Sound travels through air in invisible waves

KS4 PHYSICS Ages 11-14 ⏰ 3 min read

What is sound?

Sound is a type of energy that travels through the air as **vibrations**. When something moves back and forth really quickly — like a guitar string or a drum — it shakes the air molecules around it. These molecules bump into each other, creating waves of movement that spread outward in all directions, a bit like ripples in a pond.

Sound needs something to travel through, unlike **light**, which can move through empty space. Sound can travel through air, water, and solid objects, but it cannot travel through a vacuum (completely empty space with no air or anything else).

Think of it like dropping a stone in water. The ripples spread outward in circles, getting bigger and bigger. Sound waves work the same way, but instead of moving water, they move air molecules.

How fast does sound travel?

Sound moves through air at roughly **343 metres per second** — that's incredibly fast, but still much slower than light, which travels at about **300,000 kilometres per second**. This is why you see lightning before you hear thunder: light reaches your eyes almost instantly, but sound takes a few seconds longer to arrive.

Sound waves and their journey

When sound vibrations reach your ear, they pass through three important parts: the **outer ear** collects the sound, the **middle ear** contains tiny bones that shake and amplify it, and the **inner ear** converts these vibrations into signals your **brain** understands as noise, music, or speech.

Sound waves bounce off hard surfaces like walls and floors — this is called **reflection**. In a large, empty room, you might hear an **echo**, which is the same sound bouncing back at you. Soft materials like carpets and curtains **absorb** sound instead of

bouncing it, which is why music sounds different in a quiet, carpeted bedroom than in a tiled bathroom.

Think of it like throwing a ball at a wall. A hard wall bounces it back to you (reflection), but a soft cushion absorbs it and keeps it from bouncing (absorption).

The speed of sound matters

Understanding how sound travels helps us design better concert halls, create quieter cars, and even develop **sonar** technology that lets submarines see underwater using sound waves. The **frequency** and **amplitude** (loudness) of these vibrations determine what we hear — whether a sound is high or low, quiet or loud.

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