THIN-LENS EQUATION
This equation is derived assuming that the thickness of the lens is much less than the focal length of the lens.

$$\frac{1}{p}+\frac{1}{q}=\frac{1}{f}$$

MAGNIFICATION OF A LENS
This equation can be used only when the index of refraction of the first medium (n_i) is greater than the index of refraction of the second medium (n_r).

$$M=\frac{h'}{h}=-\frac{q}{p} \quad (\text{for } n_i > n_r)$$

CRITICAL ANGLE
This equation can be used only when the index of refraction of the first medium (n_i) is greater than the index of refraction of the second medium (n_r).

$$\sin\theta_c=\frac{n_r}{n_i} \quad (\text{for } n_i > n_r)$$

Chapter 15 Interference and Diffraction

CONSTRUCTIVE AND DESTRUCTIVE INTERFERENCE
The grating spacing multiplied by the sine of the angle of deviation is the path difference between two waves. To observe interference effects, the sources must be coherent and have identical wavelengths.

Constructive Interference:
$d\sin\theta=\pm m\lambda$
$m=0, 1, 2, 3, \ldots$

Destructive Interference:
$d\sin\theta=\pm(m+\frac{1}{2})\lambda$
$m=0, 1, 2, 3, \ldots$

DIFFRACTION GRATING

See the equation above for constructive interference.

LIMITING ANGLE OF RESOLUTION
This equation gives the angle θ in radians and applies only to circular apertures.

$$\theta=1.22\frac{\lambda}{D}$$

Chapter 16 Electric Forces and Fields

COULOMB'S LAW
This equation assumes either point charges or spherical distributions of charge.

$$F_{electric}=k_C\left(\frac{q_1q_2}{r^2}\right)$$

ELECTRIC FIELD STRENGTH DUE TO A POINT CHARGE

$$E=k_C\frac{q}{r^2}$$