again.
4. See if they notice a difference.
5. Repeat these steps, this time having students try to balance different things on their heads while they stand on one foot with ear plugs.

**Match that sound: Pitch and sound matching**

**Part 1: Pitch**

**Materials:**

* iPad, tuning fork, musical instruments, home-made musical instruments, or voices

**Directions:**

1. Start with one constant pitch, either produced by a tuning fork or instrument (could be home-made, or a glass with a constant volume of water) or the tuner app on the iPad.
2. Try to match the pitch using another instrument (if using glasses and water, try using a different sized glass) or a voice.
3. Use the tuner app on the iPad to see how close you got.
4. To make this competitive, see who can get closest to the original note the fastest.

**Part 2: Sounds**

**Materials:**

* iPad or YouTube clip or compiled sound file

**Directions:**

1. Play one audio recording, using whatever source you have found.
2. Have students guess what the sound is and write this down.
3. Repeat with the other sounds you have collected.
4. Reveal the sources of the sounds to the students.

**Or, alternatively:**

**Materials:**

* Small sheets of paper
* Writing utensils

**Directions:**

1. Have students each write down something that makes a sound (ie the name of an animal) on a sheet of paper.
2. Collect the papers into a hat or bowl.
3. Have students take turns pulling a paper from the bowl or hat, and vocalizing the word written on their paper.
4. The other students try to guess what the word is, and the person who says the correct answer first gets to be the next to act out a sound.