

WAVES

Repeating pattern through which energy moves

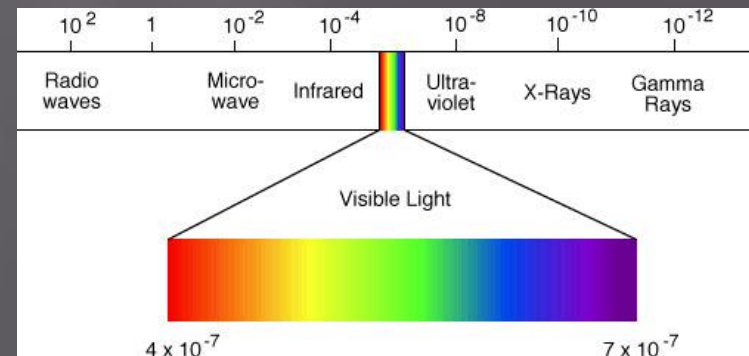


2 Overall Types

- ▣ 1. Mechanical---Must travel through a medium (water waves, sound waves, earthquake or seismic waves)

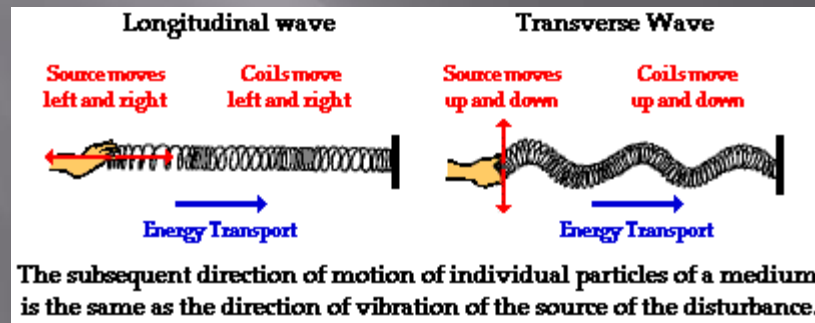


- ▣ 2. Electromagnetic – Can travel through empty space (all waves on electromagnetic spectrum)



2 Types of Mechanical Waves

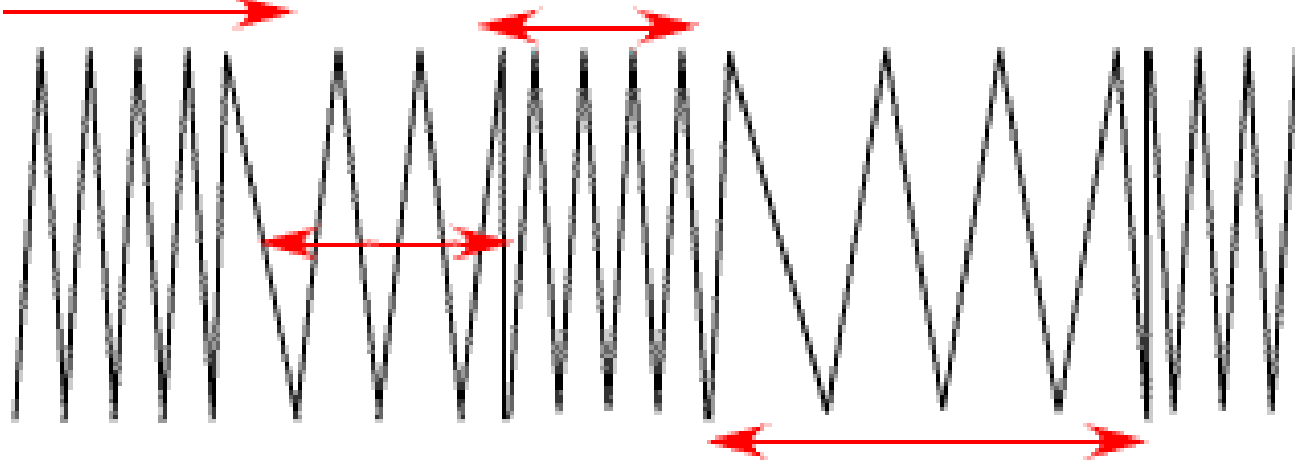
- 1. longitudinal (compression) – type of wave in which matter moves in the same direction as the energy moves (sound, tsunami)



