How does sound travel?

KS2 KS3 Ages 7-14 ⏰ 3 min read

Sound is a wave of pressure travelling through a material — usually air, but it can travel through water, metal, wood, and almost anything else. It is not a physical object; it's a pattern of movement passing through matter.

How does it start?

When something vibrates — a guitar string, your vocal cords, a loudspeaker — it pushes against the air molecules next to it. Those molecules bump into the ones next to them, which bump into the next ones, and so on. This creates alternating areas of compressed (squished together) and rarefied (spread apart) air, rippling outward from the source as a wave.

Imagine a long line of people standing shoulder to shoulder. Push the person at one end, and they stumble into the next person, who stumbles into the next, and the bump travels down the line. Nobody moves very far — but the disturbance travels the whole length. Sound in air works exactly like this, but with air molecules instead of people, travelling at about 343 metres per second.

What is pitch?

Pitch — how high or low a note sounds — is determined by **frequency**: how many pressure waves pass a point per second. A bass guitar string vibrates slowly, producing low-frequency sound waves — a low pitch. A piccolo produces very fast vibrations — high frequency, high pitch. Frequency is measured in hertz (Hz). Humans can hear roughly 20Hz to 20,000Hz. Dogs can hear up to 65,000Hz; bats use ultrasound at over 100,000Hz for echolocation.

What is volume?

Volume is determined by amplitude — the size of the pressure wave. A larger vibration pushes air molecules harder, creating bigger pressure differences and a louder sound. Volume is measured in decibels (dB). Normal conversation is about 60dB. A jet engine nearby is about 140dB — at that level, the pressure wave itself is physically painful and causes immediate hearing damage.

Why is there no sound in space?

Sound needs something to travel through — a medium. Space is essentially a vacuum: there are almost no molecules to push. With nothing to carry the pressure wave, there's nothing to hear. All those dramatic space battle explosions in films are physically incorrect. Real space is completely silent. The shockwave of a supernova exists, but would be completely inaudible.