NC SCIFEST
PRESENTED BY BIOGEN FOUNDATION

DUKE ENERGY SCIENCE NIGHT

Sound Sandwiches

Big idea

Build a noisemaker and discover why we can hear and sometimes *feel* sound.

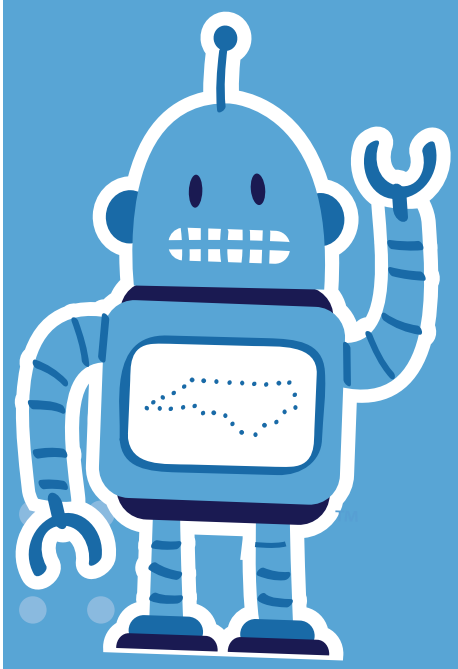
You will need

WHAT WE GAVE YOU:

- jumbo craft sticks
- big rubber bands
- little rubber bands
- straws
- Sound Sandwiches instructions

STUFF YOU PROVIDE:

- scissors



Set it up

Cut the straws into pieces a little longer than the width of the jumbo craft sticks (1-1 ½ inches long). Lay out the materials in order from left to right: jumbo craft sticks, big rubber bands, straws, little rubber bands. Place the instructions on the table. It's a good idea to make your own Sound Sandwich as an example. This way the students can see the finished product, and you get a chance to make sure you understand the instructions as well as anticipate any issues children may have assembling their Sound Sandwiches.

It's showtime!

Help students build their Sound Sandwiches according to the instructions. Younger children may have difficulty wrapping the small rubber bands around the ends of the craft sticks. Encourage family to help with this part. Once they are built, encourage them to experiment with their Sound Sandwiches.

NOTE: Things to look for if a Sound Sandwich isn't making noise –

1. Check to make sure the large rubber band is around only one of the craft sticks – not both.

2. Make sure the rubber bands on the ends are wrapped tightly, pressing the two craft sticks together.

3. Watch to see that they are blowing air between the two craft sticks – not into the straws.

Fun options

DURING SCIENCE NIGHT

Ask kids if they can play a recognizable song on their Sound Sandwich. It's hard for one person to do it, but see what happens if each person sets his or her sandwich to play a different note. Kids can work together to play a simple song like "Twinkle, Twinkle, Little Star" if they each have one note to play.

Continued ›

SCIENCE FOR ALL • CIENCIA PARA TODOS •

DUKE ENERGY SCIENCE NIGHT

Sound Sandwiches

Why is this science?

In order to understand how musical instruments create sound, you need to know a little bit about the physics of **sound waves**. Sound is the **vibration**, or back-and-forth movement, of air particles. We hear sound when those vibrations hit our eardrums. All sound is created by vibration, but not all vibrations are made in the same way. You can make vibrations by hitting something (like a drum, or stomping your foot), by plucking something (like a guitar string) or by using your breath to make vibrations in a column of air (like playing the flute or horn).

In the Sound Sandwich, what's vibrating? The big rubber band sandwiched between the two craft sticks. When you blow through the sound sandwich, you force air through the space created by the straws, and that air makes the big rubber band vibrate. The movement of the rubber band makes the air move, and that movement of air is what we hear as sound.

Sound can have pitch, meaning how high or low it sounds. Moving the straws closer together makes the pitch higher, because a shorter portion of the rubber band is vibrating. Moving the straws farther apart makes the pitch lower, because a longer portion is vibrating. Think about big instruments versus small ones: the double bass makes much lower sounds than the violin, and the tuba is much deeper than the trumpet. A longer vibration makes a lower sound.

North Carolina connection

Imagine the sound you'd get from a Sound Sandwich 456 times bigger than the one you just made! Well, you may not have to imagine. Suspended 1 mile above sea level, the Mile High Swinging Bridge at Grandfather Mountain in Linville, NC could be renamed the Mile High Singing Bridge. Rebuilt in 1999 with galvanized steel and additional support cables, the bridge no longer sways as much as it used to, but has the unintended side effect of "singing" in high winds. Strong winds whipping around the bridge cause it to vibrate, similar to the vibrations you produced with your Sound Sandwich. And just like your Sound Sandwich, these vibrations make tones that have been described as singing or whistling noises. Locals report that the singing can sometimes be heard a mile away!

Listen to a recording of the Mile High "Singing" Bridge at Grandfather Mountain:
https://freesound.org/people/rodincoil/sounds/271530/

N&C SCIFEST

PROUDLY PRODUCED BY

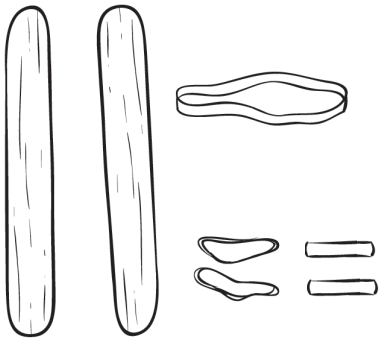
MOREHEAD PLANETARIUM+ SCIENCE CENTER

DUKE ENERGY SCIENCE NIGHT

Sound Sandwiches

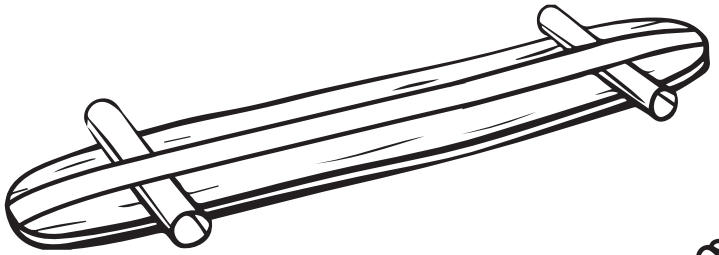
Supplies

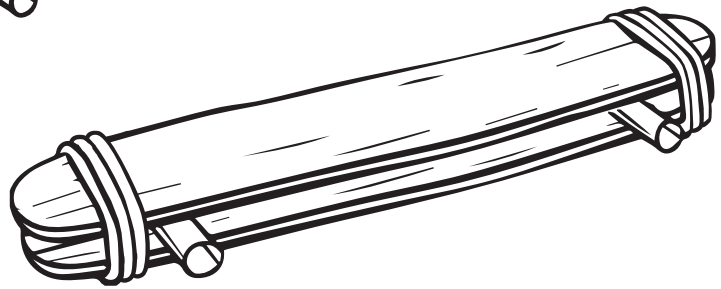
- 2 jumbo craft sticks
- 1 big rubber band
- 2 little rubber bands
- 2 inch-long straw pieces



What to do

1. Wrap the big rubber band long-ways around one of the jumbo craft sticks.
2. Slide the two straw pieces under the rubber band and push one toward each end of the craft stick.
3. Stack the second craft stick on top of the straws.
4. Wrap the little rubber bands around the ends of the craft sticks to hold the stack together.





Play your Sound Sandwich

Purse your lips (like you are about to say “pop”) and blow between the two craft sticks.

Experiment with your Sound Sandwich

Try moving the straws closer together and blow through the middle again. Did moving the straws change anything?