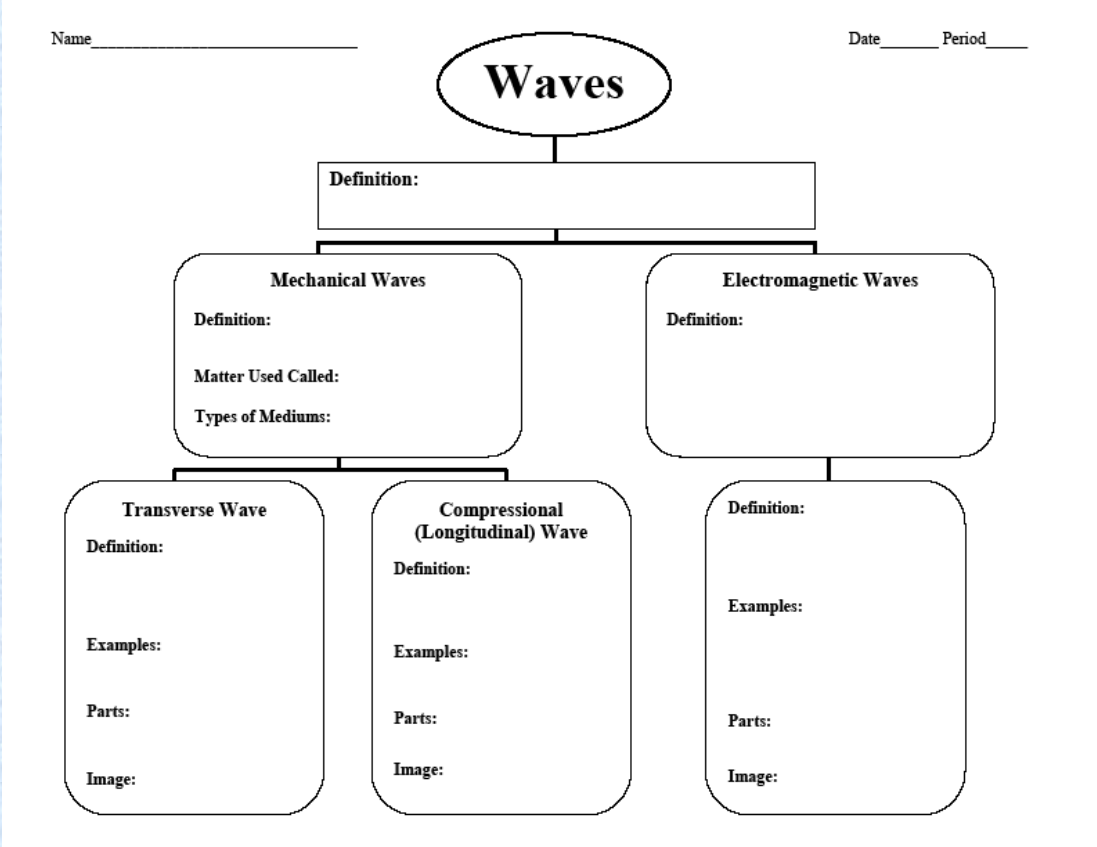
Introduction to Waves

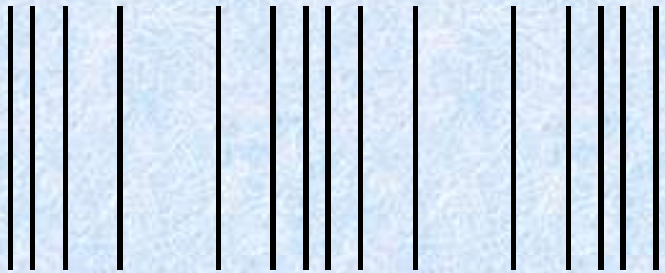
S8P4. a. Ask questions to develop explanations about the similarities and differences between electromagnetic and mechanical waves. (Clarification statement: Include transverse and longitudinal waves and wave parts such as crest, trough, compressions, and rarefactions.)

Use the PowerPoint to fill in the Waves graphic organizer as we discuss the characteristics of waves



What are Waves?

A disturbance that transfers energy through matter or space.

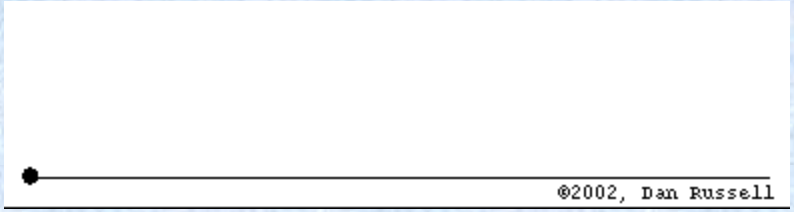


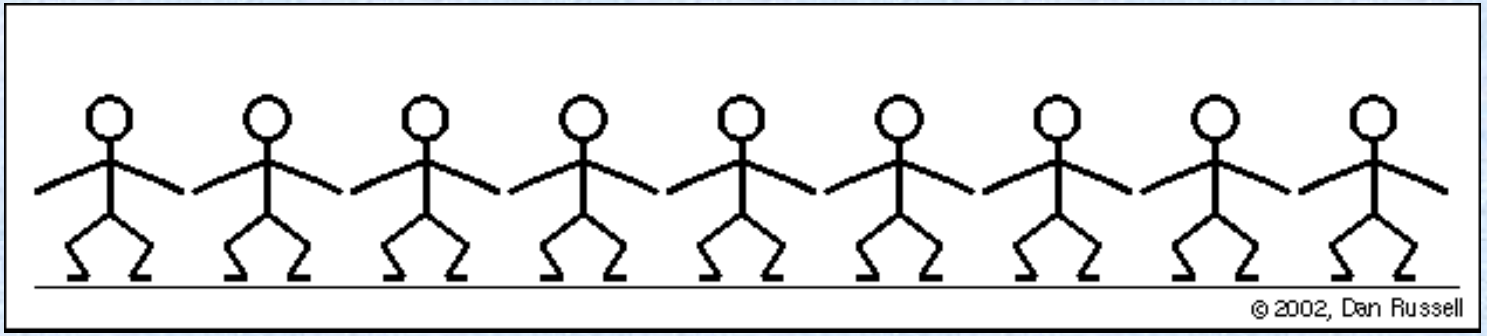
Mechanical Waves

Waves that need matter (medium) to transfer energy:

Examples: Sound waves, Ocean Waves, Ripples in Water, Earthquakes, People doing the wave at a sporting event

