

**Curriculum topics:**

- Sound
- Waves
- Musical Instruments

**Subjects: Art, Life Science, Physical Science**

**Grade range: K – 8**

**Who we are:**

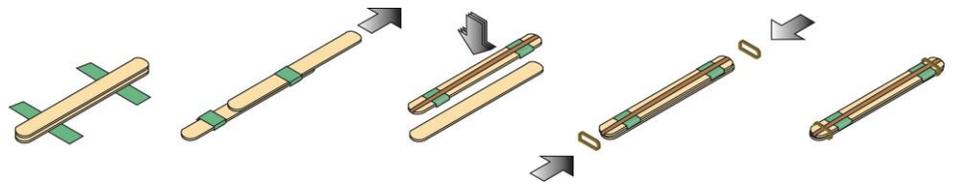
Resource Area for Teaching (RAFT) helps educators transform the learning experience through affordable “hands-on” activities that engage students and inspire the joy and discovery of learning.

For more ideas and to see RAFT Locations

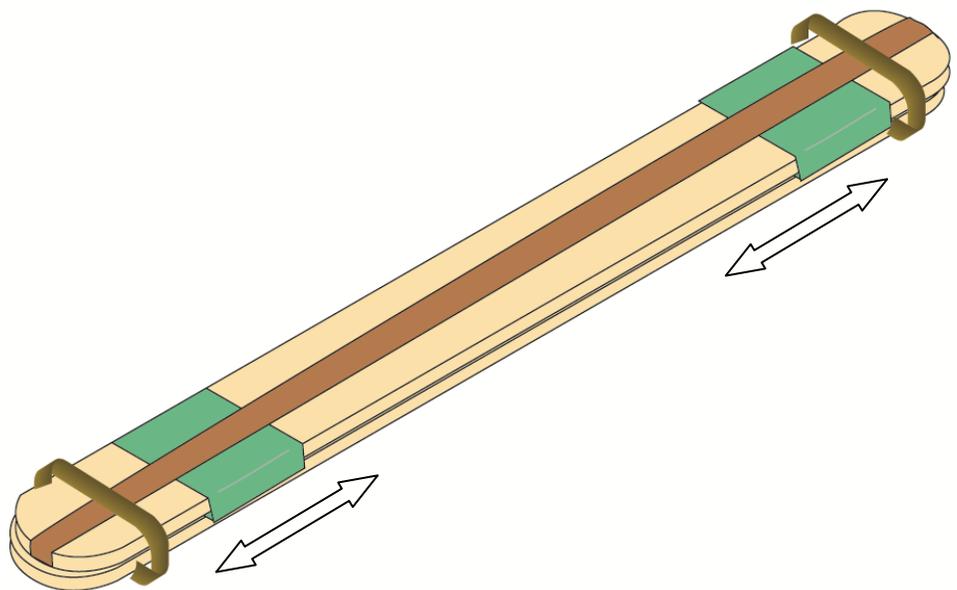
[www.raft.net/visit-raft-locations](http://www.raft.net/visit-raft-locations)

# TONGUE DEPRESSOR HARMONICA

Vibrations in the air create sound



People of all ages love the Kazoo-like sounds that come from this fun-to-make and easy-to-play instrument. The RAFT harmonica uses a rubber band vibrating between tongue depressors to make sound. Changing the length of the rubber band changes the sound. Start your own harmonica band today!



# Materials required

Per Harmonica:

- 2 jumbo craft sticks (tongue depressors)
- 2 cardstock strips about 2 cm x 8 cm ( $\frac{3}{4}$ " x 3")
- 2 small rubber bands 1-2 mm ( $\frac{1}{16}$ " wide)
- A long, wide rubber band [size 64, 6 x 87 mm ( $\frac{1}{4}$ " x  $3\frac{1}{2}$ ") or similar]
- Tape

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



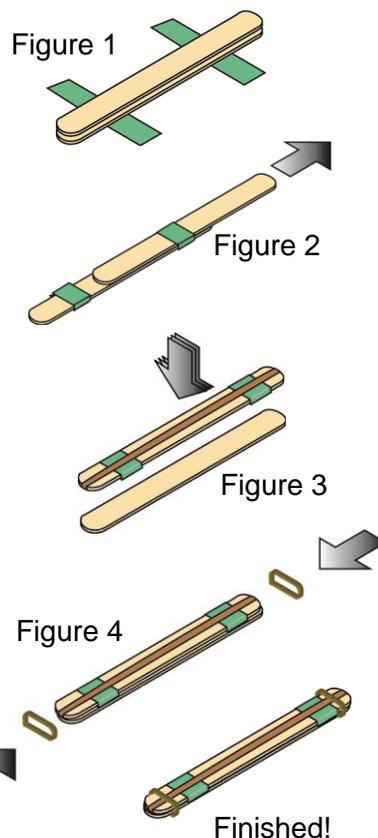
**WARNING:**

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

Check craft sticks for splinters – use only smooth sticks for this project.