- 2. transverse – matter moves at right angles to the direction the energy moves (rubber band, string)

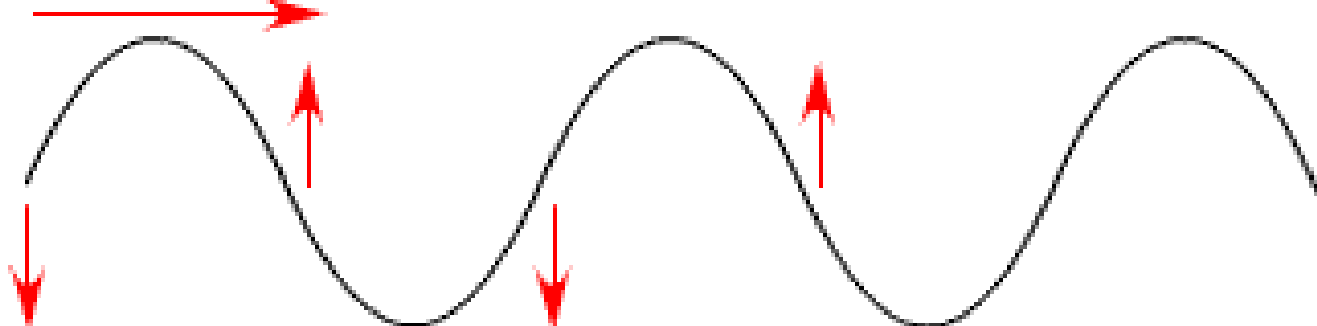
A longitudinal Wave

Energy transfer



A transverse wave

Energy transfer



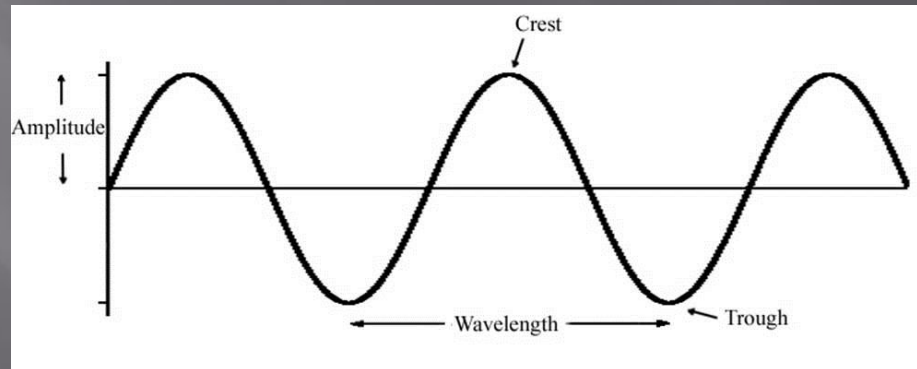