Some examples of Mechanical Waves





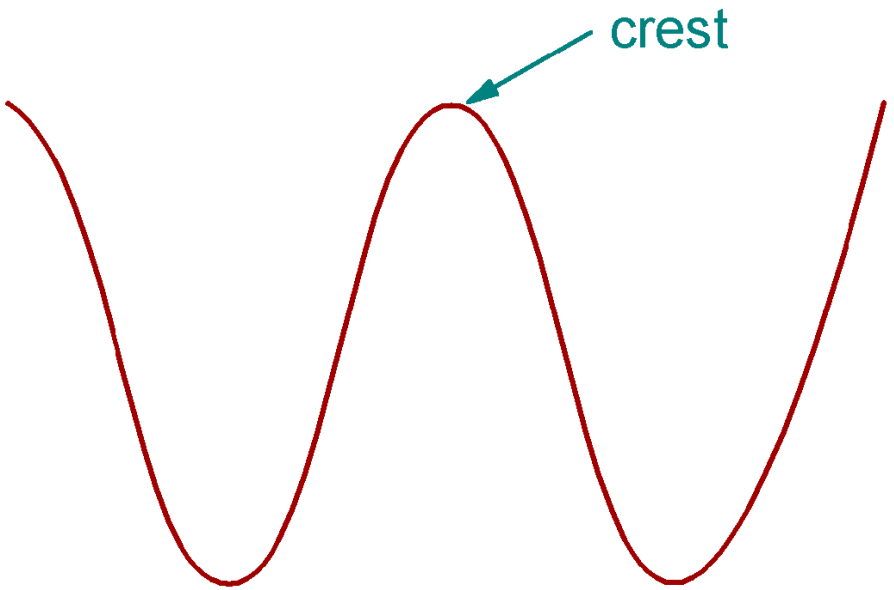
Transverse (Mechanical) Waves

- A wave in which the particles of the medium move perpendicular to the path of the wave.
- Examples: Waves in Water

https://www.ck12.org/physics/transverse-wave/lesson/Transverse-Waves-PHYS/

Scroll down for video clip

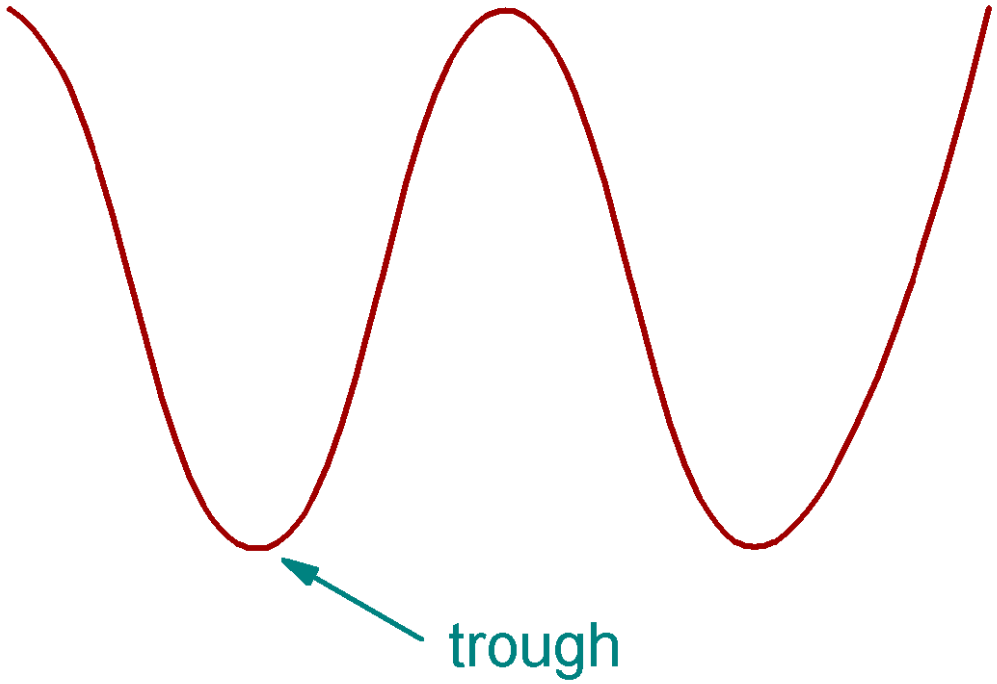
Parts of a Transverse Wave



The **crest** is the highest point on a wave.

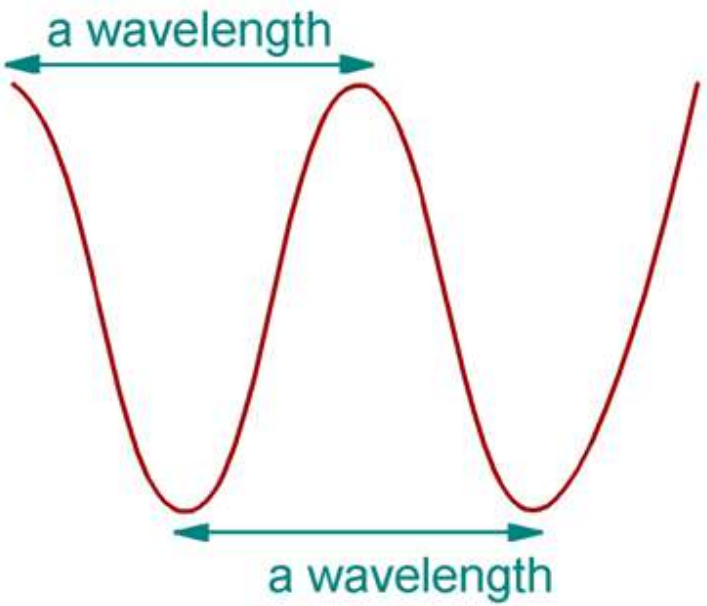
Parts of a Transverse Wave

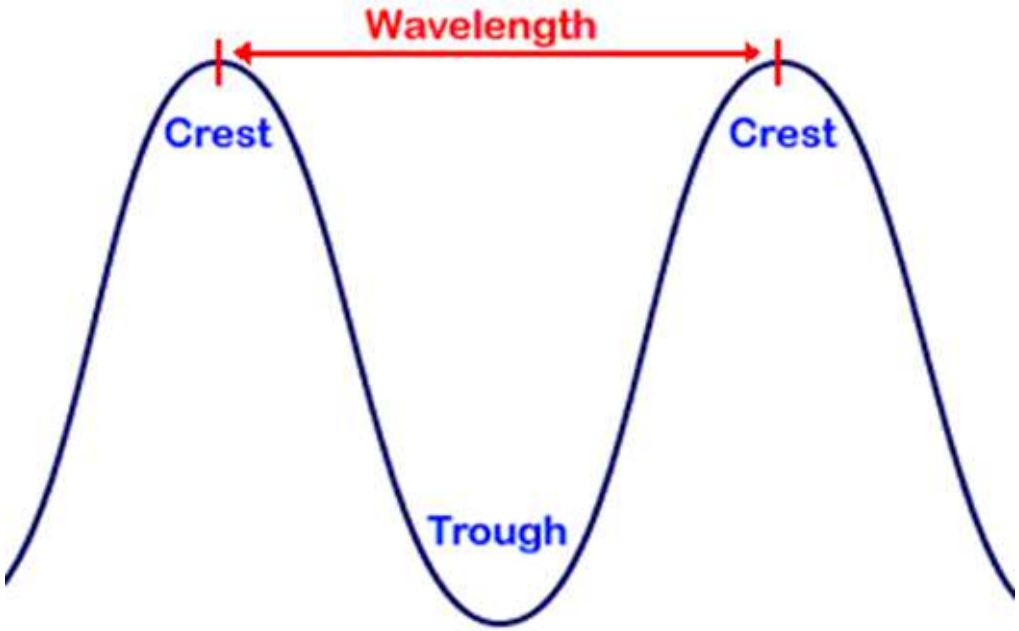
The **trough** is the valley between two waves, is the lowest point.



