Physics 2145 Starting Equations

All solutions to homework problems must begin with a starting equation. Show all work.

$x = x_i + v_{ix}\Delta t + \frac{1}{2}\, a_x(\Delta t)^2$ $\quad v_x = v_{ix} + a_x\Delta t$ $\quad v_x{}^2 = v_{ix}{}^2 + 2\, a_x(x - x_i)$

$\sum F_x = ma_x$ $\quad \sum F_y = ma_y$ $\quad f_S \le \mu_S N$ $\quad f_k = \mu_k N$

$a_c = \frac{v^2}{R}$ $\quad v = \frac{2\pi R}{T} = \omega R$ $\quad \omega = 2\pi f = \frac{2\pi}{T}$ $\quad F_G = \frac{GmM}{r^2}$ $\quad F_{Sx} = -kx$

$\tau = rF\sin\theta$ $\quad \sum \tau = I\alpha$ $\quad v = \omega r$ $\quad a = \alpha r$ $\quad I = \sum_i m_i r_i^2$ $\quad L = I\omega$

$\vec{p} = m\vec{v}$ $\quad \vec{J} = \vec{F}_{avg}\Delta t$ $\quad \vec{P}_f - \vec{P}_i = \vec{J}_{ext}$ $\quad W = Fd\cos\theta$ $\quad \Delta E = W$

$K = \frac{1}{2}mv^2$ $\quad U_{grav} = mgy$ $\quad U_{spring} = \frac{1}{2}kx^2$ $\quad \Delta E_{th} = f_k \Delta x$ $\quad P = W/\Delta t = Fv$

$F = k\frac{|q_1 q_2|}{r^2}$ $\quad E = k\frac{|q|}{r^2}$ $\quad \vec{F} = q\vec{E}$ $\quad U = k\frac{q_1 q_2}{r}$ $\quad V = k\frac{q}{r}$ $\quad U = qV$

$C = \frac{Q}{\Delta V}$ $\quad C = \kappa\varepsilon_0\frac{A}{d}$ $\quad \Delta V = Ed$ $\quad U = \frac{1}{2}Q\Delta V = \frac{1}{2}C(\Delta V)^2 = \frac{1}{2}\frac{Q^2}{C}$

$K = \frac{1}{2}mv^2$ $\quad \Delta K = -q\Delta V$ $\quad$ parallel: $C_{eq} = \sum_i C_i$ $\quad$ series: $\frac{1}{C_{eq}} = \sum_i \frac{1}{C_i}$

$I = \frac{\Delta q}{\Delta t}$ $\quad I = \frac{V}{R}$ $\quad R = \rho\frac{L}{A}$ $\quad P = IV = \frac{V^2}{R} = I^2R$

series: $R_{eq} = \sum_i R_i$ $\quad$ parallel: $\frac{1}{R_{eq}} = \sum_i \frac{1}{R_i}$ $\quad C = \frac{Q}{V}$

Discharging $\quad Q = Q_0 e^{-\frac{t}{RC}}$ $\quad I = I_0 e^{-\frac{t}{RC}}$ $\quad V_C = V_{C0} e^{-\frac{t}{RC}}$

Charging $\quad Q = Q_f\left(1 - e^{-\frac{t}{RC}}\right)$ $\quad I = I_0 e^{-\frac{t}{RC}}$ $\quad V_C = V_{Cf}\left(1 - e^{-\frac{t}{RC}}\right)$

$F = qvB\sin\theta$ $\quad F = ILB\sin\theta$ $\quad B = \frac{\mu_o I}{2\pi r}$ $\quad B = \frac{\mu_o I}{2R}$ $\quad B = \frac{\mu_o N I}{L}$ $\quad \tau = IAB\sin\theta$

$\Phi = AB\cos\theta$ $\quad \varepsilon = \left|\frac{\Delta\Phi}{\Delta t}\right|$ $\quad V = IR$

$E_y = E_{0y}\sin\left(2\pi\left(\frac{x}{\lambda} - ft\right)\right)$ $\quad E = cB$ $\quad E_{ph} = hf$ $\quad \lambda f = c$ $\quad I = \frac{Power}{Area}$

$n = \frac{c}{v}$ $\quad n_1 \sin\theta_1 = n_2 \sin\theta_2$ $\quad \frac{1}{s} + \frac{1}{s'} = \frac{1}{f}$ $\quad m = -\frac{s'}{s} = \frac{h'}{h}$

$e = 1.602 \times 10^{-19}$ C $\quad$ electron: $m_e = 9.11 \times 10^{-31}$ kg $\quad$ proton: $m_p = 1.67 \times 10^{-27}$ kg

$\varepsilon_0 = 8.85 \times 10^{-12}$ C^2/N•m^2 $\quad k = 9.0 \times 10^9$ N•m^2/C^2 $\quad \mu_0 = 4\pi\times10^{-7}$Tm/A

$h = 6.63 \times 10^{-34}$ Js $\quad c = 3 \times 10^8$ m/s