

# Western Engineering Outreach

*Strike A Tune*

*Grade K-2*

*Meet Today's ENG HERO!*



*Stan Metchev* - Associate Professor with Western Science

Stan Metchev is an Associate Professor in Physics and Astronomy at Western University. Dr. Metchev's research is on planetary systems around nearby stars and on the atmospheres of brown dwarfs and exoplanets. His main fields of expertise include extrasolar planets, brown dwarfs, circumstellar disks, and formation and evolution of planets. To learn more about Dr. Metchev, please visit:

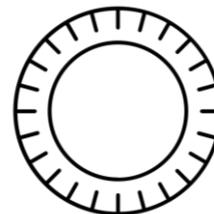
[http://physics.uwo.ca/people/faculty\\_web\\_pages/metchev.html](http://physics.uwo.ca/people/faculty_web_pages/metchev.html)

## *Learning Goal:*

- Students will be exploring sound through a lesson and building an instrument
- Students will be learning about the 3 parts of the ear (inner, middle, outer)
- Students will be discovering that the brain and ears are connected
- Sk to 1- Understanding Matter and Energy 2.3 Design and construct a device that uses energy to perform a task (e.g., a musical instrument that uses human energy to make sounds)

## *Materials Needed:*

- Two small, sturdy paper plates
- Five flat popsicle sticks
- Brads or small screws (optional)
- Paper glue
- Wood glue
- Additional popsicle sticks



# Strike a Tune

## Engineering and Science Connections:

### *How is Sound Made?*

Air is all around you. You cannot see it, but you feel it when you feel a breeze or the wind. Breezes and wind are moving air. Air is made up of huge numbers 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 make them vibrate. In this way, the vibrations spread. When air molecules in your ears start vibrating, you hear sounds. If you have a slinky move it from one hand to the other to demonstrate vibrations. To feel the vibrations, you can lightly hold your hand at the side of the slinky as you lift it up and down with the other hand.

### *How can we use our bodies to make sound?*

We can clap our hands, we can stomp our feet. If you put your fingers on your vocal chords while you speak, you can feel the vibration that these make to produce sound.

### *The Ear*

Which part of the body do you use for hearing? Yes, you use your ears! The ear has three parts: outer, middle and inner. The bones in the middle ear (hammer, anvil, stirrup) are the smallest in the body.

### *Definitions:*

**Noise:** a discordant or unpleasant sound

**Sound:** vibrations in air or water that stimulate the auditory nerve and produce the sensation of hearing

**Vibration:** a movement back and forth

**Volume:** the degree of loudness

**Pitch:** the quality of sound determined by the frequency of sound waves when they reach the ear: a high frequency will have a high pitch

**Timbre:** the quality of sound that allows an observer to tell the difference between different musical instruments: timbre is determined by the harmonics of the sound

**Vocal cords:** two pairs of membrane-like cords in the larynx

**Inner ear:** the innermost section of the ear, containing the cochlea and the semi-circular canals

**Middle ear:** the middle section of the ear, containing the eardrum and the three ear bones

**Outer ear:** the outermost section of the ear including the pinna and the auditory canal

## Strike a Tune

### Activity:

Before beginning, let's try to see how many different noises we can guess!

- With a partner, have one person close their eyes while another person makes a noise. See how many noises the person with their eyes closed can identify. No peaking!
- Example noises:
  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

*Video of Activity (Instrument):* Kiss the Rain Kalimba Cover

[https://www.youtube.com/watch?v=Bgo\\_1OtePfQ](https://www.youtube.com/watch?v=Bgo_1OtePfQ)

*Let's Make a Kalimba!*

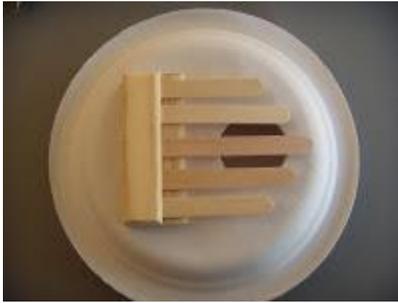
1. The length is determined by the size of the paper plates. These measurements are for the structural stability of the instrument, NOT the intonation. Just eyeball or loosely measure the wood.
- 2.



3. Glue a stack of popsicle sticks to form a block of wood to a paper plate near its edge.
4. Glue another paper plate (plates facing each other) to the original plate and the wood block.
5. Spread glue on both the rims of the plates and the wood block.

## Strike a Tune

6. Glue one more popsicle stick to form a small wood block to one of the plates directly over the inside wood block.
7. Cut a hole in the top paper plate.
8. Glue five or six flat popsicle sticks to the wood block, arranged so that the center sticks are longer than the side sticks (use proportions like your fingers to one another).
9. Glue a thin, flat piece of 1/8 inch wood, such as screen door molding (same dimensions as wood block), to the tops of the popsicle sticks.
10. If desired, brads or very small screws can be used to help hold the entire bridge mechanism in place.
11. Decorate the outside of your Kalimba and try it out!
- 12.



### What Did You Learn?



- Sounds are all around us and they travel through the air molecules in the form of vibrations
- We listen to sounds with our ears and the ear has three parts: outer, middle and inner.
- We can make sounds by generating vibrations, just like our vocal chords do when we speak.

### Future Learning



- Further explore the parts of the ear using this foldable ear printout (cut out and glued together)  
[http://www.scholastic.com/listencarefully/pdf/starkey\\_68\\_imallears.pdf](http://www.scholastic.com/listencarefully/pdf/starkey_68_imallears.pdf)

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Thanks for discovering with us!