Parts of a Transverse Wave

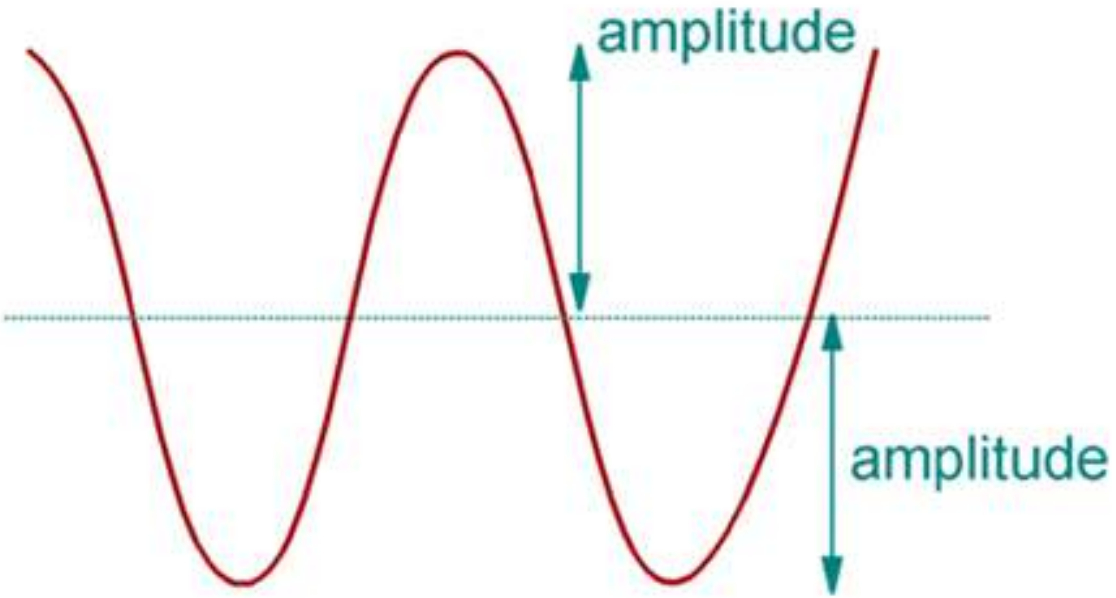
The **wavelength** is the horizontal distance, either between the crests or troughs of two consecutive waves.





