

Problems of Light and electromagnetic waves

1) A light wave has a frequency of 7.58×10^{14} Hz. Calculate its wavelength.

Data: $c = 3 \times 10^8$ m/s.

Answer: 3.96×10^{-7} m = 396 nm.

2) A beam of light has a wavelength of 4.78×10^{-7} m. Calculate its frequency.

Data: $c = 3 \times 10^8$ m/s.

Answer: 6.27×10^{14} Hz.

3) A radio station broadcasts at a frequency of 100.4 MHz. Find the length of the radio wave in meters.

Data: $c = 3 \times 10^8$ m/s.

Answer: 2.988 m.

4) Find the frequency of a radio wave with an energy of 6.222×10^{-26} J/photon.

Data: $h = 6.626 \times 10^{-34}$ J·s.

Answer: 93.9 MHz.

5) A radio wave has a wavelength of 267.9 m. Calculate the frequency of this radio wave in Hz and kHz.

Data: $c = 3 \times 10^8$ m/s.

Answer: 1.12×10^6 Hz = 1120 kHz.

6) Find the energy (in joules) of a photon whose frequency is 5.28×10^{14} Hz.

Data: $h = 6.626 \times 10^{-34}$ J·s.

Answer: 3.499×10^{-19} J.

7) Find the wavelength of the electromagnetic radiation whose frequency is 6.14×10^{15} Hz.

Data: $c = 3 \times 10^8$ m/s.

Answer: 48.86 nm.

8) The wavelength of a gamma radiation is 8.30×10^{-12} m. Find its energy in joules/photon.

Data: $c = 3 \times 10^8$ m/s, $h = 6.626 \times 10^{-34}$ J·s.

Answer: 2.395×10^{-14} J/photon.