

STEM Program



Build an Ear

Sound Waves - How Do We Hear?

Build a human ear and learn about how we hear sound, see if you can demonstrate how sound waves move through the structures of our ear allowing us to hear.

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 sound and how it travels. Can you come up with a creative way to visualise how sound travels? Can you feel sound? Try placing your hand on a speaker playing loud music and observing what you feel.
2. Investigate the human ear, focussing on structure and function. What parts make up our ears? What is the role of each part in helping us hear? How does sound pass through each part of the ear?
3. Come up with a plan for your ear model. What elements of the ear will you incorporate and how? Check out these models for inspiration:
<https://sciencing.com/make-model-ear-children-5833451.html>
https://www.123homeschool4me.com/ear-anatomy-science-project_86/
https://www.youtube.com/watch?v=Ybt5y_OjunU
4. Collect the materials required for the activity. Communicate with your patrol and leaders if you need to bring items from home.
5. Read the safety requirements and discuss with you leaders/adults supervisors what supervision and safety requirements might be needed.

Do

1. Work as a patrol to build your model ear! Younger sections may want to focus on building an eardrum and seeing how sound can make it vibrate. Older sections may want to challenge themselves and attempt to convert sound waves to an electrical signal.
2. Remember to be creative! There are lots of things around your home and Scout Hall that could represent different parts of the ear. Remember, your model can be much bigger than a real ear.
3. Your goal is to make a functional model. You should be able to show how a sound wave moves through the different parts of the ear allowing us to hear. How will you demonstrate to your unit your model in action?
4. As a unit, take turns sharing your ear models. Discuss what each patrol did well, as well as ways they could improve their ear model. Demonstrate the process of hearing a sound.

Review

1. What have you learnt about sound during this activity? How do our ears work to hear sound?
2. Could you demonstrate hearing a sound with your ear model? How might you improve your ear model for next time?
3. If you were to do this activity again, what would you do the same? What would you do differently? What did you enjoy most about this activity?
4. Each part of our ears has a special role to play in helping us hear. What parts of the ear did you include in your model? What does each of these parts do to help you hear?

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Variations

- A larger program can be built using other 'How Do We Hear' or sound wave challenge cards.
- Now that you've made a functional model, can you make a model that resembles the structures of the ear? Set yourself a creative challenge to make an ear model with arts and craft supplies that looks as much like an ear as possible.

Safety Tips

- The safety hazards and protection needed will be highly dependent on the resources you choose to use during this challenge card to build your model. For example, using scissors will introduce a sharps hazard. Talk to your leaders and patrol about what safety issues might arise during this activity and systems or supervision you need to set up to keep safe.

Why Does This Happen?

Every part of our ear plays an important role in hearing, from the parts we can see, all the way to the connections within our brain. The ear can be broken into three main sections: the outer ear, middle ear, and inner ear. The outer ear consists of the pinna (the part we can see), and the ear canal. The outer ear helps to collect and funnel sound waves from our environment into the ear. The sound then reaches our middle ear which is made of the eardrum and ear bones. Sound waves cause the eardrum to vibrate which then passes the vibrations onto the ear bones. The three ear bones, known as the hammer, anvil, and stirrups, pass the vibrations along, like a set of dominos knocking into each other. Finally, the vibrations reach the cochlea in the inner ear. The cochlea, which looks a little bit like a snail shell, is full of fluid. When the vibrations from the middle ear reach the cochlea, they cause the fluid inside to move. This movement is detected by tiny hairs inside the cochlea which then pass the sound message onto our auditory nerves and brain, allowing us to hear. The inner ear also has some other important parts that have other functions. What are these other parts and what do they do? Why do you sometimes get dizzy when you have an ear infection?

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.

