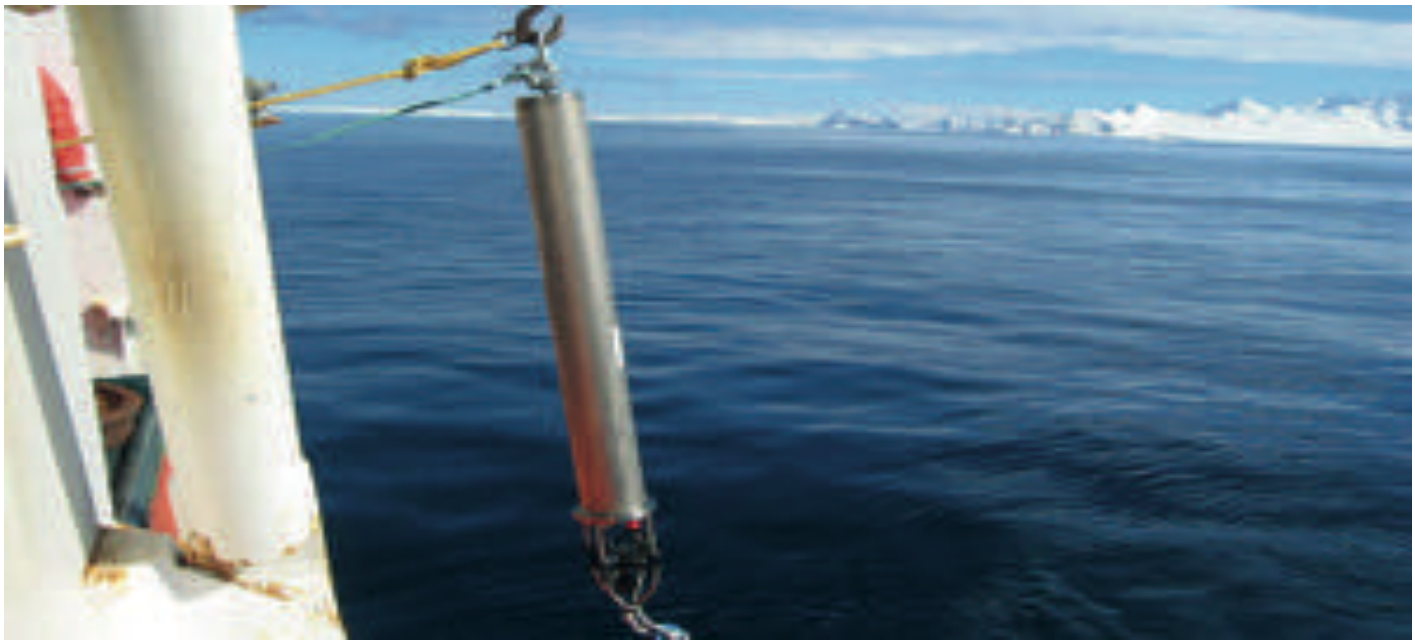
The Ogden Trust

making physics matter

Phizzi practical

Age 7-9 years

Make a hydrophone



Introduction

When learning about what sound can and can't travel through, children are often curious about whether sound travels through liquids and may ask the question 'Does sound travel through water?' If your class has a swimming lesson that week you will have a perfect opportunity to carry out a test but if not, then the ideal classroom-based alternative is for children to make and test their own hydrophone.

Scientific explanation

A hydrophone is a device used for listening to underwater sounds and was first used by Colladon and Sturm in 1826 for their experiment at Lake Geneva to measure the speed of sound in water. Vibrations travel through water as sound waves which cause the water to alternately undergo compression (squash together becoming denser) and rarefaction (expand becoming less dense). Sound vibrations travel through the water until they are detected by a receiver such as the human ear or a hydrophone. Modern hydrophones are electronic underwater microphones that can measure and record the sounds they detect and are used to study marine mammals and investigate how sounds from the shipping industry affect underwater habitats.

Sound travels faster in liquids than in gases, but it travels the fastest in solids.

Equipment needed

- A two litre plastic bottle
- A large washing up bowl or sink full of water
- Craft knife (for adult use only)
- Scissors
- Two solid objects eg wooden spoons or rocks

Method

1. With adult help, cut the bottom off the plastic bottle, approximately 5cm from the base to make the hydrophone.
2. Fill the washing up bowl or sink with water almost to the top.
3. Working in pairs, child A will tap the two solid objects together underwater while child B listens carefully to observe the sound.
4. Child B will then place the open base of the hydrophone in the water and put their ear to the bottle opening while using their other hand to block their other ear.
5. Child A taps the two objects together again while child B observes how the sound has changed when listened to through the hydrophone.

Working scientifically

This practical activity can help to form part of a comparative test where children investigate sound travelling through a variety of materials. The Marvin and Milo cards from the Institute of Physics have other tests that could be included such as **Silent Bell, Sound of Gas, Musical Coat Hanger** and **Laser Slinky**; children can also develop their own tests to find out if sounds travel through materials in their classrooms and playground.

Using the Ogden Trust **research cards**, the children could carry out a research enquiry to find out how our ideas about sound have changed over time and to find out more about how Colladon and Sturm used their hydrophone.

Teaching tip

Children could explore whether their voices travel clearly through water by making two hydrophones. One of the hydrophones is placed in the water for listening by child A (as described in the method) while the other is placed with the bottle opening in the water and the open base of the bottle pointing upwards so that child B can whisper into it. Child A can listen carefully to see if they can hear child B's voice.

The cut edge of a plastic bottle can be sharp and covering it with tape can make it more comfortable for being held against the face and reduce the chance of scratches and injury.