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

Objective(s):

- Understand how electromagnetic waves are created, and the evidence for the wave and particle properties for these waves.
- Recognize the different types of electromagnetic waves, and how they differ with regards to 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?”
Questions to Consider

Answer the following.

1. What are the two fields that electromagnetic waves are comprised of?

2. How do electromagnetic waves differ from mechanical waves?

3. Define a photon in your own words.

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

5. What was Einstein’s hypothesis that provided evidence for the particle nature of light called?

6. Complete the following table:

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Can be explained by wave nature</th>
<th>Can be explained by particle nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refraction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diffraction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photoelectric Effect</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Answer the following.

7. What kind of waves are electromagnetic waves?

8. On the diagram below, label a crest, trough, and wavelength:

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

10. Write the wave speed equation for light below:

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

12. List a use or property for each type of electromagnetic waves, from lowest to highest frequency:

   Radio waves: ____________________________

   Microwaves: ____________________________

   Infrared: ______________________________

   Visible Light: __________________________

   Ultraviolet Light: ______________________

   X-rays: ________________________________

   Gamma Rays: __________________________

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

    ______________________________________

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

    ______________________________________