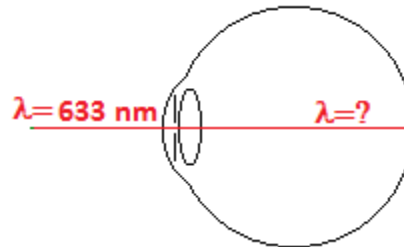


Physics I

Basic Waves

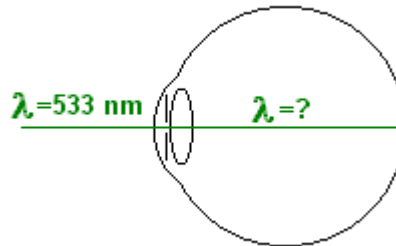
Fundamental equation of waves $\lambda f = v_{\text{wave}}$

Problem 1.- In air the speed of light is 3.00×10^8 m/s and red light from a He-Ne laser has a wavelength of 633 nm. Calculate the wavelength of that red light inside the human eye where the speed of light is 2.33×10^8 m/s, knowing that the frequency is the same.



Solution: The frequencies are the same, so $f_1 = f_2 \rightarrow \frac{3 \times 10^8}{633} = \frac{2.33 \times 10^8}{\lambda} \rightarrow \lambda = \mathbf{492 \text{ nm}}$

Problem 1a.- In air the speed of light is 3.00×10^8 m/s and green light has a wavelength of 532 nm. Calculate the wavelength of green light inside the human eye where the speed of light is 2.33×10^8 m/s, knowing that the frequency is the same.



Solution: We first find the frequency: $f = \frac{c}{\lambda} = \frac{3 \times 10^8 \text{ m/s}}{532 \times 10^{-9} \text{ m}} = 5.64 \times 10^{14} \text{ Hz}$

Then use this to find the wavelength inside the eye: $\lambda = \frac{c}{f} = \frac{2.33 \times 10^8}{5.64 \times 10^{14} \text{ Hz}} = \mathbf{413 \text{ nm}}$