From 203

$\vec{F} = m\vec{a}$ $\quad ma_{ucm} = \frac{mv^2}{R}$ $\quad \vec{p} = m\vec{v}$ $\quad \vec{p}_i = \vec{p}_f$

$A_{sph\text{-}surf} = 4\pi r^2$ $\quad A_{circ} = \pi r^2$ $\quad V_{sph} = \frac{4}{3}\pi r^3$

$KE = \frac{1}{2}mv^2 = \frac{p^2}{2m}$ $\quad W_{tot} = KE_f - KE_i$

$E = KE + U$ $\quad E_i = E_f$

$F = k\frac{q_1 q_2}{r^2} = \frac{q_1 q_2}{4\pi\ \varepsilon_o r^2}$ $\quad k = 8.99\ (10)^9 \left[\frac{Nm^2}{C^2}\right]$ $\quad k = \frac{1}{4\pi\ \varepsilon_o}$

$E = \frac{F}{q}$ $\quad E = k\frac{q}{r^2} = \frac{q}{4\pi\ \varepsilon_o r^2}$ $\quad \varepsilon_o = 8.85\ (10)^{-12} \left[\frac{C^2}{N\ m^2}\right]$

$\Phi = \sum_{surf} E_\perp \Delta A = \frac{q_{inside}}{\varepsilon_o}$

$V = U / q$

$V = k\frac{q}{r} = \frac{1}{4\pi\ \varepsilon_o}\frac{q}{r}$

$Q = VC$ $\quad V = Ed$ $\quad C = \kappa\frac{A\varepsilon_o}{d}$ $\quad \sigma = Q / A$ $\quad E = \frac{\sigma}{\varepsilon_o}$

$V = IR$ $\quad \sum_{junc} I_j = 0$ $\quad \sum_{loop} V_j = 0$

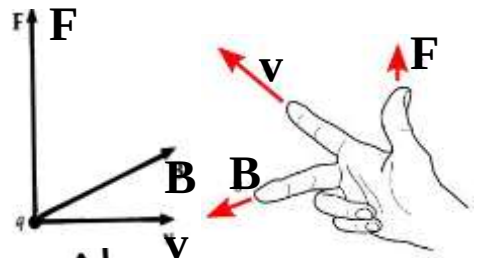
$\frac{QV}{2} = \frac{CV^2}{2} = \frac{Q^2}{2C}$

$R_{eff} = R_1 + R_2$ $\quad \frac{1}{C_{eff}} = \frac{1}{C_1} + \frac{1}{C_2}$ $\quad P = IV = I^2 R = V^2 / R$

$\frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2}$ $\quad C_{eff} = C_1 + C_2$ $\quad \sim e^{-t/\tau}$ $\quad \tau = RC$ $\quad \tau = L / R$

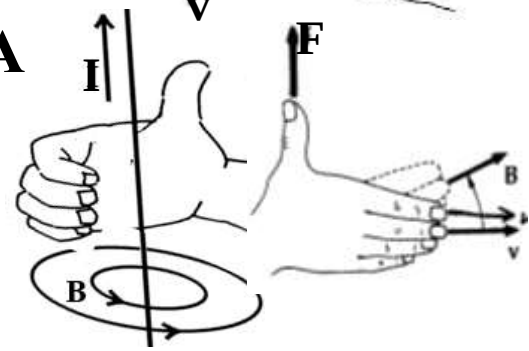
$F = qvB_\perp = qv_\perp B = qvB\sin(\theta)$

$F = ILB_\perp = I_\perp LB = ILB\sin(\theta)$



$\sum_{curv} B_\parallel \Delta l = \mu_o I_\perp$ $\quad \mu_o = 4\pi(10)^{-7} Tm/A$

$B = \frac{\mu_o I}{2\pi r} = \frac{2k'I}{R}$ $\quad k' = \frac{\mu_0}{4\pi} = (10)^{-7} Tm/A$



$$\Phi = \sum B_{\perp} \Delta A \qquad \mathcal{E} = -N \frac{\Delta \Phi}{\Delta t} \qquad \xi = -L \frac{\Delta I}{\Delta t} \qquad \frac{I_1}{I_2} = \frac{V_1}{V_2} = \frac{N_1}{N_2}$$

$$V = I Z \qquad Z_C = X_C = 1/\omega C \qquad Z_L = X_L = \omega L$$

$$c = \lambda f \qquad \frac{\Delta f}{f} = \pm \frac{v}{c} \qquad Z = \sqrt{R^2 + (X_L - X_C)^2} \qquad \omega_0 = \frac{1}{\sqrt{LC}}$$

$$f' = f\left(1 \pm \frac{v}{c}\right)$$

$$u = \frac{1}{2}\varepsilon_o E^2 + \frac{1}{2\mu_o} B^2 \qquad c = 3 \times 10^8 \, m/s = \frac{1}{\sqrt{\varepsilon_0 \mu_0}}$$

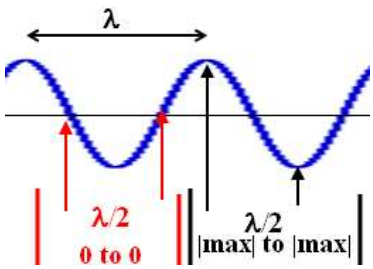
$$\frac{1}{f} = \frac{1}{o} + \frac{1}{i}$$

$$n = \frac{c}{v} \qquad n_1 \sin(\theta_1) = n_2 \sin(\theta_2)$$

$$m = -\frac{i}{o}$$

||-f

cent. undev.



$$\Delta \ell = \frac{d}{2n} \sin\theta = \frac{\lambda}{2}$$

$$\Delta \ell = \mathbf{d \sin(\theta)} = \ldots \quad \frac{\lambda}{2} \text{ or } \lambda \quad + m\lambda$$

[total] = [reflection] + [path length]

$$E = mc^2 \qquad m = m_0 / \sqrt{1 - (v/c)^2} \qquad \tau = \tau_0 \Big/ \sqrt{1 - \frac{v^2}{c^2}} \qquad L = L_0 \sqrt{1 - \frac{v^2}{c^2}}$$

$$E = h f \qquad h f = \varphi_0 + \frac{1}{2} m v^2 \qquad h = 6.63\,(10)^{-34} \text{ Js}$$

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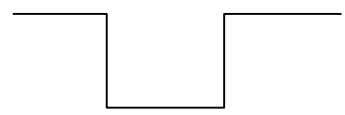
$$E = -13.6 \frac{(Z^*)^2}{n^2} (eV) \qquad r = .53 \frac{n^2}{Z} (\text{Å}) \qquad p = h/\lambda \qquad L = n\frac{\lambda}{2}$$

$$E = \frac{p^2}{2m} + V(x) \qquad \psi(x) \qquad |\psi(x)|^2 \qquad \Delta p \, \Delta x \geq h/2\pi \qquad \Delta E \, \Delta t \geq h/2\pi$$



$$2l + 1$$

$$n = 1, 2, 3, \ldots \qquad l = 0, 1, 2, \ldots \qquad l = n-1, n-2, \ldots$$

$$m = -l, -l+1, \ldots, l-1, l$$

$${}_1^1p \qquad {}_0^1n \qquad e^- \qquad e^+$$

$$938 \text{ MeV} \qquad .511 \text{ MeV}$$

$${}_Z^A X \qquad {}_2^4He$$

$$N = N_0 \left(\frac{1}{2}\right)^{t/T_{1/2}}$$