Parts of a Wave

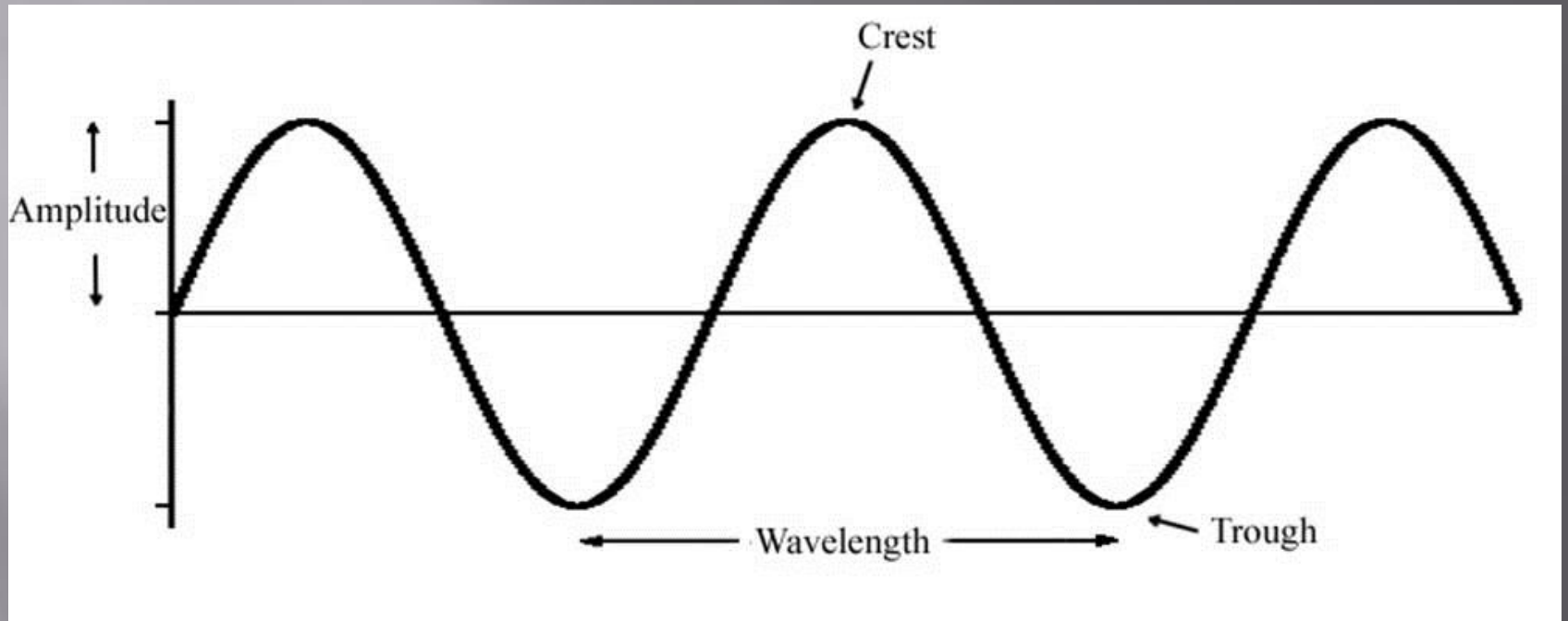
Crest — top

Trough — bottom

Amplitude — one half wave height

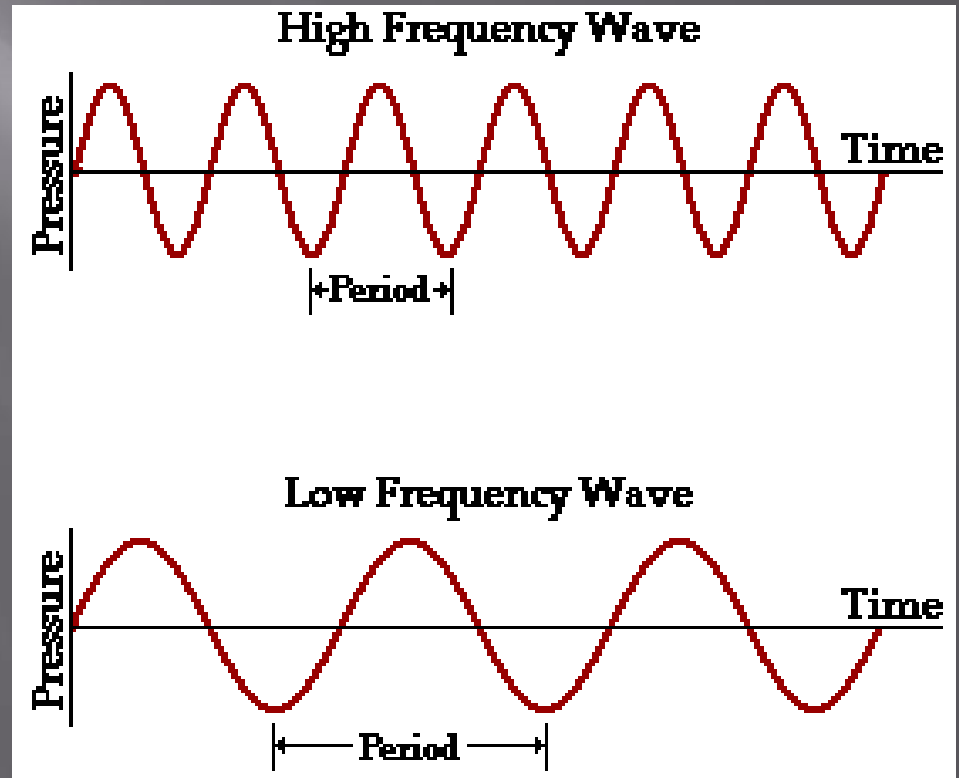
Wave length — distance from crest to crest
or trough to trough



