

Introduction to Waves

Essential Question:
What are the characteristics
of mechanical and
electromagnetic waves?
(S8P4a,d,f)

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

Name _____ Date _____ Period _____

Waves

Definition: _____

Mechanical Waves

Definition: _____

Matter Used Called: _____

Types of Mediums: _____

Transverse Wave

Definition: _____

Examples: _____

Parts: _____

Image: _____

Compressional (Longitudinal) Wave

Definition: _____

Examples: _____

Parts: _____

Image: _____

Electromagnetic Waves

Definition: _____

Definition: _____

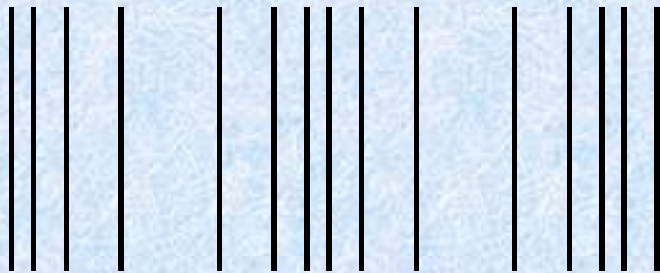
Examples: _____

Parts: _____

Image: _____

What are Waves?

Rhythmic disturbances that carry energy without carrying matter



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

Mechanical Waves

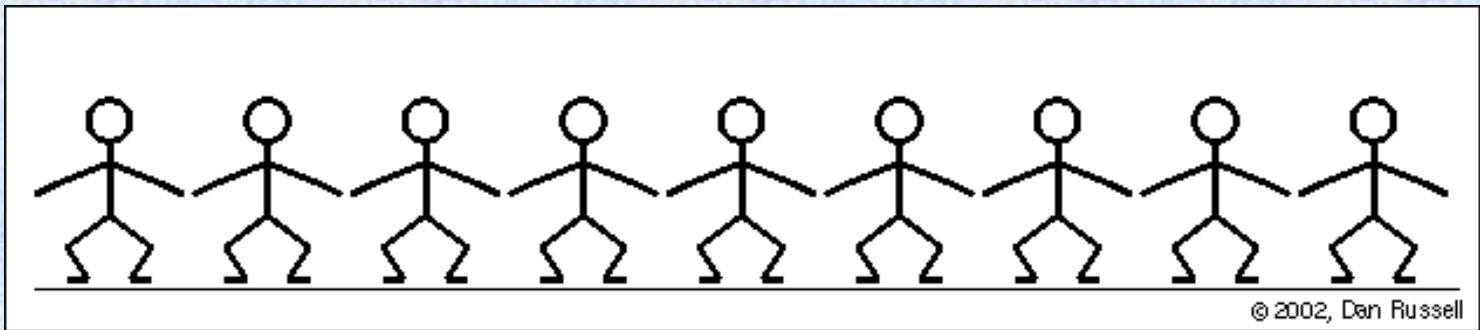
Waves that need matter (medium)
to transfer energy:

Examples: Sound waves, ocean
waves, ripples in water,
earthquakes, wave of people at
a sporting event

Some examples of Mechanical Waves



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Distributed Summarizing

Answer the following question with an elbow partner:

Look back at the examples of mechanical waves. If waves transfer energy, which type of mechanical wave do you think transferred the most energy? Why?

Transverse (Mechanical) Waves

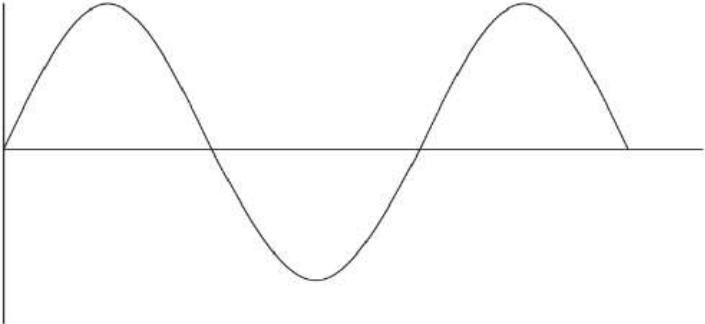


- Energy causes the matter in the medium to move up and down or back and forth at right angles to the direction the wave travels.
- Examples: waves in water
- http://www.stmary.ws/highschool/physics/home/notes/waves/intro/video/Creating_a_Transverse_Wave.mov
- <http://www.stmary.ws/highschool/physics/home/notes/waves/intro/wavesVibration.html>

