Robogals Science Challenge

SCIENCE CHALLENGE

Minor Challenge - Activity Sheet

STEM Field	Biomedical Engineering
Challenge Name	Make An Ear Trumpet
Challenge Level	Intermediate
Project Cost (approx)	0 - 20 USD

Materials Required	• Cardboard tubes (e.g. paper towel rolls)
	• Plastic funnel
	• Plastic bottles
	  ◦ Ask an adult to cut the bottoms off each bottle
	• Disposable cups
	  ◦ different materials to compare effects (paper, plastic, styrofoam)
	• Segments of clear plastic tubing
	  ◦ ~1.5 cm diameter, and ~10-15 cm in length
	• Scissors
	• Tape
	• Blu-tack or modelling clay

Safety	• Complete this activity with an adult • Do not put small objects near or in your ear
Duration (approx)	2 hours

Introduction

The human ear can hear a wide range of sounds. However, hearing can become weaker because of age, injury, or illness. Today, many people use hearing aids to help them hear better. In the past, people used a device called an **ear trumpet** to make sounds louder.
An ear trumpet had a large, funnel-shaped end that collected sound waves and directed them down a narrow tube into the ear. This helped make sounds easier to hear by increasing their **amplitude** (loudness).

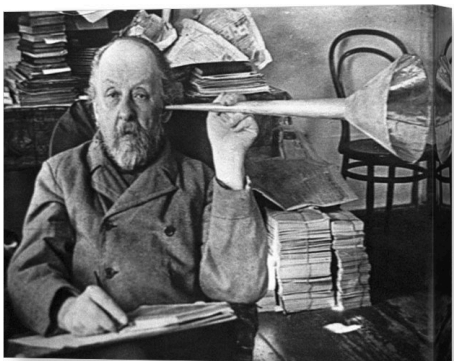
Two important sound words to understand are:

- Amplitude – how loud or soft a sound is
- Pitch – how high or low a sound is

For example:

- A jet engine is high amplitude (loud) and low pitch.
- A buzzing fly is low amplitude (quiet) and high pitch.

In this experiment, you will design, build, and test your own ear trumpet to see how well it amplifies different sounds.



Instructions

Part 1: Investigating Sound

1. Listen carefully to your surroundings.
2. Write down at least five different sounds you hear.
3. For each sound, describe whether it is:
    - High or low amplitude (loud or soft)
    - High or low pitch

You can include background noises or create sounds using objects around you.

Part 2: Build Your Ear Trumpet

Using the materials provided, build your first ear trumpet.

Your design should include:

- One large funnel-shaped end to collect sound
- One smaller end that fits near your ear

Think about:

- The size of the funnel
- The length of the tube
- The material you are using

What features might help focus sound more effectively?

Instructions

Part 3: Test Your Design

Test your ear trumpet using the sounds you recorded earlier.

- Does your device make all sounds louder?
- Are some sounds amplified more than others?
- Do high-pitch or low-pitch sounds work better?

Record your observations carefully.

Extension: Improve Your Design

Engineers rarely get things perfect the first time!

Think about changes you could make, such as:

- Increasing or decreasing the funnel size
- Changing the length of the tube
- Using a different material

Modify your design and test it again. Compare your results:

- Which design increased amplitude the most?
- Did any changes affect pitch?
- Which version worked best overall?

Reflection Questions

- How could you improve this challenge or your design?
- What real-world uses can you think of for this type of device?
- What science concepts (like sound waves or energy) are involved?
- What engineering skills (like testing, redesigning, and problem-solving) did you use?
- What changes affected the loudness (amplitude) of sounds the most?
- Did your ear trumpet work better for high-pitch or low-pitch sounds? Why do you think that is?

Submission Guidelines

📷 Submit clear photos of:

- Your ear trumpet design
- Your testing setup
- Any modifications you made

📝 Include a short summary (1–2 paragraphs) that:

- Explains how your ear trumpet works
- Answers several of the reflection questions

The submission form is at the bottom of the following webpage: https://sciencechallenge.org.au/index.php/minor-challenges/

Note: If you want to include yourself in the pictures of your Minor Challenge, make sure you ask your parent or guardian first to see if it's okay.

Learn More! Resources

How do birds make do without external ears?
https://www.huffpost.com/entry/birds-ears-hear-external_n_6314760

Learn more about how hearing work -
https://health.howstuffworks.com/mental-health/human-nature/perception/hearing.htm

Bibliography

- What was that? (no date) Neuroscience for Kids - Hearing Experiments: https://faculty.washington.edu/chudler/chhearing.html