

Name: _____ Date _____ Period _____

I. Calculating Frequency & Wavelength of EM radiation

A. Defining variables

- Example:*
What is the variable that we use to represent frequency (Hz)? = f (aka ν)?
- What is the variable that we use to represent wavelength (m) = w
- What is the variable that we use to represent Speed of Light (m/s) = c
Note: all Electromagnetic Spectrum Waves travel at this same speed
- Speed of light is a constant. How many m/s does light travel? 3.00×10^8

B. Deriving equations

Given the formula $C = f \cdot W$ (aka $c = \nu \cdot \lambda$)

- What is the formula for calculating f (aka ν)? $f = c/w$
- What is the formula for calculating W (λ)? $W = c/f$

C. Calculating Frequency (f) and Wavelength (W)

Show your work! Use a calculator and do the actual math – don't just leave the answer as a fraction!

- Violet light has a wavelength of 4.10×10^{-12} m. What is the frequency?
 $f = c/w$
 $= 3.00 \times 10^8 / 4.10 \times 10^{-12}$
 $= 0.73 \times 10^{20}$
 $= 7.3 \times 10^{19}$ m
- Green light has a frequency of 6.01×10^{14} Hz. What is the wavelength?
 $f = c/w$
 $= 3.00 \times 10^8 / 6.01 \times 10^{14}$
 $= 0.499 \times 10^{-6}$ m
 $= 4.99 \times 10^{-7}$ m
- What is the wavelength (in meters) of the electromagnetic carrier wave transmitted by The Sports Fan radio station at a frequency of 640 kHz? (*Hint: convert kHz into Hz by multiplying by 10^3 .*)
 $f = 6.4 \times 10^{(3+2)} = 6.4 \times 10^5$
 $w = 3.00 \times 10^8 / 6.4 \times 10^5$
 $0.47 \times 10^{(8-5)}$ Hz
 $= 0.47 \times 10^3$ Hz
 $= 4.7 \times 10^2$ Hz
- Calculate the wavelength of radiation with a frequency of 8.0×10^{14} Hz.
 $w = c/f$
 $= 3.00 \times 10^8 / 8.0 \times 10^{14}$
 $= 0.375 \times 10^{(8-14)}$ m
 $= 0.375 \times 10^{-6}$ m
 $= 3.75 \times 10^{-7}$ m