Potentially Useful Formulas

$\vec{F} = k\frac{q_1 q_2}{r_{12}^2}\hat{r}_{12}, \quad k = \frac{1}{4\pi\epsilon_0}$

$\Phi_E = \oint \vec{E}\cdot d\vec{A} = \frac{Q_{encl}}{\epsilon_0}$

$E_s = -dV/ds$

$V = W/q$

$V_{pt\,chg} = kq/r$

$\vec{E} = \int_{vol} \frac{k\,dq}{r^2}\hat{r}$

$V = \int_{vol} \frac{k\,dq}{r}$

$U_{capacitor} = \frac{1}{2}CV^2$

$E_{\parallel plate\ capac.} = \sigma/\epsilon_0$

$\mathcal{U}_E = \frac{\epsilon_0}{2}E^2$

$C_{TOT} = \Sigma C_i$ (parallel)

$\frac{1}{C_{TOT}} = \Sigma \frac{1}{C_i}$ (series)

$R_{TOT} = \Sigma R_i$ (series)

$\frac{1}{R_{TOT}} = \Sigma \frac{1}{R_i}$ (parallel)

$Q = CV$

$V = iR$

$P = \frac{dU}{dt} = iV = i^2R = \frac{V^2}{R}$

$\vec{F} = q\vec{v}\times\vec{B} = i\vec{L}\times\vec{B}$

$|\vec{\mu}| = NiA$

$\vec{\tau} = \vec{\mu}\times\vec{B}$

$\oint \vec{B}\cdot d\vec{\ell} = \mu_0 I_{encl}$

$B_{solenoid} = \mu_0 N i$

$d\vec{B} = \frac{\mu_0}{4\pi} i \frac{d\vec{\ell}\times\hat{r}}{r^2}$

$\mathcal{E} = -\frac{d\Phi_B}{dt}$

$\Phi_B = \int \vec{B}\cdot d\vec{A}$

$\Phi = Li$

$\mathcal{E} = -L\frac{di}{dt}$

$\mathcal{U}_m = B^2/2\mu_0$

$Q = C\mathcal{E}(1 - e^{-t/RC})$

$Q = Q_0 e^{-t/RC}$

$E = E_0/\kappa$

$X_L = \omega L$

$X_C = 1/\omega C$

$\omega_0 = \frac{1}{\sqrt{LC}}$

$Z = \sqrt{R^2 + (X_L - X_C)^2}$

$\Phi_{LRC} = \tan^{-1}\left(\frac{X_L - X_C}{R}\right)$

$V = \lambda\nu$

$n = c/v$

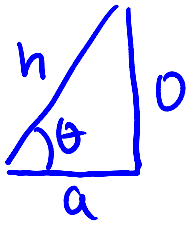
$n_1 \sin\theta_1 = n_2 \sin\theta_2$

$\frac{1}{i} + \frac{1}{o} = \frac{1}{f}$

$m = -i/o$

$F\,number = \frac{Foc.\,length}{diameter}$

$Pressure = S/c$



$\sin\theta = o/h$

$\cos\theta = a/h$

$\tan\theta = o/a$

Sphere:

$A = 4\pi r^2$

$Vol = \frac{4}{3}\pi r^3$

Cylinder:

$A = 2\pi rL + 2\pi r^2$

$Vol = \pi r^2 L$

$x' = \gamma(x - vt)$

$y' = y$

$z' = z$

$t' = \gamma\left(t - \frac{v}{c^2}x\right)$

$\gamma = \frac{1}{\sqrt{1-(v/c)^2}}$

quadratic eqn

$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$\int u^n du = \frac{u^{n+1}}{n+1}$

$\int \frac{du}{u} = \ln|u|$

$\int e^u du = e^u$

$\int \frac{x\,dx}{\sqrt{x^2+a^2}} = \sqrt{x^2+a^2}$

$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots$

$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} + \cdots \quad (-1 < x \le 1)$

$\ln x = \frac{x-1}{x} + \frac{1}{2}\left(\frac{x-1}{x}\right)^2 + \cdots$

$(1-x)^{-1} = 1 - x + x^2 - x^3 + \cdots (-1 < x < 1)$

$(1+x)^{-2} = 1 - 2x + 3x^2 + \cdots (-1 < x < 1)$

$(1+x)^{1/2} = 1 + \frac{1}{2}x - \frac{x^2}{8} + \cdots -1 < x \le 1$

$\sin(x) = x - \frac{x^3}{3!} + \cdots$

$\cos(x) = 1 - \frac{x^2}{2!} + \cdots$