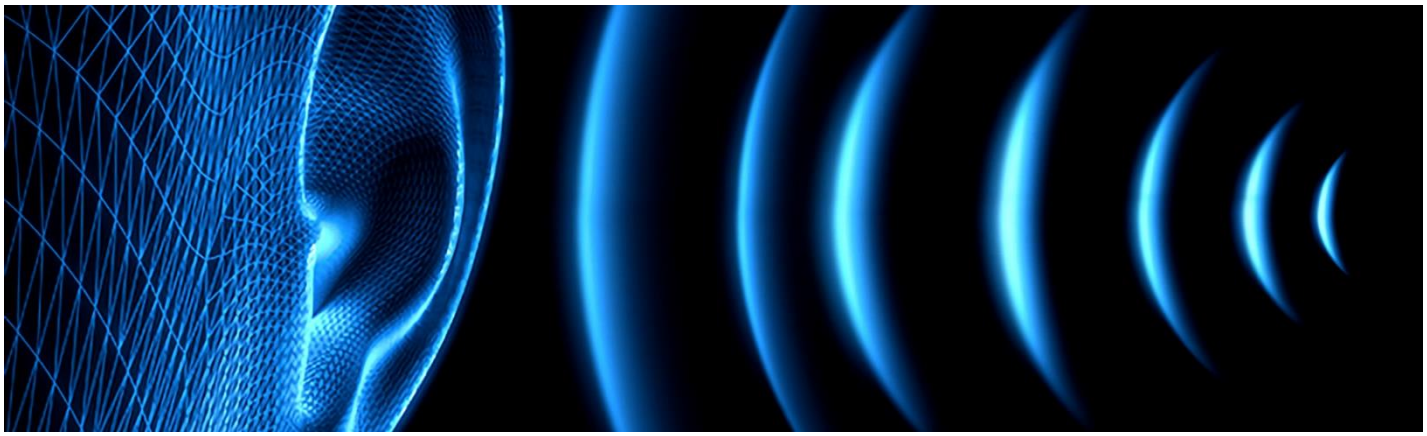
EUREKA!

the national children's museum

The Science of Sound Show



Information for teachers and group leaders

What will the show involve?

In this 30min show we'll explore the fascinating world of sound, from vibrations to pitch and everything in between. Containing a mix of presenter led and volunteer demonstrations as well as full audience participation this is a fun way of introducing the topic or consolidating knowledge for KS2 groups.

Is there anything I need to do to prepare the children before the visit?

Not particularly. It can be helpful if children have been doing something about this topic at school but not essential.

Risk assessment

- Please visit our website education.eureka.org.uk/resources to download both the general museum risk assessment and the one for your chosen session.
- We advise you to make a preview visit to carry out your own risk assessment for the overall visit.

Evaluation

Eureka! constantly aims to improve its programmes for school groups and feedback from adults and children is an essential part of this. We value all comments made and will always try our best to act upon them. You will be sent a link to an online survey following your visit and we'd be extremely grateful if you could complete and return as soon as possible.

Additional resources & information

The following pages contain various supporting resources and information related to the science show.

Please find the following documents in this pack:

- **Teacher's assessment chart** - *this outlines the aims and objectives of the show and their learning outcomes.*

The Science of Sound Show Learning Outcomes

Aims and objectives – by the end of this science show children should have learned:

- That sound is a type of energy caused by vibrations.
- That sound travels in all directions in sound waves.
- How the anatomy of the ear works that allows us to hear sounds.
- That sound needs a medium to travel through and travels faster through solids and liquids because the molecules are closer together.
- That amplitude is a measurement of sound vibrations and links to volume. The bigger the vibration = the bigger the amplitude = the louder the sound.
- That an echo is when a sound bounces back, and we hear it again as a separate sound.
- That animals like bats and dolphins use echolocation to navigate.
- How the pitch of a sound changes depending on how fast or slow the vibrations are.
- That frequency is a measurement of sound vibrations and links to pitch. The faster the vibration = the higher the frequency = the higher the sound.
- That scale is a group of notes arranged in order of pitch.

