Refraction of Light

mp|399 air → unknown liquid.

$n_i = 1.00$
$\theta_i = 65.0^\circ$
$\theta_R = 42.0^\circ$
$n_r = ?$

$n_i \sin\theta_i = n_R \sin\theta_R$

$(1.00)\sin 65.0^\circ = n_R \sin 42.0^\circ$

$n_R = \frac{1.00 \sin 65.0^\circ}{\sin 42.0^\circ}$

$n_R = 1.35$

mp|404

air → ruby

$n_i = 1.00$
$\theta_i = 45^\circ$
$n_R = 1.54$
$\theta_R = ??$

$n_i \sin\theta_i = n_R \sin\theta_R$

$(1.00)(\sin 45^\circ) = (1.54)\sin\theta_R$

$\sin\theta_R = \frac{(1.00)\sin 45^\circ}{1.54}$

$\theta = 27^\circ$

mp|409 find the critical angle for diamond

$n_i = 2.42$
$\theta_i = ??$
$n_R = 1.00$
$\theta_R = 90^\circ$ (exactly)

diamond → air

$n_i \sin\theta_i = n_R \sin\theta_R$

$(2.42)\sin\theta_i = (1.00)(\sin 90^\circ)$

$\sin\theta_i = \frac{1.00}{2.42}$

$\theta_i = \sin^{-1}\left(\frac{1.00}{2.42}\right)$

$\theta_i = 24.4^\circ$

a very low critical angle since the index of refraction is so high → (very sparkly! → lots of light trapped total internal reflection + geometry of cuts.