Additional Practice Problems

1. A photon has a frequency (ν) of 2.68×10^{6} Hz. Calculate its energy.
   Ans: $E = 1.78 \times 10^{-27}$ J

2. Calculate the energy (E) and wavelength (λ) of a photon of light with a frequency (ν) of 6.165×10^{14} Hz. Ans: $E = 4.1 \times 10^{-19}$ J $\lambda = 4.87 \times 10^{-7}$ m

3. Calculate the frequency and the energy of blue light that has a wavelength of 400 nm ($h = 6.62 \times 10^{-34}$ J-s). Ans: $\nu = 7.5 \times 10^{14}$ Hz $E = 4.97 \times 10^{-19}$ J

4. Calculate the wavelength and energy of light that has a frequency of 1.5×10^{15} Hz.
   Ans: $\lambda = 2.0 \times 10^{-7}$ m $E = 9.95 \times 10^{-19}$ J

5. A photon of light has a wavelength of 0.050 cm. Calculate its energy.
   Ans: $E = 3.98 \times 10^{-22}$ J

6. Calculate the number of photons having a wavelength of 10.0 μm required to produce 1.0 kJ of energy. Ans: 5.0×10^{22} photons

7. Calculate the total energy in 1.5×10^{13} photons of gamma radiation having $\lambda = 3.0 \times 10^{-12}$ m.
   Ans: 1.0 J

8. Calculate the energy and frequency of red light having a wavelength of 6.80×10^{-5} cm.
   Ans: $E = 2.92 \times 10^{-19}$ J $\nu = 4.4 \times 10^{14}$ Hz

9. The wavelength of green light from a traffic signal is centered at 5.20×10^{-5} cm. Calculate the frequency.
   Ans: $\lambda = 5.77 \times 10^{14}$ Hz.

10. Calculate the frequency of light that has a wavelength of 4.25×10^{-9}m. Identify the type of electromagnetic radiation. Ans: $\nu = 7.1 \times 10^{16}$ Hz. UV radiation

Equations and constants:

$E = h\nu$ and $E = hc/\lambda$ — E = energy of one photon with a frequency of ν

$c = \lambda\nu$ $c/\lambda = \nu$ — c = speed of light = 3.0×10^{8} m/s (meters per second)

h = Planck's constant = 6.63×10^{-34} J-s

λ = wavelength in meters

ν = frequency in Hz (waves/s or 1/s or s^{-1})

Source: panthercountry.org