5. Which of the following are **directly** proportional? Which of the following are **inversely** proportional?

   a. energy and wavelength? inversely ($\uparrow E = \downarrow \lambda$, b/c $E = hc/\lambda$)

   b. wavelength and frequency? inversely ($\uparrow \lambda = \downarrow \nu$, b/c $\lambda = c/\nu$)

   c. frequency and energy? directly ($\uparrow E = \uparrow \nu$, b/c $E = h\nu$)

Multiple Choice Practice

6. The wavelength range for infrared radiation is 10^{-5} m, while that of ultraviolet radiation is 10^{-8} m. Which type of radiation has more energy, and why?

   (a.) Ultraviolet has more energy because it has a higher frequency.

   b. Ultraviolet has more energy because it has a longer wavelength.

   c. Infrared has more energy because it has a lower frequency.

   d. Infrared has more energy because it has a shorter wavelength.

7. Which of the following statements is or are true?

   X 1) An excited atom can return to a lower energy level by absorbing light energy.

   X 2) An atom can be excited by emitting light energy.

   ✓ 3) As the energy of electromagnetic radiation increases, its frequency increases.

   ✓ 4) The frequency and wavelength of light are inversely proportional.

   a. 1 and 2   b. 3 only   c. 1 and 3   (d.) 3 and 4

8. What is the wavelength of yellow light having a frequency of 5.17×10^{14} s^{-1}?

   a. 3.60×10^{-10} m   c. 1.55×10^{23} m

   (b.) 5.80×10^{-7} m   d. 2.72×10^{-6} m

   $\lambda = \dfrac{c}{\nu} = \dfrac{3 E 8 \, m/s}{5 E 14 \, 1/s} = \dfrac{3}{5} E - 6 \, m = 0.6 E - 6 = 6 E - 7 \, m$

9. Which of the following statements is true?

   a. As energy increases, the frequency of the radiation decreases.

   b. As the wavelength of light increases, the frequency increases.

   c. Red light has a higher frequency than blue light.

   (d.) The product of wavelength and frequency of light in a vacuum is a constant.