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: _____

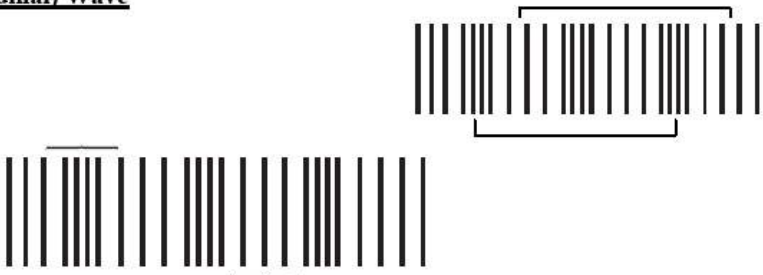
Trough: _____

Wavelength: _____

Amplitude: _____

Compressional (Longitudinal) Wave

Rarefaction: _____

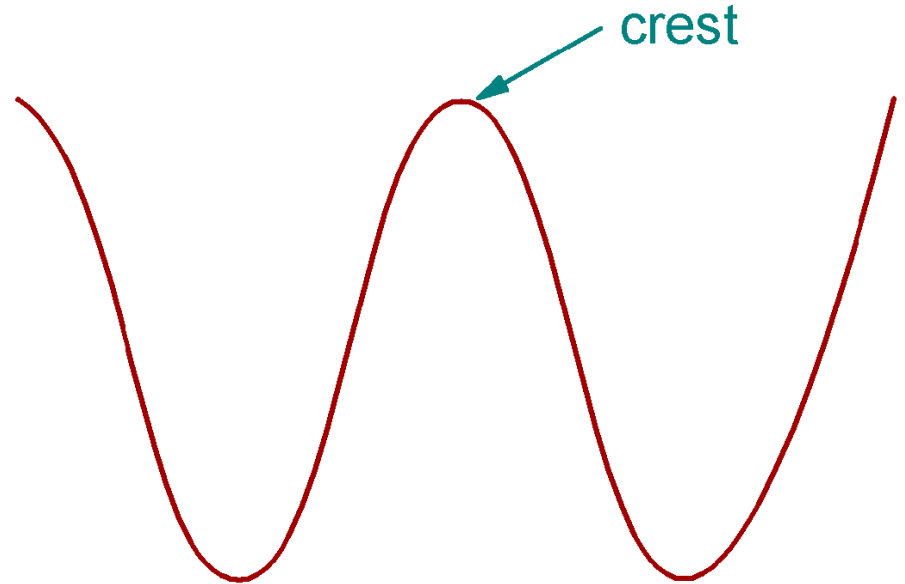


Compression: _____

Parts of a Transverse Wave

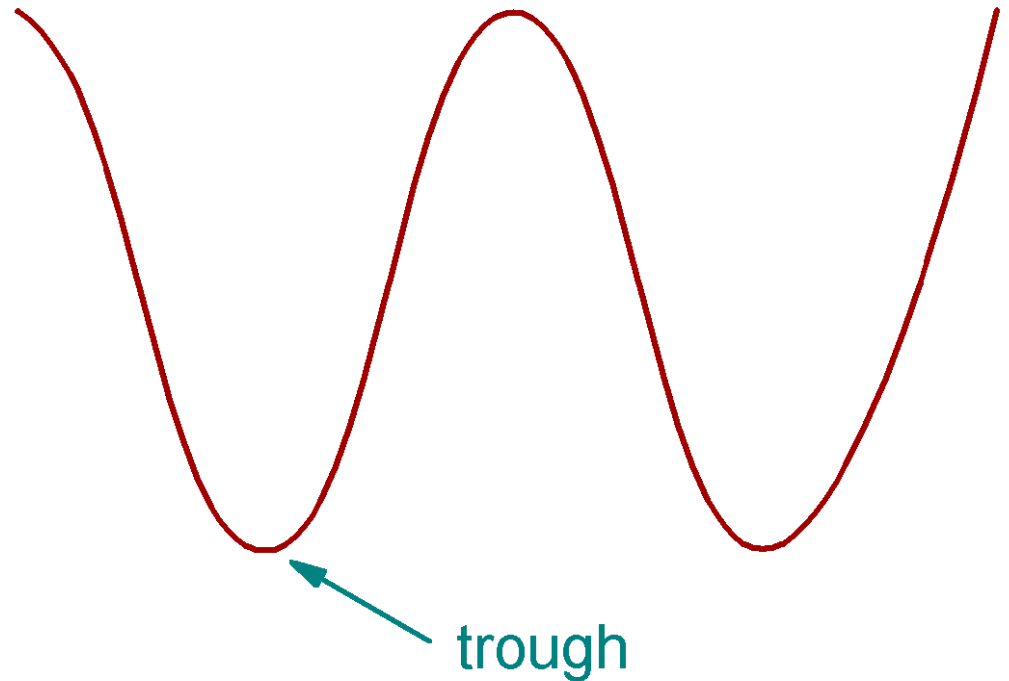


The **crest** is the highest point on a wave.