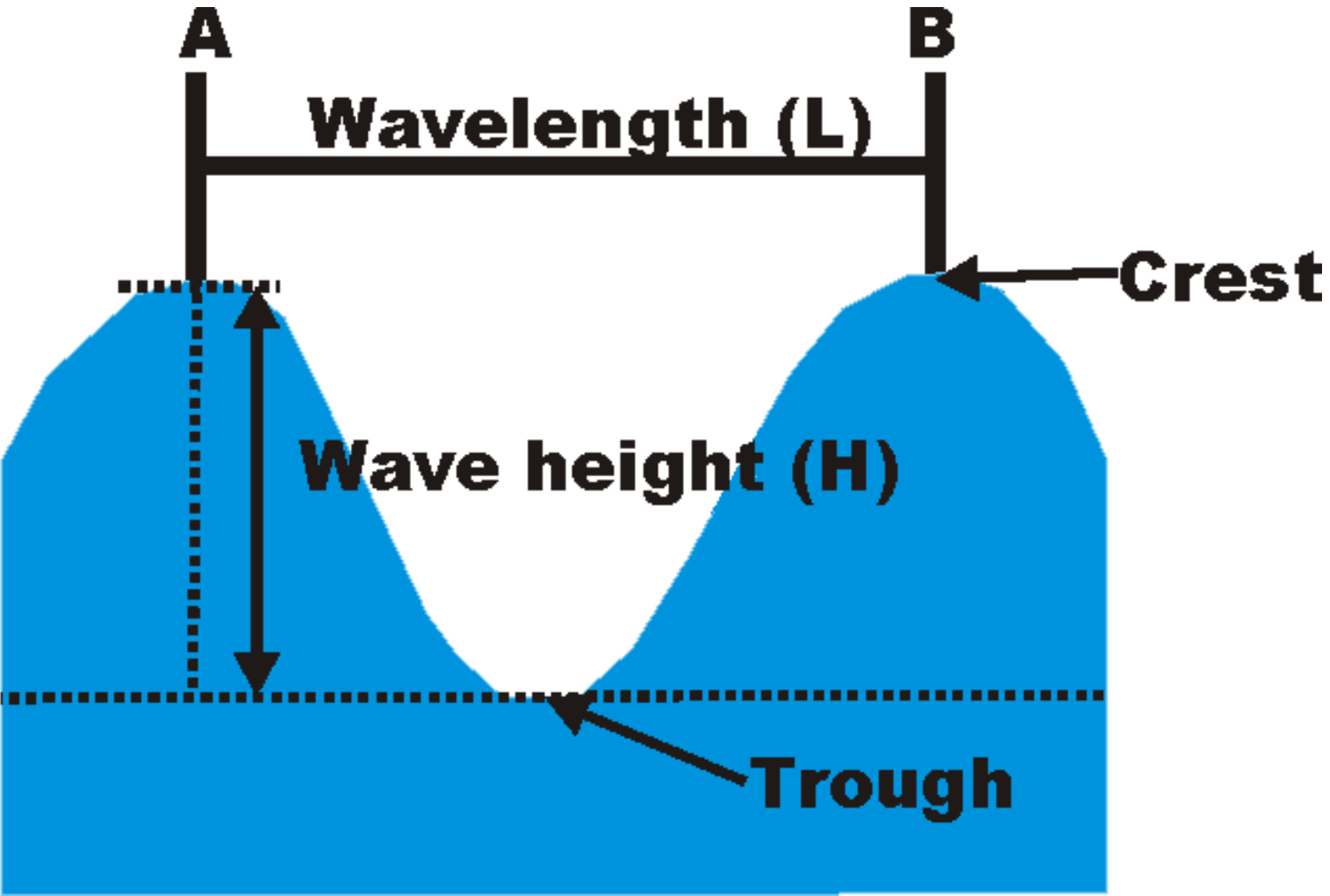
Parts of a Transverse Wave

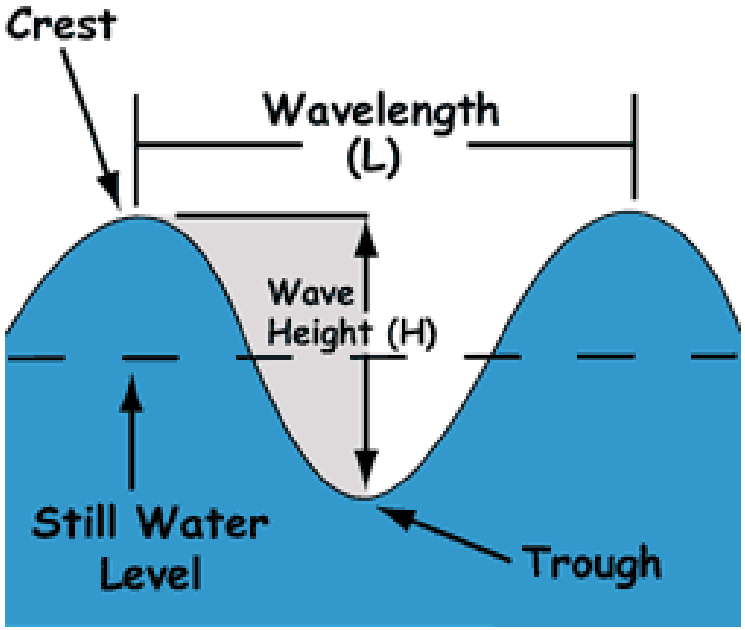
The **amplitude** is the peak (greatest) value (either positive or negative) of a wave. The distance from the undisturbed level to the trough or crest.

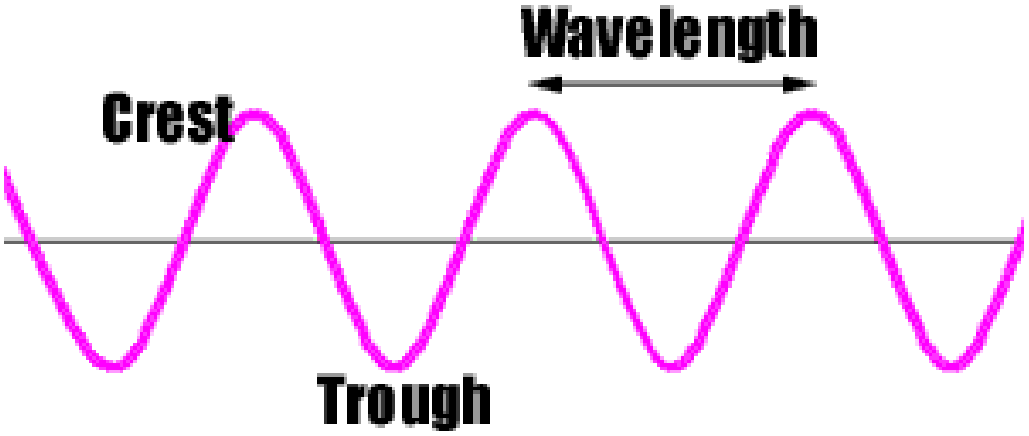


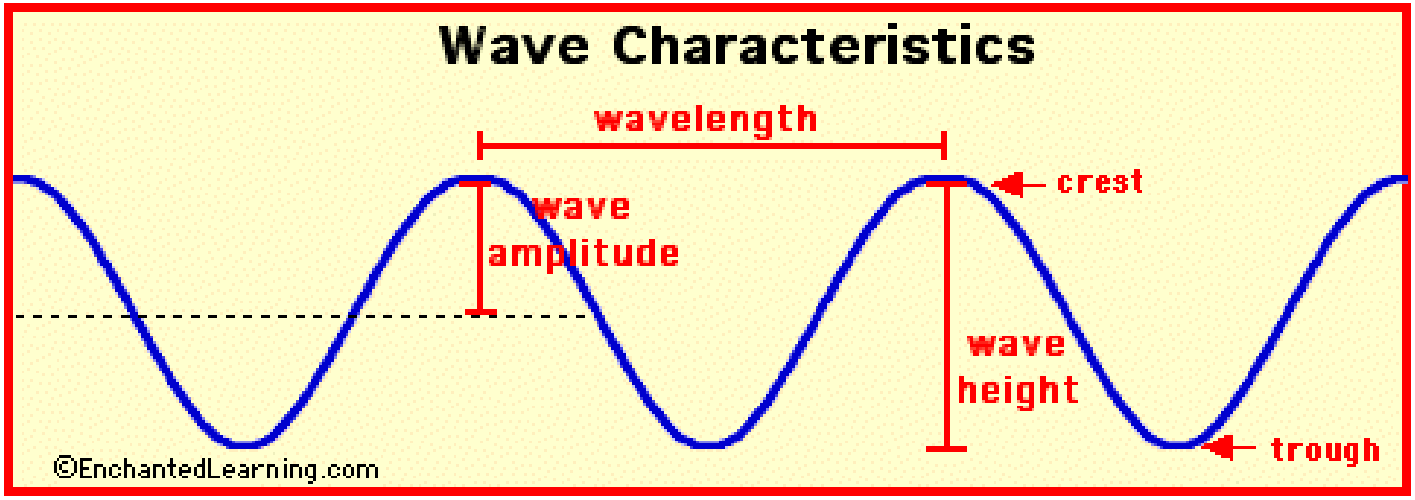
An ocean wave is an example of a mechanical transverse wave