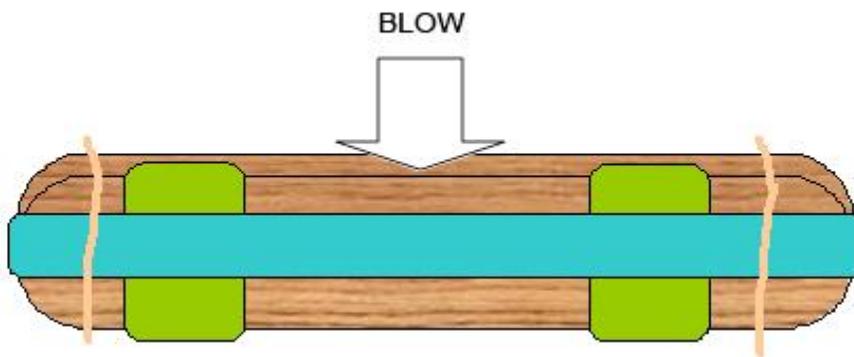
## How to build it

- 1 Stack the jumbo craft sticks (tongue depressors) together. See figure 1.
- 2 Create 2 “sliders” by wrapping 2 cardstock strips around the stack of 2 craft sticks and securing the ends with tape. See figure 2.
- 3 Remove one of the craft sticks and save to use in step 5. Check to make sure the sliders move freely. See figure 2.
- 4 Stretch the wide rubber band lengthwise around the craft stick and sliders. Make sure it is flat. See figure 3.
- 5 Stack the craft stick with the rubber band on top of the plain craft stick. See figure 3.
- 6 Wrap small rubber bands around each end of the craft sticks, as shown. See figure 4.



## To do and notice

- 1 Blow on the side of the harmonica into the gap between the craft sticks and the two sliders.
- 2 Move the sliders together or apart. Blow hard, and then blow softly. Does the sound change?



# The science behind the activity

Sound is caused by **vibrations** that travel in the form of **waves** through a medium (such as air) and into the ear. For the Tongue Depressor Harmonica, the **pitch**, or frequency, produced is equal to the number of times per second (**hertz**) that the rubber band vibrates. Higher pitched sounds are created by waves with a higher frequency. Players can change the pitch by moving the slider(s) or blowing with varying speeds. In general, a shorter length of material (string, rubber, metal) will vibrate more quickly (at a higher pitch) than longer lengths. When the sliders are closer together, the pitch will be higher.

The airflow around the rubber band will also affect the sound. The air flowing above and below causes the rubber band between the craft sticks to vibrate due to air turbulence. The rubber band, like most objects, has a **natural frequency** at which it vibrates most easily.

## Learn more

- Use a thicker slider to increase the distance between the craft sticks. How will this change affect the sound? Build a sample and find out!

Experiment with other RAFT music makers:

### ***2-Tubaphones -***

<http://www.raft.net/ideas/2-Tubaphones.pdf>

### ***Cap Maracas -***

[www.raft.net/ideas/Cap Maracas.pdf](http://www.raft.net/ideas/Cap%20Maracas.pdf)

### ***Finger-Phone -***

<http://www.raft.net/ideas/Finger-Phone.pdf>

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

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

### ***Hand Chimes -***

[www.raft.net/ideas/Hand Chimes.pdf](http://www.raft.net/ideas/Hand%20Chimes.pdf)

### ***Pan Pipes -***

[www.raft.net/ideas/Pan Pipes.pdf](http://www.raft.net/ideas/Pan%20Pipes.pdf)

### ***Straw Oboes -***

[www.raft.net/ideas/Straw Oboes.pdf](http://www.raft.net/ideas/Straw%20Oboes.pdf)

### ***Straw Noisemakers -***

[http://www.raft.net/ideas/Straw Noisemakers.pdf](http://www.raft.net/ideas/Straw%20Noisemakers.pdf)

### ***VHS Shamisen -***

[http://www.raft.net/ideas/VHS Shamisen.pdf](http://www.raft.net/ideas/VHS%20Shamisen.pdf)

## Curriculum Standards:

Senses  
(Next Generation Science Standards: Grade 4, Life Science 1-2)

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)

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

Science & Engineering Practices  
(Next Generation Science Standards Grades K – 8)

Playing classroom instruments  
(CA Music Standards: Creative Expression, 2.0; Grades K-8)

Additional standards at:  
<http://www.raft.net/raft-idea?isid=442>

## Learn more (continued)

Experiment with other RAFT sound makers, and explore sound waves:

### ***Ballooniacs*** -

<http://www.raft.net/ideas/Ballooniacs.pdf>

### ***Back in the Groove*** -

<http://www.raft.net/ideas/Back in the Groove.pdf>

### ***Buzz Off*** -

[www.raft.net/ideas/Buzz Off.pdf](http://www.raft.net/ideas/Buzz Off.pdf)

### ***Match the Sounds*** -

[www.raft.net/ideas/Match the Sounds.pdf](http://www.raft.net/ideas/Match the Sounds.pdf)

### ***Making Waves*** -

[www.raft.net/ideas/Making Waves.pdf](http://www.raft.net/ideas/Making Waves.pdf)

### ***Preform Sound Tubes*** -

<http://www.raft.net/ideas/Preform Sound Tubes.pdf>

### ***RAFTy Rainsticks*** -

<http://www.raft.net/ideas/RAFTy Rainsticks.pdf>

### ***Rubber Trumpet*** -

[www.raft.net/ideas/Rubber Trumpet.pdf](http://www.raft.net/ideas/Rubber Trumpet.pdf)

### ***Sound Shakers*** -

[www.raft.net/ideas/Sound Shakers.pdf](http://www.raft.net/ideas/Sound Shakers.pdf)

### ***Sound String*** -

[www.raft.net/ideas/Sound String.pdf](http://www.raft.net/ideas/Sound String.pdf)

## Resources

Visit [www.raft.net/raft-idea?isid=442](http://www.raft.net/raft-idea?isid=442) for “how-to” video demos & more ideas!

See these websites for more information on the following topics:

- **Harmonicas** – [http://www.musicfolk.com/docs/Features/Feature\\_Harmonica.htm](http://www.musicfolk.com/docs/Features/Feature_Harmonica.htm)
- **Turbulence** – <http://hyperphysics.phy-astr.gsu.edu/hbase/pturb.html#turb>