

## Unit 4 Hd 2

### CALCULATION PRACTICE — 1

#### Formulas and Constants

$$c = \lambda \nu$$

$$\nu = \frac{c}{\lambda}$$

$$\lambda = \frac{c}{\nu}$$

$$E = h\nu$$

$$E = \frac{hc}{\lambda}$$

$$c = 2.998 \times 10^8 \text{ m/s} \quad \lambda = \text{wavelength} \quad \nu = \text{frequency} \quad h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s} \quad E = \text{energy}$$

1. List all electromagnetic radiations from low energy to high. (**See notes**)

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2. What is the wavelength of electromagnetic radiation having a frequency of  $5.00 \times 10^{12}$  Hz?
3. What is the frequency of a wave with a wavelength of  $2.3 \times 10^{-7}$  meters?
4. What is the frequency of electromagnetic radiation having a wavelength of  $3.33 \times 10^{-8}$  m?
5. The laser in a CD player uses light with a wavelength of 720 nm. What is the frequency of this light?
6. An FM radio station has a frequency of 88.9 MHz (1 MHz =  $10^6$  Hz, or  $\text{s}^{-1}$ ). What is the wavelength of this radiation in **meters**?
7. The U.S. Navy has a system for communicating with submerged submarines. The system uses radio waves with a frequency of  $76 \text{ s}^{-1}$ . What is the wavelength of this radiation in **meters**?
8. Calculate the energy of a photon of radiation with the frequency of  $5.10 \times 10^{14}$  Hz.

9. Calculate the frequency of a photon if the energy is  $5.61 \times 10^{-19} \text{J}$ .
10. Light has a wavelength of about 410 nm. What is its frequency? Calculate the energy of one photon of the light. **What color is the light?**
11. Fireworks are often achieved by heating CuCl to about  $1200^\circ\text{C}$ . Then the compound emits light and gives off  $3.61 \times 10^{-19} \text{J}$ . What is the wavelength. **What color is the light?**
12. The energy of a photon from a laser is  $2.91 \times 10^{-19} \text{J}$ . What is the wavelength of the light in **nm**? **What color is the light?**
13. **The most prominent line in the spectrum of neon is found at 865.4 nm.** What is the frequency? What is the energy of one photon of this wavelength?