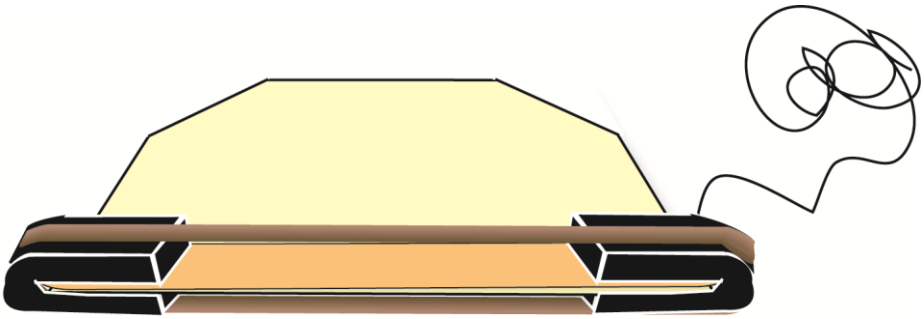
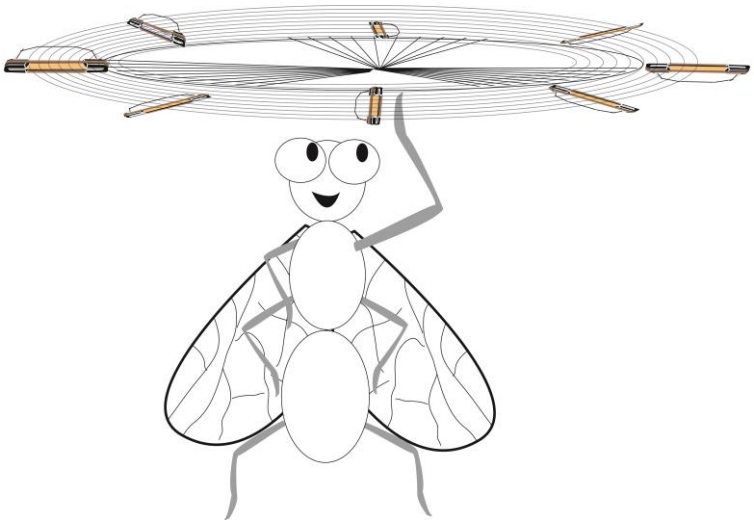
BUZZ OFF

The faster it whirls, the louder it buzzes!



Give this little noisemaker a whirl to learn about the effects of air passing over a taut rubber band. As it vibrates, the rubber band can generate a surprising range of deep rumbling tones. How can the pitch be changed? Experiment to find the answer!



Curriculum topics:

- Sound
- Waves
- Forces and Motion

Subject:
Physical Science

Grade range: K – 8

Who we are:

Resource Area for Teaching (RAFT) helps educators transform the learning experience by inspiring joy through hands-on learning

For more ideas visit
www.raft.net

WARNING:

CHOKING HAZARD—Small parts
Not for children under 3 yrs.

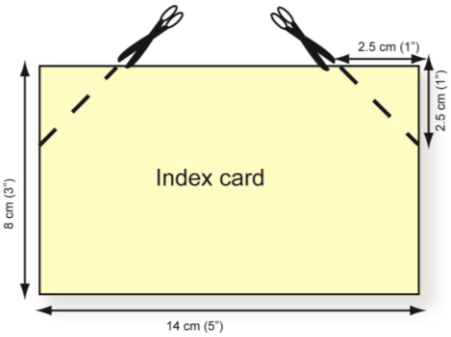
Materials required per device

- Wide rubber band (x1)
- Adhesive foam, each about 3/4” wide, 2” long, ⅛” thick (x2)
- 1 Index card, 3” x 5” (x1)
- String or yarn, 3 ft. (x1)
- Jumbo craft stick (x1)
- Scissors

Rubber bands contain Natural Rubber Latex which may cause allergic reactions.

How to build it

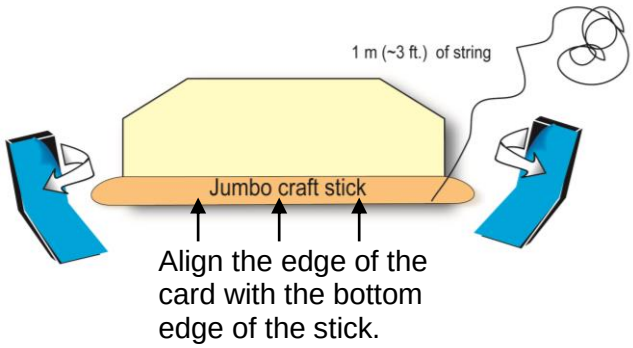
Note: **Also see the Illustrated Assembly Guide on page 4.**



1. Trim 2 corners from the long side of the index card. (right). Round off the corners to avoid sharp edges.

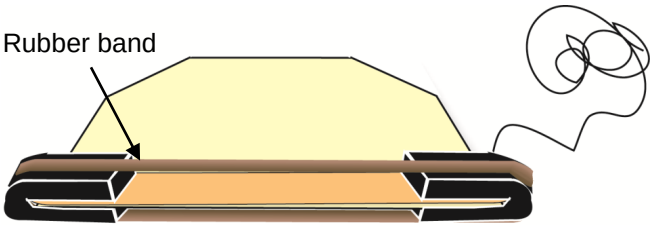
2. Place the jumbo craft stick on top of the index card. Align the stick with the long edge of the card.

