

Make your own box guitar and learn how stringed instruments create sound!

Standards listed on next page

Supplies:

***Supplies Available, order [here](#)**

- Empty box (ex. shoebox)
- Rubber bands of different sizes*
- Science logs (paper and pen)

Objective

Using a DIY box guitar, explore and identify the ways string instruments produce sound and what qualities of the strings determine pitch.

Outline of Video

1. Learn about the ways that a typical string instrument is played, such as the guitar.
2. Make a hypothesis about our upcoming experiment using the following questions:
 3. Will the different sized rubber bands produce different sounds?
 4. Students should write hypothesis down to refer back to later
5. Make the box guitar:
 6. Stretch the rubber bands carefully around the box, spreading them out across the length of the box.
7. Use the box guitar to test your hypothesis:
 8. Pluck each rubber band individually to examine the sound it produces and compare to the other rubber bands.
 9. Write the observations down.
10. Raise your hand if your rubber bands produced different sounds based on size.
11. Observe effects of pressing the rubber band while plucking
 12. Write another hypothesis for the following question: Does the pitch go higher or lower when you press on the rubber band while plucking?
 13. When trying this, we observe the pitch gets higher when pressing the rubber band. This is due to the increased tension.
14. Review what sound is and how it moves. (vibration / longitudinal waves)
 15. Notice whether you can see the vibrations in the rubber bands when they are plucked.
16. Explore different ways you can play the guitar—how many different sounds can you make?

17. Review the 3 ways sound is changed on string instruments: the length, thickness, and tightness of the string. Before Ms. Liz demonstrates, consider: whether a thicker string would produce a higher or lower pitch compared to a thinner string. (05:27)
18. Just like we watched on the guitar, take your box guitar and try to affect the sound by changing each of the three string characteristics: thickness of string, length of string, and tightness of rubber band. (You can swap rubber bands out as you explore).
19. Write a hypothesis to the question: could you produce sound with just a rubber band and no box?
20. Try this by stretching a rubber band across your hand. Notice it does produce sound, but much quieter.
21. Answer the question: why do you think the sound is louder with the box?
22. The container acts as a resonator for the sound.
23. Watch examples of different string instruments
24. DIY: Try making a rubber band guitar out of a different container at home!

Kentucky Standards:

K-PS2-1, K-PS2-2. Simple tests can be designed to gather evidence to support or refute student ideas about causes.

KPS2-1. Scientists use different ways to study the world.

KLS1-1. Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.

K-LS1-1. Patterns in the natural and human designed world can be observed and used as evidence.

K-ESS3-3. Events have causes that generate observable patterns.

K-PS3-1. Make observations (firsthand or from media) to collect data that can be used to make comparisons.

K-LS1-1. Scientists look for patterns and order when making observations about the world.

1-PS4-1 Science investigations begin with a question. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

2-PS1-4. Scientists search for cause and effect relationships to explain natural events.

3-LS1-1. Patterns of change can be used to make predictions.

3-LS2-1. Construct an argument with evidence, data, and/or a model.

3-LS3-2, 3-LS4-2. Cause and effect relationships are routinely identified and used to explain change.

4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-PS3-4. Science affects everyday life.

Ohio Standards:

K.PS.2: Some objects and materials can be made to vibrate and produce sound

3.PS.3: Heat, electrical energy, light, sound and magnetic energy are forms of energy.

5.PS.2 Light and sound are forms of energy that behave in predictable ways.