Physics 12 Equation Sheet

Kinematics

$$\vec{v} = \frac{\vec{d}}{t} \qquad \vec{d} = \frac{\vec{v}_i + \vec{v}_f}{2} t$$

$$\vec{a} = \frac{\vec{v}_f - \vec{v}_i}{t} \qquad v = \frac{2\pi r}{T}$$

$$\vec{d} = \vec{v}_i t + \tfrac{1}{2}\vec{a}t^2 \qquad a_c = \frac{v^2}{r}$$

$$\vec{d} = \frac{v_f^2 - v_i^2}{2\vec{a}}$$

Dynamics

$$\vec{F}_g = m\vec{g} \qquad g = \frac{GM}{r^2}$$

$$\vec{F}_{net} = m\vec{a} \qquad \frac{r_1^3}{T_1^2} = \frac{r_2^3}{T_2^2}$$

$$F_f = \mu F_N \qquad T = 2\pi\sqrt{\frac{l}{g}}$$

$$\vec{F}_s = -k\vec{x} \qquad T = 2\pi\sqrt{\frac{m}{k}}$$

$$F_c = \frac{mv^2}{r} \qquad \tau = F_\perp d$$

$$F_g = \frac{Gm_1m_2}{r^2}$$

Momentum and Energy

$$\vec{p} = m\vec{v} \qquad P = \frac{W}{t}$$

$$\Delta\vec{p} = m\Delta\vec{v} \qquad W = \Delta E$$

$$\vec{J} = \vec{F}\Delta t \qquad E_p = mgh$$

$$\vec{J} = \Delta\vec{p} \qquad E_k = \tfrac{1}{2}mv^2$$

$$W = Fd\cos\theta \qquad E_e = \tfrac{1}{2}kx^2$$

Electricity and Magnetism

$$F_q = \frac{kq_1q_2}{r^2} \qquad P = IV$$

$$\vec{E} = \frac{\vec{F}_q}{q_t} \qquad V = \frac{\Delta E}{q}$$

$$\left|\vec{E}\right| = \frac{kq}{r^2} \qquad F_m = IlB\sin\theta$$

$$I = \frac{V}{R} \qquad F_m = qvB\sin\theta$$

$$\frac{N_p}{N_s} = \frac{V_p}{V_s} = \frac{I_s}{I_p}$$

Quantum and Nuclear Physics

$$E_{k(\max)} = hf - W_o \qquad \lambda = \frac{h}{mv}$$

$$E_{photon} = hf \qquad E_n = \frac{-13.6}{n^2}eV$$

$$p = \frac{h}{\lambda} \qquad E_{photon} = E_u - E_l$$

$$c = \lambda f \qquad E = mc^2$$

Math Formulas

$$0 = at^2 + bt + c \text{ where } t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$c^2 = a^2 + b^2 - 2ab\cos C$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Stuff you might need...

$g = 9.81\ m/s^2$

$G = 6.67\times10^{-11}\ Nm^2/kg^2$

$R_{Earth} = 6.38\times10^6\ m$

$R_{Earth\ Orbit} = 1.4957\times10^{11}\ m$

$m_{Earth} = 5.98\times10^{24}\ kg$

$m_{Sun} = 1.99\times10^{30}\ kg$

$k = 8.99\times10^9\ Nm^2/C^2$

$e = 1.60\times10^{-19}\ C$

$1\ eV = 1.60\times10^{-19}\ J$

$h = 6.626\times10^{-34}\ Js$

$c = 3.00\times10^8\ m/s$

$1\ \text{u} = 1.6605\times10^{-27}\ kg$

$m_{electron} = 9.109\times10^{-31}\ kg$

$m_{proton} = 1.6726\times10^{-27}\ kg = 1.007276\ \text{u}$

$m_{neutron} = 1.6749\times10^{-27}\ kg = 1.008665\ \text{u}$