

Name:

Date:

Wave Properties of Light

Electromagnetic Spectrum

1. $10^3 = 1000$
2. $10^6 = 1,000,000$

- 1. Energy of one photon with a frequency of 5×10^{14} Hz
- 2. Speed of light = 3×10^8 m/s
- 3. Wavelength of light = 4.0×10^{-7} m
- 4. Wavelength of radio
- 5. Frequency of the gamma rays (approx)

10. $10^9 = 1,000,000,000$
15. $10^{12} = 1,000,000,000,000$

Electromagnetic Spectrum (Wavelengths)

- 10^3 m - Radio waves
- 10^2 m - Microwaves
- 10^1 m - Infrared
- 10^0 m - Visible light
- 10^{-1} m - Ultraviolet
- 10^{-2} m - X-rays
- 10^{-3} m - Gamma rays

Worked Example 1

1. A photon has a frequency (ν) of 5.00×10^{14} Hz. Calculate its energy.

2. Calculate the energy (E) and wavelength (λ) of a photon of light with a frequency (ν) of 6.00×10^{14} Hz.

3. Calculate the frequency and the energy of blue light that has a wavelength of 450 nm .

4. Calculate the wavelength and energy of light that has a frequency of 3.3×10^{17} Hz.

5. A photon of light has a wavelength of 3.00×10^{-7} m. Calculate its energy.

6. Calculate the number of photons having a wavelength of 300 nm required to produce 1.0 J of energy.

7. Calculate the total energy in 1.0×10^{17} photons of gamma radiation having λ of 3.0×10^{-13} m.

8. Calculate the energy and frequency of red light having a wavelength of 6.50×10^{-7} m.

9. The wavelength of green light from a traffic signal is centered at 5.20×10^{-7} m. Calculate the frequency.

10. Calculate the frequency of light that has a wavelength of 4.20×10^{-7} m. Identify the type of electromagnetic radiation.