

STEM Program



Make a Guitar

Sound Waves - Magic of Music

Explore soundwaves and the magic of music by creating your own guitar using items from around your house.

Suited to Section



Joey Scouts



Cub Scouts



Scouts



Venturer Scouts



Rover Scouts

Key SPICES Growth



SOCIAL



PHYSICAL



INTELLECTUAL



CHARACTER



EMOTIONAL



SPIRITUAL

Challenge Area



COMMUNITY



PERSONAL GROWTH



OUTDOORS



CREATIVE

Likely Scout Method Elements



COMMUNITY INVOLVEMENT



LEARNING BY DOING



NATURE AND THE OUTDOORS



PATROL SYSTEM



PERSONAL PROGRESSION



PROMISE AND LAW



SYMBOLIC FRAMEWORK



YOUTH LEADING, ADULTS SUPPORTING

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Plan

1. Investigate how string instruments work, especially how different notes are produced. Depending on your section, you may find these websites useful as a starting point: <https://method-behind-the-music.com/mechanics/strings/> and <https://www.bbc.co.uk/teach/class-clips-video/music-science-ks2-how-string-instruments-make-sound/zfmd7nb>
2. Investigate instrument tuning and methods of tuning.
3. Investigate different approaches to making a guitar at home and how these may differ to commercial guitars. There are a range of websites that outline how to make a guitar at home such as <https://www.sciencebuddies.org/stem-activities/rubber-band-guitar> and https://www.3m.com/3M/en_US/gives-us/education/science-at-home/tune-up-your-rubber-band-guitar/. These websites also often explain some of the science behind guitars.
4. Determine how many strings you would like your guitar to have and collect the necessary supplies. Most guitars have 6 strings but 4, 7, 8, and 12 string guitars also exist. If you are working with your patrol, you may like to make one of each type to see how they compare.
5. Make sure that you and any patrol members that you are working with have read and understood the safety section and that you have a supervising adult, if required.

Do

1. Make your guitar using a set of instructions that you have found or by following the instructions below in steps 2-5.
2. Take an empty tissue box and remove any plastic from the inside of the hole.
3. To make the handle of your guitar, attach either the cardboard tube inside of a roll of paper towel to one of the short ends of the tissue box or attach a ruler to the back of the tissue box, using tape or glue. If you are using a cardboard tube, you should make about 8 five-centimetre-long cuts about equally apart into one end of the tube. You can then fold these tabs over to help you join the tube to the box.
4. Glue two pencils, pop sticks, pens, or other similar objects parallel to each other on either side of the hole in the top of the box. The two objects should be the same height and close to the edge of the hole. If you are making a 4-string guitar, it would likely be best to place these objects parallel to the short ends of the box whereas for guitars with more strings, it would be best to place these objects parallel to the long ends of the box.
5. Gently pull a series of rubber bands, equal to the number of strings you want your guitar to have, over the box so that they rest on the objects. Ideally, your rubber bands should be of different thicknesses.
6. Decorate your guitar as desired.
7. Hold your guitar by the handle and pluck one of the rubber bands, paying attention to the sound made. Work your way through the strings and listen to which ones make a higher pitched sound, etc.

8. Press one of the rubber band strings down against the object and pluck the string again. Does this make a difference to the sound?
9. Explore what happens if you pluck more than one rubber band at a time.

Review

1. Did your guitar work as you expected it to? Why or why not?
2. What did you enjoy the most from making and playing with your guitar? What did you learn?
3. If you were to do this activity again, what would you do the same? What would you do differently? How could you improve your guitar? Do you think you could tune your guitar?
4. What do you think would happen if you changed the size of the hole in the box or changed the size of the box?

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Variations

- Experiment with different types of strings and different plucking techniques and methods, such as a guitar pick.
- Try and play a song with your guitar.
- This challenge card pairs nicely with other challenge cards from the Magic of Music theme such as 'Make Glasses/Glass Bottles Sing' and 'Make an Idiophone', or other soundwave related challenge cards. In your patrol, you could make a range of instruments and play them together. Think about what other instruments that you may be able to make.

Safety Tips

- Sharps warning: If you are using the cardboard roll for the handle of your guitar, you will be using scissors and therefore there is the risk of cuts. Younger sections should have appropriate adult supervision.
- Be careful with rubber bands as if looped too tight onto limbs, etc, they can impair circulation. Rubber bands can also be used as projectiles that, if not careful, may pose a danger to eyes. Never shoot a rubber band in the direction of someone else.

Why Does This Happen?

String instruments produce sound through the vibrations of their strings. Different lengths, tightness, and thickness of the strings affect the pitch of the sound produced. For instance, thicker strings produce a lower sound than thinner strings. These vibrations are then amplified by the sound box of the instrument.

SciScouts Physics of Waves

The SciScouts Physics of Waves is a National Science Week project, undertaken in collaboration with Fizzics Education. These instructions were prepared by Scouts for Scouts. This National Science Week project is supported by the Australian Government.

Scouting has always been strong on STEM skills. Maths to calculate catering quantities and navigate, the science of water purification, the physics of abseiling, and the engineering of pioneering structures – they all have their place. In the current program for our youth members, STEM and Innovation forms one of six Special Interest Areas that enable Scouts to set goals and pursue their own ideas.

