

**Answer on Question #52738-Physics-Optics**

The refractive index of diamond is given as 2.42. A ray of yellow light of wavelength 589 nm passes through a rectangular diamond block in  $1.32 \times 10^{-9}$  s. What is the thickness of the block?

10.5 cm

12.7 cm

16.4 cm

22.3 cm

**Solution**

The speed of yellow light with wavelength  $\lambda = 589$  nm in diamond is

$$v = \frac{c}{n} = \frac{3.00 \cdot 10^8 \frac{m}{s}}{2.42} = 1.24 \cdot 10^8 \frac{m}{s}.$$

The thickness of the block is

$$d = vt = 1.24 \cdot 10^8 \frac{m}{s} \cdot 1.32 \cdot 10^{-9} s = 16.4 \text{ cm}.$$

**Answer: 16.4 cm.**