Basic Properties of Waves

- **Amplitude**
- **Wavelength**
- **Frequency**
- **Speed**

Speed and Frequency ARE NOT THE SAME!
They both involve wavelength and time but…

Frequency is how many *wavelengths* **pass a point** *in a second .*
frequency is measured in units called hertz (Hz) one wave passing a point in one second

Speed is **how far** a *wavelength* **travels** *in a second*

Speed is measured in units of distance per time (i.e. m/s)

Speed and Frequency are related to each other by the formula:
Speed = wavelength X frequency

Wave- a disturbance that transfers energy from one place to another

Mechanical Wave- a disturbance in a *medium* that transfers energy, transfers kinetic energy

Examples of Mechanical Waves:

Transverse- particles of medium move 90 degrees to the direction energy travels light also travels as a transverse wave

Longitudinal- particles of medium move in the direction the energy travels

Surface- occur at the boundary between two types of materials (like the air and water) Particles move vertically AND Horizontally creating a circular motion

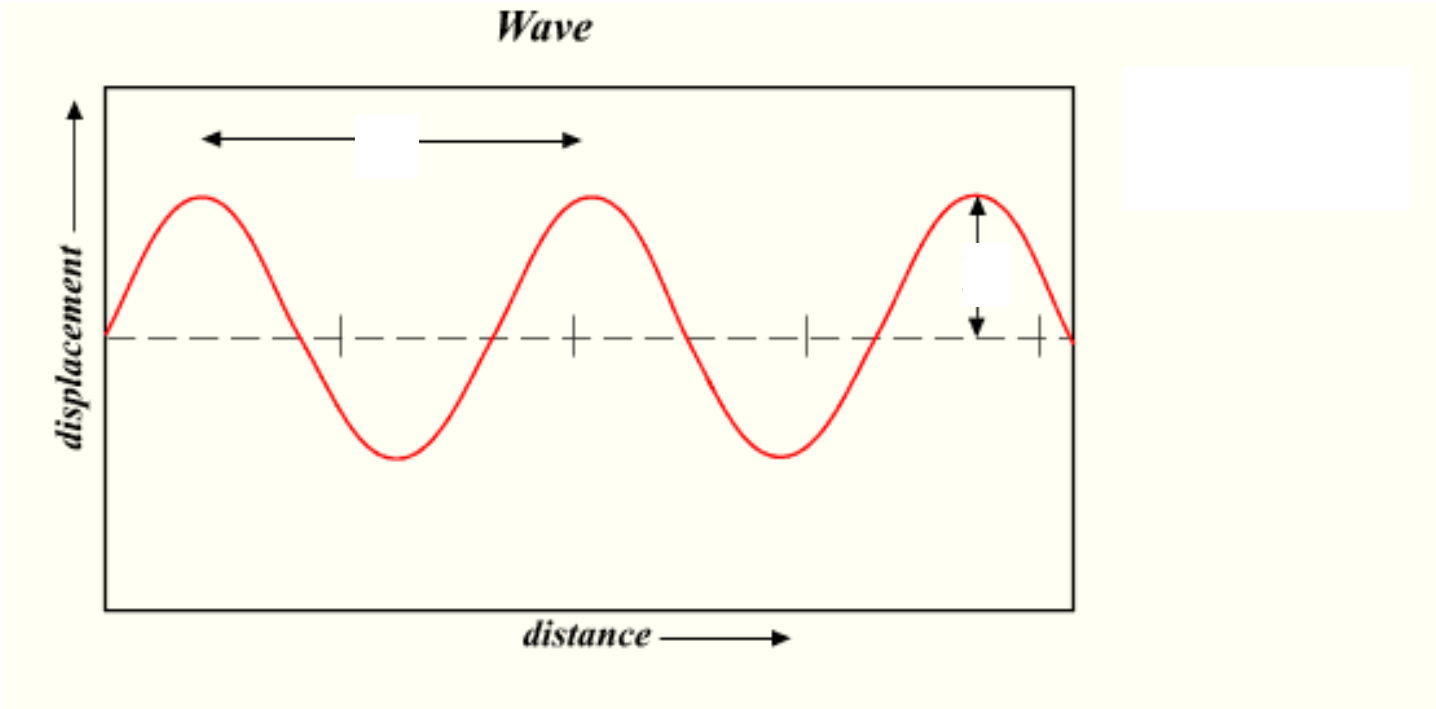
Sound- Type of Longitudinal

Electromagnetic Wave- a disturbance that transfers electrical and magnetic energy

