PHYS 375 Equations:

Snell's Law:

$$n_1 \sin(\theta_1) = n_2 \sin(\theta_2)$$

Lens equation:

$$\frac{1}{s_o} + \frac{1}{s_i} = \frac{1}{f}$$

Lens Maker's Equation

$$\frac{1}{f} = (n_l - 1)\left\{\frac{1}{R_1} - \frac{1}{R_2}\right\}$$

Transverse (lateral) magnification:

$$M_T \equiv \frac{y_i}{y_o} = -\frac{s_i}{s_o}$$

Angular magnification with image at infinity and a near point of 254 mm:

$$M_A = \frac{254}{f}$$

Critical Angle

$$\sin\theta_c = \frac{n_t}{n_i}$$

Brewster's Angle

$$\tan\theta_B = \frac{n_t}{n_i}$$

Malus' Law

$$I(\theta) = I(0)\cos^2\theta$$

Fresnel Reflection (at $\theta_i = 0$)

$$r_{\parallel} = -r_{\perp} = \frac{n_t - n_i}{n_t + n_i}$$

Two beam interference

$$I = I_1 + I_2 + 2\sqrt{I_1 I_2}\cos\delta$$

Multi-Slit interference, N slits of width a and spacing period b:

$$I(\theta) = I_0 N^2 \left(\frac{\sin\alpha}{\alpha}\right)^2 \left(\frac{\sin N\beta}{N\sin\beta}\right)^2,$$

with $\alpha = (ka/2)\sin\theta$ and $\beta = (kb/2)\sin\theta$

Grating Equation

$$d(\sin\theta_m - \sin\theta_i) = m\lambda$$

Resolving power of a grating

$$\Re = mN$$