3. Peel the backing from one piece of adhesive foam. Fold the foam over the end of the craft stick so that the craft stick, and the index card are joined (shown at right).



4. Peel the backing off the other piece of adhesive foam. Place the string across the adhesive side of the second foam piece, leaving a loose end of several inches. Place this foam piece over the other end of the craft stick in the same way as step 3. Tie a loop around the foam, making a secure attachment.

5. Stretch the rubber band over the foam covered ends of the craft stick as shown. Make sure the rubber band is not twisted.



To do and notice

After making sure the flight path is clear of objects, persons, and animals, hold the string and whirl the Buzz Off device in circles over your head. How does the sound change as the device is whirled at different speeds or in circles of different sizes? Change a variable and note the effect on the sound that is produced.

Troubleshooting tips: If the buzz is not very loud, try bending the craft stick or add another material to increase the gap between the rubber band and the stick. Try taping the edge of the card to the edge of the craft stick.

Curriculum Standards:

NGSS

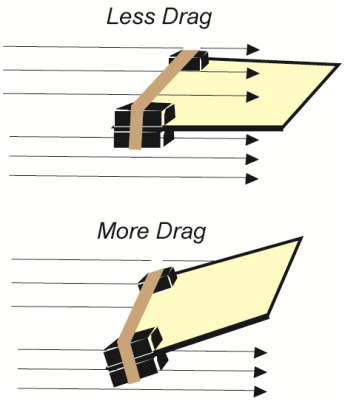
Sound, Wave Properties
1-PS4-1

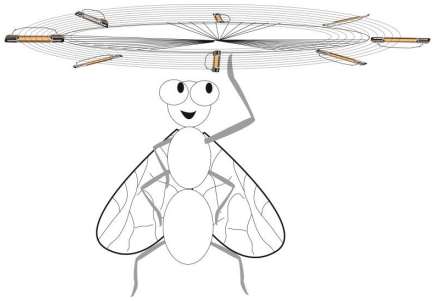
Information Technologies and Instrumentation
1-PS4-4

Definitions, Conservation, and Transfer of Energy
4-PS3-2

The science behind the activity

The air flowing above and below the rubber band causes the rubber band to vibrate. Vibration causes sound (outside of a vacuum). The rubber band will produce more sound when it is at the leading edge of the card with the card moving parallel to the direction of the airflow. Aerodynamic **drag** on the card keeps it and rubber band parallel to the airflow. The drag will increase if the card is at any other angle. The increased drag will automatically move the card back to being parallel with the airflow. The **frequencies** (rates of vibration per second) produced by the rubber band will depend on several variables such as the rotation speed, tension, and dimensions. The foam thickness and the size of the gap between foam pieces also affect the produced sound.





Learn more

- Try different sizes or numbers of rubber bands.
- Cut the index card into different shapes (for example, a fly).
- Stretch the rubber band so that the top and the bottom have different tensions.
- Put a thicker material between the rubber band and the foam. How does this change the sound?
- Does spinning the Buzz Off device in a circle over head (horizontally) make a different sound than swinging around off to the side (vertically)?

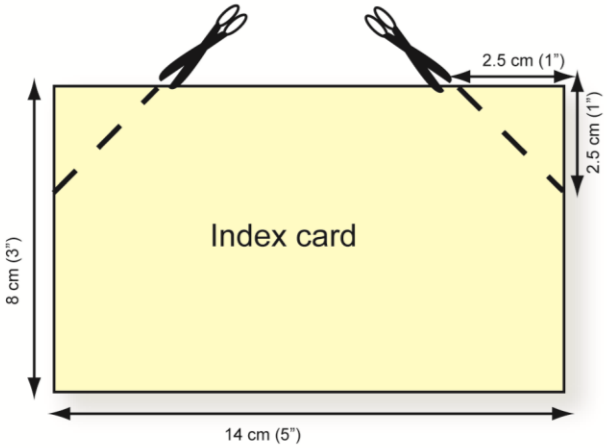
Visit https://raft.net to view the following related activities!

Caterpillar Crawl
Glove-a-Phone
Tongue Depressor Harmonica

Resources

- YouTube video (0:31), Rubber Band Vibrations - https://bit.ly/33QtQ0T
- YouTube video (3:58), What is Sound? - https://bit.ly/33PeyJP

Buzz Off Assembly Guide



Adhesive backed foam pieces -
minimum thickness - 3 mm (1/8")
prefered thickness - 6 mm (1/4")

1 m (~3 ft.) of string