Overview: Through a series of interactive activities, powerpoint presentation and discussion, children will learn about sound.	
Activities	**Learning Outcomes**
Introduction to the show	*That sound is a type of energy caused by vibrations and travels in sound waves.* *How the anatomy of the ear works that allows us to hear sounds.*
Game using volunteers to show how sound travels through different mediums	*That sound needs a medium to travel through and travels faster through solids and liquids because the molecules are closer together.*
We use a gong to show how the size of the vibration determines if a sound is loud or quiet.	*That amplitude is a measurement of sound vibrations and links to volume. The bigger the vibration = the bigger the amplitude = the louder the sound.*
By using a slinky we demonstrate the travelling of sound waves and those waves bouncing back. The whole class participates in an echolocation game.	*That an echo is when a sound bounces back, and we hear it again as a separate sound.* *That animals like bats and dolphins use echolocation to navigate.*
Water xylophone demo to show how the pitch of sound changes.	*How the pitch of a sound changes depending on how fast or slow the vibrations are.*
Handbell challenge – can the class put the handbells in order of scale from low to high	*That scale is a group of notes arranged in order of pitch.*

Follow-up activities to try with your class.

Paper cup and string phone

A classic experiment to show how sound travels.

What you will need:

paper cups
Long string, like fishing line or kite string
A sharp pencil or needle to poke holes in the cups
Scissors

What to Do:

1. Start by cutting the string into long pieces. The longer the better to really make the demo work. At least 15m if you have the space!

2. Poke a small hole at the bottom of each cup.

3. Using each end of the string, thread it through the bottoms of the cups, tying a large knot so that the string does not fall out of the cup. If you make the holes too large, use a washer or paper clip to hold the string in place so that it does not pull out of the cup.

4. Pull the string taut and have one person speak into one of the cups whilst someone else listens at the other. Be sure that the string does not touch any other object and that it remains suspended in air as you complete the experiment.

5. Tell the children to take turns talking into the cup, while the other person listens by putting the cup to their ear. Can they repeat what the other person has said?

What's happening?

Speaking into the cup transmits the sound of the speaker's voice into the bottom of the cup. The bottom of the cup acts as a diaphragm and vibrates with the sound of the speaker's voice.

As the bottom of the cup vibrates, it transmits the vibrations into the taut string. The sound travels along the string as a longitudinal wave and ultimately vibrates the bottom of the receiving cup. The cup transmits the sound into the air around the listener's ear, allowing them to hear the speaker.

Because the sound travels through solid mediums – the cup and the string – it travels more effectively than through air, allowing the users to communicate across large distances with volumes that would be inaudible if spoken through air.

Follow-up activities to try with your class.

Make a rubber band guitar.

Make a simple guitar to show how sound is caused by vibrations and how the pitch of sound can be changed.

What you will need:

Long tissue box with a single hole in the top

Assorted rubber bands

2 x pencils

What to do:

1. Remove any plastic liner from the hole of the tissue box.
2. Wrap a rubber band around the tissue box so it goes across the hole. Whether you do this length-wise or width-wise depends on the size of your rubber band.
3. Slide the two pencils under the rubber band, on each side of the hole.
4. Pluck the rubber band with your finger. *What do you hear?*
5. Try adding rubber bands of different lengths and/or thickness to your guitar. Pluck them. *Do they sound different?*
6. After you pluck a rubber band, touch it with your finger to make it stop vibrating. *What happens?*
7. Try moving the pencils closer together or further apart. *How does this change the sound?*

What's happening?

When you plucked the rubber band, you made it vibrate. This caused the nearby air molecules to vibrate, creating a sound wave that travelled to your ear. Your brain interpreted these vibrations and you heard the sound.

The pitch of the rubber bands in your guitar depends on how thick they are, how tightly they are stretched, and the length of the vibrating section between the pencils.

The thinner the rubber band, the tighter it is stretched, and the shorter the length of the vibrating section, the higher the pitch will be.

By carefully manipulating these variables (for example, using rubber bands that are all the same length, but different thickness) you can create a rubber band guitar with multiple "strings" that each have a different pitch.