Name _____ Light Calculation Practice

Given Variables:	**Given Formulas:**	**Given Constants:**
E = Energy (J)	$E = mc^2$	Speed of Light (c)
f = frequency (1/s or s^{-1})	$E = hf$	$c = 3.0 \times 10^8$ m/s
λ = wavelength (nm or m)	$c = f \cdot \lambda$	Planck's Constant (h)
		$h = 6.626 \times 10^{-34}$ J·s

1.) The yellow light given off by a sodium vapor lamp used for public lighting has a wavelength of 5.89×10^{-7} m. What is the frequency of this radiation?

2.) An FM radio station broadcasts electromagnetic radiation at a frequency of 1.034×10^8 s^{-1}. Calculate the wavelength of this radiation.

3.) Calculate the energy of one photon of yellow light whose wavelength is 5.89×10^{-7} m.
** Use your answer to 1.) to help you.

4.) a) A laser emits light with a frequency of 4.69×10^{14} s^{-1}. What is the energy of one photon of the radiation from this laser?

b) If the laser emits a pulse of energy containing 5.0×10^{17} photons of this radiation, what is the total energy of that pulse?

Honors Light Calculations: Homework

Given Variables:
E = Energy (J)
f = frequency (1/s or s^{-1})
λ = wavelength (nm or m)

Given Formulas:
$E = mc^2$
$E = hf$
$c = f \cdot \lambda$

Given Constants:
Speed of Light (c)
$c = 3.0 \times 10^8$ m/s
Planck's Constant (h)
$h = 6.626 \times 10^{-34}$ J·s

Light Problems: First determine which equation to use, then substitute the numbers into the equation. Round your answer to the nearest tenths place and be sure to provide proper unit.

1. If the speed of light is 3.0×10^8 m/s, calculate the wavelength of the electromagnetic radiation whose frequency is 7.500×10^{14} s^{-1}.

2. Determine the energy of a photon whose frequency is 3.55×10^{17} s^{-1}.

3. Determine the frequency of light with a wavelength of 4.26×10^{-9} m.

4. When barium is heated, a green spectral line whose energy is 3.54×10^{-19} J is produced.
   a) What is the frequency of this light?

   b) What is the wavelength of this light?