WAVE SIMULATOR




Crest
Wavelength
(L)
Wave
Height (H)
Still Water
Level
Trough


Wavelength
Crest
Trough


Wave Characteristics
wavelength
wave
amplitude
crest
wave
height
trough
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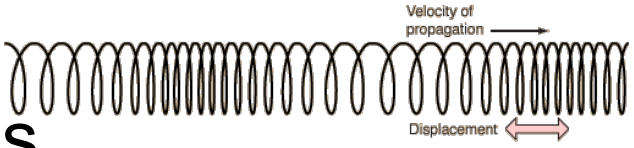
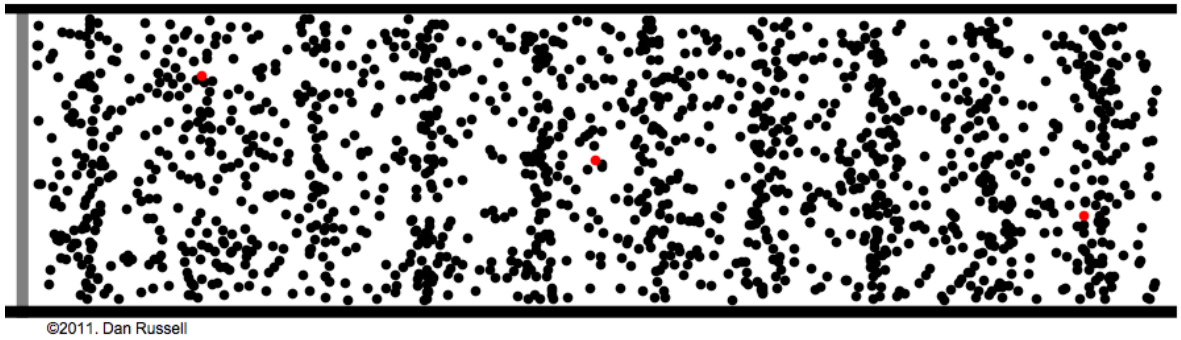
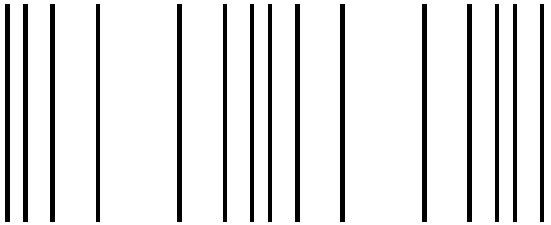
Compressional Wave (longitudinal)

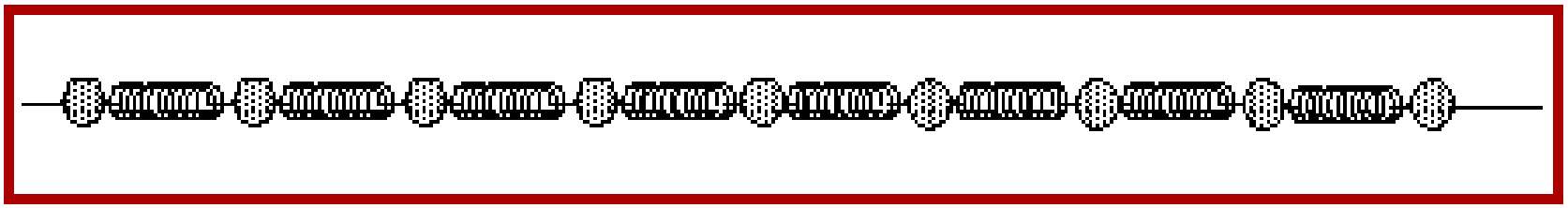
- A mechanical wave in which matter in the medium moves forward and backward along the same direction that the wave travels.
- Ex. Sound waves, Seismic Waves (Earth quakes)



A slinky is a good illustration of how a compressional wave moves



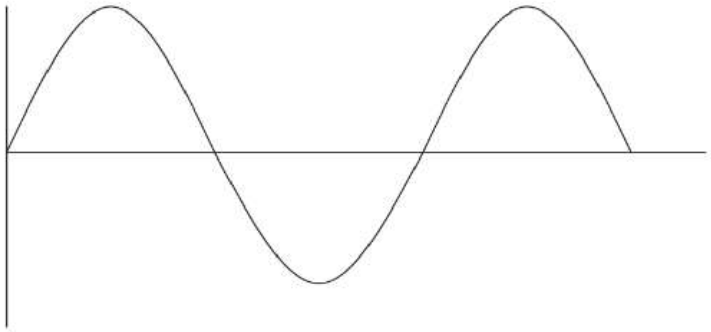




Use the next three slides and your Wave Diagram sheet to label and define the parts of a Compressional wave.

Name _____ ____Date_____ Period ___

Transverse Wave



Crest:

Trough:

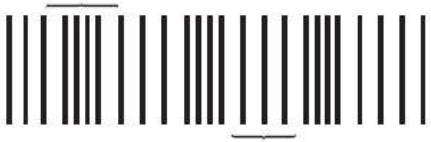
Wavelength:

Amplitude:

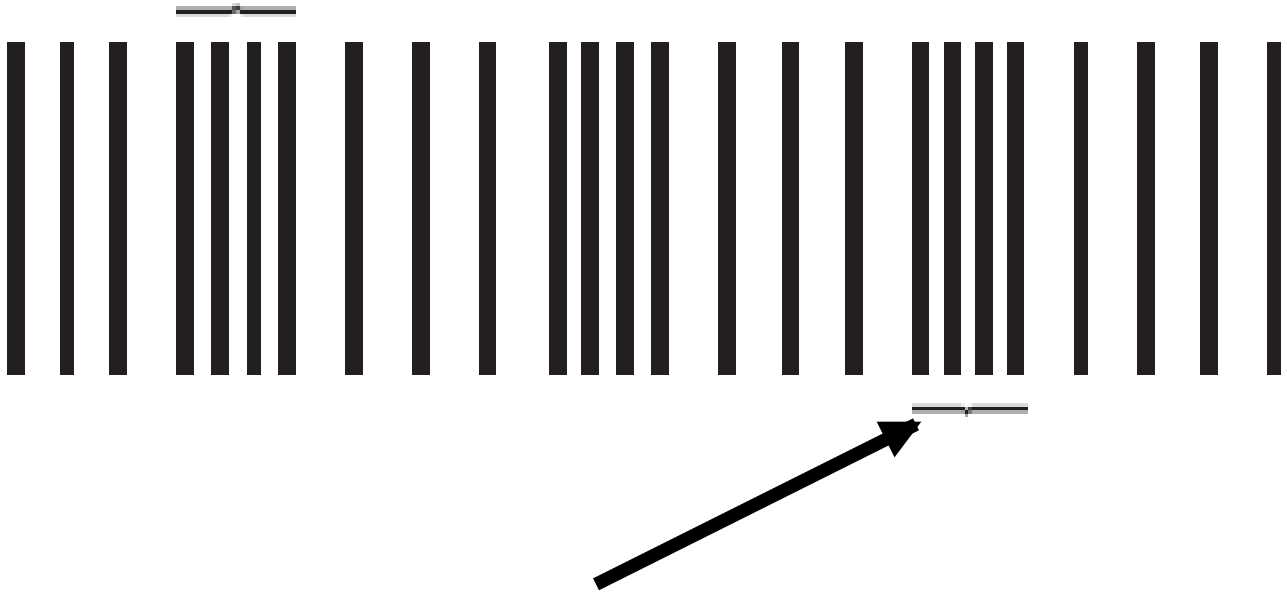
Compressional (Longitudinal) Wave

Rarefaction:

Compression:

