

**Show your work.**

$$E = h\nu$$

$$\nu = c/\lambda$$

$$h = 6.626 \times 10^{-34} \text{ J}\cdot\text{sec}$$

$$c = 2.997 \times 10^8 \text{ m/sec}$$

$$28.35 \text{ g} = 1 \text{ ounce}$$

$$0.62 \text{ mile} = \text{km}$$

$$i\hbar \delta/\delta t \psi = \mathfrak{H}\psi$$

$$\Delta x \Delta mv = h/4\pi$$

$$\lambda = h/mv$$

$$1/\lambda = 1.097 \times 10^{-2} \text{ nm}^{-1} (1/m^2 - 1/n^2)$$

$$J = \text{kgm}^2/\text{sec}^2$$

1. ( 5 points) A certain laser emits light with a wavelength of 480nm. What is the energy of a single photon of this laser light?

2. (6 points) What is the deBroglie wavelength for a 5.2 ounce baseball that has a velocity of 90 miles/hour.

3. (2 points) What radiation has the most energy per photon?

- a. infrared      b. green light      c. radio waves      d. micro waves      e. blue light

4. (5 points) What wavelength of light does a hydrogen atom emit based on the Balmer-Rydberg equation, if its electron is initially in the n=4 state and transitions to the n=2 state?

5. (2 points) Which answer correctly ranks the light frequencies from greatest to least?

- a. microwave > infrared > ultraviolet > gamma ray  
 b. microwave > infrared > gamma ray > ultraviolet  
 c. infrared > microwave > ultraviolet > gamma ray  
 d. gamma ray > infrared > ultraviolet > microwave  
 e. gamma ray > ultraviolet > infrared > microwave