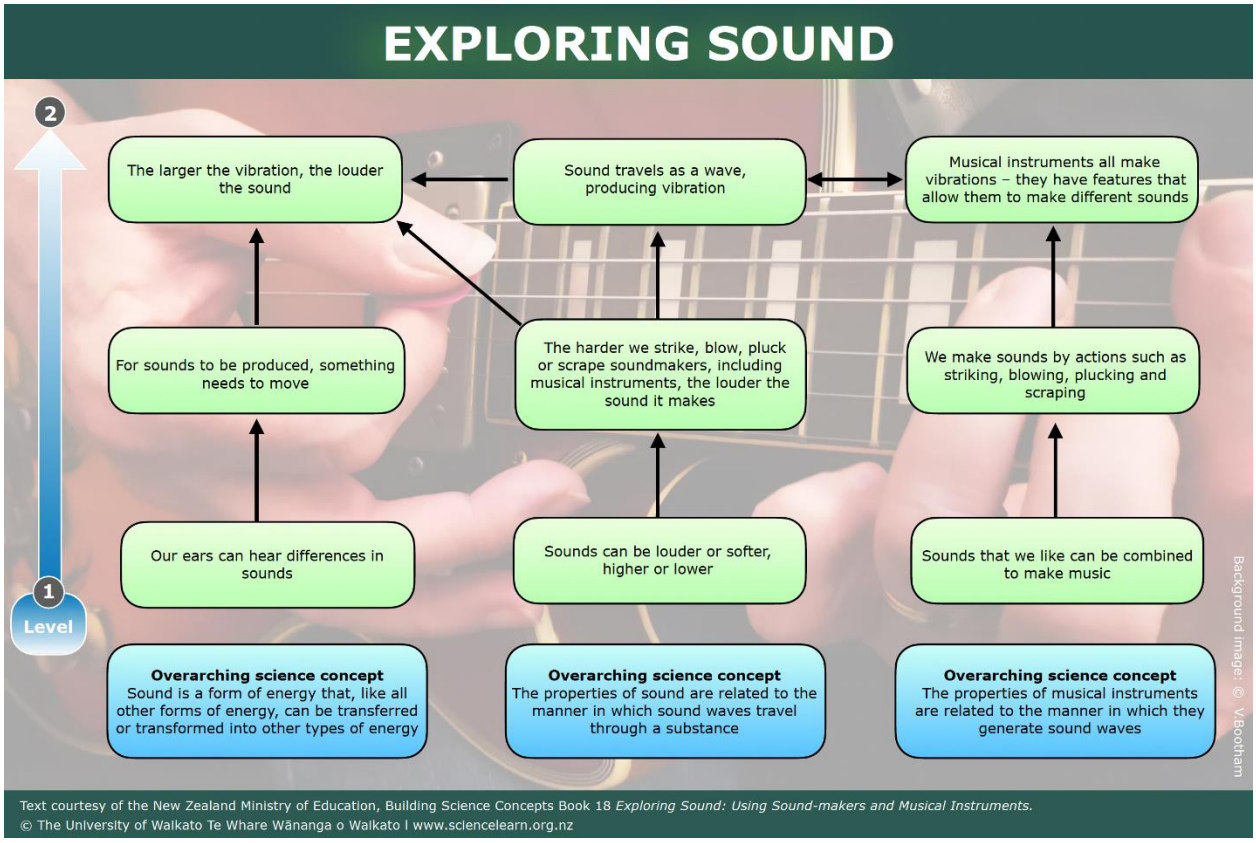
Exploring sound



This interactive diagram explores the sequential and interlinking concepts that underpin knowledge about sound, sound waves and music.

The concepts listed just above the overarching concepts reflect learning at New Zealand Curriculum level 1 and show how they may build in sequence to level 2. The overarching science concepts are fully developed concepts and might not be achieved until level 7 or 8.

The text is courtesy of the New Zealand Ministry of Education's Building Science Concepts Book 18 *Exploring Sound: Using Sound-makers and Musical Instruments*. The links to Hub resources provide additional background information and classroom activities that will support teachers to scaffold the development of their students' conceptual understanding about sound and how it travels. The activities provide a means to initiate discussions, check student thinking and consolidate student understanding.

The article Building Science Concepts: Exploring sound provides additional science and pedagogical information.

Index

The larger the vibration, the louder the sound

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Sound is a form of energy. To create sound, you need to make vibrations. We can change the size of these vibrations to make them bigger or smaller. This changes the loudness or volume of the sound.