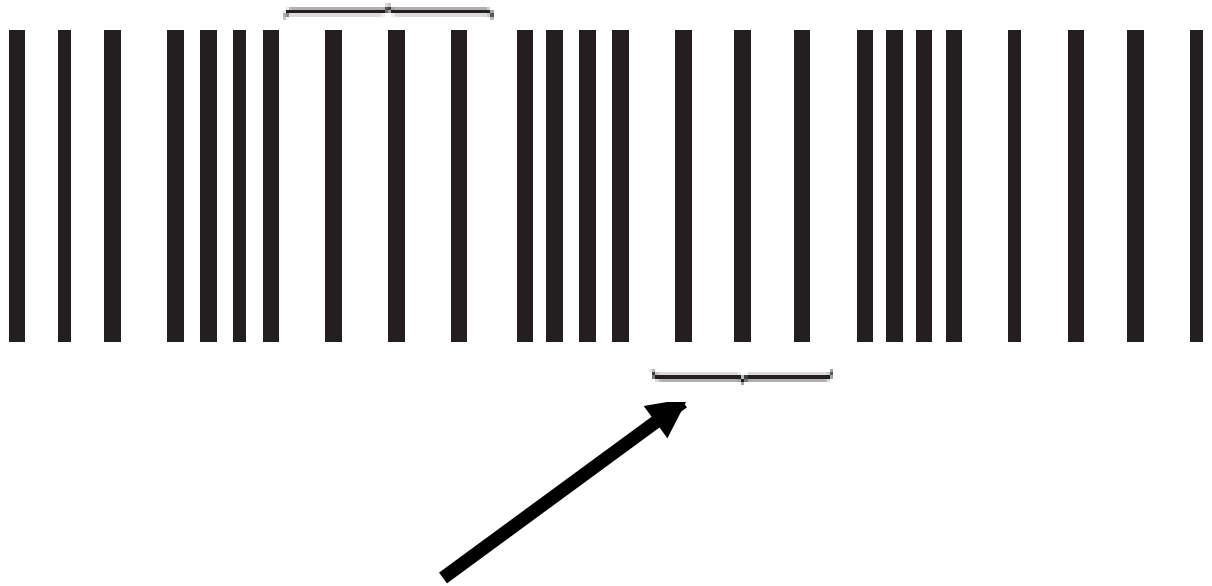


Parts of a Compressional Wave (Longitudinal)



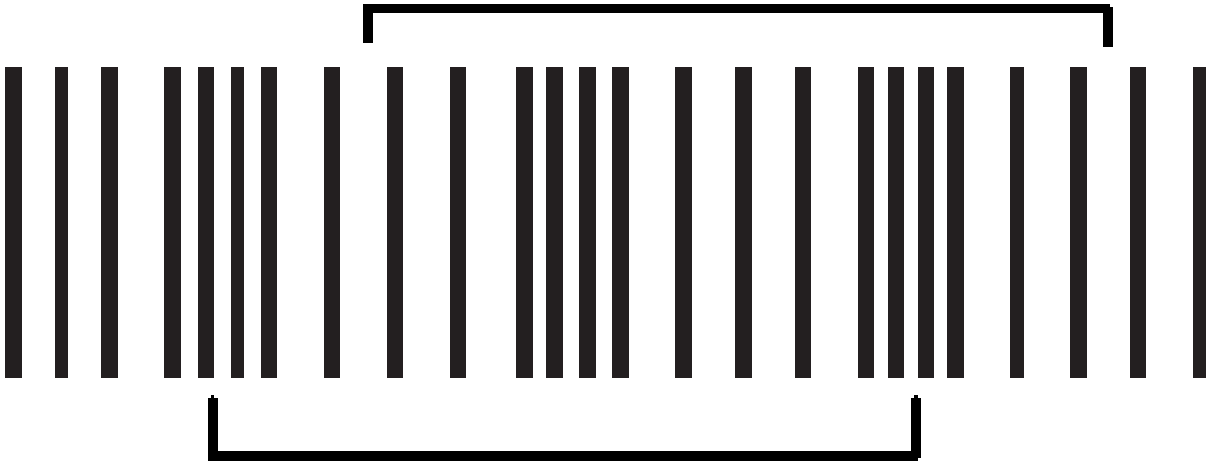
The **compression** is the part of the compressional wave where the particles are crowded together.

Parts of a Compressional Wave (Longitudinal)

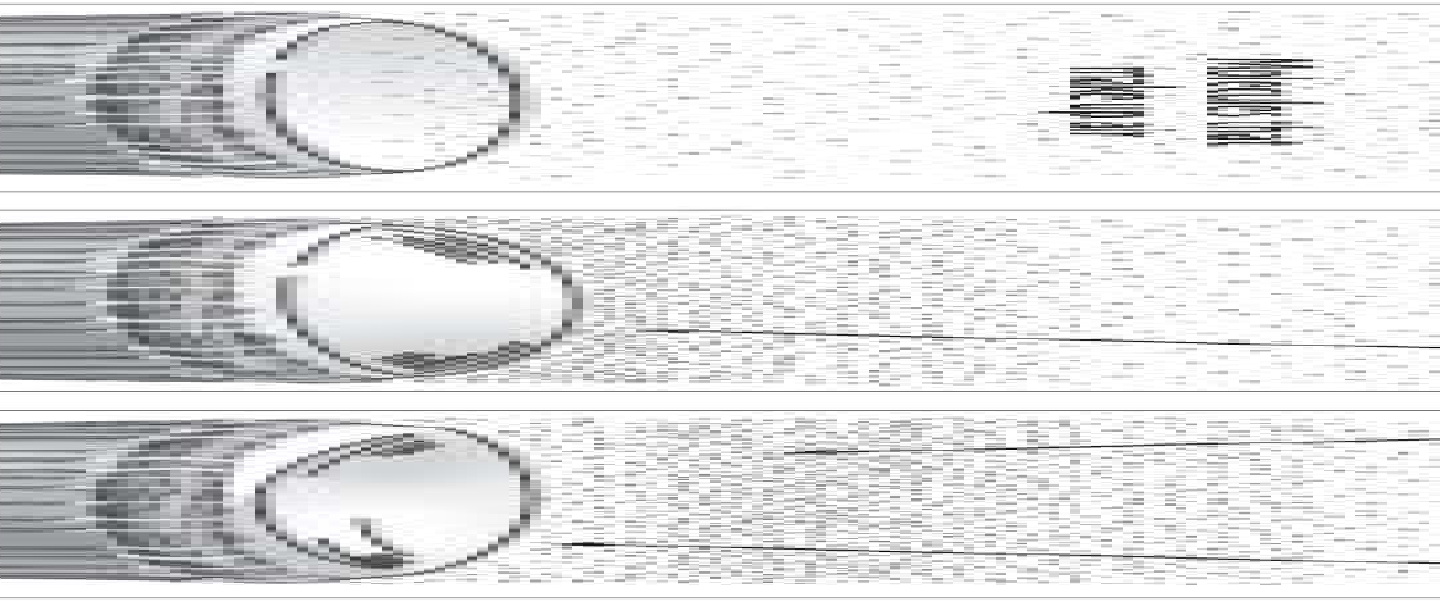


The **rarefaction** is the part of the compressional wave where the particles are spread apart.