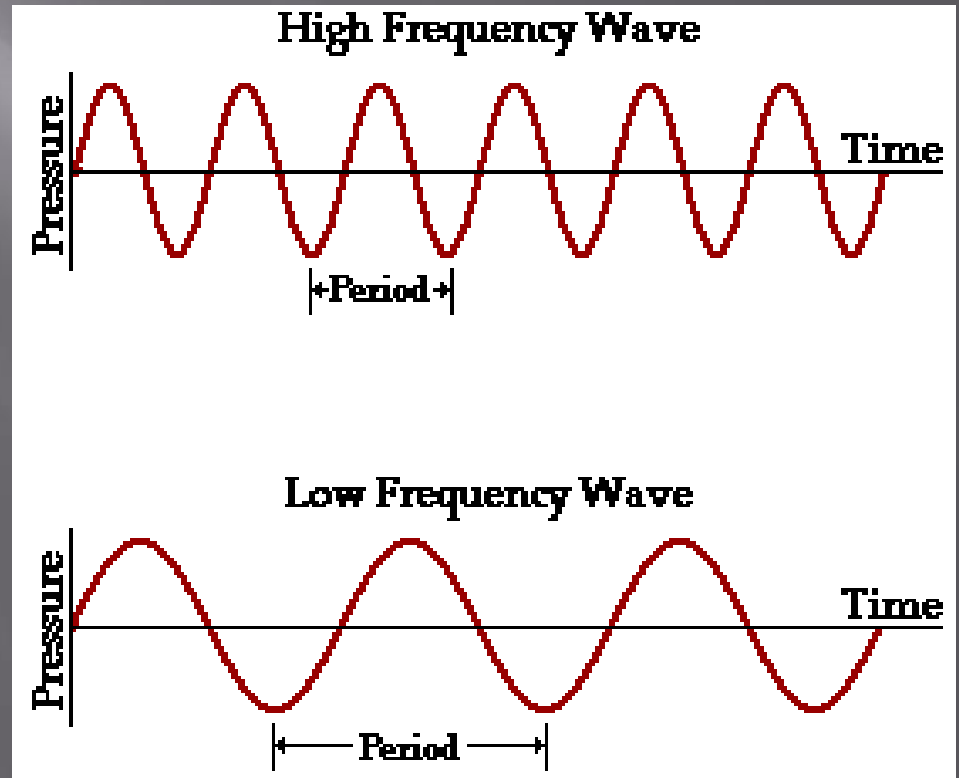


Characteristic of Waves

- Frequency – speed at which a wave travels or # of crests or troughs that pass within a given amount of time

