Physics Equations Sheet

Work, Power, & Machines

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

$$IMA = \frac{d_{effort}}{d_{resistance}} \qquad AMA = \frac{F_{weight}}{F_{applied}}$$

$$efficiency = \frac{W_{out}}{W_{in}} x100\%$$

Electricity

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

$$k = 9.0x10^9 \frac{Nm^2}{C^2}$$

$$Q = \frac{W}{v} \qquad I = \frac{Q}{t}$$

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

$$V = \frac{W}{t} \qquad V = IR$$

$$P = \frac{E}{t} \qquad P = IV$$

Charge of electron = 1.6 x 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

$$v = f\lambda$$

$$f = \frac{1}{T} \qquad T = \frac{1}{f}$$

$$T = 2\pi\sqrt{\frac{L}{g}} \qquad v_{sound} = 331 + .6Temp$$

Optics

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o} \qquad c = 3x10^8 m/s$$

$$n_r = \frac{\sin\theta_i n_i}{\sin\theta_r} \qquad \sin\theta_c = \frac{n_i}{n_r}$$

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

Trig Reminders

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

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

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

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

Law of sines:

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

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

Law of cosines:

$$a^2 = b^2 + c^2 - 2bc\cos A$$

Physics Equations Sheet

Motion

$$v = \frac{d_{total}}{t_{total}}$$

$$v_{ave} = \frac{v_o + v_f}{2}$$

$$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_o}{t_f - t_o}$$

$$d = 1/2\,at^2$$

$$d = v_o t + 1/2\,at^2$$

$$v_f = v_o + at$$

$$v_f{}^2 = v_o{}^2 + 2ad$$

Projectiles

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

$$d_x = v_x t$$

$$d_y = 1/2\,gt^2$$

$$d_y = v_y t + 1/2\,gt^2$$

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

Force & Friction

$$F = ma$$

$$F_W = mg$$

$$F_f = \mu F_N$$

$$F_{net} = F_1 + F_2$$

Circular Motion

$$F_c = ma_c$$

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

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

$$v_c = \frac{2\pi(r)}{T}$$

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

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

$$\tau = Fd$$

$$F_1d_1 = F_2d_2$$

Energy & Momentum

$$PE = mgh$$

$$KE = 1/2mv^2$$

$$p = mv$$

$$impulse = F\Delta t$$

$$F\Delta t = mv$$

Elastic Collisions:

$$v_{1f} = \frac{m_1v_{1o} + m_{2o}v_{2o} - m_{2f}v_{2f}}{m_{1f}}$$

$$v_{2f} = \frac{m_1v_{1o} + m_{2o}v_{2o} - m_{1f}v_{1f}}{m_{2f}}$$

Inelastic Collisions:

$$v_f = \frac{m_1v_{1o} + m_{2o}v_{2o}}{m_1 + m_2}$$