Examples of Electromagnetic Waves:

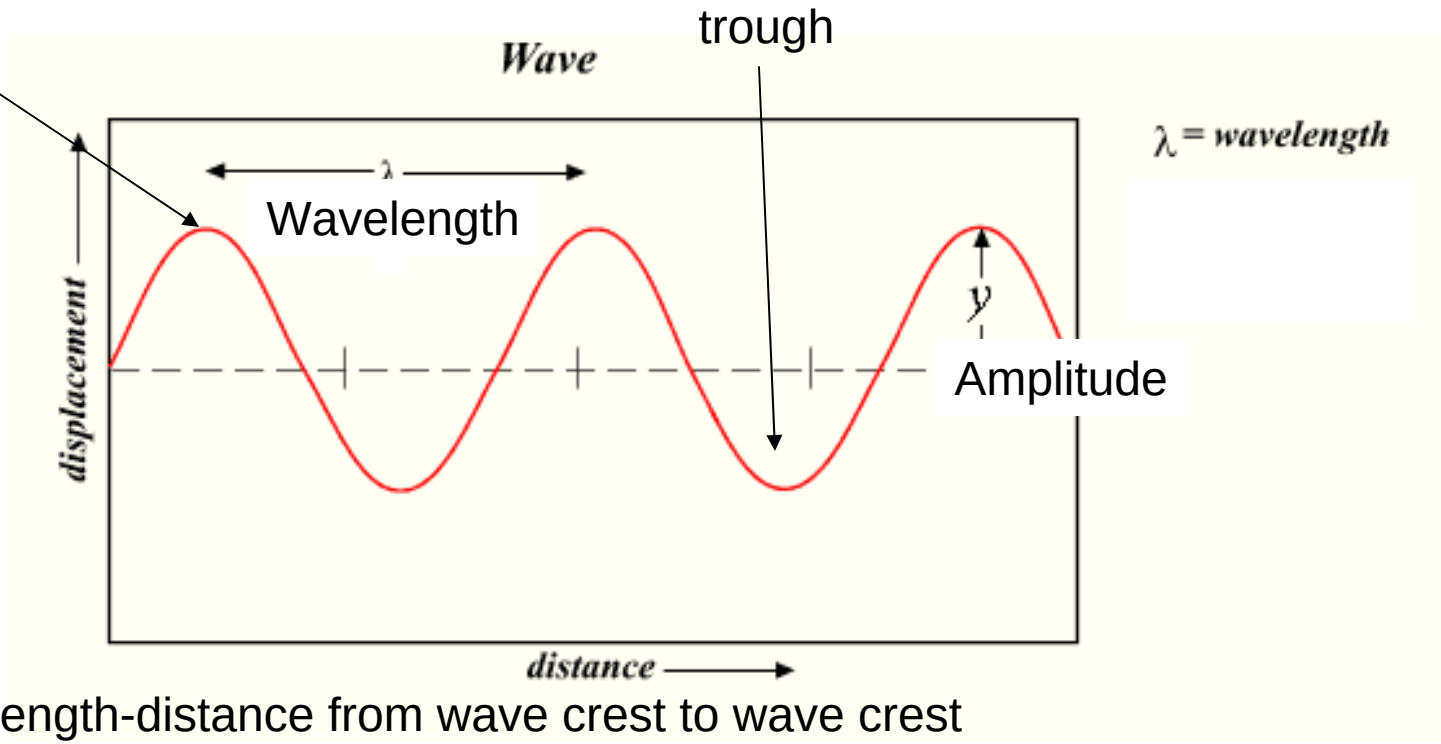
- **Radio**
- **Infra Red**
- **Visible Light (ROYGBIV)**
- **Ultra Violet**
- **X-Ray**
- **Gamma**