Parts of a Compressional Wave (Longitudinal)



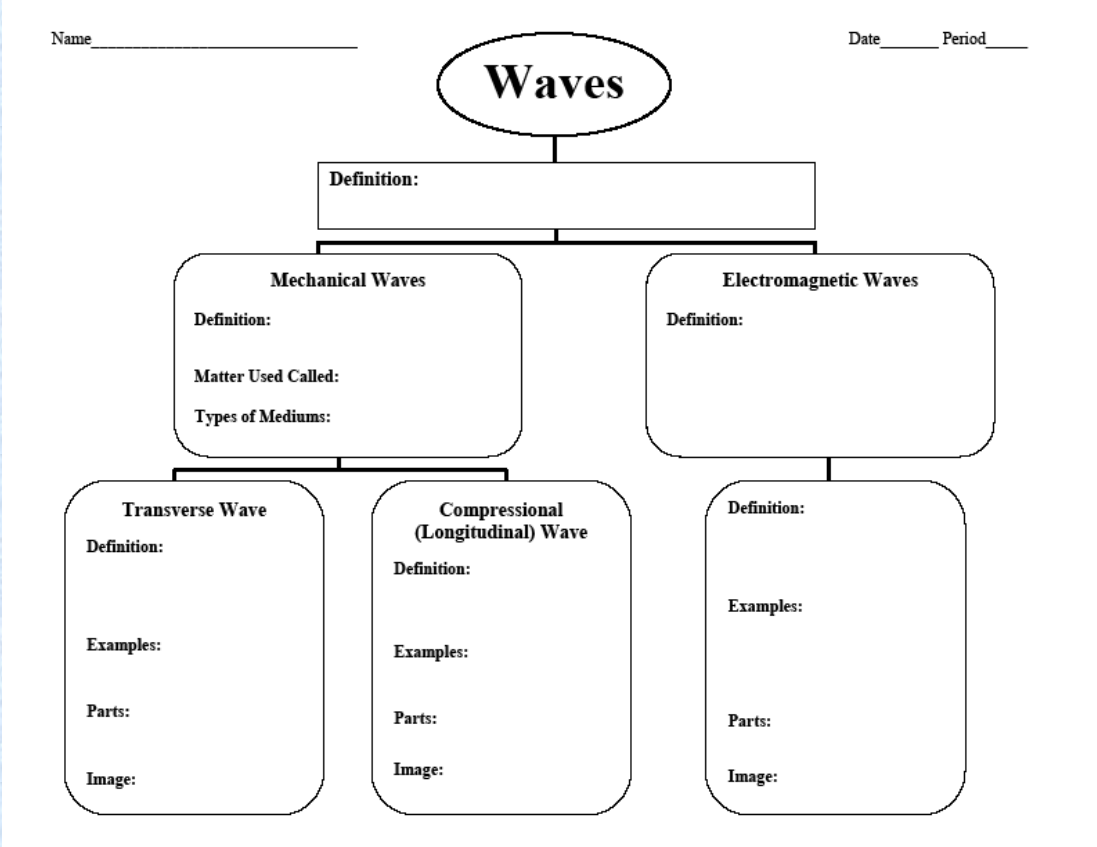
The **wavelength** is the distance from compression to compression or rarefaction to rarefaction in a compressional wave.



Sound Waves Video

- https://www.youtube.com/watch?v=aA1CrxII9G4

Use the PowerPoint complete the Waves graphic organizer as we discuss the characteristics of waves



Electromagnetic Waves

Waves that DO NOT NEED matter (medium) to transfer energy.

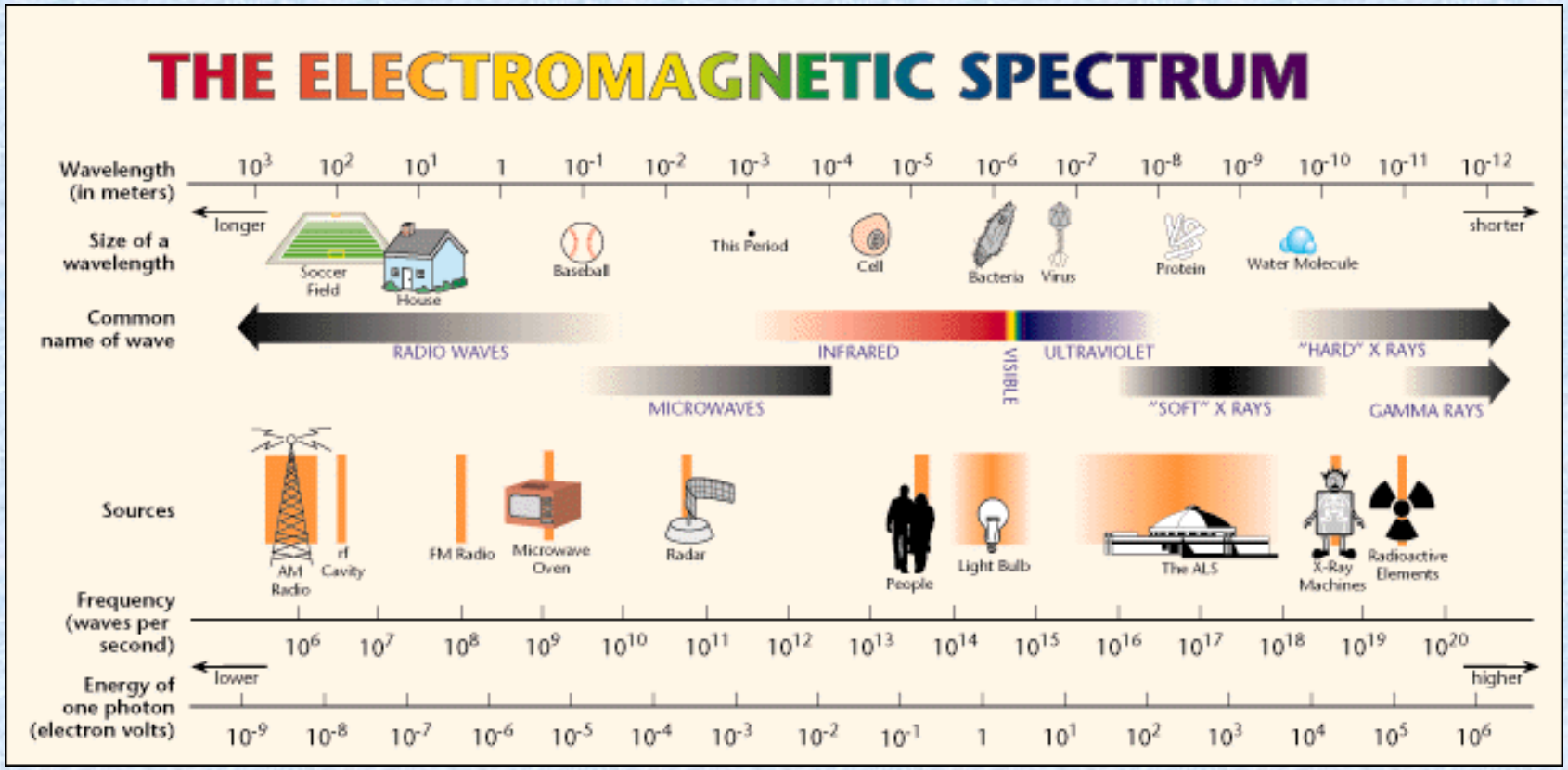
Examples: Radiation, TV & Radio Waves, X-rays, Microwaves, Lasers, Energy from the Sun, and Visible Light

