1. An FM radio station has a frequency of 88.9 MHz (1 MHz = 10^6 Hz, or cycles per second). What is the wavelength of this radiation in meters?

2. The U.S. Navy has a system for communicating with submerged submarines. The system uses radio waves with a frequency of 76 s^{-1}. What is the wavelength of this radiation in meters? In miles?

3. What is the frequency of light having a wavelength of 456 nm? What is the wavelength (in nanometers) of radiation having a frequency of 2.45×10^9 Hz? (This is the type of radiation used in microwave ovens.)

4. The blue color of the sky results from the scattering of sunlight by air molecules. The blue light has a frequency of about 7.5×10^{14} Hz.
   a. Calculate the wavelength, in nm, associated with this radiation
   b. Calculate the energy, in joules, of a single photon associated with this frequency

5. What is the wavelength, in nm, of radiation that has an energy content of 1.0×10^3 \( kJ/mol \)? In which region of the electromagnetic spectrum is this radiation found?

6. A particular form of electromagnetic radiation has a frequency of 8.11×10^{14} \( Hz \).
   a. What is its wavelength in nanometers? In meters?
   b. To what region of the electromagnetic spectrum would you assign it?
   c. What is the energy (in Joules) of one quantum of this radiation?

7. Violet light has a wavelength of about 410 nm. What is its frequency? Calculate the energy of one photon of violet light. What is the energy of 1.0 mol of violet photons?

8. The energy of a mole of photons of red light from a laser is 175 kJ/mol. Calculate the energy of one photon of red light. What is the wavelength of red light in meters? In nm? Compare the energy of photons of violet light with those of red light. Which is more energetic and by what factor?

9. The most prominent line in the spectrum of neon is found at 865.438 nm. Other lines are found at 837.761 nm, 878.062 nm, 878.438 nm, and 1885.387 nm.
   a. Which of these lines represents the most energetic light?
   b. What is the frequency of the most prominent line? What is the energy of one photon of this wavelength?