

**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.

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