

Calculations on the Visual Spectrum**Class Practice:** Do these questions with your teacher. Make sure to show your work!

1. A flame test shows an element burns blue-green. The electromagnetic spectrum shows that that color of light has a wavelength of 500nm. What is the frequency of the light?
2. What is the energy of the blue-green light in question 1 (wavelength = 500nm)?
3. X-rays have a higher frequency (1×10^{10} Hz) than visible light. How much energy do they carry?

Practice: Use the equations and constants from the STARR reference chart and a calculator to complete the table. The values in the first row are calculated for you. Remember to use units properly! A nanometer is 10^{-9} of a meter. When using values of wavelength in a formula, be sure you are calculating with units of meters.

Color	Wavelength	Frequency	Energy of a photon
Red	700 nm ($nm = 10^{-9}m$)		
Orange	610 nm		
Yellow		5.2×10^{14} Hz	
Green		6.0×10^{14} Hz	
Blue			4.2×10^{-19} J
Violet			5.0×10^{-19} J

Analysis:

1. What trend do you observe in the data table?
2. How does a typical wavelength of visible light compare to the wavelength of other waves you have observed, such as water waves in a lake or pond?
3. Does violet light have the maximum possible frequency and energy of electromagnetic radiation? Explain.

Practice exam questions:

1. A scientist measures the wavelength of green light to be 525 nm. What is the frequency of the light?
 - A. 3.22×10^{13} Hz
 - B. 5.71×10^{14} Hz
 - C. 1.75×10^{15} Hz
 - D. 2.28×10^{15} Hz
2. The energy of a photon of light is 9.70×10^{-19} J. What is the frequency of the photon?
 - A. 1.46×10^{15} Hz
 - B. 6.83×10^{15} Hz
 - C. 6.83×10^{14} Hz
 - D. 9.70×10^{15} Hz