Volume – louder and softer

The size of the vibration (also called amplitude) determines the volume. The amplitude of the vibration carries the energy. A big vibration causes large sound waves that transmit a lot of energy. The resulting volume of sound is loud – for example, a balloon bursting or a dog barking. A small vibration causes small sound waves that carry less energy.

Related articles

- Building Science Concepts: Exploring sound
- Measuring sound
- Can you hear that? – *Connected*

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- Hearing sounds
- Musical sounds
- Investigating movement and sound with a pūrerehua

For sounds to be produced, something needs to move

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Sound is a form of energy. To create sound, you need an input of energy in the form of movement. Striking, scraping or blowing into an object makes it vibrate. These changes in pressure create waves of vibrations that move both the object and the substance surrounding it – usually air. If the vibrations reach our ears, we hear a sound. If there is no movement, no vibrations are created and no sound is made.

Related articles

- Sound – visualising sound waves
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- Creating soundscapes
- Sound detectives

Our ears can hear differences in sounds

chutidechchaisab, 123RF Ltd

Sound waves are picked up by our ears. The waves travel via our outer ear to our inner ear, where they are converted to electrical impulses. The electrical 'messages' travel along the auditory nerves to our brain, which interprets them as sound.

Three things are needed for sound to be heard:

- A source – something that makes the sound – movement is needed.
- A medium – something for the sound to travel through – gas, liquid or solid.
- A receiver – something to detect the sound – for example, our ears.

Changes to the source or medium changes the sounds we hear. We are able to detect changes in direction, volume and pitch.

Related articles

- Human hearing
- Hearing
- Hearing sound
- Can you hear that? – *Connected*

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- Cross-section of the human ear

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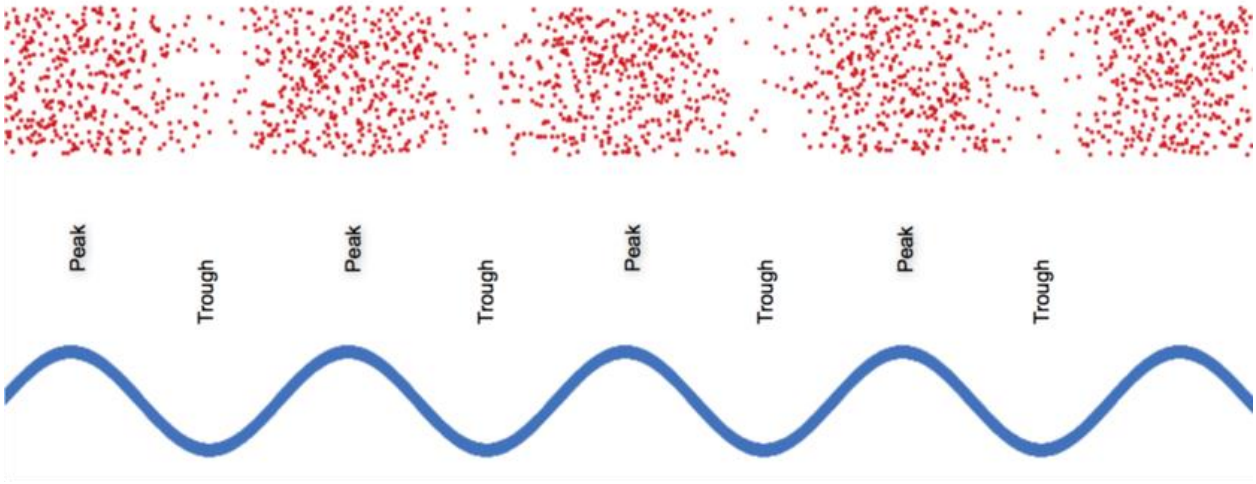
Sound travels as a wave, producing vibration



The University of Waikato Te Whare Wānanga o Waikato

The variation in pressure caused by an object's vibrations push against the surrounding substance – air, for example, and sets up vibrations in the substance – called sound waves. Sound needs a substance to travel through – it cannot travel through a vacuum.

Related articles

- Hearing sound
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- Measuring sound
- Sound – visualising sound waves

Related videos

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- Sound waves in air and water

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- Investigating movement and sound with a pūrerehua

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- Physics made simple – waves

The harder we strike, blow, pluck or scrape soundmakers, including musical instruments, the louder the sound it makes

University of the Fraser Valley, CC BY 2.0

The size (amplitude) of the vibration determines the volume of the sound. The amplitude of the vibration carries the energy. A big vibration causes large sound waves that transmit a lot of energy. The resulting volume of sound is loud – for example, hitting a table with a ruler.