Electromagnetic waves travel as Transverse Waves



The diagram illustrates the motion of a **transverse wave**. Particles of the medium vibrate **at right angles to the direction the energy travels** and are have alternating crests and troughs. Simple water waves, such as the ripples produced when a stone is dropped into a pond, can be thought of as examples of transverse waves.

Mechanical waves need a medium to move through, electromagnetic waves do not!



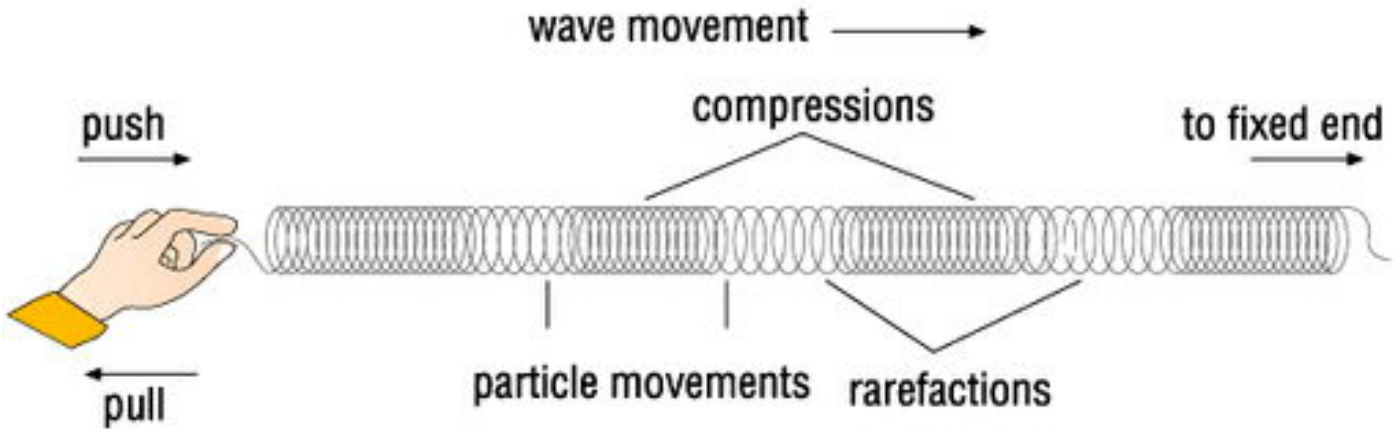
Wavelength-distance from wave crest to wave crest

Amplitude-the maximum displacement of particles in a medium through which a mechanical wave passes

