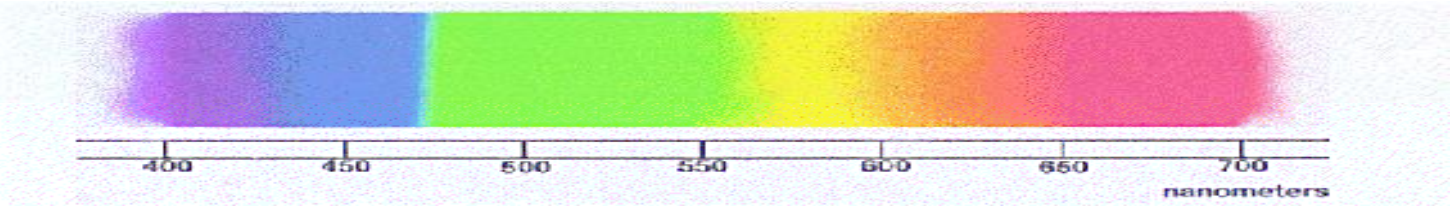
Light Equation Worksheet Name _____ Period___

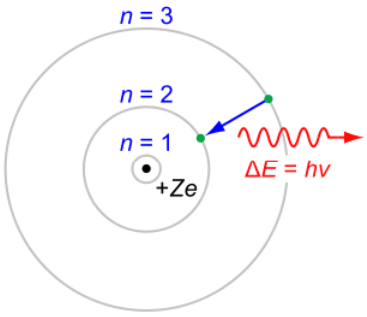
speed of light = wavelength x frequency $c = \lambda \nu$

(speed of light = c = 3.00 x 10^8 m/s) $E = h\nu$

h = Planck's constant = **6.626 x 10^{-34} J·s**

Color	Wavelength λ	Frequency ν	Energy E
Violet	400 nm = 400 x 10^{-9} m	= 3.00 x 10^8 m/s ÷ 4.00 x 10^{-7} m = 7.50 x 10^{14} /s (Hz)	
Indigo	445 nm		
Blue	475 nm		
Green	510 nm		
Yellow	570 nm		
Orange	590 nm		
Red	650 nm		
H – red line	656 nm		





This how we calculated that the energy difference between the 2nd and 3rd shell in a Hydrogen atom was equal to...

speed of light = wavelength x frequency

Honors Chemistry Name _____Period_____

Electromagnetic Radiation Light as Waves Worksheet

Use the following equation to solve the following problems:

$c = \lambda\nu$
c = the speed of light (2.998 x10^8 m/sec)
λ= wavelength measured in meters.
ν= frequency (unit is sec^{-1} or hertz (Hz))

Conversions
1nm = 10^{-9} m
10^9 nm = 1m
10^2 cm = 100cm = 1m

1. What is the frequency in hertz of red light having a wavelength of 710 nm?

2. Ozone protects the earth's inhabitants from the harmful effects of ultraviolet light arriving from the sun. This shielding is a maximum for UV light having a wavelength of 295 nm. What is the frequency in hertz of this particular wavelength of UV light?

3. Radar signals are also part of the electromagnetic spectrum in the microwave region. A typical radar signal has a wavelength of 3.19 cm. What is the frequency in hertz?

4. AM radio dials are calibrated in frequency. A certain AM Brockville radio station broadcasts at a frequency of 830 kHz. What is the wavelength of these radio waves expressed in meters?

Use the following equations to solve the following problems:

$E = nh\nu$
E = energy in Joules (J)
h = plank's constant 6.626 x10^{-34} J s
n = integer (number of photons)

$c = \lambda\nu$
c = the speed of light (2.998 x10^8 m/sec)
λ = wavelength measured in meters.
ν = frequency (unit is sec^{-1} or hertz (Hz))

5. Sodium vapor lamps are used to sometimes light streets. If the frequency of the light coming from them is 5.09 x 10^{14} Hz what is the energy in each photon?

6. What is the energy of each photon of red light that has a frequency of 4.0 x 10^{14} Hz?

7. Calculate the energy in joules/photon for green light having a wavelength of 550 nm.

8. Microwaves are used to heat food in microwave ovens. The microwave radiation is absorbed by moisture in the food. This heats the water, and as water becomes hot, so does the food. How many photons having a wavelength of 3.00 mm would have to be absorbed by 1.00 g of water to raise its temperature by 1^oC? It takes 4.184 J of energy to heat this much water.