Electromagnetic waves are considered transverse waves because they have similar characteristics; therefore, they have the same parts.

More to come on Electromagnetic waves…

Electromagnetic Spectrum

The electromagnetic spectrum illustrates the range of wavelengths and frequencies of electromagnetic waves.



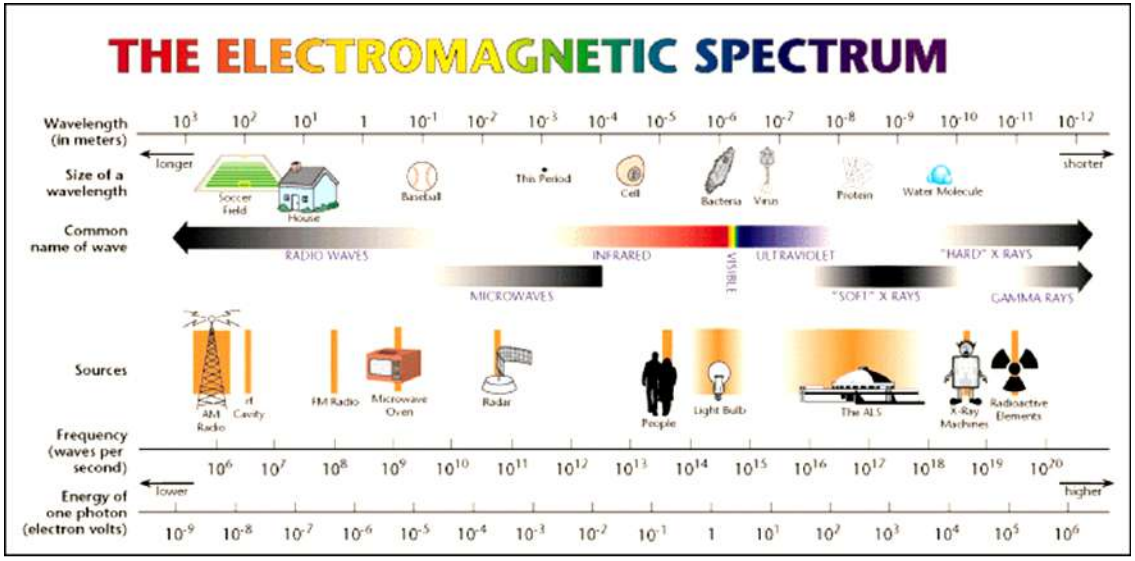
Light Waves Video

- https://www.youtube.com/watch?v=BUYeQa_-ojk

Ticket Out The Door

1. Name and describe the 2 types of waves.
2. Give an example of each of the 2 types of waves.
3. Draw and label a compressional wave.
4. Draw and label a transverse wave.
5. What are the characteristics of mechanical and electromagnetic waves?

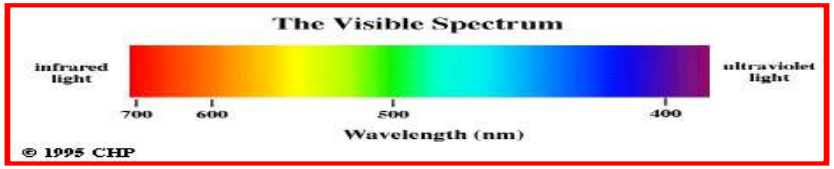
Electromagnetic Spectrum Sheet



1. Which of the following has the longest wavelength? Microwave Gamma Ray Radio Wave Ultraviolet Light

2. Which of the following has the highest frequency? Microwave Gamma Ray Radio Wave Ultraviolet Light

3. Compare the wavelength and frequency of a radio wave to the wavelength and frequency of a gamma ray.



4. Compare the wavelength of infrared light to the wavelength of ultraviolet light.

- Stop Here

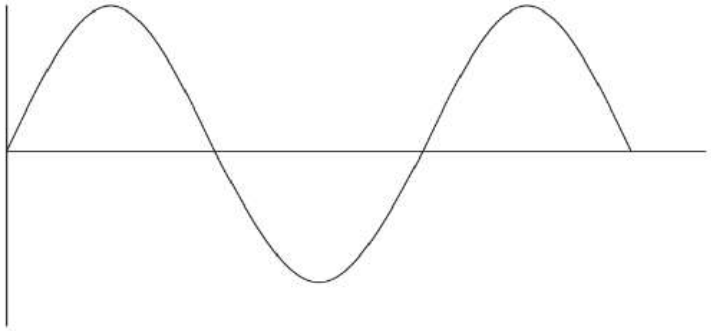
Use the next four slides and your Wave Diagram sheet to label and define the parts of a Transverse wave.

Name _____ ____Date_____ Period ___

Transverse Wave

Crest:

Trough:



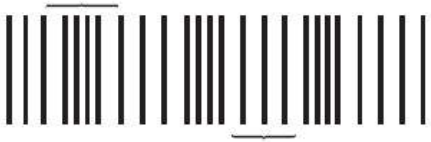
Wavelength:

Amplitude:

Compressional (Longitudinal) Wave

Rarefaction:

Compression:



Types of Waves

- Mechanical Waves – need matter (or medium) to transfer energy
  - A medium is the substance through which a wave can travel. Ex. Air; water; particles; strings; solids; liquids; gases
- Electromagnetic Waves – DO NOT NEED matter (or medium) to transfer energy
  - They do not need a medium, but they can go through matter (medium), such as air, water, and glass

Sound:

http://studyjams.scholastic.com/studyjams/jams/science/energy-light-sound/sound.htm

Light:

http://studyjams.scholastic.com/studyjams/jams/science/energy-light-sound/light.htm