

**Curriculum topics:**

- Sound
- Waves
- Forces and Motion

**Subject:**

**Physical Science**

**Grade range: K – 8**

**Who we are:**

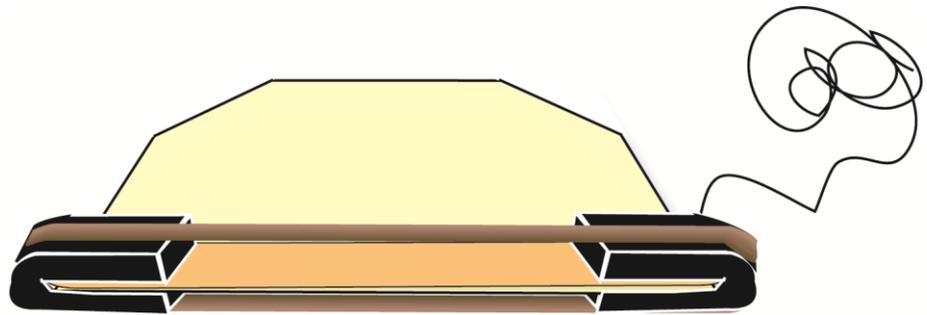
Resource Area for Teaching (RAFT) helps educators transform the learning experience through affordable “hands-on” activities that engage students and inspire the joy and discovery of learning.

For more ideas and to see RAFT Locations

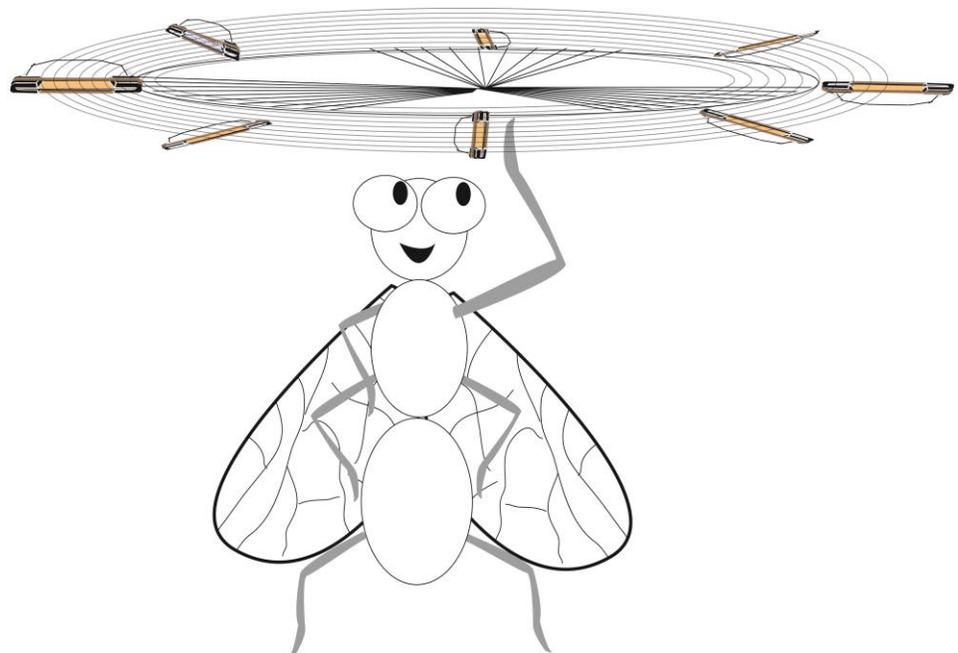
[www.raft.net/visit-raft-locations](http://www.raft.net/visit-raft-locations)

# 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!



**WARNING:**

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

# Materials required

Per unit:

- 1 Wide rubber band
- 2 Adhesive backed foam pieces: each piece approximately 1.8 cm (3/4") wide, 5.1 cm (2") long, and 3 mm (1/8") thick (Note: 1/8" thick foam is the minimum thickness that will work. 1/4" thickness is preferred.)
- 1 Index card ~8 cm x ~14 cm (3" x 5") or similar
- 1 meter (3 ft) String or yarn
- 1 Jumbo craft stick (tongue depressor)
- 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. (See figure 1.) 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 as shown in figure 2.
- 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 together (see figures 2 and 3).
- 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 second piece of foam 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. See figures 2 and 3.
- 5** Stretch the rubber band over the foam covered ends of the craft stick as shown. Make sure the rubberband is not twisted. See figure 3.

