Name: Period:

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| **CW - Electrons and Light****Directions: Answer each question fully. To receive credit, you must show all your work, your answers must have units and be in the correct amount of significant figures.**1. Determine if the statement is true or false: All electromagnetic radiation travels at different speeds.
2. Define wavelength.
3. Draw and label 2 waves: one with a large wavelength and one with a small wavelength.
4. Define frequency.
5. Draw and label 2 waves: one with a high frequency and one with a low frequency.
6. How are the wavelength of light and the frequency of light related to each other?
7. Which color of light has the highest frequency? Lowest frequency?
8. Which color of light has the largest wavelength? Smallest wavelength?
9. Describe how light can act as a particle.
10. What is a photon?
11. What happens to the electrons in an atom when energy is initially added to an element?
12. Why and how do elements emit colored light?
13. How can the color of light produced by an element identify that element?

**c = λ × ν E = h × ν****c = 3.00 × 108 m/s h = 6.626 × 10-34 J·s****Answer the following problems and show your work.**1. Yellow light has a longer wavelength than green light. Which color of light has the higher frequency?

1. Green light has a lower frequency than blue light. Which color of light has a longer wavelength?
2. Calculate the wavelength of violet light with a frequency of 7.65 × 1014 1/s.
3. Calculate the frequency of yellow light with a wavelength of 5.80 × 10-7 m.
4. Calculate the wavelength of red light with a frequency of 4.47 × 1014 1/s.
5. Calculate the frequency of green light with a wavelength of 5.20 × 10-7 m.
6. For **#16** above, using the frequency calculate the Energy of one photon of violet light. How much energy would 2.00 × 1025 photons have?
7. From **#17** above, use the frequency to calculate the Energy of one photon of yellow light. How much energy would 1.00 × 1050 photons have?
8. From **#18** above, use the frequency to calculate the Energy of a photon of red light. How much energy would 6.00 × 1010 photons have?
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