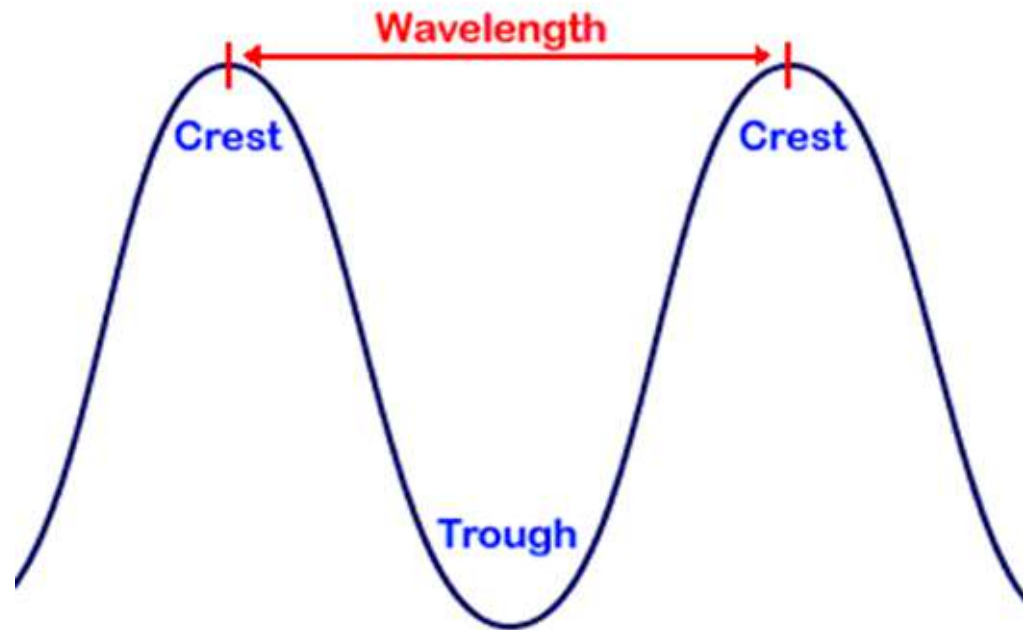
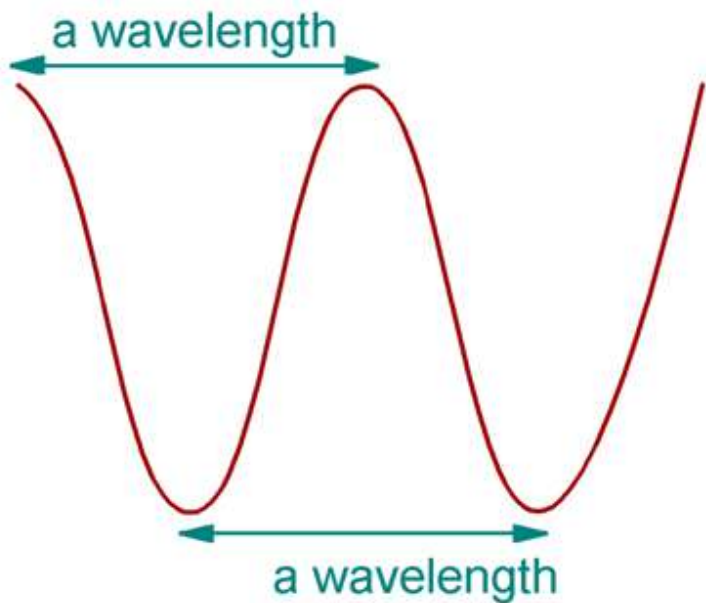
Parts of a Transverse Wave

