

Physics Formula Sheet 2010 – 2011

Newtonian Mechanics

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

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

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

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

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

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

Waves and Optics

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

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

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

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

Geometry

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

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

Circle

$$A = \pi r^2$$

$$C = 2\pi r$$

Sphere

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

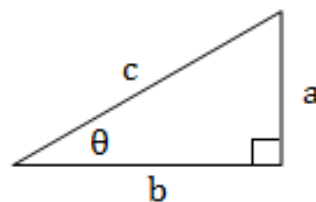
$$S = 4\pi r^2$$

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

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

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

$$\Delta PE = qV$$

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

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

$$C = \epsilon_0 \frac{A}{d}$$

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

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

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

$$R_s = R_1 + R_2 + \dots$$

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

$$C_p = C_1 + C_2 + \dots$$

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

$$V = IR$$

$$P = IV$$

$$F_B = qvB \sin \theta$$

$$F_B = BIL \sin \theta$$

$$\varepsilon = Blv$$

Constants

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

$$g = 9.81 \text{ m/s}^2$$

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

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

$$\epsilon_0 = 8.85 \times 10^{-12} \frac{\text{C}^2}{\text{Nm}^2}$$

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

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

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

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

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

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

Earth:

$$\text{Mass} = 5.98 \times 10^{24} \text{ kg}$$

$$\text{Radius} = 6.38 \times 10^3 \text{ km}$$

Moon:

$$\text{Mass} = 7.35 \times 10^{22} \text{ kg}$$

$$\text{Radius} = 1.74 \times 10^3 \text{ km}$$

Sun:

$$\text{Mass} = 1.99 \times 10^{30} \text{ kg}$$

$$\text{Radius} = 6.96 \times 10^5 \text{ km}$$

$$\text{Earth - Sun Distance: } 149.6 \times 10^6 \text{ km}$$

$$\text{Earth - Moon Distance: } 384 \times 10^3 \text{ km}$$

Modern Physics

$$E = hf$$

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

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

$$E = mc^2$$