02-09 Frequency & Wavelength Name: _____

Remember: $\lambda = c / \nu$ speed of light = 3×10^8 m/sec = 3×10^{17} nm/sec
λ = wavelength ν = frequency c = speed (or velocity)

1. A light wave has a frequency of 4.0×10^{14} Hz. Find its wavelength.

$\lambda = c / \nu = 3 \times 10^{17}$ nm/sec / 4.0×10^{14} Hz = 7.5×10^2 nanometers = 750 nm
or
$\lambda = c / \nu = 3 \times 10^8$ m/sec / 4.0×10^{14} Hz = 7.5×10^{-7} meters = 7.5×10^2 nanometers = 750 nm

2. A light wave has a wavelength of 479 nm. Find its frequency.

$\nu = c / \lambda = 3 \times 10^{17}$ nm/sec / 479 nm = 0.00626×10^{17} Hz = 6.26×10^{14} Hz

3. A light wave has a frequency of 3.7×10^{13} Hz. Find its wavelength.

$\lambda = c / \nu = 3 \times 10^{17}$ nm/sec / 3.7×10^{13} Hz = 8.1×10^3 nanometers = 8100 nm
or
$\lambda = c / \nu = 3 \times 10^8$ m/sec / 3.7×10^{13} Hz = 8.1×10^{-6} meters = 8.1×10^3 nanometers = 8100 nm

4. A light wave has a wavelength of 724 nm. Find its frequency.

$\nu = c / \lambda = 3 \times 10^{17}$ nm/sec / 724 nm = 0.00414×10^{17} Hz = 4.146×10^{14} Hz

5. A light wave has a frequency of 7.4×10^{15} Hz. Find its wavelength.

$\lambda = c / \nu = 3 \times 10^{17}$ nm/sec / 7.4×10^{15} Hz = 4.1×10^1 nanometers = 41 nm
or
$\lambda = c / \nu = 3 \times 10^8$ m/sec / 7.4×10^{15} Hz = 4.1×10^{-8} meters = 4.1×10^1 nanometers = 41 nm

6. A light wave has a wavelength of 145 nm. Find its frequency.

$\nu = c / \lambda = 3 \times 10^{17}$ nm/sec / 145 nm = 0.0207×10^{17} Hz = 2.07×10^{15} Hz

7. The frequency of yellow light is 5.0×10^{14} Hz. Find its wavelength.

$\lambda = c / \nu = 3 \times 10^{17}$ nm/sec / 5.0×10^{14} Hz = 6.0×10^2 nanometers = 600 nm
or
$\lambda = c / \nu = 3 \times 10^8$ m/sec / 5.0×10^{14} Hz = 6.0×10^{-7} meters = 6.0×10^2 nanometers = 600 nm

8. What is the frequency of yellow light, λ = 556 nm?

$\nu = c / \lambda = 3 \times 10^{17}$ nm/sec / 556 nm = 0.00540×10^{17} Hz = 5.40×10^{14} Hz