

Equations

$$\begin{array}{llll}
 F = \frac{k|q_1||q_2|}{r^2} & \vec{E} = \frac{\vec{F}}{q_o} & \Phi = E A \cos \theta & \Phi = \frac{q}{\epsilon_o} \\
 \Delta V = \frac{\Delta U}{q_o} = \frac{-W}{q_o} & E = \frac{-\Delta V}{\Delta s} & V = \frac{kq}{r} & U = \frac{kq_o q}{r} \\
 C = \frac{Q}{V} & C = \frac{\kappa \epsilon_o A}{d} & U = \frac{1}{2} C V^2 & I = \frac{\Delta Q}{\Delta t} \\
 V = IR & R = \frac{\rho L}{A} & P = IV & \tau = RC \\
 q(t) = Q(1 - e^{-t/\tau}) & q(t) = Q e^{-t/\tau} & F = |q| v B \sin \theta & \sum F = ma \\
 a_{cp} = \frac{v^2}{r} & F = ILB \sin \theta & \tau = NIB A \sin \theta & B = \frac{\mu_o I}{2\pi r} \\
 \sum B_{\parallel} \Delta L = \mu_o I_{enclosed} & B = \frac{N \mu_o I}{2R} & B = \mu_o n I & \Phi = BA \cos \theta \\
 \mathcal{E} = -N \frac{\Delta \Phi}{\Delta t} & \mathcal{E} = BLv & \mathcal{E} = NBA \omega \sin(\omega t) & |\mathcal{E}| = L \left| \frac{\Delta I}{\Delta t} \right| \\
 L = \mu_o n^2 A l & I = \frac{\mathcal{E}}{R} (1 - e^{-t/\tau}) & \tau = \frac{L}{R} & U = \frac{1}{2} L I^2 \\
 \frac{V_p}{V_s} = \frac{N_p}{N_s} = \frac{I_s}{I_p} & V = V_{max} \sin(\omega t) & x_{rms} = \frac{x_{max}}{\sqrt{2}} & I_{rms} = \frac{V_{rms}}{X_C} \\
 X_C = \frac{1}{\omega C} & I_{rms} = \frac{V_{rms}}{X_L} & X_L = \omega L & \omega_o = \frac{1}{\sqrt{LC}} = 2\pi f \\
 f' = f \left(1 \pm \frac{u}{c} \right) & c = f \lambda & I = I_o \cos^2 \theta & \frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i} \\
 m = \frac{h_i}{h_o} = -\frac{d_i}{d_o} & n = \frac{c}{v} & n_1 \sin \theta_1 = n_2 \sin \theta_2 & D = \frac{1}{f} \\
 M = \frac{N}{f} \text{ or } M = \frac{N}{f} + 1 & M = \frac{\theta'}{\theta} & M = \frac{-d_{i1} N}{f_{objective} f_{eyepiece}} & M = \frac{f_{objective}}{f_{eyepiece}} \\
 d \sin \theta = m \lambda, \quad m = 0, 1, 2, \dots & d \sin \theta = (m + \frac{1}{2}) \lambda, \quad m = 0, 1, 2, \dots & & y = L \tan \theta \\
 2t = m \lambda_{film}, \quad m = 0, 1, 2, \dots & 2t = (m + \frac{1}{2}) \lambda_{film}, \quad m = 0, 1, 2, \dots & & \lambda_{film} = \frac{\lambda_{vac}}{n_{film}} \\
 W \sin \theta = m \lambda, \quad m = 1, 2, 3, \dots & & &
 \end{array}$$

Constants

$$e = 1.60 \times 10^{-19} \text{C}$$

$$k = 8.99 \times 10^9 \text{ Nm}^2/\text{C}^2$$

$$\varepsilon_o = 8.85 \times 10^{-12} \text{ C}^2/(\text{Nm}^2)$$

$$1\text{eV} = 1.60 \times 10^{-19} \text{J}$$

$$\mu_o = 4\pi \times 10^{-7} \text{ Tm/A}$$

$$c = 3.00 \times 10^8 \text{ m/s}$$