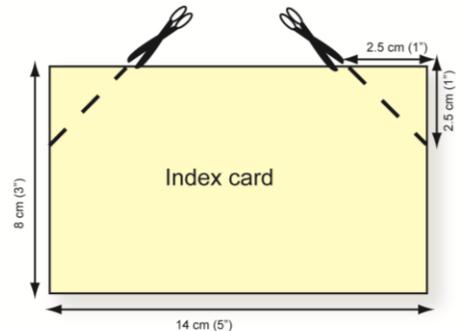


Figure 1

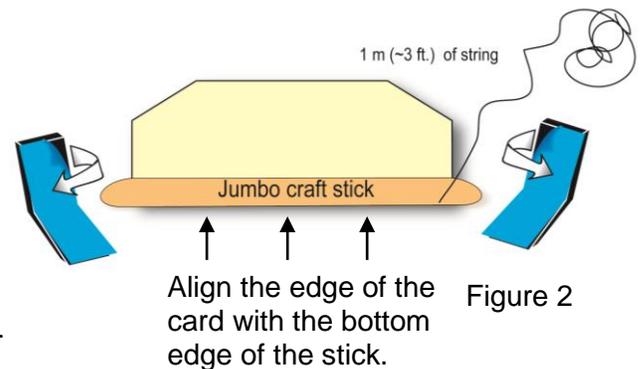


Figure 2

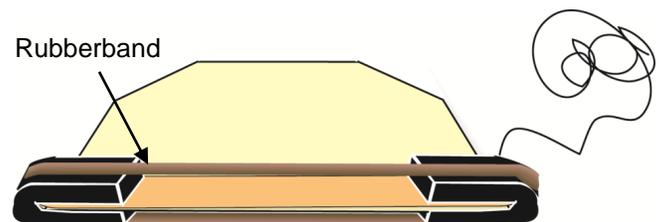


Figure 3

## 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 in circles over your head. How does the sound change as the Buzz Off 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 or big, try bending the craft stick to increase the gap between the rubber band and the stick. Also, try taping the edge of the card to the edge of the craft stick.*

## Curriculum Standards:

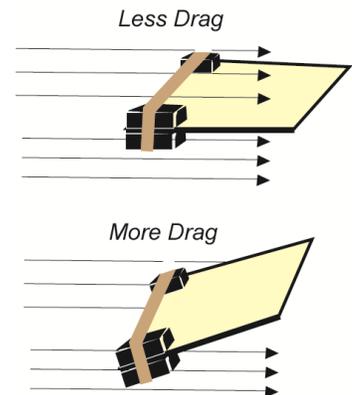
Sound  
(Next Generation Science Standards: Grade 1, Physical Science 4-1, 4-4)

Energy and sound  
(Next Generation Science Standards: Grade 4, Physical Science 3-2, 3-4)

Science Practices  
(Next Generation Science Standards: Grades K– 8)

# 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 the most sound when the rubber band 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 the card 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 produced by the rubber band will depend on several variables such as the rotation speed, the rubber band tension, the rubber band's dimensions, foam thickness and the size of the gap between foam pieces. A change in any of these variables can affect the sound that is produced.



## Learn more

- Try different sizes of rubber band or more than 1 rubber band.
- Have fun cutting the index card into different shapes (a fly?).
- Try stretching the rubber band so that the top and the bottom are at different tensions.
- What happens if the rubber band is twisted?
- Try putting a thicker material between the rubber band and the foam so that there is more distance between the rubber band and the craft stick. How does this change the sound?
- Does spinning the Buzz Off in a circle over head (horizontally) make a different sound than swinging around off to the side (vertically)?

**Related activities:** See RAFT Idea Sheets:

***Glove-a-Phone*** -

[www.raft.net/ideas/Glove-a-Phone.pdf](http://www.raft.net/ideas/Glove-a-Phone.pdf)

***Tongue Depressor Harmonica*** -

[http://www.raft.net/ideas/Tongue Depressor Harmonica.pdf](http://www.raft.net/ideas/Tongue%20Depressor%20Harmonica.pdf)

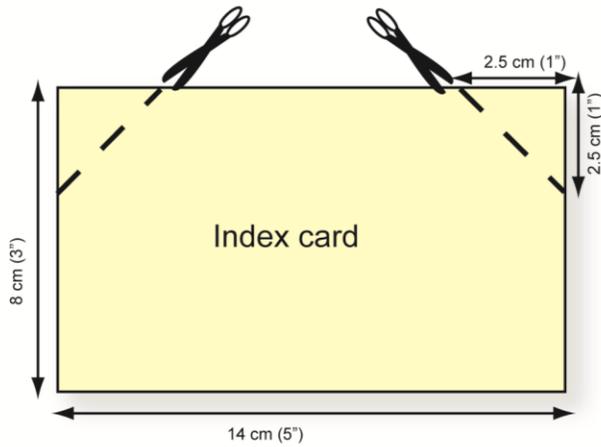
## Resources

Visit [www.raft.net/raft-idea?isid=19](http://www.raft.net/raft-idea?isid=19) for “how-to” video demos & more ideas! See these websites for more information on the following topics:

- **Historical version of the Buzz Off with background information** – [http://www.scritonscience.com/Wilson/physics/worksheets/practical physics/Lab making a bullroarer.pdf](http://www.scritonscience.com/Wilson/physics/worksheets/practical%20physics/Lab%20making%20a%20bullroarer.pdf)

Additional standards at:  
<http://www.raft.net/raft-idea?isid=19>

# Buzz Off Assembly Guide



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



1 m (~3 ft.) of string

