



MoLab Mondays!

*Twirling **Bee** Buzzers!*

MoLab is excited to have the opportunity to stay in touch with our MoFamilies and continue to provide on-the-go, dynamic, hands-on, and inquiry-based science experiences through a mobile laboratory that promotes discovery. Our weekly activities will engage your little investigators with hands-on learning that proves anyone can think like a scientist.

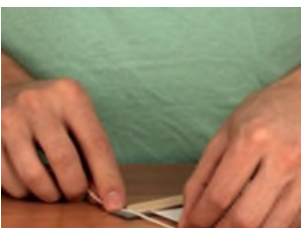
For our fourth MoLab Mondays!, we are going to explore sound and engineer a Twirling Bee Buzzer that will surely provide many moments of entertainment for the whole family. Your pets might get a kick out of it too! The materials that you will need should be easy to round up, or just improvise!

Tools & Materials:

- Index card
- Wide rubber band
- 2 adhesive backed foam pieces
- String or yarn
- Jumbo craft stick (tongue depressor)
- Scissors

Constructing Your Bee Buzzer

- Use the scissors to cut two of the corners off one of the long sides on the index card.
- Cut two pieces of adhesive foam. The pieces should be about 2 cm x 5 cm. If you don't have adhesive foam, try substituting cardboard and use glue as an adhesive.
- Place the jumbo craft stick on the long, uncut end of the index card. Only half (lengthwise) of the craft stick should be touching the index card.
- Fold one piece of the adhesive foam around the end of the craft stick and index card to hold them in place.
- Use the scissors to cut a length of string or yarn 1 meter in length. Lay the string across the second piece of adhesive foam. Leave 5-10 cm of string on one side of the foam.
- Fold the second piece of foam with the string around the other end of the craft stick and index card and tie a loop around the foam.
- Stretch a wide rubber band over each of the foam pieces ensuring that the rubber band isn't twisted.
- Twirl the Buzzing Noise Maker overhead. Be careful and keep an eye out for nearby objects!
- Confused? Check out these "in construction" pictures that we found super helpful!



Make Observations and Ask Your Student

- What happens when you change the twirling speed of the Buzzing Noise Maker?
- How does the pitch change when you shorten or lengthen the string?
- Can you twirl the Buzzing Noise Maker backwards? Why or why not?

What's Going On?

The buzzing bee like sound is produced when air moves over the rubber band causing it to vibrate against the craft stick. The best vibrations are created when the Bee Buzzer is moving parallel with your twirling motion. The design of buzzer is made so that the aerodynamic drag will keep the Bee Buzzer parallel to the air flow. Have fun perfecting your twirling technique!

When you twirl the Bee Buzzer faster, the vibrations on the band are increased and in turn the pitch of the sound is increased. Pitch is how high or low the noise sounds. Pitch is basically your ears' response to the frequency of sound. Frequency is determined by how fast the sound producing object vibrates. Frequency is the number of sound waves that move past a point in one second.

Dig a Little Deeper

Playing with your Twirling Bee Buzzer is obviously a great opportunity to explore the science of sound. Sound is a form of energy. Other forms of energy include thermal, electric, chemical, nuclear, solar, and light. Sound travels in waves. When an object vibrates it pushes the surrounding air molecules into one another starting a chain reaction of collisions through the air. These collisions travel in waves. When they strike your ear drum the vibration is converted into electrical signals that your brain recognizes as sound.

Unlike light waves, sound waves need something to travel through. What do they need? Matter! Matter is anything that takes up space. The three basic forms of matter are solid, liquid, and gas. Sound waves move through each of these mediums by vibrating the molecules. The molecules in a solid are arranged more tightly than in a liquid. Molecules in a gas are further apart than in a liquid. The spacing of the molecules enables sound to travel much faster through a solid than a gas. Sound travels about four times faster and farther in water than it does in air. This is why whales can communicate over huge distances in the oceans. Sound waves travel about thirteen times faster in wood than air. They also travel faster on hotter days as the molecules bump into each other more often than when it is cold.

Extension Activity Ideas

- Experiment by changing up the design or materials used to make a Bee Buzzer.
 - Try using different sizes of craft sticks, rubber bands, or even index cards.
 - Maybe try changing the shape of the index card. How will that affect the sound created?
 - Or, try a MoEducator's idea! She constructed a GIANT Bee Buzzer using half a file folder, a ruler, large rubber bands and string. It was pretty neat!

- Another idea to continue your exploration of sound science is to construct the classic shoe box guitar. You just need a shoe box, scissors, and rubber bands of various sizes. Which rubber band has the highest pitch? If you shorten the strings does it alter the sound? If so, how? There are tons of resources out there for this activity. Just google “easy shoe box guitar” – enjoy!



Happy Experimenting from MoLab, Inc!