Physics Equation Sheet

Work, Power, & Machines

$W = Fd$ $\quad P = \frac{W}{t}$

$IMA = \frac{d_{effort}}{d_{resistance}}$ $\quad IMA = \frac{d_i}{d_o} \times 100$

$AMA = \frac{F_{resistance}}{F_{effort}}$

$efficiency = \frac{W_{out}}{W_{in}} \times 100\%$

Electricity

$F = \frac{kQ_1Q_2}{d^2}$ $\quad C = \frac{Q}{V}$

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

$q = \frac{W}{V}$ $\quad I = \frac{Q}{t}$

$E = \frac{F}{q}$ $\quad E = \frac{V}{d}$

$V = \frac{W}{q}$ $\quad V = IR$ $\quad P = \frac{V^2}{R}$

$P = \frac{Energy}{t}$ $\quad P = IV$ $\quad P = I^2R$

q_e = Charge of electron = -1.6×10^{-19} C

Magnetism

$F = BIL$

$F = BQv$

Series Circuits

$V_{emf} = V_1 + V_2 + V_3 + \ldots$

$I_T = I_1 = I_2 = I_3 = \ldots$

$R_T = R_1 + R_2 + R_3 + \ldots$

Parallel Circuits

$V_{emf} = V_1 = V_2 = V_3 = \ldots$

$I_T = I_1 + I_2 + I_3 + \ldots$

$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots$

Sound & Waves

$v = f\lambda$ $\quad T = \frac{1}{f}$

$f = \frac{1}{T}$ $\quad v_{sound} = 331 m/s + 0.6T(°C)$

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

Optics

$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$ $\quad c = 3 \times 10^8 m/s$

$n_i \sin\theta_i = n_r \sin\theta_r$ $\quad n = \frac{c}{v_{material}}$

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

Trig Reminders

$\sin\theta = \frac{opposite}{hypotenuse}$

$c^2 = a^2 + b^2$

$\cos\theta = \frac{adjacent}{hypotenuse}$

$\tan\theta = \frac{opposite}{adjacent}$

Physics Equation Sheet

Motion

$$v_{avg} = \frac{d}{t}$$

$$v_{avg} = \frac{v_i + v_f}{2}$$

$$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t}$$

$$d = v_i t + 1/2\ at^2$$

$$v_f = v_i + at$$

$$v_f^2 = v_i^2 + 2ad$$

Projectiles

$$t = \sqrt{\frac{2d_y}{g}}$$

$$d_x = v_x t$$

$$d_y = v_{iy} t + \frac{1}{2}\ gt^2$$

$g = 9.8 m/s^2$, down

Force & Friction

$$F_{net} = ma$$

$$F_w = mg$$

$$F_f = \mu F_N$$

$$F_{net} = \sum F$$

Circular Motion

$$F_c = ma_c$$

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

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

$$v_{tangential} = \frac{2\pi r}{T}$$

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

$$G = 6.67x10^{-11} \frac{Nm^2}{kg^2}$$

$$\tau = Fd$$

$$F_1d_1 = F_2d_2$$

Energy & Momentum

$PE = mgh$

$KE = 1/2mv^2$

$p = mv$

$impulse = F\Delta t$

$F\Delta t = m\Delta v = \Delta(mv)$

Elastic Collisions:

$$m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f}$$

Inelastic Collisions:

$$m_1v_{1i} + m_2v_{2i} = (m_1 + m_2)v_f$$