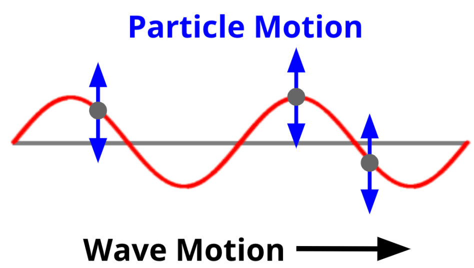
Sound as a Pressure Wave
Lesson Notes

Learning Outcomes
- Why is a sound wave referred to as a pressure wave?
- How are compressions and rarefactions associated with pressure?

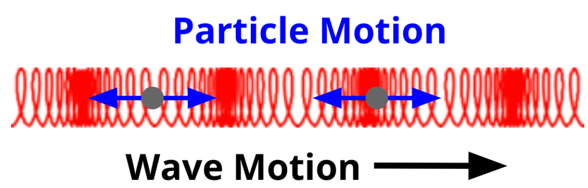
Particle Motion vs. Wave Motion
Transverse Waves: particles vibrate in a direction that is **perpendicular** to the wave's motion.

This results in the formation of crests and troughs.



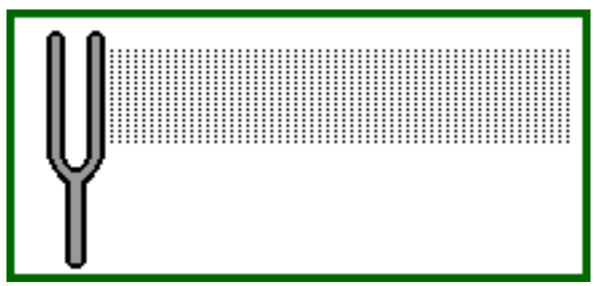
Longitudinal Waves: particles vibrate in a direction that is **parallel** to the wave's motion.

There are no crests and troughs.

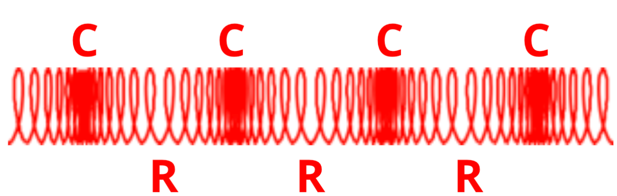


Longitudinal Waves
Sound waves traveling through fluids like air or water travel as **longitudinal waves**.

Longitudinal waves consist of **compressions** (**C**) and **rarefactions** (**R**) - high density and low density regions.



The repeating pattern of compressions and rarefactions are what we would see moving through the medium.

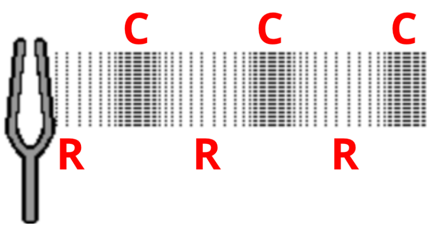


Compressions and Rarefactions

For fluids such as air, density is related to pressure.
Air pressure is greatest where air density is greatest.

$$P = \frac{m}{V} \cdot \frac{R \cdot T}{MM}$$

density



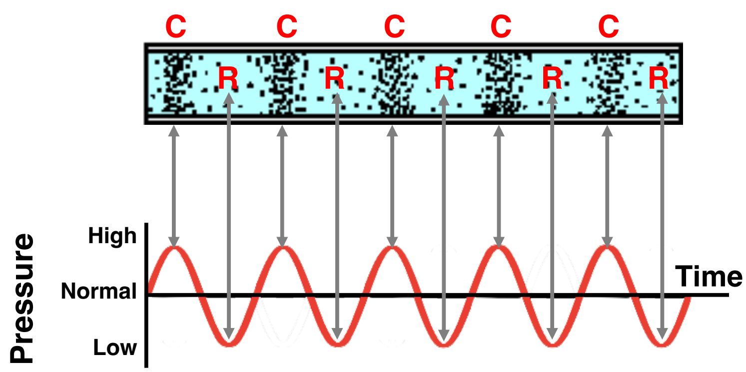
Compressions (C) = regions of high pressure
Rarefactions (R) = regions of low pressure

Sound as a Pressure Wave

A sound wave traveling through air consists of alternating regions of **high pressure** and **low pressure** that are propagating through air.

At any given location around the source, a pressure sensor would detect variations in pressure that vary as a function of the sine of time.

The fluctuations in pressure are "sinusoidal".



C = compressions (High Pressure)

R = rarefactions (Low Pressure)