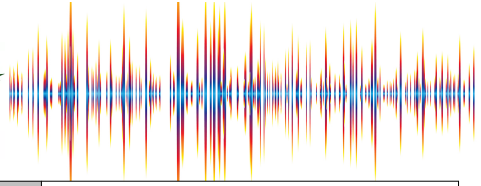




PRACTICE	LABS	TESTS
Practice Problems (1-8)	<ul style="list-style-type: none"> Exploring Waves Interactive (RsVCP) Wave Addition Interactive (No RsVCP) 	Unit 14 Test Thursday (5/2/19)

Properties and Detection of Sound



14.3 I can define, analyze, and solve problems involving sound.

Waves

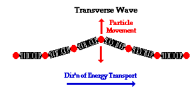
A **transverse wave** is...

A **longitudinal wave** is...

Waves

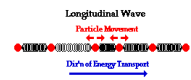
A **transverse wave** is a wave in which particles of the medium move in a direction perpendicular to the direction that the wave moves.

Examples:



A **longitudinal wave** is a wave in which particles of the medium move in a direction parallel to the direction that the wave moves.

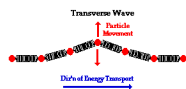
Examples:



Waves

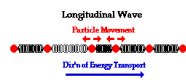
A **transverse wave** is a wave in which particles of the medium move in a direction perpendicular to the direction that the wave moves.

Examples: Crowd wave, waves on a string / rope, radio waves



A **longitudinal wave** is a wave in which particles of the medium move in a direction parallel to the direction that the wave moves.

Examples: Sound wave, ultrasound waves, seismic waves



Waves

An **electromagnetic wave** is...

Mechanical waves...

Waves

An **electromagnetic wave** is a wave that is capable of transmitting its energy through a vacuum (i.e., empty space).

Examples:

Mechanical waves require a medium in order to transport their energy from one location to another.

Examples:

Waves

An **electromagnetic wave** is a wave that is capable of transmitting its energy through a vacuum (i.e., empty space).

Examples: Light, radio waves, microwaves

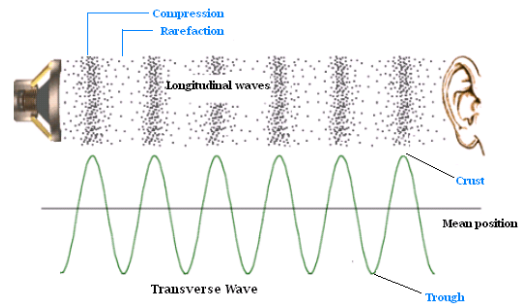
Mechanical waves require a medium in order to transport their energy from one location to another.

Examples: Sound wave, water waves, seismic waves

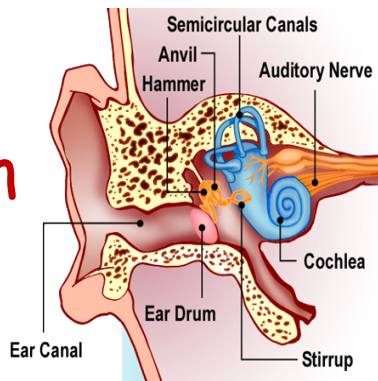
Tuning Fork



Sound Waves

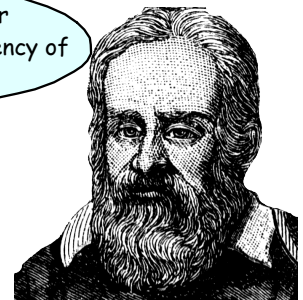



The Human Ear



Perceiving Sound

The **pitch** that we hear depends on the frequency of the vibration.





Spectrum of sound

Frequency range Hz	Description	Example
0 - 20	Infrasound	Earth quake
20 - 20,000	Audible sound	Speech, music
> 20,000	Ultrasound	Bat, Quartz crystal

6/3/2014 Harresh N G, Dept of Aero Engg, DsCE 5

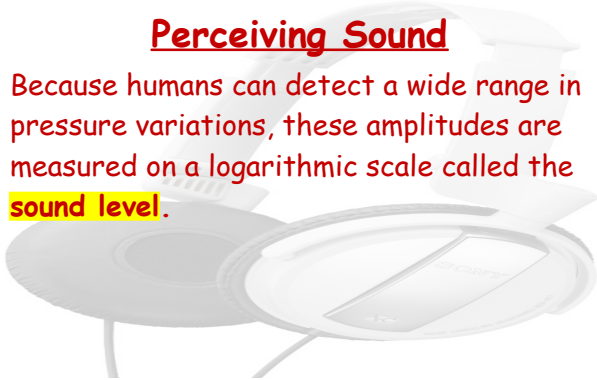
Perceiving Sound

The **loudness** of a sound, as perceived by our sense of hearing, depends primarily on the amplitude of the pressure wave.



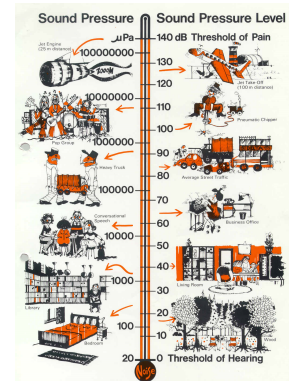
Perceiving Sound

Because humans can detect a wide range in pressure variations, these amplitudes are measured on a logarithmic scale called the **sound level**.



Loudness

The unit of measurement for sound level is the **decibel (dB)**. The sound level depends on the ratio of the pressure variation of a given sound wave to the pressure variation in the most faintly heard sound, 2×10^{-5} Pa.



Speed of Sound

Mach 1

Speed of Sound



Faster In...
Hot air or cold air
Air or water or solids

UNIT 14: IN-CLASS PROBLEMS

3. During a thunder storm, you see a flash of lightning. Five seconds later you hear the corresponding thunder. How far away was the lightning strike? (Assume the speed of sound is 343 m/s)
4. A 2280-Hz sound wave has a wavelength of 0.655 m in an unknown medium. Identify the medium.

UNIT 14: IN-CLASS PROBLEMS

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**UNIT 14: IN-CLASS PROBLEMS**

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$$\begin{aligned} x &= v t \\ x &= (343 \text{ m/s})(5 \text{ s}) \\ x &= 1715 \text{ m} \end{aligned}$$

**UNIT 13: IN-CLASS PROBLEMS**

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Table 15-1 Speed of Sound in Various Media	
Medium	m/s
Air (0°)	331
Air (20°)	343
Helium (0°)	972
Water (25°)	1493
Seawater (25°)	1533
Copper (25°)	3560
Iron (25°)	5130

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