Light and Electromagnetic Radiation Worksheet

Be sure to set up each problem correctly and show how units cancel. For questions, explain your answers clearly.

1. What is the relationship between the frequency of light and its wavelength?

2. What is the relationship between the frequency of light and its energy?

3. Which color of visible light has the longest wavelength? Which color has the shortest?

4. Which color of visible light has the highest energy? Which color has the lowest?

5. What is meant by the "frequency of light"? What is the symbol & what is the SI unit for frequency?

6. Define Hz, kHz and MHz.

7. Sketch a diagram of a wave and label its wavelength and its amplitude.

8. What is the frequency of blue light with a wavelength of 425 nm?
9. What is the frequency of a short-wave radio transmission with a wavelength of 20. m?

10. What is the wavelength of red light with a frequency of $4.6 \times 10^{14}$ s$^{-1}$?

11. Antennas designed to receive radio waves are typically one-half of a wavelength long. How long should the antenna be to receive radio waves from television station channel 2, KTVU (frequency: 55.5 MHz)?

12. What is the energy of a radio wave from the AM broadcast band? Use the frequency of KNBR which broadcasts the San Francisco Giants games (680 kHz)?

13. What is the energy of the radio signals from your cell phone? Assume the transmission frequency is 900 MHz.

14. What is the energy of red light with a frequency of $4.6 \times 10^{14}$ s$^{-1}$?

15. What is the energy of an x-ray with a wavelength of $10^{-10}$ m?

16. If a red light wave and a $10^{11}$ Hz microwave race down a 10 m tube, which one will get to the other end first? Explain your answer.