

➤ Main Ideas, Key Points, Questions:

After watching the video segment, write down key points, main ideas, and big questions.

➤ Objective(s):

- *Understand how electromagnetic waves are created and how to identify the wave and particle properties of these waves.*
- *Recognize the various types of electromagnetic waves and how they differ in frequency and wavelength.*

➤ Notes:

During the video segment, use words, phrases, or drawings to take notes.

➤ Summary:

After watching the video segment, write at least three sentences explaining what you learned. You may ask yourself: "If I was going to explain this to someone else, what would I say?"

Answer the following.

1. What two fields form electromagnetic waves?

Electromagnetic waves are formed by an electric field and a magnetic field.

2. How do mechanical waves differ from electromagnetic waves?

Mechanical waves need a medium through which to travel,

while electromagnetic waves can move through a vacuum.

3. Define a photon in your own words.

A photon is a discrete packet of light energy.

4. What happens when electrons are excited to a higher energy level then fall back down to a lower, more stable energy level?

Light is emitted from an atom when electrons fall back

down to a lower energy level from a higher energy level.

5. What is the name of Albert Einstein's hypothesis that provides evidence for the particle nature of light?

the photoelectric effect

6. Complete the following table:

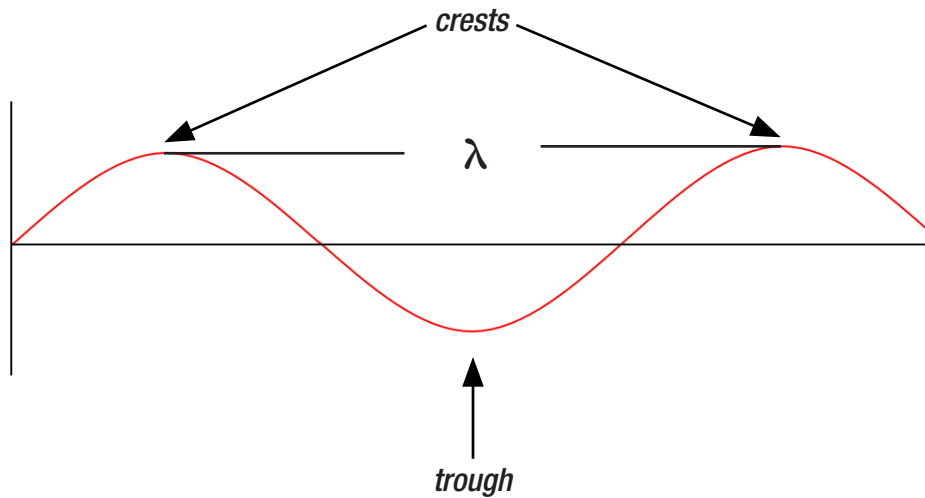
Phenomenon	Can be explained by wave nature	Can be explained by particle nature
Reflection	X	
Refraction	X	
Interference	X	
Diffraction	X	
Photoelectric Effect		X

Answer the following.

7. What type of wave is an electromagnetic wave?

An electromagnetic wave is a transverse wave.

8. Label a crest, trough, and wavelength on the diagram below:



9. Knowing that light travels at a constant speed, if the frequency of light increases, what happens to the wavelength of light?

If the frequency of light increases, the corresponding wavelength of light decreases.

10. Write the wave speed equation for light:

$$c = \lambda f$$

11. What is the rounded speed in meters per second of light in a vacuum?

$$300\,000\,000 \text{ m/s} = 3 \times 10^8 \text{ m/s}$$

Answer the following.

12. Name a use or property for each type of electromagnetic wave listed below from lowest to highest frequency:

Radio Waves: communicate information via radio and television

Microwaves: cell phones and communication satellites

Infrared: heat lamps and television remote controls

Visible Light: vision

Ultraviolet Light: produced by the sun

X-rays: x-ray machines

Gamma Rays: by-product of nuclear reactions

13. Which color of visible light has the lowest frequency?

Red light has the lowest frequency.

14. Which color of visible light has the highest frequency?

Violet light has the highest frequency.