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



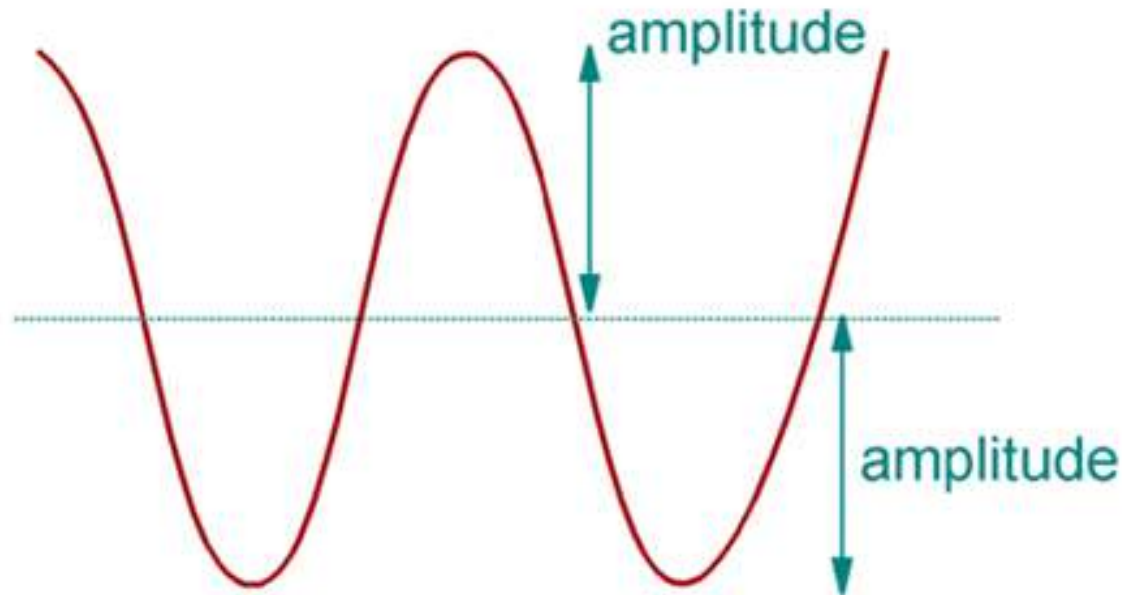
Parts of a Transverse Wave

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



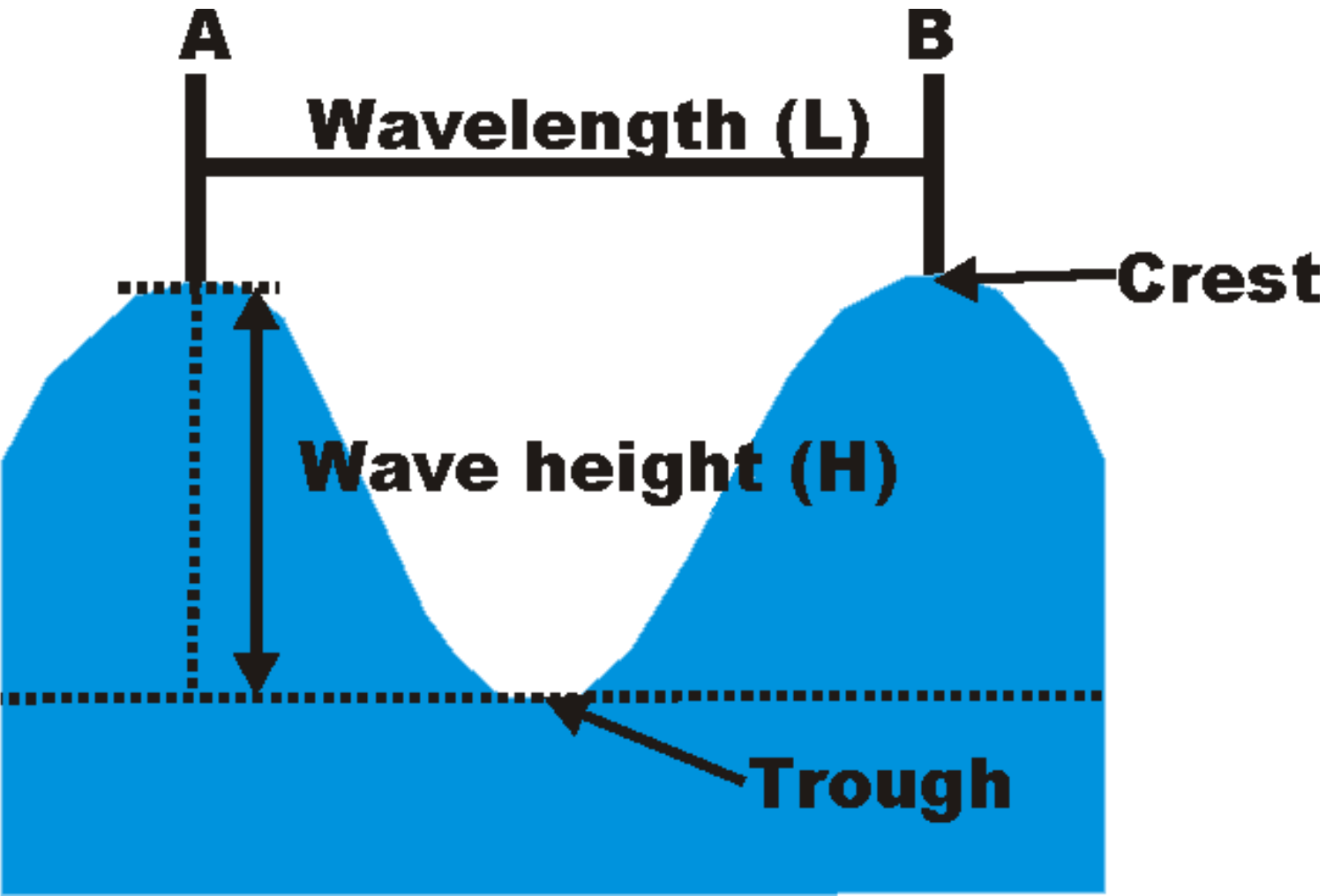
Parts of a Transverse Wave

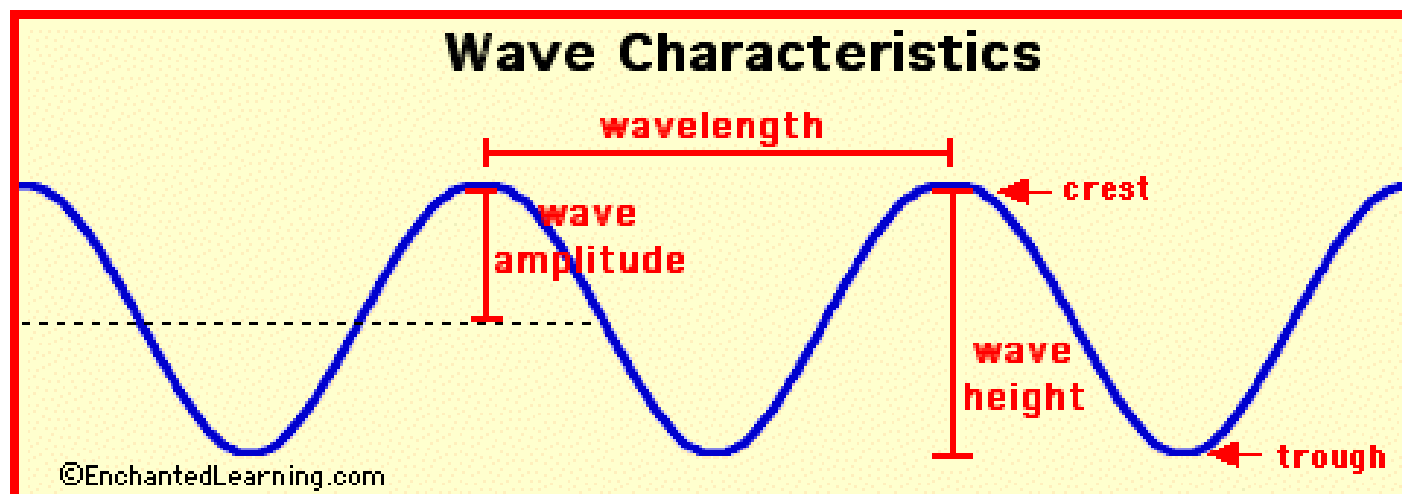
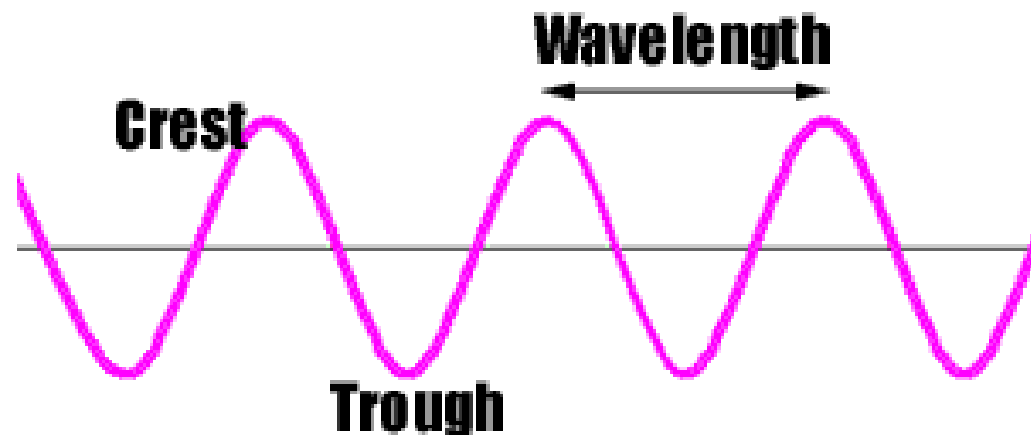
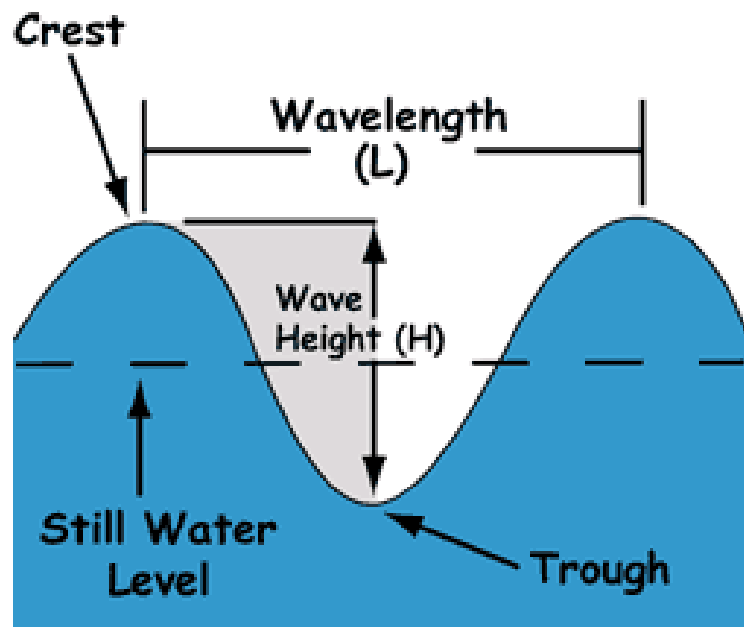
The **amplitude** is the peak (greatest) value (either positive or negative) of a