Key

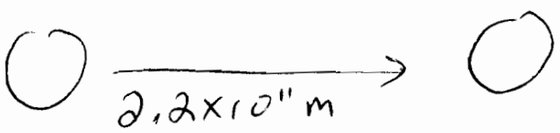
Light & Color - Word Problem Practice (like test!)

4-step method template & some useful definitions: (use 4-steps to get partial credit on test!)

$V_{light} = c = 3 \times 10^8$ m/s $c = f\lambda$ $d = v\,t$; You need to have memorized: G, M, k, micro, nano

1. How long will it take for an astronaut on mars to receive communication with earth 2.2×10^{11} m away?

(1) Draw a picture of what's going on



(2) List knowns & unknowns

$d = 2.2 \times 10^{11}$ m
$v = 3 \times 10^8$ m/s
$t = ?$

(3) List formula to use

$d = v\,t$

(4) Solve with units

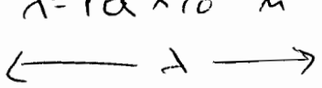
$2.2 \times 10^{11} = 3 \times 10^8\, t$

$t = \frac{2.2 \times 10^{11}}{3 \times 10^8} =$ 733 seconds (12 minutes)

2. What is the frequency of radiation whose wavelength is 12 nm (nanometers)?

(1) Draw a picture of what's going on

$\lambda = 12 \times 10^{-9}$ m $F = ?$



(2) List knowns & unknowns

$\lambda = 12 \times 10^{-9}$ m
$v = 3 \times 10^8$
$F = ?$

(3) List formula to use

$v = f\lambda$

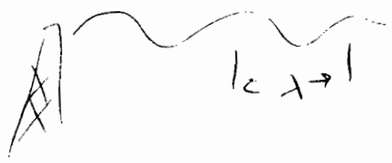
(4) Solve with units

$3 \times 10^8 = F\,(12 \times 10^{-9})$

$f = \frac{3 \times 10^8}{12 \times 10^{-9}} =$ 2.5×10^{16} Hz

3. Radio station 780 AM communicates at 780 kHz. How big are their radio waves?

(1) Draw a picture of what's going on



(2) List knowns & unknowns

$F = 780 \times 10^3$ Hz
$v = 3 \times 10^8$ m/s
$\lambda = ?$

(3) List formula to use

$v = f\lambda$

(4) Solve with units

$3 \times 10^8 = 780 \times 10^3\, \lambda$

$\lambda = \frac{3 \times 10^8}{780 \times 10^3} =$ 385 m