# *Sound and hearing* **Teacher background notes**

**In this investigation, sound and hearing are investigated in the context of the many sources of sound sensed in the environment and how this sound is sensed.**

## [Australian Curriculum: Science links](http://assist.asta.edu.au/resource/2977/sound-and-hearing-cle)

## Learning intentions

Students will be able to:

* identify that sound is produced by vibrations and can be sensed
* demonstrate that sound can travel through a range of materials
* produce, identify and compare sounds using a range of objects
* identify and sort sounds using volume as a criterion
* identify and sort sounds using pitch as a criterion.

## Suggested time for this CLE

The time needed to complete the *Sound and Hearing* CLE will depend on the depth of the prior knowledge of the students, the time to perform the three investigations – ‘Making sounds and listening’, ‘Sound energy travels through a solid material’, ‘Sensing the volume and pitch of sound’ and any follow up with any further extension activities. Allow 3–4 hours.

## New concepts to be introduced

* **Sound can be produced by a range of sources**

The sound produced by a range of objects is defined by various frequencies and pitches. Musical instruments produce sounds that are identified as notes. These notes are produced in a predictable way to make music. Banging two sticks together produces a different sound to that of splashing water.

* **Vibrations produce sound**

Vibrating objects cause vibrations in objects and substances they are in contact with. Sound travels through solids, liquids or gases (such as air). So, if you beat a drumstick on a drum, the resulting vibrations will travel through the air around it. When you stop beating the drum with the stick, the vibrations in the air (that were set up from this event) will also stop. In a string toy telephone, the speaker’s voice directed into a cup will cause the taut string to vibrate. The sound wave produced travels along the string to the air in the cup of the listener.

* **Sensing the volume and pitch of sound**

Vibrating objects produce sound. We hear sounds because vibrations travel through the air from the source of a sound to our ears. The ear is an organ with structures that sense sounds. The brain can discriminate the pitch of a sound, that is, how high or how low a given sound is and the volume of a sound from the vibrations picked up by the ear. The volume of a sound is a measure of how much energy a sound has.

Sources of sound have **volume** and **pitch,** which our ears are able to sense. The energy of the vibration of a sound determines the **volume** or how loud the sound is. The unit of measurement for the loudness of sounds is the decibel. The volume of sound can be measured on a decibel scale. The softest sound a normal functioning human ear can hear is chosen as zero decibels. The sound of a jet plane taking off may measure between 110 and 140 decibels. Sounds in excess of 120 decibels may cause pain.

Sounds may have different pitches. The **frequency** (speed) with which an object vibrates determines the pitch of the sound. Fast vibrations produce high-pitched sounds, whereas slow vibrations produce low-pitched sounds.

While conducting investigations into sound and hearing, students may articulate alternative concepts about sound to our scientific understanding about sound energy and how it may be sensed. Purposeful and effective teaching interventions will assist and support student understandings and skill development.

## Possible misconceptions

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| **STUDENTS MAY THINK…** | **INSTEAD OF THINKING…** |
| Sound is a physical substance that is made of particles. | Sound is a form of energy that moves through and vibrates a substance such as air. |
| Sound only travels through air. | Sound produces vibrations that may travel through any continuous solid, liquid or gaseous substance. |
| The function of the visible outer ear is the hearing part of ears. | When an ear senses sound, structural parts of an ear (outer, middle, inner) vibrate however the brain interprets the sounds. |
| Sound travels through space. | Sound cannot travel through space because there is no matter to vibrate. |

## Links to further information

Further teaching and learning discussions on investigating sound and hearing can be found in the following links:

‘Investigating Sound and Hearing’, Victorian Department of Education and Training website <http://www.education.vic.gov.au/school/teachers/teachingresources/discipline/science/continuum/Pages/soundlearn.aspx> (2013)

Academy of Science, 2012, Primary Connections, ‘Look! Listen! Year 1 Physical sciences’ <http://www.scootle.edu.au/ec/viewing/S7156/look-listen-2012/index.html>