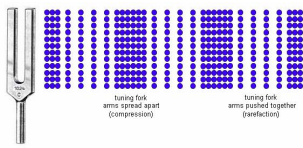


Sound Waves

Sound Waves

Objectives

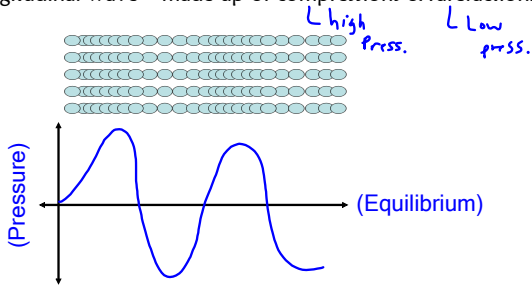
- Explain how sound waves are produced & transmitted.
- Use the wave equation to relate velocity, frequency and wavelength.
- Calculate the speed of sound in air at a given temperature.



Sound - Longitudinal Wave

Form of energy that causes molecules of a medium to vibrate back & forth.

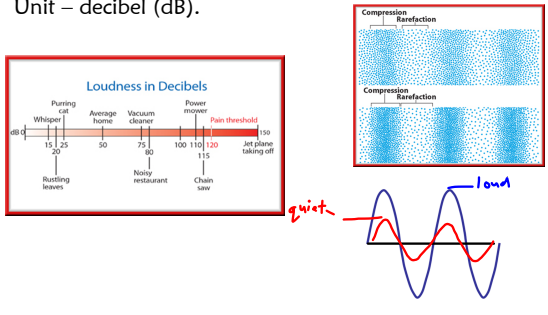
Longitudinal wave – made up of compressions & rarefactions.



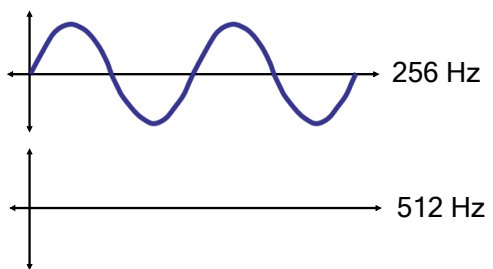
Loudness

Amount of energy (amplitude) in a wave.

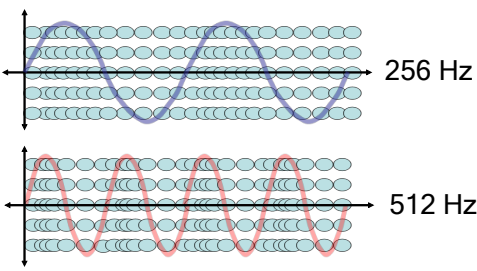
Unit – decibel (dB).



Frequency



Frequency



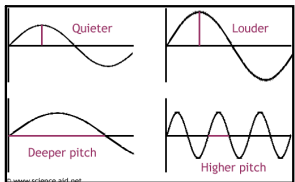
Pitch

How fast molecules of a medium vibrate.

How high/low sound is.


frequency - pitch.

| | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|
| C | D | E | F | G | A | B | C |
| do | re | mi | fa | so | la | ti | do |
| 262 Hz | 294 Hz | 330 Hz | 349 Hz | 393 Hz | 440 Hz | 494 Hz | 524 Hz |




Sound Waves

Low Frequency



- these natural frequencies are called [resonant frequencies](#)

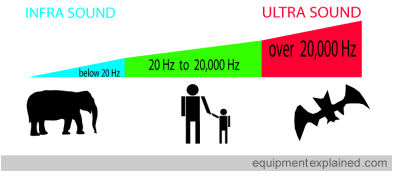
High Frequency



Hearing

A healthy human ear can hear sound waves with frequencies from about 20 Hz to 20,000 Hz.

The human ear is most sensitive to sounds in the range of 440 Hz to about 7,000 Hz.



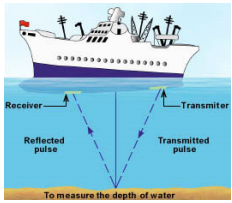

equipmentexplained.com

Infrasonic vs. Ultrasonic

Infrasonic – sound waves < 20 Hz.

Ultrasonic – sound waves > 20,000 Hz.

Examples: medical diagnosis and treatments, estimate the size, shape, and depth of underwater objects.

Wave Velocity

The speed with which waves pass by a particular point.

Depends on the medium.

- In a given medium, speed of wave is constant
- Solids – liquids – gas.

Depends on the temp.

temperature – speed.

$$v = f\lambda$$

$$v = \frac{d}{t} = \frac{\lambda}{T} = f\lambda$$

Speed of Sound

Depends on the medium.

- In a given medium, speed of wave is constant
- Solids – liquids – gas.


Depends on the temp.

temperature – speed.

$$V_{\text{air}} = 331 \text{ m/s} + 0.6 \text{ m/s} \times T_{\text{C}}$$

| Speed of Sound in Different Mediums | |
|-------------------------------------|-------------------------|
| Medium | Speed of Sound (in m/s) |
| Air | 347 |
| Cork | 500 |
| Water | 1,498 |
| Brick | 3,650 |
| Aluminum | 4,877 |

Assignments . . .



- Chapter 19 Homework #1 - 6

