

Name: _____

Date: _____

Wave Properties of Light

Electromagnetic Spectrum

Radio 10^3 Hz
TV 10^6 Hz

- Energy of one photon with a frequency of ν
- Speed of light = 3×10^8 m/s
- Wavelength $\lambda = c/\nu$
- Frequency of the photons or light ν
- Wavelength of light λ

IR 10^{12} Hz
UV 10^{15} Hz

Electromagnetic Spectrum (Wavelengths)

- 10^3 m - Radio waves
- 10^6 m - Microwaves
- 10^9 m - Infrared
- 10^{12} m - Visible light
- 10^{15} m - Ultraviolet
- 10^{18} m - Gamma rays

Worked Example 1

1. A photon has a frequency (ν) of 3.00×10^{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 the light that has a wavelength of 4000 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 3.00000 nm. 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 $\lambda = 3.0 \times 10^{-11}$ 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 4.26×10^{-7} m. Identify the type of electromagnetic radiation.