wave. The distance from the undisturbed level to the trough or crest.



An ocean wave is an example of a mechanical transverse wave

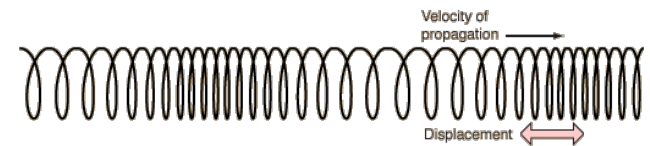
WAVE SIMULATOR



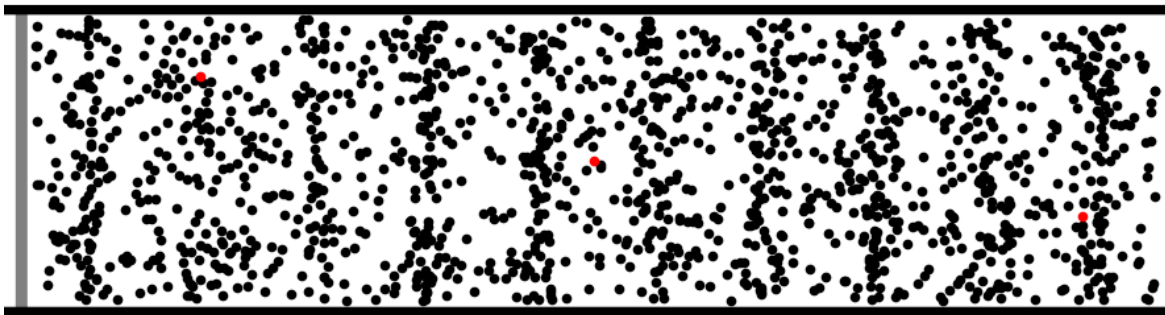


Compressional Wave (longitudinal)

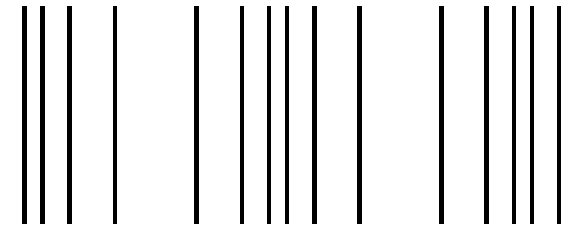
- A mechanical wave in which matter in the medium moves forward and backward along the same direction that the wave travels.
- Ex. Sound waves



