Electromagnetic Spectrum & Light: Practice and Review

1. Light travels as an electromagnetic wave. How are these waves similar and different to transverse waves?

2. List the electromagnetic spectrum in order of decreasing wavelength. Would that order change for decreasing frequency? Decreasing energy?

3. A girl reading a book needs to buy a brighter bulb. What information should she look for on the package?

4. Starting at a position of 20 m from a light source; describe by what factor the illuminance will change as you go to the following positions: 15 m, 10m, 5m, 1m, 25m, 30m, 40m, 100m.

Electromagnetic Waves

1. Gamma-ray bursters are objects in the universe that emit pulses of gamma rays with high energies. The frequency of the most energetic bursts has been measured at around 3.0×10^{21} Hz. What is the wavelength of these gamma rays?
2. What is the wavelength range for the FM radio band (88 MHz–108 MHz)?
3. Shortwave radio is broadcast between 3.50 and 29.7 MHz. To what range of wavelengths does this correspond? Why do you suppose this part of the spectrum is called shortwave radio?
4. What is the frequency of an electromagnetic wave if it has a wavelength of 1.0 km?
5. The portion of the visible spectrum that appears brightest to the human eye is around 560 nm in wavelength, which corresponds to yellow-green. What is the frequency of 560 nm light?
6. What is the frequency of highly energetic ultraviolet radiation that has a wavelength of 125 nm?

1. Identify which portions of the electromagnetic spectrum are used in each of the devices listed.
   a. a microwave oven
   b. a television set
   c. a single-lens reflex camera
2. If an electromagnetic wave has a frequency of 7.57×10^{14} Hz, what is its wavelength? To what part of the spectrum does this wave belong?
3. Galileo performed an experiment to measure the speed of light by timing how long it took light to travel from a lamp he was holding to an assistant about 1.5 km away and back again. Why was Galileo unable to conclude that light had a finite speed?