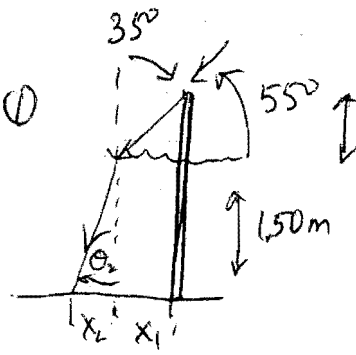
① 

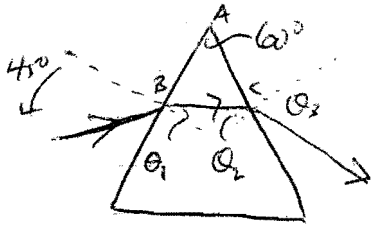
$$\frac{0.50\text{m}}{x_1} = \tan 55^\circ \Rightarrow x_1 = \frac{0.50\text{m}}{\tan 55^\circ} = 0.35\text{m}$$

$$\sin\theta_2 = \frac{n_1 \sin\theta_1}{n_2} = \frac{(1)\sin 35^\circ}{1.33} = 0.431$$

$$\theta_2 = 25.5^\circ$$

$$\tan\theta_2 = \frac{x_2}{1.50\text{m}} \Rightarrow x_2 = 0.72\text{m}$$

$$x_1 + x_2 = 0.35\text{m} + 0.72\text{m} = 1.07\text{m}$$

② 

1st refraction:

$$\sin 45^\circ = n \sin\theta_1$$

$$\sin\theta_1 = \frac{\sin 45^\circ}{1.50} \Rightarrow \theta_1 = 28.1^\circ$$

From triangle ABC $\quad 60^\circ + (90^\circ - \theta_1) + (90^\circ - \theta_2) = 180^\circ$

$$\Rightarrow \theta_2 = 31.9^\circ$$

$$n \sin\theta_2 = \sin\theta_3 \Rightarrow \sin\theta_3 = (1.50)\sin 31.9^\circ$$

$$\theta_3 = 52.4^\circ$$