Study Guide KEY – Waves – Part A

S8P4. Students will explore the wave nature of sound and electromagnetic radiation.

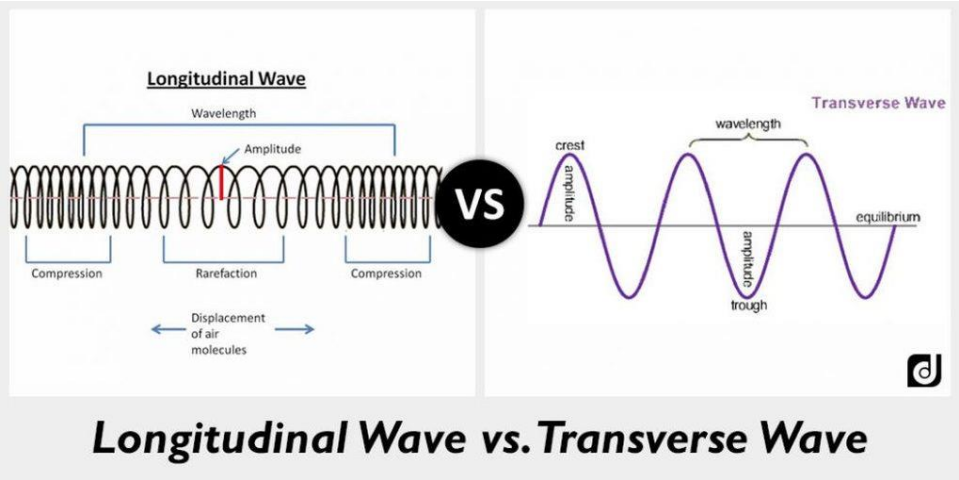
a. Identify the characteristics of electromagnetic and mechanical waves.

b. Describe how the behavior of light waves is manipulated causing reflection, refraction diffraction, and absorption.

c. Explain how the human eye sees objects and colors in terms of wavelengths.

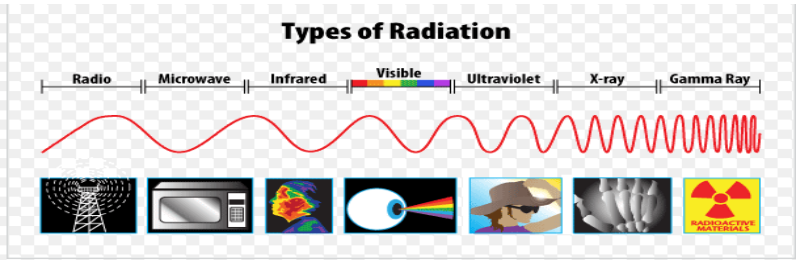
f. Develop and use a model to predict and describe the relationships between wave properties (i.e. frequency, amplitude and wavelength) and energy.

1. Define Medium
   -matter; solid, liquid, gas
2. Draw a transverse wave and label the crest, trough, amplitude, and wavelength, and baseline/line of origin



3. Draw a longitudinal wave and label the compression, rarefaction, and wavelength.
   -see above
4. In what kind of wave do the particles move <u>perpendicular</u> to the energy flow?
   -Transverse
5. In what kind of wave do the particles move <u>parallel</u> to the energy flow?
   -Longitudinal

*Use this picture for #7-9



6. Which type of radiation above has the highest energy? Lowest energy?
   -Low energy on left. High energy on right.

7. Which type of radiation above has the longest wavelength? Shortest wavelength?
   -Longest wavelength on left. Shortest wavelength on right.

8. Which type of radiation above has the lowest frequency? Highest frequency?
   -Waves on the left, low frequency. Wave on the right, high frequency.

9. Be able to put the EM waves in order with examples of how we use each wave.
   -see example above.

10. Know how to find wavelength and frequency.
   -For Wavelength- Be able to measure using a ruler. Frequency, count number of waves that pass by a reference point in a second.

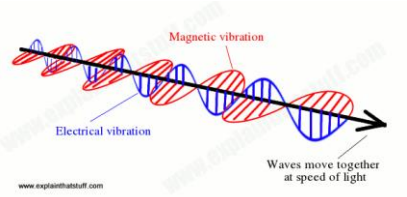
11. How are frequency and energy related?
   Higher the frequency, the higher the energy.
12. How are wavelength and frequency related?
   The longer the wavelength, the shorter the frequency AND the shorter the wavelength the longer the frequency.

13. How is amplitude and energy related?
   Higher amplitude, higher energy.

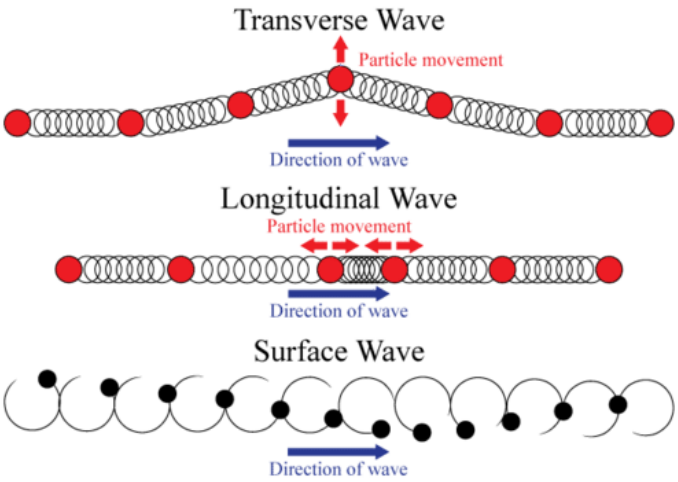
14. Be able to explain the similarities and differences between electromagnetic and mechanical waves.
   -EM Waves can travel without a medium and mechanical waves need a medium.