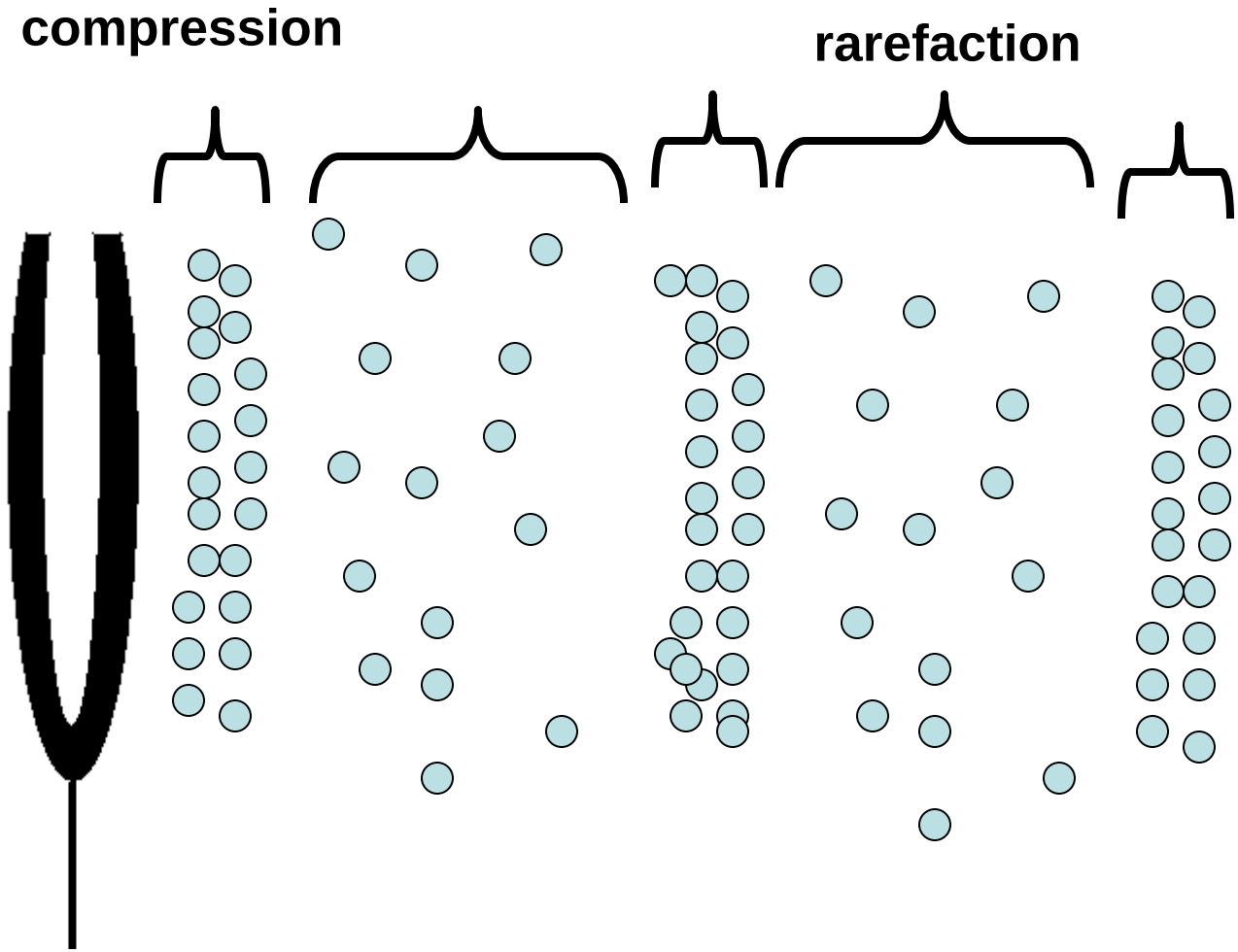
Frequency-how many wavelengths pass a point in a second

Crest-highest point particles in a transverse wave are displaced

Trough-lowest point particles in a transverse wave are displaced



The diagram illustrates the motion of a longitudinal wave. Sound, for example, travels through air in **longitudinal waves**: the waves **vibrate back and forth in the direction the energy travels**. In the **compressions** the particles of the medium are pushed together, and in the **rarefactions** they are pulled apart.



As the tuning fork vibrates, it pushes against the air particles, compressing them. These compressed air particles "uncompress" pushing on air particle next to them causing them to compress. This continues as the energy is passed trough the medium as a longitudinal wave.

Some examples of waves you know…

Speed of sound in dry air = 330 meters per second = 770 mph

Speed of light = 300,000 Kilometers per second = 300,000,000 meters per second = 670,000,000 mph!!!

For mechanical waves the speed they travel depends upon the density of the medium they travel through! Generally, the denser the medium, the faster the wave

Speed of sound in:

dry air = 330 m/s

Salt water = 1500 m/s

fresh water = 1497 m/s