



# What is sound energy?

## What Is Sound?

Sound is a wave of vibrations that spread from their source. A vibration is a back-and-forth movement.

Sound waves are made of particles. The particles in a sound wave move in a pattern. They get closer together and then move farther apart. The areas where particles are close together are called crests. The number of crests that pass a point in one second is the frequency. Pitch is how high or low a sound is. A sound's pitch is higher when the sound has a greater frequency.

Why are some sounds louder than others? The source of the louder sounds is vibrating more. These sound waves have more energy. The energy squeezes the particles at the crests closer together.

## Your Voice

As air rushes past your vocal cords, your vocal cords vibrate. Your vocal cords make the particles in the air around them vibrate. These vibrations travel through the air as sound waves. Sound waves travel in all directions. People in front of you can hear you speak. People behind you can hear this sound too.

## How Does Sound Behave?

Sound can move through water and metal, and many other materials. But sound cannot move through vacuum. A vacuum is empty space without particles. Sound cannot be made without particles.

When sound waves reach a border between different materials, they can

bounce back from the border, they can be absorbed, or the sound can pass into the second material.

Sound waves can bounce back when they hit a surface, such as a wall. This reflection may cause an echo.

Sound can also be absorbed, or soaked up by a material. For example, you may not hear footsteps when you walk on a carpet. The carpet absorbs the sound.

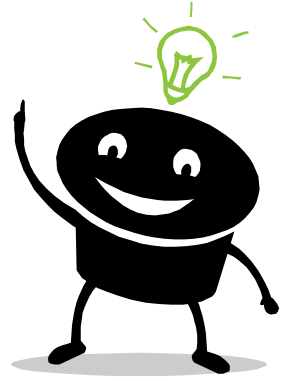
Moving from one material to another material changes the speed of a sound wave. The sound wave's speed depends on what the materials are made of. For example, sound moves more slowly in air than in water, depending on the temperature.

## Sound Transfers Energy

Sound waves transfer energy from one object to another. For example, the kinetic energy of piano keys make the piano's strings vibrate. This creates sound energy. Special walls in a music room are lined with soundproofing materials. The piano's sound bounces off the material many times. The material vibrates each time it bounces, creating thermal energy. The material absorbs almost all of the sound waves that hit it. This causes the sound to lessen.

Sound begins with a vibrating object. The object gives off energy in sound waves in air. As the sound waves move, the energy is transferred through the air. Some of the energy reaches your ear. Your eardrum absorbs some of the energy. Your eardrum begins to vibrate, and you receive the energy of the original vibrating object.

# Think About It



1. Describe a sound you have heard.

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2. What happens when sound waves hit a wall?

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3. Describe a time you observed the transmission, reflection, or absorption of a sound.

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4. **Predict:** When sound waves travel from air to water what will happen to the speed at which they are moving?

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5. Can sound exist without matter? Explain.

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