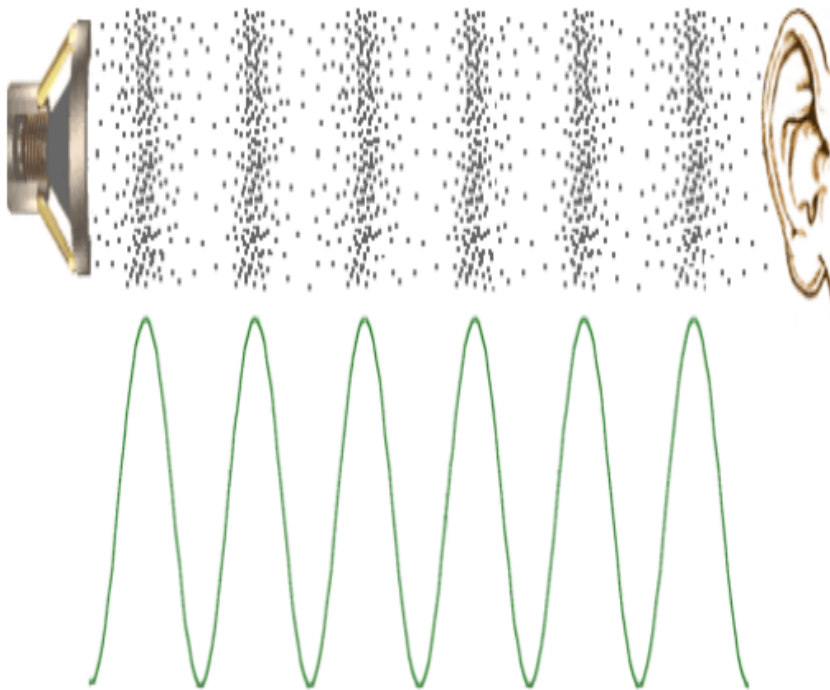


# Sound

**What is sound?** Sound is a form of energy, just like electricity and light. Sound is made when air molecules vibrate and move in a pattern called waves, or sound waves. Think of when you clap your hands, or when you slam the car door shut. That action produces sound waves, which travel to your ears and then to your brain, which says, "I recognize that sound." Sound is defined as a disturbance in an elastic medium that can be detected by the human ear. The medium can be gas, liquid or solid

Sounds are produced by mechanical vibrations. Vibrating object disturbs the molecules of air surround it causing periodic variations in the air pressure. As the object vibrates back and forth, the pressure becomes alternately more, and then less dense.

## Variations in Air Pressure and Corresponding Waveform



The image shows a speaker creating sound waves to reaches an ear

The loudspeaker moves and pushes the air particles on its right (phase a) causing compression to take place. These particles then push their adjacent particles and transfer the energy they have received from the loudspeaker to them. The loudspeaker then moves back again and carries out a compression in the opposite direction, in other words dilation towards the left takes place (phase b) and in doing so forms an air gap that gets filled up by the air particles that are immediately close by. These particles in turn create other gaps to their right, and so on and so forth. This process allows the particles to transfer their energy to each other by oscillating without physically moving in the sound's direction.

### **Compression (C= compression) and dilation (R = rarefaction) of particles in the air**

The normal range of frequencies audible to humans is **20 to 20,000 Hz** (the number of vibration per second). A range of **200 to 2000 Hz** is required to understand speech. the speed of sound is approximately **341 m/s**

## **Decibels**



**(Sound) Db meter**

## History of decibel

Alexander Graham Bell. Before Mr. Bell started to experiment with audio transmission and reproduction, there was no scale to measure acoustic energy, so Bell came up with his own scale to measure how loud a given sound was. He called his scale the Bell scale. His instruments were crude and his 1-10 scale was not very fine or accurate. We still use his scale today, but we have increased the sensitivity tenfold (that's where the deci part of decibel comes from); in other words, what Bell would have measured to be 7 bells, we now call 70 decibels. In fact, Bell would have measured any sound between about 65 and 75 decibels at 7 bells, Definition for **decibel** the measuring of sound level ..

$$NdB = 10 \log (P/Pr)$$

NdB = Number of decibels

P = The power being measured

Pr = A reference power level

**A decibel** is a unit of measurement which is used to indicate how loud a sound is. Continuous exposure to sound above 80 decibels could be harmful. a unit for measuring the loudness of sound (deci + bel unit of sound power (20-21 centuries), from Alexander Graham Bell (1847-1922), US inventor). Unit for measuring the relative intensities of sounds or the relative amounts of acoustic or electric power.