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| **Balloon Speakers** |
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| Using a balloon to amplify sound |
| **Subject(s):** Science**Approx time:** 20 - 30 minutes |  | **Key words / Topics:** * Air
* Amplify
* Balloon
* Pressure
* Sound
* Speakers
* Vibrations
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| **Suggested Learning Outcomes**  |  |  |
| * To know that vibrations from sounds travel through a medium to the ear.
* To use a balloon as a simple speaker and explain how it works.
* To understand how pushing air closely together affects the volume of sound travelling through it.
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| **Introduction** |  |  |
| This is one of a set of resources developed to support the teaching of the primary national curriculum. They are designed to support the delivery of key topics within maths and science. This resource focusses on using a balloon as a simple speaker to amplify sound.Speakers are used to make sure sounds are clear and easy for us to hear. They are used everywhere from music players to phones. In this activity you will find out how they work! |
| **Purpose of this activity**In this activity learners will investigate how a balloon can be used as a simple speaker. They will blow up the balloon, tap it and listen to how the sounds travel through it. They will then discuss the outcome of their experiment and explain why the balloon speaker works in the way that it does.This activity could be used as a starter activity to introduce the concept of sound and how it travels, or as one of several activities within a wider scheme of learning focussing on sound. |
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| **Activity** |  | **Teacher notes** |
| **Introduction (2-5 minutes)**Teacher to explain that learners are going to make a simple speaker using a balloon and investigate how it works. Teacher to hand out the balloons to learners.**Blowing up the balloon (2-5 minutes)**Teacher to demonstrate how to blow up and tie the balloon with the aid of the teacher presentation. Learners to complete this step. The balloon should be blown up fully and tied (or held) so that no air can escape.**Turning the balloon into a speaker and testing it (5-10 minutes)**Learners to hold one side of the balloon up to their ear. They should then use their finger to lightly tap the other side of the balloon. Learners to consider the following questions, using the teacher presentation as a prompt:* What happens when you tap the balloon?
* What can you hear and feel?
* Why do you think this is happening?

**Discussion of findings (5-10 minutes)**Teacher to lead discussion of the findings of the experiments and the observations of the learners. Teacher to explain why and how the balloon speaker works as it does. |  | This activity could be done as individuals or in pairs.**Blowing up the balloon**Tying the end of a balloon can be tricky. If learners struggle to do this, it is sufficient for the purposes of the experiment to simply hold the end so that the air does not escape. Alternatively, the teacher could complete this step in advance for the learners or provide clips to seal the balloons. The following website shows how to tie a balloon correctly. <https://www.wikihow.com/Tie-a-Balloon> **Turning the balloon into a speaker and testing it**This step could be done in pairs with one learner holding the balloon and the other tapping it, and then swapping over afterwards.Learners should hear the sound of the tapping loudly and clearly through the balloon. They should also feel the vibrations from the sound. Learners could also try this with balloons of different sizes and explain the differences in what happens.**How the balloon speaker works**When air is blown into the balloon it is pushed closely together as it is stuck within a small space – this increases the air pressure. This allows the sound to travel better than if it was going through the air outside of the balloon. This is similar to how a speaker works.  |
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| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| Blow up and tie the balloons in advance. Use the website <https://www.wikihow.com/Tie-a-Balloon> to assist with blowing up and tying the balloons.Recap prior to the activity how sounds are made through something vibrating, and that these vibrations travel through a medium to the ear. |  | Repeat the experiment with balloons of different sizes. How does this affect how the balloon speaker works? Why does this happen?Release the balloon and the air from it (this would be best done in an open space) – what direction does the balloon fly in and why? |
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| **Resources** |  | **Required files** icon-docicon-pdficon-ppt |
| * Balloons
 |  |  Teacher presentation – Balloon speakers |
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| **Additional websites** |  |  |
| * **WikiHow – How to tie a balloon:** Step by step instructions for how to blow up and tie a balloon. <https://www.wikihow.com/Tie-a-Balloon>
* **Bitesize - Sound and vibration:** Comprehensive set of learner guides and video clips covering the topic of sound. <https://www.bbc.co.uk/bitesize/topics/zgffr82>
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| **Related activities (to build a full lesson)** |  |  |
| **Starters** (Options) * Write down as many different uses for speakers as you can e.g. phones, music players, TVs etc on a post it note and place on the board.
* Recap how sounds are made through something vibrating, and that these vibrations travel through a medium to the ear.
 | **Extension** (Options)* Repeat the experiment with balloons of different sizes.
* Release the balloon and observe what direction the balloon flies.
* ACTIVITY – Beat it out!

**Plenary*** Discuss why and how the balloon speaker works as a class or in small groups.
* Produce a short written explanation of the findings of the experiment.
* Quickfire ‘quiz’ of key learning from the activity.
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| **The Engineering Context** film |
| * Engineers must understand how speakers work in order to successfully design products that use them, such as phones, music players and TVs.
* Sound engineers must understand how sound can be amplified and transmitted from one place to another. For example, at a concert. Understanding how speakers work is a very important part of this.
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| **Curriculum links**  |
| **England: National Curriculum**ScienceKS2 Year 4 Sound:* identify how sounds are made, associating some of them with something vibrating
* recognise that vibrations from sounds travel through a medium to the ear
* find patterns between the volume of a sound and the strength of the vibrations that produced it
* recognise that sounds get fainter as the distance from the sound source increases.
 | **Northern Ireland Curriculum**KS2 – The world around usMovement and energy:* the causes and effect of energy, forces and movement.
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| **Scotland: Curriculum for Excellence**SciencesVibrations and waves:* SCN 2-11a
 | **Wales: National Curriculum** ScienceKS2 – How things work:* how different sounds are produced and the way that sound travels.
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| **Assessment opportunities** |
| * Questioning of learners to check understanding of how the balloon speaker works.
* Quickfire ‘quiz’ of key learning from the activity, with results formally assessed.
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