

Physics Equations Sheet

Circular Motion

Motion

$$v_{ave} = \frac{d_{total}}{t_{total}}$$

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

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

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

$$v_f = v_o + at$$

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

$$F_c = ma_c$$

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

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

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

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

$$G = 6.67 \times 10^{-11} \frac{Nm^2}{kg^2}$$

$$\tau = Fd$$

$$F_1d_1 = -F_2d_2$$

Projectiles

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

$$d_x = v_x t$$

$$d_y = v_{oy} t + 1/2 gt^2$$

$$g = -9.8 m/s^2$$

Energy & Momentum

$$PE = mgh$$

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

$$p = mv$$

$$\text{impulse} = F\Delta t$$

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

Force & Friction

$$F_{net} = ma$$

$$F_w = mg$$

$$F_f = \mu F_N$$

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

Elastic Collisions:

$$v_{1f} = \frac{m_1v_{1o} + m_2v_{2o} - m_2v_{2f}}{m_1}$$

Inelastic Collisions:

$$v_f = \frac{m_1v_{1o} + m_2v_{2o}}{m_1 + m_2}$$

Physics Equations Sheet

Work, Power, & Machines

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

$$IMA = \frac{d_{\text{effort}}}{d_{\text{resistance}}}$$

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

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

Electricity

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

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

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

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

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

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

$$\text{Charge of electron} = 1.6 \times 10^{-19} \text{ C}$$

Magnetism

$$F = BIL$$
$$F = BQv$$

Series Circuits

$$V_{\text{emf}} = V_1 + V_2 + V_3 + \dots$$

$$I_T = I_1 = I_2 = I_3 \dots$$

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

Parallel Circuits

$$V_{\text{emf}} = V_1 = V_2 = V_3 = \dots$$

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

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

Sound & Waves

$$v = f\lambda$$

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

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

$$v_{\text{sound}} = 331 \text{ m/s} + 0.6T(^{\circ}\text{C})$$

Optics

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

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

$$\sin \theta_c = \frac{n_i}{n_r} \qquad n = \frac{c}{v_{\text{material}}}$$

Trig Reminders

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

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

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

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