

8.12 Orange light of wavelength $0.61 \mu\text{m}$ in air enters a block of glass with $\epsilon_r = 1.44$. What color would it appear to a sensor embedded in the glass? The wavelength ranges of colors are violet (0.39 to $0.45 \mu\text{m}$), blue (0.45 to $0.49 \mu\text{m}$), green (0.49 to $0.58 \mu\text{m}$), yellow (0.58 to $0.60 \mu\text{m}$), orange (0.60 to $0.62 \mu\text{m}$), and red (0.62 to $0.78 \mu\text{m}$).

Solution: In the glass,

$$\lambda = \frac{\lambda_0}{\sqrt{\epsilon_r}} = \frac{0.61}{\sqrt{1.44}} = 0.508 \mu\text{m}.$$

The light would appear green.
