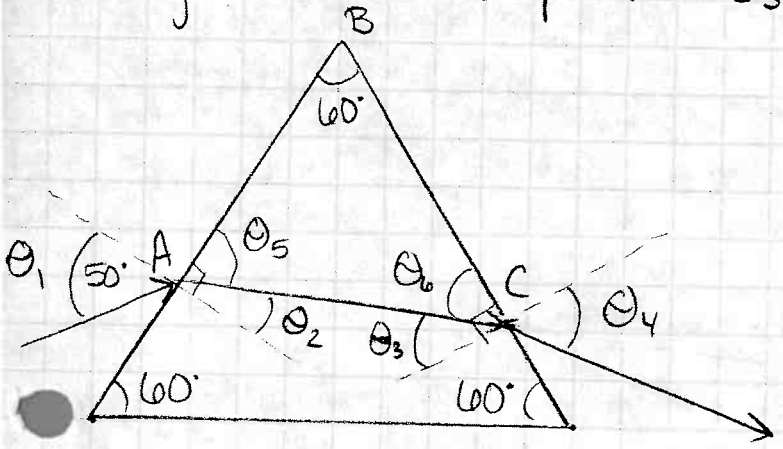
P#32

Ch 22

Air: $n_1 = 1.00$ $\theta_1 = 50°$

Glass: $n_{2\text{-}v} = 1.660$
$n_{2\text{-}r} = 1.62$

First, find the relationship between the angle of refraction as light enters the prism (θ_2) & the angle of incidence as light exits the prism (θ_3)



Since points, A, B, and C form a triangle . . .

$\theta_5 + \theta_6 + 60° = 180°$

or

$(90° - \theta_2) + (90° - \theta_3) + 60 = 180°$

$180° - \theta_2 - \theta_3 + 60° = 180°$

$\theta_2 + \theta_3 = 60°$

Find angle of refraction into glass (θ_2)

$n_1 \cdot \sin\theta_1 = n_2 \cdot \sin\theta_2$ so $\theta_2 = \sin^{-1}\left(\frac{n_1 \cdot \sin\theta_1}{n_2}\right)$

For violet:

$\theta_2 = \sin^{-1}\left(\frac{(1.00)\sin 50°}{1.660}\right)$

$\theta_{2\text{-violet}} = 27.5°$

For red:

$\theta_2 = \sin^{-1}\left(\frac{(1.00)\cdot\sin 50°}{1.62}\right)$

$\theta_{2\text{-red}} = 28.2°$