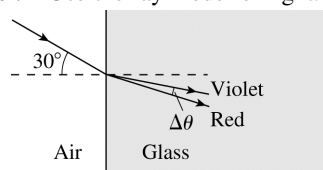


**23.22. Model:** Use the ray model of light.

**Visualize:**



**Solve:** Using Snell's law,

$$n_{\text{air}} \sin 30^\circ = n_{\text{red}} \sin \theta_{\text{red}} \Rightarrow \theta_{\text{red}} = \sin^{-1} \left( \frac{\sin 30^\circ}{1.52} \right) = 19.2^\circ$$

$$n_{\text{air}} \sin 30^\circ = n_{\text{violet}} \sin \theta_{\text{violet}} \Rightarrow \theta_{\text{violet}} = \sin^{-1} \left( \frac{\sin 30^\circ}{1.55} \right) = 18.8^\circ$$

Thus the angular spread is

$$\Delta\theta = \theta_{\text{red}} - \theta_{\text{violet}} = 19.2^\circ - 18.8^\circ = 0.4^\circ$$