

Answer on Question #39325, Physics, Optics

Refractive index of glass is 1.5 the time taken by light to travel a distance of 10 cm of glass is

Solution:

The index of refraction (refractive index) is defined as the speed of light in vacuum divided by the speed of light in the medium.

$$n = \frac{c}{v}$$

c = speed of light in vacuum = $3 \cdot 10^8$ m/s.

Thus, speed of light in glass

$$v = \frac{c}{n} = \frac{3 \cdot 10^8}{1.5} = 2 \cdot 10^8 \text{ m/s}$$

Time taken by light to travel a distance of $d = 10$ cm is

$$t = \frac{d}{v} = \frac{10 \cdot 10^{-2}}{2 \cdot 10^8} = 5 \cdot 10^{-10} \text{ s}$$

Answer. $t = 5 \cdot 10^{-10}$ s