Physics Formula Sheet

General

E_a = |observed – actual| D_a = |observed – average|

$$E_r = \frac{|observed - actual|}{actual} \times 100 \qquad D_r = \frac{D_a(average)}{average} \times 100$$

Kinematics

$v_{av} = \Delta x/\Delta t$ $\mathbf{v_{av}} = \Delta \mathbf{x}/\Delta t$ $a_{av} = \Delta v/\Delta t$ $v = v_0 + at$

$x = \frac{1}{2}(v + v_0)t$ $x = v_0t + \frac{1}{2}at^2$ $v^2 = v_0^2 + 2ax$

Forces

$F = ma$ $W = mg$ $f = \mu N$ $F = -kx$ $F = G\frac{m_1m_2}{R^2}$ $G = 6.67 \times 10^{-11}\ N\cdot m^2/kg^2$

Uniform Circular Motion

$$v = \frac{2\pi r}{T} \qquad a_c = \frac{v^2}{r} \qquad F_c = \frac{mv^2}{r} \qquad \tan\theta = \frac{v^2}{rg} \qquad v = \sqrt{\frac{GM_p}{R_p}} \qquad T^2 = \frac{4\pi^2R^3}{GM_p}$$

Work & Energy

$W = Fd\cos ß$ $GPE = mgh$ $EPE = \frac{1}{2}kx^2$ $KE = \frac{1}{2}mv^2$

$P = W/t$ efficiency = $\frac{W\ output}{W\ input}$ x 100 MA = $\frac{output\ F}{input\ F} = \frac{input\ d}{output\ d}$

Impulse & Momentum

$I = F\Delta t$ $p = mv$ $F\Delta t = \Delta p$ $p = p_0$

Static Electricity

$$F = k\frac{q_1q_2}{d^2},\ k = 8.99\times10^9\ N\cdot m^2/C^2 \qquad E = F/q \qquad V = W/q = \Delta EPE/q$$

$q = CV$ $C = \kappa\varepsilon A/d$ $EPE_{point\ chg} = k\frac{q_1q_2}{r}$ $V_{point\ chg} = k\frac{q_1}{r}$

Current Electricity

$V = IR$ $E = Pt$ $P = IV = I^2R$ $R = \rho\cdot l/A$ $R_{series} = R_1 + R_2 + \ldots$ $\frac{1}{R_{parallel}} = \frac{1}{R} + \frac{1}{R_2} + \ldots$

Special Relativity

$t = \gamma t_0$ $ι = ι_0/\gamma$ $m = \gamma m_0$ $E_0 = m_0c^2$ $E_T = \gamma m_0c^2 = mc^2$ $p = \gamma m_0v$

$KE = (\gamma - 1)m_0c^2$ $\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$ $u = \frac{v + u'}{1 + \frac{vu'}{c^2}}$