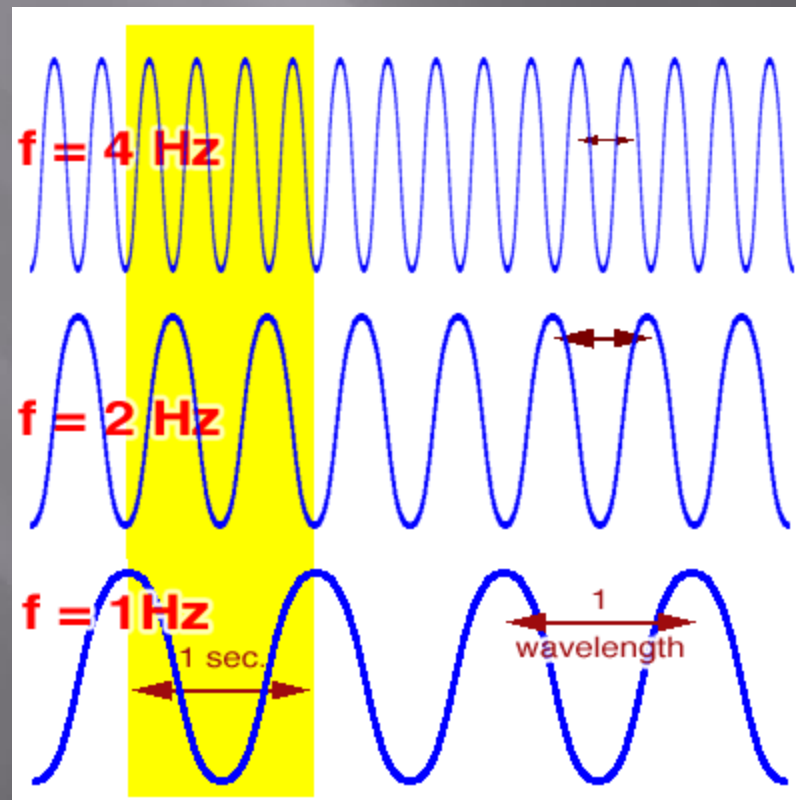


- ▣ Pitch is frequency in a sound wave



Hertz

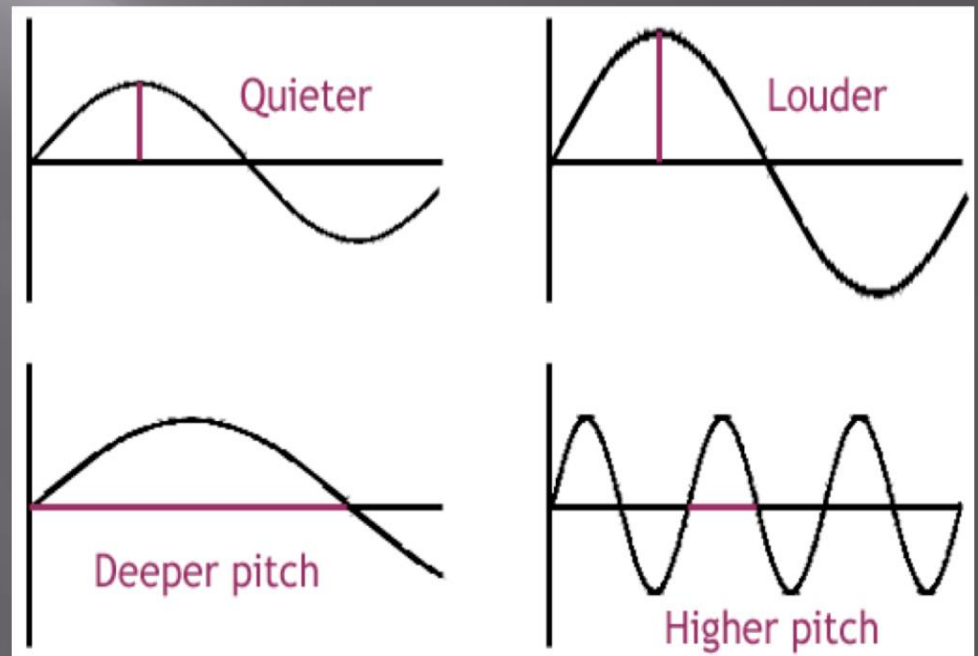
- Hertz is the unit for wave frequency
- 1 Hz = one cycle per second



Sound Waves

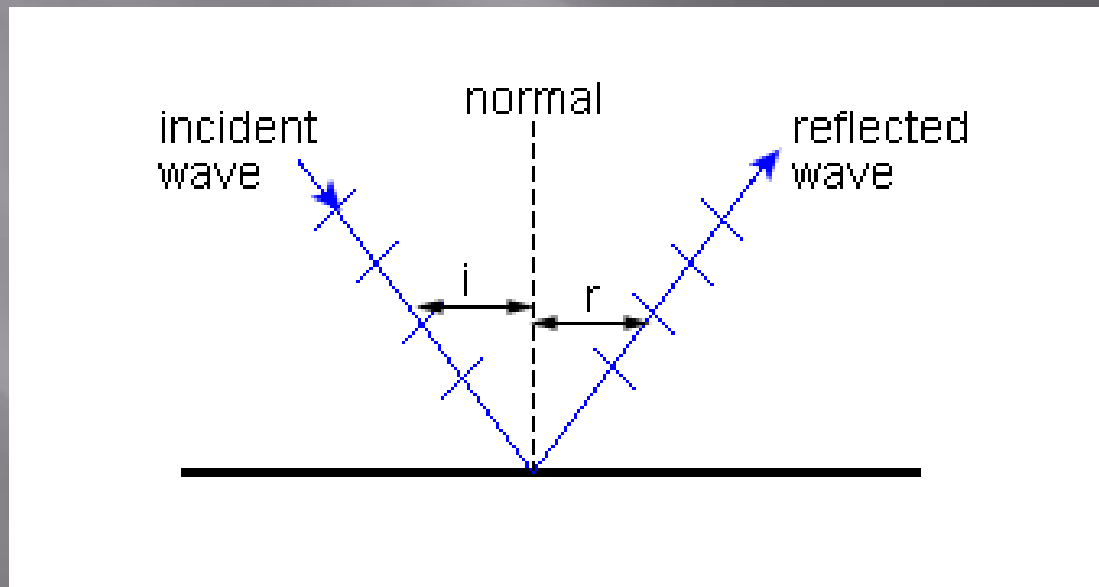
The greater the amplitude,
the louder the sound

