Light

Speed of Light

$$c = \frac{1}{\sqrt{\mu_0 \epsilon_0}}$$

$$v = \frac{c}{\sqrt{\mu_r \epsilon_r}}$$

Intensity EM-Wave

$$I = \frac{1}{2}\sqrt{\frac{\epsilon_0 \epsilon_r}{\mu_0 \mu_r}} E_0^2 \quad , \quad B_z = \frac{E_y}{v}$$

Intensity when two waves are added

$$I_{tot} = I_1 + I_2 + 2\sqrt{I_1 I_2} < \cos\delta >$$

where δ is the relative phase between the waves.

Refractive Index

$$n \equiv \frac{c}{v} = \sqrt{\mu_r \epsilon_r}$$

Snell's Law

$$\frac{\sin\alpha_1}{\sin\alpha_2} = \frac{\lambda_1}{\lambda_2} = \frac{v_1}{v_2} = \frac{n_2}{n_1}$$

Boundary Angle for Total Reflection

$$\alpha_g = \arcsin\left(\frac{n_2}{n_1}\right)$$

Prism

$$\sin\left(\frac{A+\delta}{2}\right) = n \cdot \sin\left(\frac{A}{2}\right)$$

Where A is the prisms top angle and δ the reflection angle.

Fiber Optics, Numerical Aperture

$$N.A. \equiv n_0 \sin\theta_m$$

$$N.A. = \sqrt{n_1^2 - n_2^2}$$