Physics: Sound
Class Examples

Sections Covered – Physics

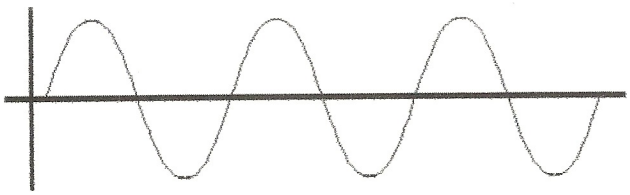
- Chapter 25: Sections 3 – 11
- Chapter 26

Topics Covered:

- Nature of Sound Waves
- Speed of Sound/Quality of Sound
- Sound Interference
- Sound Intensity
- Doppler Effect
- Standing Waves
- Musical Instruments

Two Types of Waves:

Transverse:



Longitudinal:

Velocity of Waves:

Example 1:
An orchestra normally tunes to an A or 440 Hz. If we assume the velocity of sound in air is the standard 343 m/s, what is the wavelength of this sound wave?

$v = f \cdot \lambda$

$\frac{v}{f} = \lambda$

$f = 440\ Hz$

$v = 343\ m/s$

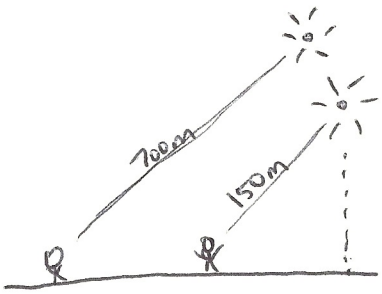
$\frac{343}{440} = \lambda$

$\lambda = 0.780\ m$

Sound Intensity:

Example 2:
You and a friend are watching fireworks that are launching from an observatory. You are standing right in front of _____(150.0 m away) and your friend is at _____ (700.0 m away). The sound intensity at your friend's location is 0.0200 W/m². Assume the sound is spreading evenly in all directions.

A. What is the power of the fireworks?
B. What is the sound intensity at your location?



A.) $I = \frac{P}{A}$

$I = \frac{P}{4\pi r^2}$

$P = I \cdot 4\pi r^2$

$P = (0.0200) \cdot 4\pi (700)^2$

$P = 123{,}150\ W$

B.) $I = \frac{P}{4\pi r^2}$

$I = \frac{123{,}150}{4\pi (150)^2}$

$I = 0.436\ W/m^2$