Physics Formula Sheet 2009 – 2010

Newtonian Mechanics

$v_f = v_i + a\Delta t$ $\quad \Delta x = v_i\Delta t + \frac{1}{2}a(\Delta t)^2$ $\quad \Delta x = \frac{1}{2}(v_i + v_f)\Delta t$

$v_f^2 = v_i^2 + 2a\Delta x$ $\quad \Sigma\vec{F} = \overrightarrow{F_{net}} = m\vec{a}$ $\quad F_{fric} \leq \mu F_N$ $\quad \overrightarrow{F_s} = -k\Delta x$

$PE_e = \frac{1}{2}k(\Delta x)^2$ $\quad PE_g = mgh$ $\quad KE = \frac{1}{2}mv^2$ $\quad P_{avg} = \frac{W}{\Delta t}$

$P = Fv$ $\quad W = Fd\cos\theta$ $\quad \vec{p} = m\vec{v}$ $\quad \vec{J} = \vec{F}\,\Delta t = \overrightarrow{\Delta p}$

$F_G = G\frac{m_1 m_2}{r^2}$ $\quad P_G = G\frac{m_1 m_2}{r}$ $\quad \left(\frac{T_1}{T_2}\right)^2 = \left(\frac{R_1}{R_2}\right)^2$

$a_c = \frac{v^2}{r}$ $\quad v = r\omega$ $\quad s = r\Delta\theta$

Waves and Optics

$T_p = 2\pi\sqrt{\frac{L}{g}}$ $\quad T_s = 2\pi\sqrt{\frac{m}{k}}$ $\quad T = \frac{1}{f}$ $\quad v = \lambda f$ $\quad f_n = nf_1$ $\quad \lambda_n = \frac{\lambda_1}{n}$

$f' = f\left(\frac{v \pm v_d}{v \mp v_s}\right)$ $\quad v = 331.5 + 0.59T$ $\quad n = \frac{c}{v}$

$M = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$ $\quad \frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$ $\quad f = \frac{R}{2}$

$n_1\sin\theta_1 = n_2\sin\theta_2$ $\quad \sin\theta_c = \frac{n_2}{n_1}$ $\quad v = \sqrt{\frac{F_T}{m/L}}$

Geometry

$R = \sqrt{R_x^2 + R_y^2}$

$\theta = \tan^{-1}\frac{R_y}{R_x}$

Sphere

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

$S = 4\pi r^2$

Circle

$A = \pi r^2$

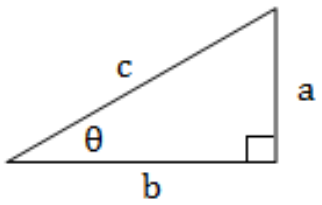
$C = 2\pi r$

Rectangle

$A = bh$

Triangle

$A = \frac{1}{2}bh$ $\quad c^2 = a^2 + b^2$



$\sin\theta = \frac{a}{c}$

$\cos\theta = \frac{b}{c}$

$\tan\theta = \frac{a}{b}$

Electricity & Magnetism

$$F_C = k\frac{q_1 q_2}{r^2}$$

$$E = \frac{F}{q}$$

$$\Delta PE = qV$$

$$E = -\frac{V}{d}$$

$$C = \frac{Q}{V}$$

$$C = \epsilon_o \frac{A}{d}$$

$$PE_C = \frac{1}{2}QV = \frac{1}{2}CV^2 = \frac{Q^2}{2C}$$

$$I_{avg} = \frac{\Delta Q}{\Delta t}$$

$$R = \frac{\rho L}{A}$$

$$R_s = R_1 + R_2 + \cdots$$

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots$$

$$C_p = C_1 + C_2 + \cdots$$

$$\frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} + \cdots$$

$$V = IR$$

$$P = IV$$

$$F_B = qvB\sin\theta$$

$$F_B = BIL\sin\theta$$

$$\varepsilon = Blv$$

Modern Physics

$$E = hf$$

$$KE_{max} = hf - hf_1$$

$$\lambda = \frac{h}{mv}$$

$$E = mc^2$$

Constants

$$G = 6.67\ x\ 10^{-11}\ Nm^2/kg^2$$

$$g = 9.81\ m/s^2$$

$$c = 3.00\ x\ 10^8\ m/s$$

$$k = 9.0\ x\ 10^9\frac{Nm^2}{C^2}$$

$$\epsilon_o = 8.85\ x\ 10^{-12}\frac{C^2}{Nm^2}$$

$$h = 6.63\ x\ 10^{-34}\ Js$$

$$N_A = 6.02\ x\ 10^{23}$$

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

$$m_e = 9.11\ x\ 10^{-31}kg = 0.511\ MeV$$

$$m_p = 1.673\ x\ 10^{-27}\ kg = 938.3\ MeV$$

$$m_n = 1.675\ x\ 10^{-27}\ kg = 939.6\ MeV$$

Earth:

$$Mass = 5.98\ x\ 10^{24}kg$$

$$Radius = 6.38\ x\ 10^3\ km$$

Moon:

$$Mass = 7.35\ x\ 10^{22}kg$$

$$Radius = 1.74\ x\ 10^3\ km$$

Sun:

$$Mass = 1.99\ x\ 10^{30}kg$$

$$Radius = 6.96\ x\ 10^5\ km$$

Earth - Sun Distance: $149.6\ x\ 10^6\ km$

Earth - Moon Distance: $384\ x\ 10^3\ km$