Honors Physics Master Equation Sheet

$$\Delta x = x_f - x_i$$

$$v = \frac{\Delta x}{\Delta t}$$

$$a = \frac{\Delta v}{\Delta t}$$

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

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

$$v_f = v_i + a\Delta t$$

$$v_f^2 = v_i^2 + 2a\Delta x$$

$$\Sigma \boldsymbol{F} = m\boldsymbol{a}$$

$$F_g = mg$$

$$F_f = \mu F_N$$

$$F_s = -kx$$

$$a_c = \frac{v_t^2}{r}$$

$$F_c = \frac{mv_t^2}{r}$$

$$F_G = G\frac{m_1 m_2}{r^2}$$

$$W_{net} = F_{net} d\cos\theta$$

$$KE = \frac{1}{2}mv^2$$

$$W_{net} = \Delta KE$$

$$PE_g = mgh$$

$$PE_s = \frac{1}{2}kx^2$$

$$ME = KE + \Sigma PE$$

$$P = \frac{W}{\Delta t} = Fv$$

$$\boldsymbol{p} = m\boldsymbol{v}$$

$$F\Delta t = \Delta p = mv_f - mv_i$$

$$T = 2\pi\sqrt{\frac{r^3}{Gm}}$$

$$v_t = \sqrt{G\frac{m}{r}}$$

$$T = 2\pi\sqrt{\frac{L}{g}}$$

$$T = 2\pi\sqrt{\frac{m}{k}}$$

$$\tau = Fd\sin\theta$$

$$MA = \frac{F_{out}}{F_{in}} = \frac{d_{in}}{d_{out}}$$

$$eff = \frac{W_{out}}{W_{in}}$$

$$\rho = \frac{m}{V}$$

$$F_B = F_{g,f} = m_f g$$

$$P = \frac{F}{A}$$

$$P = P_0 + \rho gh$$

$$A_1 v_1 = A_2 v_2$$

$$T_F = \frac{9}{5}T_C + 32.0$$

$$T_K = T_C + 273.15$$

$$intensity = \frac{P}{4\pi r^2}$$

$$f_n = n\frac{v}{2L}; n = 1,2,3\ldots$$

$$f_n = n\frac{v}{4L}; n = 1,3,5\ldots$$

$$v = f\lambda$$

$$c = f\lambda$$

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$$

$$M = \frac{h'}{h} = -\frac{q}{p}$$

$$n = \frac{c}{v}$$

$$n_i \sin\theta_i = n_r \sin\theta_r$$

$$\sin\theta_c = \frac{n_r}{n_i}; n_i > n_r$$

$$d\sin\theta = \pm m\lambda; m = 0,1,2,3\ldots$$

$$d\sin\theta = \pm\left(m + \frac{1}{2}\right)\lambda; m = 0,1,2,3\ldots$$

$$\theta = 1.22\frac{\lambda}{D}$$

$$Q = mc\Delta T$$

$$Q_H + Q_C = 0$$

$$Q = mL$$

$$W = PAd = P\Delta V$$

$$\Delta U = Q - W$$

$$eff = \frac{W_{net}}{Q_h} = \frac{Q_H - Q_C}{Q_H} = 1 - \frac{Q_C}{Q_H}$$

$$F_e = k_C\left(\frac{q_1 q_2}{r^2}\right)$$

$$E = k_C\frac{q}{r^2}$$

$$PE_e = -qEd$$

$$\Delta V = \frac{\Delta PE_e}{q} = -E\Delta d$$

$$\Delta V = k_C\frac{q}{r}$$

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

$$C = \varepsilon_0\frac{A}{d}$$

$$PE_e = \frac{1}{2}Q\Delta V = \frac{1}{2}C(\Delta V)^2 = \frac{Q^2}{2C}$$

$$B = \frac{F_{mag}}{qv}$$

$$F_{mag} = BIl$$

$$\Phi_{mag} = AB\cos\theta$$

$$emf = -N\frac{\Delta\Phi_{mag}}{\Delta t}$$

$$emf = NAB\omega\sin\omega t$$

$$emf_{max} = NAB\omega$$

$$emf = -M\frac{\Delta I}{\Delta t}$$

<u>Physical Constants</u>

c = 3.00×10^{8} m/s

e = 1.60×10^{-19} C

ε_0 = 8.85×10^{-12} $C^2/(N\cdot m^2)$

G = 6.673×10^{-11} $N\cdot m^2/kg^2$

g = 9.81 m/s^2

h = 6.63×10^{-34} J·s

k_B = 1.38×10^{-23} J/K

k_C = 8.99×10^{9} $N\cdot m^2/C^2$

R = 8.31 J/(mol·K)

m_e = 9.109×10^{-31} kg

m_n = 1.675×10^{-27} kg

m_p = 1.673×10^{-27} kg