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



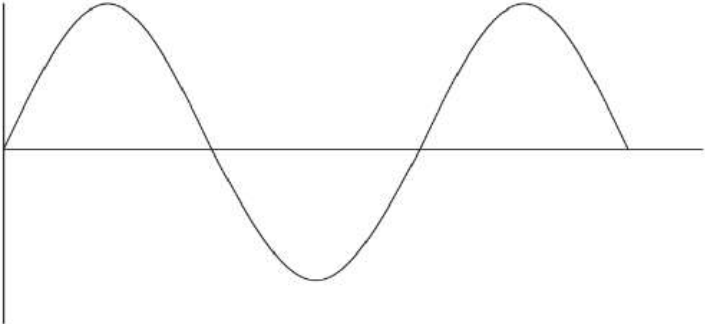
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Use the next three slides and your Wave Diagram sheet to label and define the parts of a Compressional wave.

Name _____ Date _____ Period _____

Transverse Wave



Crest:

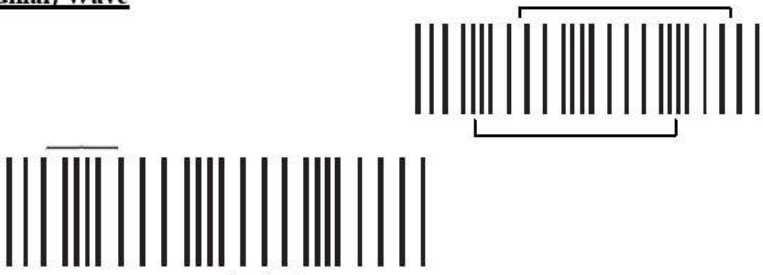
Trough:

Wavelength:

Amplitude:

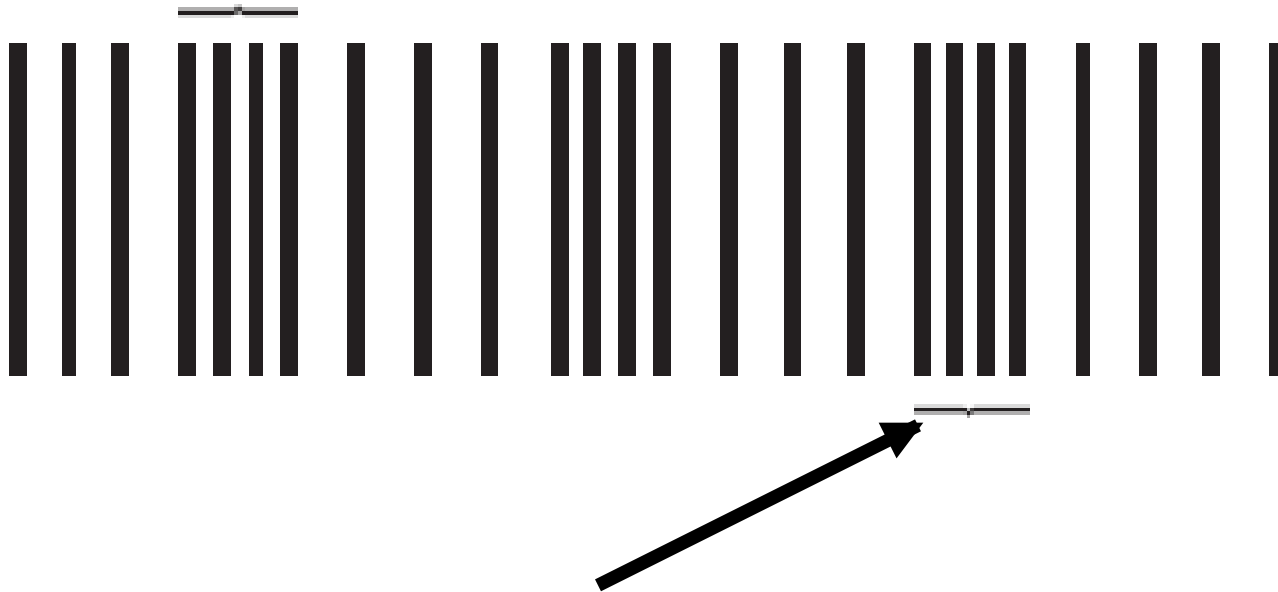
Compressional (Longitudinal) Wave

Rarefaction:



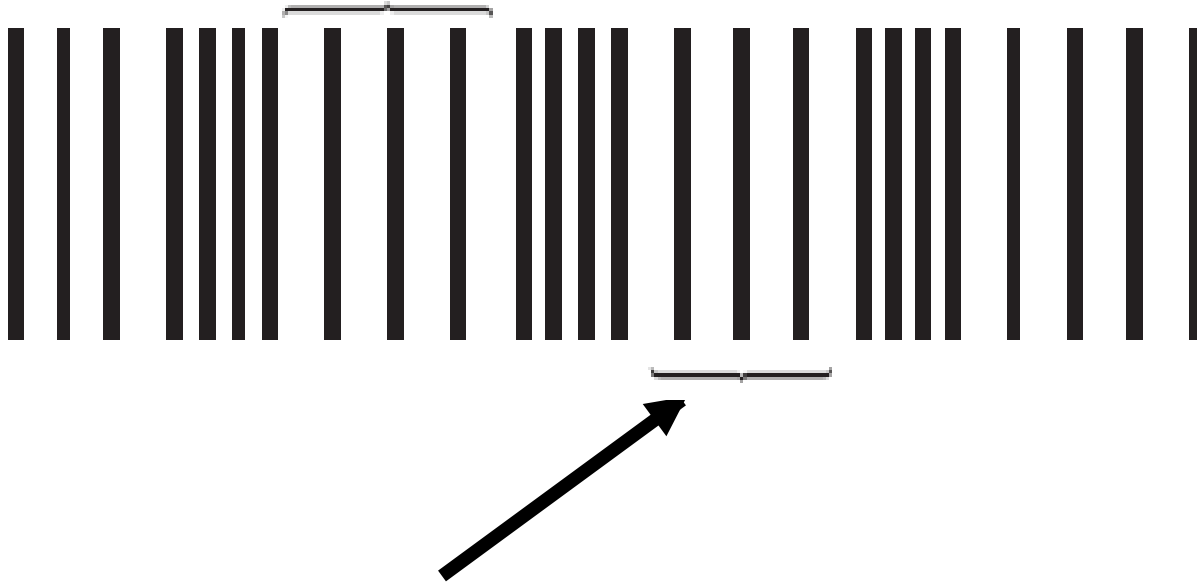
Compression:

Parts of a Compressional Wave (Longitudinal)



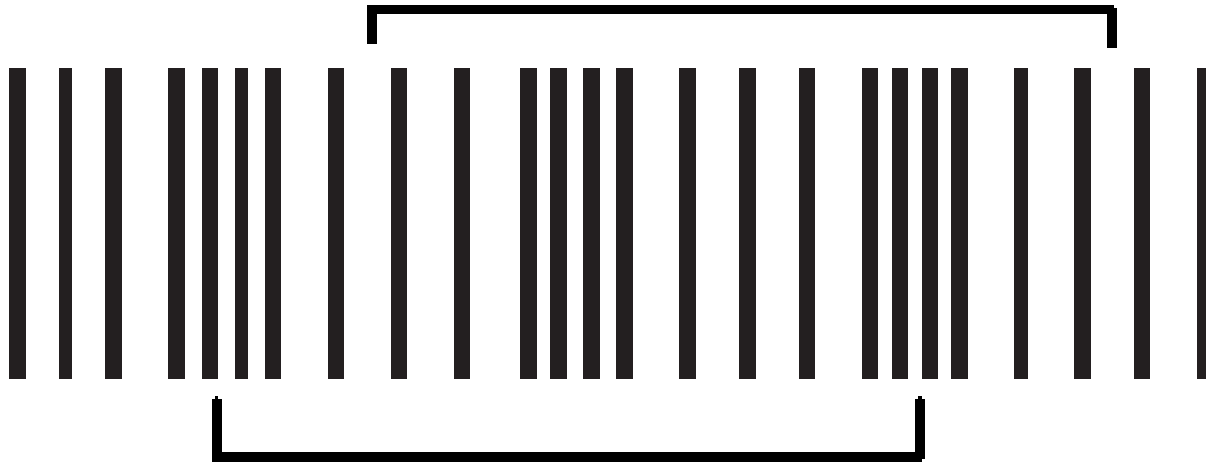
The **compression** is the part of the compressional wave where the particles are crowded together.

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.

Molecules that
make up air



Animation of Transverse and Longitudinal (Compression) Waves:

<http://www.stmary.ws/highschool/physics/home/animations3/waves/wavemotion.html>

Electromagnetic Waves

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

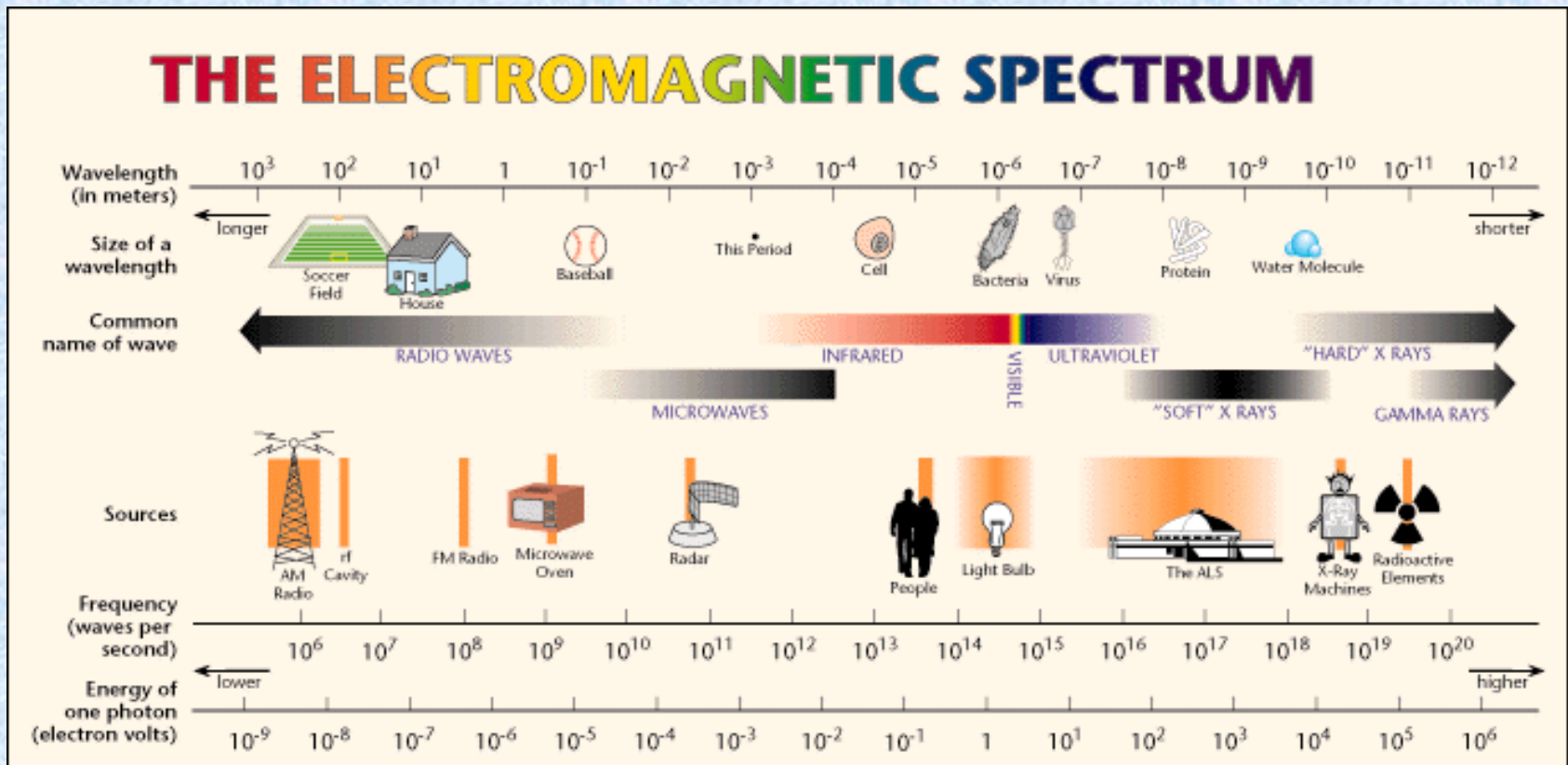
Examples: radiation, TV & radio waves,
X-rays, microwaves, lasers, energy from
the sun, visible light

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

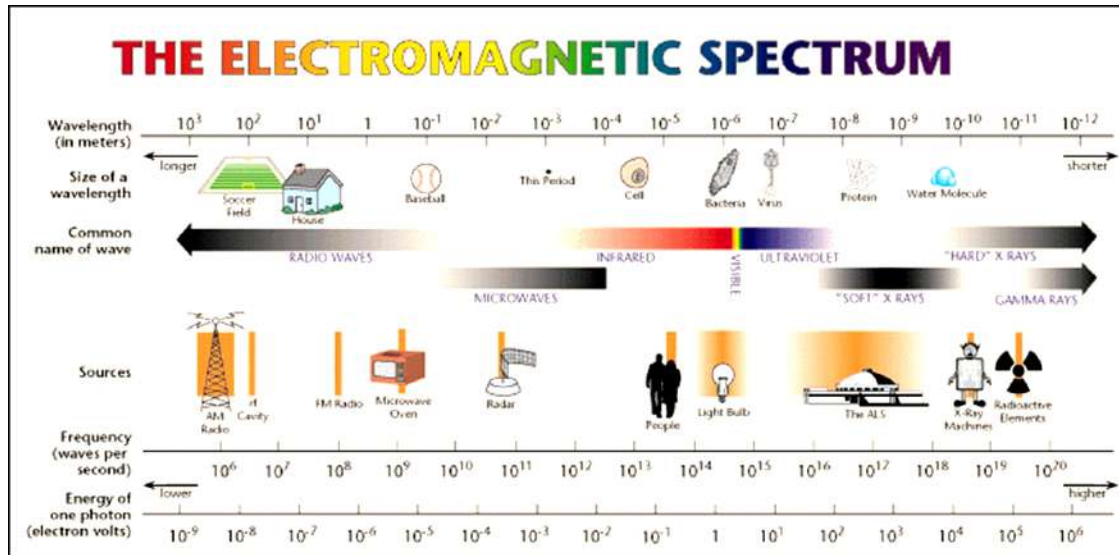
More to come on Electromagnetic waves...

Electromagnetic Spectrum

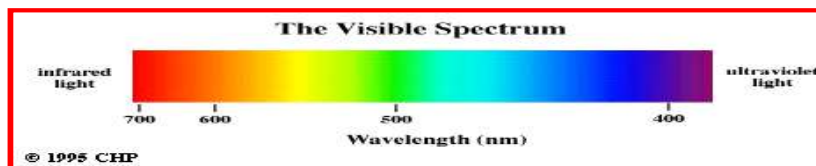
The electromagnetic spectrum illustrates the range of wavelengths and frequencies of electromagnetic waves.



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.

Summarizing Strategy

Types of Waves Quad Clusters

1. Sound Wave Ocean Wave Wave on a rope Stadium Wave

Which one does not belong? Why? _____

2. Microwave X-ray Laser Sound Wave

Which one does not belong? Why? _____

3. Radiation Radio Signal Light Earthquake

Which one does not belong? Why? _____

4. Sound Wave Ripple in water Guitar String TV Signal

Which one does not belong? Why? _____