A small vibration causes small sound waves that transmit less energy. The resulting volume of sound is soft – for example, tapping a table with a ruler.

Related articles

- Hearing sound
- Sound on the move
- Measuring sound

Related activities

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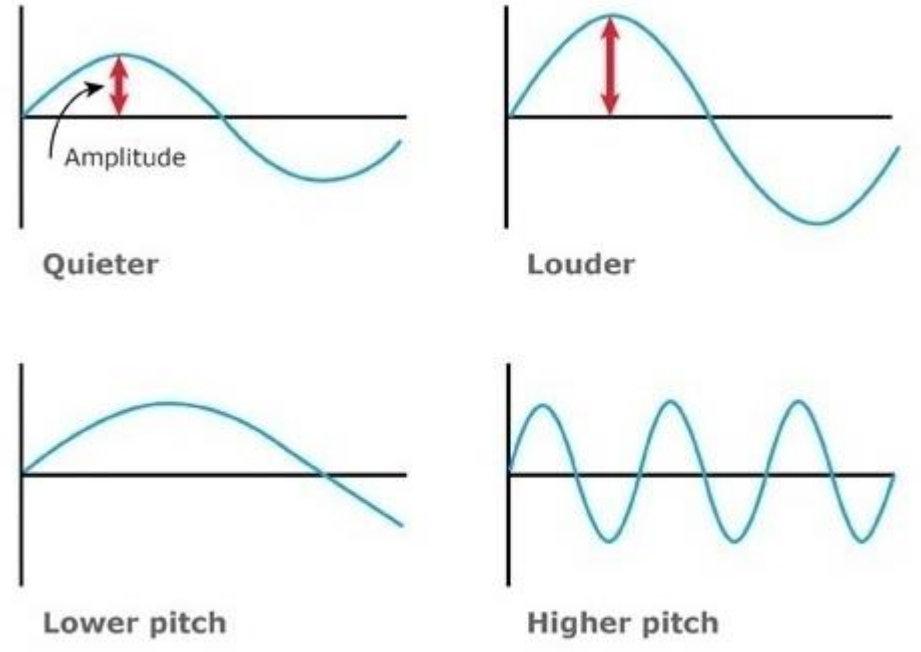
Sounds can be louder or softer, higher or lower



Volume – louder and softer

Sound vibrations travel as waves. Like waves in water, the waves get smaller the further they travel (unless something acts to boost them), so the closer we are to the source of a sound, the louder it is. As we move away from the source, the sound vibrations get smaller – and smaller means softer – so the volume of sound that reaches our ears diminishes.

Pitch – higher and lower

The frequency of the vibration determines the pitch of the sound – how high or low it sounds. Frequency is the rate at which a regular event occurs. In the case of sound, this relates to the number of repeating cycles of a sound wave passing a point per second.

Related articles

- Building Science Concepts: Exploring sound
- Hearing sound
- Can you hear that? – *Connected*

Related image

- Graphs of sound waves

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Musical instruments all make vibrations – they have features that allow them to make different sounds

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The sounds we produce from a musical instrument depend on three elements:

- The vibrating part of the instrument, which we activate by striking, blowing (including blowing air over vocal chords for speaking or singing), plucking or scraping.
- The amplifying part of the instrument – anything that can make the sound louder or bigger by allowing the vibrations to move around a space and grow such as an amplifier, a sound box (the open chamber of a stringed instrument like a guitar or the pātē drum pictured) or a tube (flutes or horns).
- Any sound-altering devices on the instrument – for example, keys, frets, valves or mutes.

Related articles

- Sound on the move
- Sound – resonance

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- Acoustic grand piano
- Standing waves in a trumpet and flute

Related activities

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We make sounds by actions such as striking, blowing, plucking and scraping

Admin, CC BY 2.5

To create sound, you need an input of energy in the form of movement. An object is struck, scraped or blown into and vibrates as a result. The vibrations cause intermittent variations in pressure in both the object and the substance surrounding it – for example, air or water. If nothing moves, there are no vibrations. If there are no vibrations, there are no changes in pressure in the surrounding substance to travel away and be picked up as sound.

Related articles

- Sound on the move
- Sound – resonance

Related images

- Acoustic grand piano
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- Musical sounds
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Sounds that we like can be combined to make music

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The definition of what music is depends on many things including the expectation of the hearer. In general, we interpret random and violent vibrations as noise and regular, patterned vibrations as music.

Related articles

- Building Science Concepts: Exploring sound
- Measuring sound
- Sound – beats, the Doppler effect and sonic booms (beat patterns are what we hear as noise)
- Sound – resonance

Related images

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