

PP/410

13.

plastic  $\rightarrow$  air

$$n_i \sin \theta_i = n_r \sin \theta_r$$

$$n_i \sin 40^\circ = 1.00 \sin 90^\circ$$

$$n_i = \frac{1.00 \sin 90^\circ}{\sin 40^\circ}$$

$$n_i = 1.56 \quad (\text{the index of refraction for the plastic})$$

plastic  $\rightarrow$  water

$$n_i \sin \theta_i = n_r \sin \theta_r$$

$$(1.56) \sin \theta_i = (1.33) \sin 90^\circ$$

$$\sin \theta_i = \frac{1.33 \sin 90^\circ}{1.56}$$

$$\theta_i = \sin^{-1} \left( \frac{1.33 \sin 90^\circ}{1.56} \right)$$

$$\theta_i = 58^\circ$$