The greater the
frequency, the
higher the
pitch



Predicting Wave Behavior

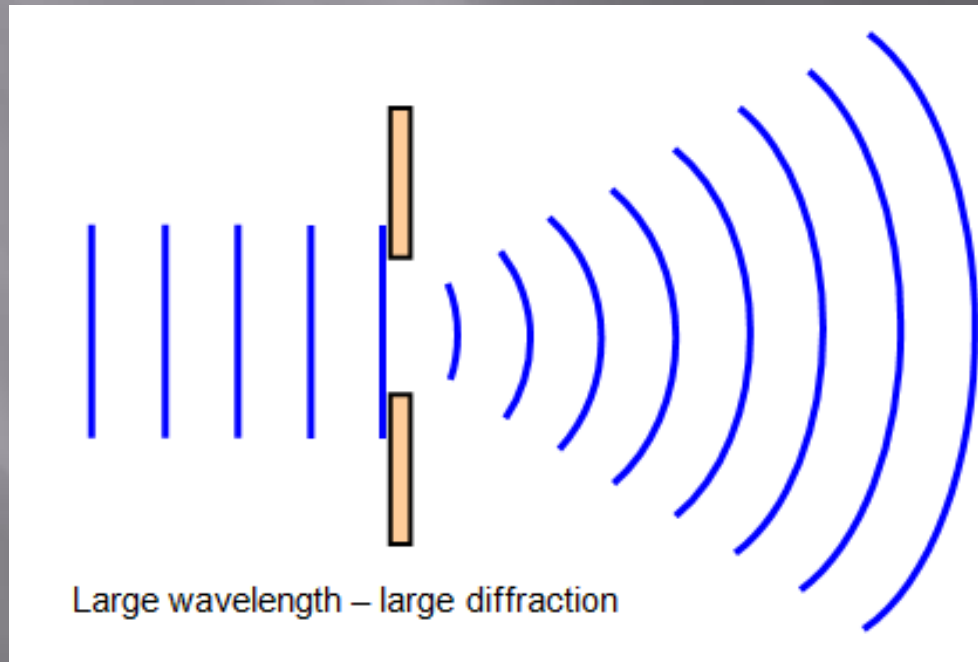
- Reflection – bouncing off objects



- ▣ Refraction – traveling at different speeds through different media



□ Diffraction – bending around barriers

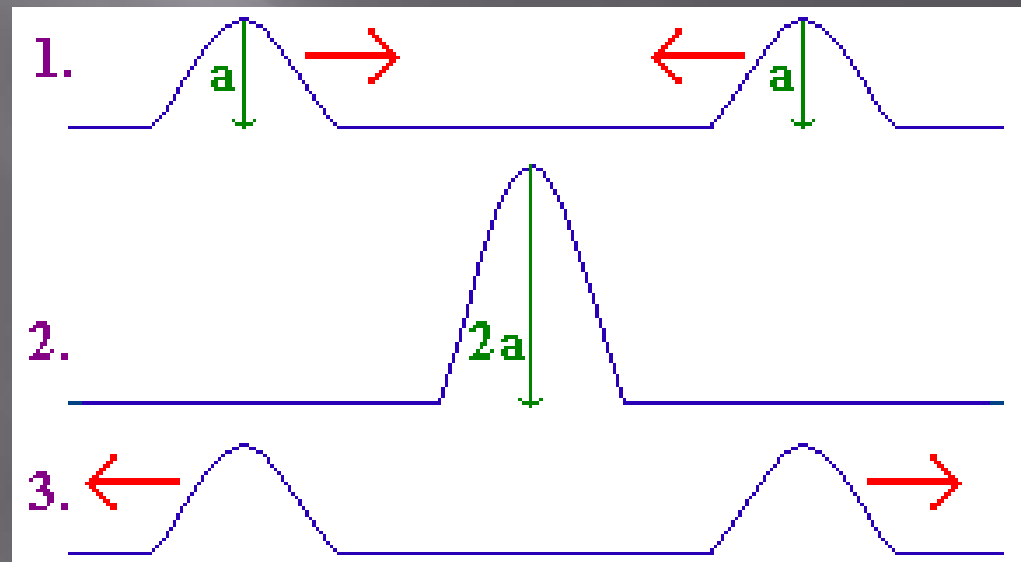


Interaction of Waves with Each Other

