STEM Program

Make Glass Bottles Sing

Sound Waves – Magic of Music

Music can be found all around us if you know where to look. Did you know that you can make glass bottles sing? This challenge card is similar to 'Make Glasses Sing' but is more appropriate for younger sections.

Suited to Section

Joey Scouts | Cub Scouts | Scouts | Venturer Scouts | Rover Scouts

Challenge Area

COMMUNITY | PERSONAL GROWTH | OUTDOORS | CREATIVE

Key SPICES Growth

SOCIAL | PHYSICAL | INTELLECTUAL | CHARACTER | EMOTIONAL | SPIRITUAL

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

STEM Program

Make Glass Bottles Sing

Plan

1. Investigate friction and vibrations and how sound waves interact with different materials such as air and water. You might also want to investigate how moisture affects friction.
2. Investigate the concept of resonance and hypothesise why this might be important in music. You may also like to look at how an opera singer can break a glass with just their voice!
3. Examine how sound waves are measured and at what frequencies humans can hear. You might also want to look at factors that affect the frequencies that we can hear and why, and what frequencies different animals can hear.
4. Read the safety section of this challenge card and make sure that everyone is aware of the safety risks and requirements.
5. Collect all the necessary materials for your experiment.

Do

1. Place an empty glass bottle on a flat surface and half fill with water.
2. With a metal spoon, gently tap the side of the bottle and observe what happens. What sound is made? Does the sound differ if you hit above or below the water line?
3. With your mouth at the same level as the top of the bottle, gently blow across the top of the bottle and observe what happens. Does it make the same or different sound than when you hit the bottle with a spoon?
4. Fill some more bottles of the same size with varying levels of water and line the bottles up from fullest to emptiest.
5. Starting at the fullest bottle, gently tap each bottle and compare the notes produced.
6. Tune your bottle xylophone to a scale (think ‘do re mi fa sol la ti’) by adding or removing water.
7. Try playing a song with your bottle xylophone. If you are working in a patrol, each patrol member could play one bottle. Some suggested songs are provided in the supplementary information.

Review

1. Did you manage to get your bottles to sing? If you didn’t, what do you think you could change to make it sing? If you did, did you find it challenging? Did it get easier with practice?
2. What did you enjoy the most from making bottles sing? 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 singing bottles?
4. Do you think the type of liquid in the glass might make a difference to the note produced?

STEM Program

Make Glass Bottles Sing

Variations

- Make your singing glasses colourful by adding some food colouring to each glass. This is especially effective if your glass bottles are clear.
- This challenge card pairs nicely with other challenge cards from the Magic of Music such as 'Make a Guitar' and 'Make an Idiophone' or other challenge cards about sound waves. 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. To add an extra sciencey challenge to your glass xylophone, try playing the periodic table song (https://www.youtube.com/watch?v=rz4Dd1l_fX0) or another science-based song.
- Try making a xylophone using the same amount of water but different size bottles. Does this affect the sound?
- Try gently tapping the glass bottles with a different utensil or object. Does a knife or fork make a different sound to a pencil? Why might this be?

Safety Tips

- Sharps/glass warning: This challenge card uses glass and therefore there is the risk of breakage and cuts. Supervise younger sections around glass and if glass is broken, get an adult to safely clean the glass up.
- Slips and Spills: This challenge card uses water. As such, it should be performed in an area that can tolerate spills, but care should be taken if spills occur so that slipping does not occur.

Why Does This Happen?

Tapping the glass bottle or blowing air across the top of the bottle creates vibrations, or sound waves, which travel differently through different substances, meaning that these sound waves will travel differently through the glass, water, and the air. As such, different water levels and different bottles create different vibrations and sound waves and therefore different sounds.

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.

SciScouts PHYSICS

Fizzics Education Since 2004 Innovative Science Shows & Workshops!

national science week 2022

An Australian Government Initiative

Inspiring AUSTRALIA

STEM Program

Make Glass Bottles Sing

Sound Waves – Magic of Music – Supplementary

Once you have made your glass bottle xylophone (or glass xylophone), you can try and play some songs. With the right notes, you can play any song that you like but here are some suggestions to get you and your patrol started. These songs are designed for a six-bottle xylophone but depending on the song, they may be able to be played with fewer bottles.
Before you play, number your bottles from 1 to 6, with 1 being the fullest bottle, which will produce the lowest note, and 6 being the emptiest bottle. These numbers will correspond to which bottle is played in the music below.

Twinkle Twinkle Little Star
1 1 5 5 6 6 5
4 4 3 3 2 2 1
5 5 4 4 3 3 2
5 5 4 4 3 3 2
1 1 5 5 6 6 5
4 4 3 3 2 2 1

Jingle Bells
3 3 3
3 3 3
3 5 1 2 3
4 4 4 4
4 3 3 3
3 2 2 3 2
5

We Will Rock You
4 3 2 1
2 2
2 2

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.