15. Be able to explain the similarities and differences between electromagnetic and mechanical waves.

Electromagnetic Waves	Same features of both	Mechanical Waves
Do Not require a medium	Carry energy not matter	requires a medium
Travel fastest with no particles	Can reflect, diffract and refract	travel fastest when particles are closest together
3 types of waves that have high energy and are dangerous to humans.		
Transverse waves		



Mechanical Waves:



- In a transverse wave, particles of the medium vibrate up and down perpendicular to the direction of the wave.
- In a longitudinal wave, particles of the medium vibrate back and forth parallel to the direction of the wave.
- In a surface wave, particles of the medium vibrate both up and down and back and forth, so they end up moving in a circle.

16.List all electromagnetic waves on one side and mechanical waves on the other.

Electromagnetic Waves	Mechanical Waves

Some of the most common examples Radio
.and seismic **waves** ,water **waves**, sound **waves** of **mechanical waves** are

:There are three types of **mechanical waves**

and surface **waves**. ,longitudinal **waves** ,transverse **waves**

Microwaves

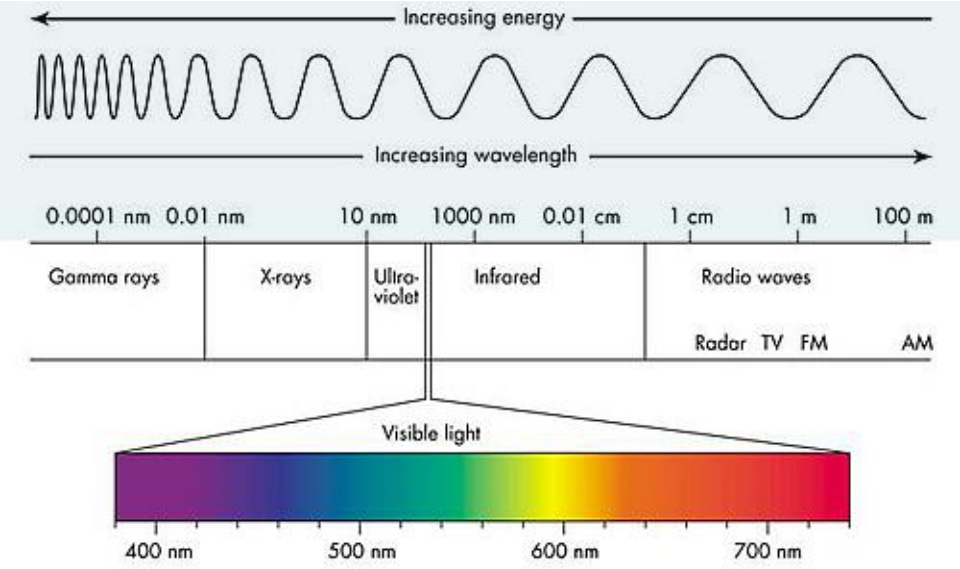
Infrared

Visible Light

Ultra violet

Xray

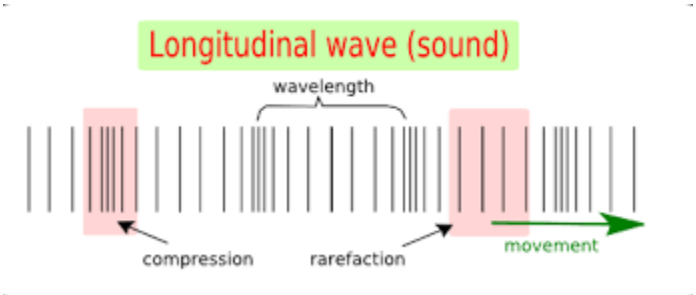
Gamma rays



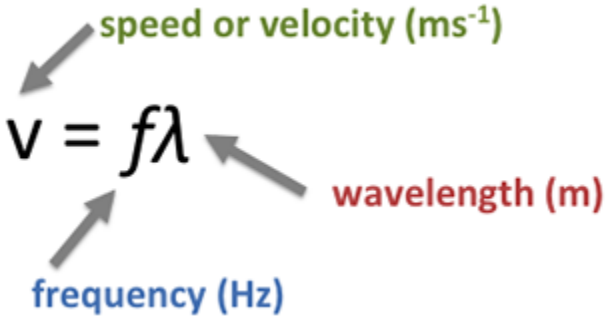
Explain how mechanical waves transfer energy from the source to a receiver. Include the word, "particle" in your response.

Mechanical waves require a medium to transfer energy through waves. The medium can consist of a solid, liquid or gas. The particle in the medium transfers energy by oscilating from it's original point of origin or rest position. Each particle passes energy to the next particle.

Draw a sound wave (Label all parts including compression, rarefaction, amplitude and show the direction of vibrations and the direction that the energy moves.)



What is the relationship between wavelength, frequency and speed?



Which properties of the wave below have changed? How (increased or decreased)?

Frequency increased, wavelength decreased, as frequency increased energy also increases.