Interference

1. constructive interference – 2 crests or 2 troughs collide (add amplitudes)

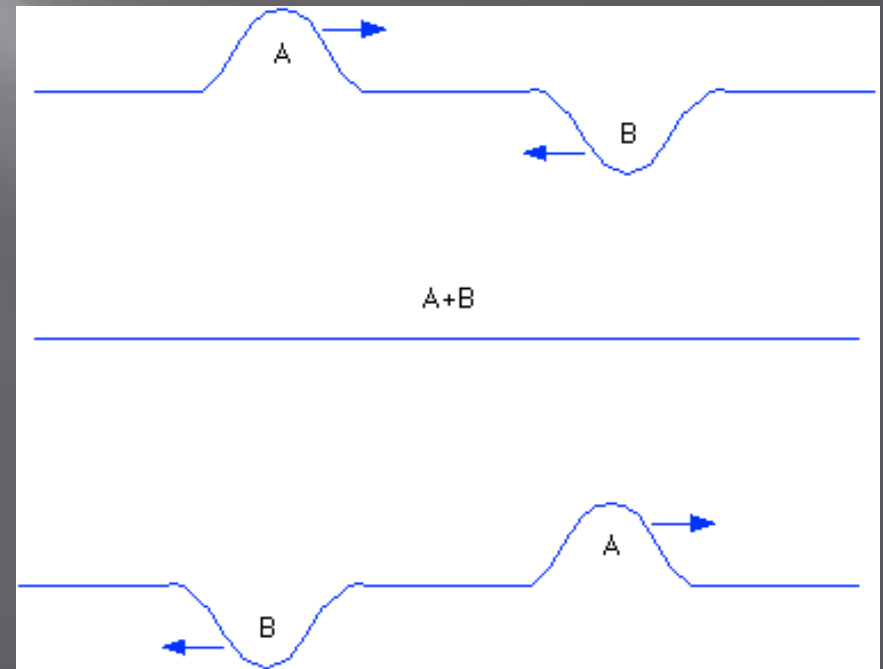
Example:
Sound
Amplifiers



- ▣ 2. destructive interference – crest of 1 wave collides with trough of another wave (subtract amplitude of 1 wave from the other)

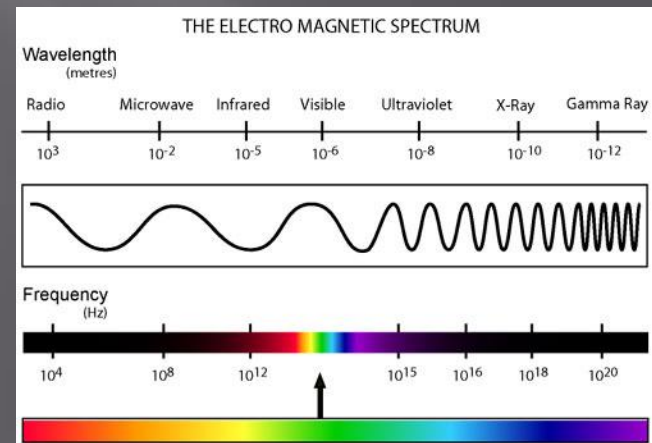
Example:

