Equations Ch. 23 & 24

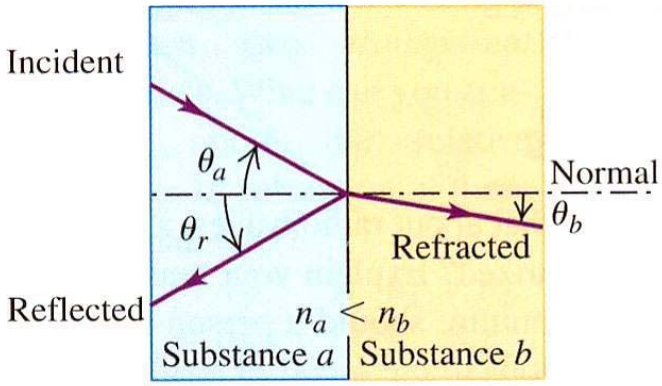
light $c = f\lambda = 3\times10^{8}\ \text{m/s}$

$$n = \frac{c}{v}$$

$$pressure = \frac{I}{c}$$

$$F = \frac{IA}{c} = \frac{P}{c}$$

reflection and refraction

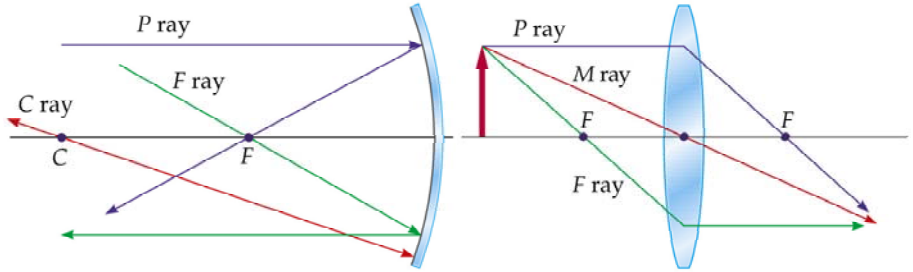


$$\theta_r = \theta_a$$

$$\frac{\sin\theta_a}{\sin\theta_b} = \frac{n_b}{n_a}$$

total internal reflection

$$\sin\theta_{crit} = \frac{n_a}{n_b} \quad for \quad n_b > n_a$$



spherical mirrors and thin lenses

$$f = R/2 \quad concave$$

$$f = -R/2 \quad convex$$

$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$$

$$m = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$$

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

Sign Conventions for mirrors:

d_i is positive if the image is in front of the mirror (real image)

d_i is negative if the image is behind the mirror (virtual image)

f is positive for concave mirrors

f is negative for convex mirrors

m is positive for upright images

m is negative for inverted images

Sign Conventions for lenses:

d_i is positive for real images (on the opposite side of the lens)

d_i is negative for virtual images (same side as object)

f is positive for converging (convex) lenses

f is negative for diverging (concave) lenses

m is positive for upright images

m is negative for inverted images