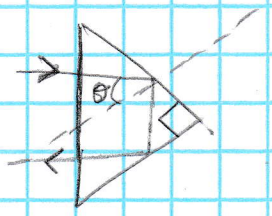
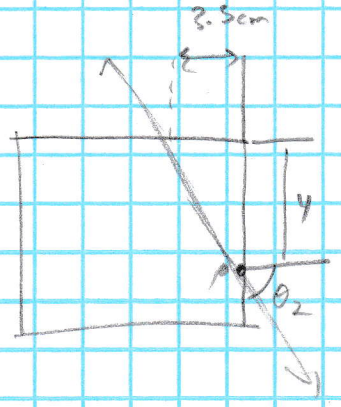
Emmanuel Cardenas

1) $\sin\theta_c = \frac{n_2}{n_1}$ $\quad n_2 = 1$ $\Rightarrow \frac{\sin\theta_c}{n_2} = \frac{1}{n_1} \Rightarrow n_1 = \frac{n_2}{\sin\theta_c}$

$= \frac{1}{\sin 45^\circ} = 1.4$





2) a) $n_1 = 1.33$ $\quad n_2 = 1.52$ $\quad \theta_1 = 41^\circ$ $\quad x = 3.5\text{cm} = .035\text{m}$

$n_1 \sin\theta_1 = n_2 \sin\theta_1'$

$\Rightarrow 1.33 \sin 42^\circ = 1.52 \sin\theta_1'$

$\Rightarrow \sin\theta_1' = \frac{1.33 \sin 42^\circ}{1.52}$

$\Rightarrow \sin\theta_1' = .59$

$\Rightarrow \theta_1' = \sin^{-1}(.54) = 36.2^\circ$

$y = \frac{x}{\tan\theta_1'} = \frac{.035\text{m}}{\tan(36.2)} = .048\text{m}$

b) $\theta_2' = 90^\circ - 36.2^\circ = 53.8^\circ$

$n_1 \sin\theta_2 = n_2 \sin\theta_2'$

$\Rightarrow 1.33 \sin\theta_2 = 1.52 \sin(53.8^\circ)$

$\Rightarrow \sin\theta_2 = \frac{1.52 \sin(53.8^\circ)}{1.33}$

$\Rightarrow \sin\theta_2 = .92$

$\Rightarrow \theta_2 = \sin^{-1}(.92) = 67^\circ$