Headphones for pilots



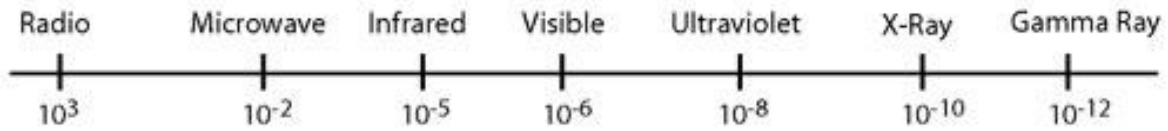
Electromagnetic (EM) Spectrum

- Increase in frequency from left to right; the higher the frequency, the more harmful to living things
- 1. Radio waves
- 2. Microwaves (radar, cell phones)
- 3. Infrared light
- 4. Visible light
- 5. Ultraviolet light
- 6. X-rays
- 7. Gamma rays



THE ELECTRO MAGNETIC SPECTRUM

Wavelength
(metres)



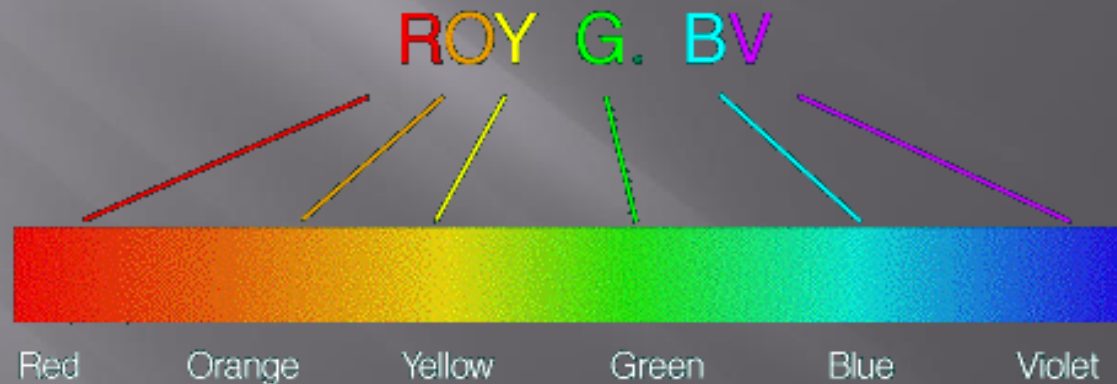
Frequency
(Hz)



Visible Light

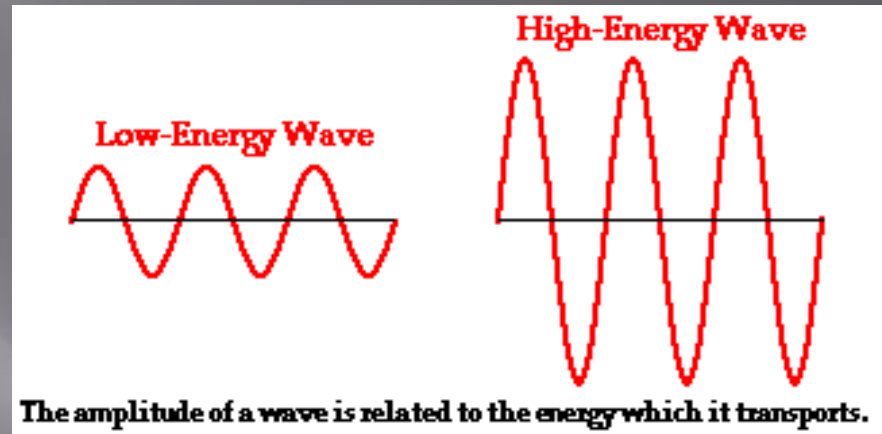
Roy G Biv

- ▣ Red (longest wavelength)
- ▣ Orange
- ▣ Yellow
- ▣ Green
- ▣ Blue
- ▣ Indigo
- ▣ Violet (shortest wavelength)



Energy in Waves

▣ Mechanical – energy is proportional to amplitude



Electromagnetic – energy is proportional to frequency

