

Waves

1. Sound

CONCEPT 1

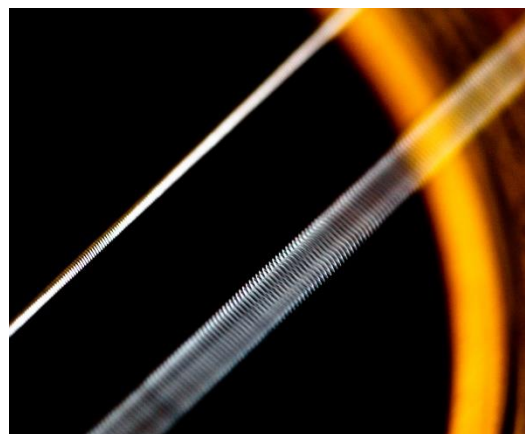
WHAT IS SOUND?

NOTES

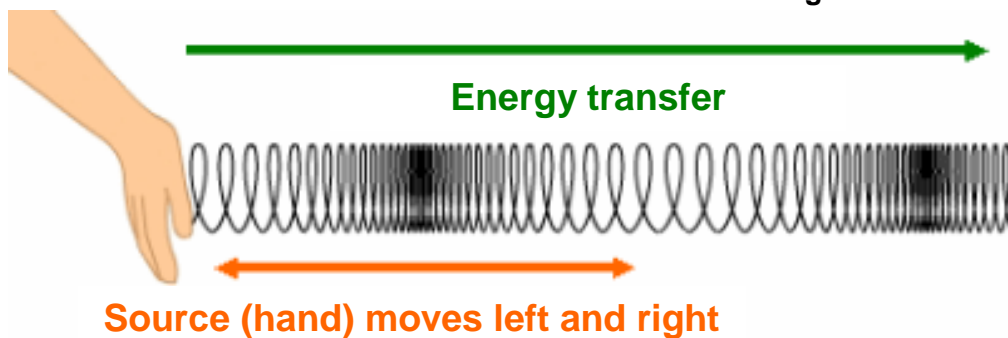
Sound is produced when something vibrates. The kinetic energy of the *thing* that has vibrated can travel outwards in the form of a wave.

If you place a finger over your voice box when speaking or singing, you will feel the **vibration** of it. This is where the sound comes from. When a musical instrument is plucked or blown through, the string or the air vibrates. Often, with strings, the vibrations are too small to see,

All vibrations result in a sound. The vibrations from the object are passed on to air particles. These air particles bump into others and the wave progresses. Eventually, the energy of the vibrations is transferred to your ears. The speed of sound in air is just over 340 m/s, around a million times slower than light.



Energy is transferred by sound in the form of waves. A slinky spring provides a model that shows how these waves work. When one end is pushed and pulled back and forth, some of the coils squash together and others pull apart. A wave of energy passes along the length of the spring. A wave like this which travels in the same line as the vibrations of the source is called a **longitudinal wave**.



A sound wave works in the same way. Vibrations push air particles together and also pull them apart, creating a longitudinal wave of energy. The energy is transferred from the source of the vibration to our ears.

The **volume** of a sound is a measure of how loud the sound is. Sounds can be made louder by increasing the energy of the vibration. Plucking a string harder, blowing harder through a wind instrument or beating a drum harder will all transfer more energy. The loudness of sound is measured in a unit called a **decibel (dB)**. The loudest sound that humans can listen to without damage to their hearing is about 120 dB. However, **continuous** sounds above 90 dB should be avoided unless ear protectors are worn.

The size of a vibration is represented by its **amplitude**. The amplitude is the maximum distance that a particle travels **from its middle position (or rest position)**. The greater the amplitude, the greater the energy of the vibration and the louder the sound. In other words, a bigger wave will transfer more energy and be heard as a louder sound.

