



Sound Waves

MY SO Waves Notes Part 2



Sound

Vibrations that travel through the air or other media

When these vibrations reach the air near your ears you hear the sound.

How Sound Travels

Sound waves carry energy through a medium (solid, liquid, or gas) without the particles of the medium traveling along.

Sound travels as a longitudinal wave.

How Sounds are Made

Longitudinal waves are generated when a source of energy forces the matter in a medium to vibrate.

This back and forth motion pushes air particles together, generating a compression, or moves the particles apart, generating a rarefaction.

Medium

Sound waves must have a medium to travel through.

Gas - Air is the most common

Liquid

Solid

In outer space there are no molecules to compress or rarefy, so sound does not travel through outer space.

Speed of Sound

Depends on the physical properties of the medium it travels through

Elasticity

Density

Temperature

At room temperature, sound travel through air at about 342 m/s

Physical Properties of Media

Elasticity - The ability of a material to bounce back after being disturbed

Solid materials are usually more elastic than liquids or gases.

Particles of a solid do not move very far, so they bounce back and forth quickly as the vibration travels through the object, which allows waves to move faster.

Physical Properties of Media

Density - how much matter there is in a given amount of space.

The speed of sound depends on how close together the particles of the substance are in the medium.

Physical Properties of medium

Temperature - Degree or intensity of heat present in a substance or object.

In a given media (solid, liquid, or gas), sound travels more slowly at lower temperatures.

Properties of Sound Waves

Intensity

Loudness

Frequency

Pitch

Properties of Sound Waves

Intensity - The amount of energy the wave carries per second through a unit of area.

Amplitude increases with increased energy.

Measured in watts per square meter (W/m^2)

Properties of Sound Waves

Loudness - describes what you actually hear.

Though not the same as loudness, the greater the intensity of the wave, the louder it is.

Measured in decibels (dB)

Maximum safe level is 85 dB

Properties of Sound Waves

Frequency - the number of vibrations that occur per second

Wavelength changes with frequency.

Measured in Hertz (Hz)

50Hz = 50 vibrations per second.

Properties of Sound Waves

Pitch - a description of how high or how the sound seems to a person

High frequency = high pitch

Low frequency = low pitch

Doppler Effect

The apparent change in frequency as a wave source moves in relation to the listener.

Sounds moves toward a person

Waves are at a higher frequency, so pitch appears to increase. (high)

Sounds moving away from a person - Waves are at a lower frequency, so pitch appears to decrease (low)