Physics 11 - Formula Sheet

Kinematics

$$d = \left(\frac{v_o + v_f}{2}\right)t \qquad a = \frac{\Delta v}{\Delta t} \qquad d = v_o t + \frac{1}{2}at^2 \qquad v_f = v_o + at \qquad v_f^2 = v_o^2 + 2ad$$

Dynamics

$$F_{NET} = ma \qquad F_g = mg \text{ (approx)} \qquad F_g = \frac{Gm_1m_2}{r^2} \text{ (general)} \qquad F_f = \mu F_N \qquad F_s = kx$$

Energy

$$E_{before} = E_{after} \qquad E_k = \frac{1}{2}mv^2 \qquad E_p = mgh \qquad E_h = mc\Delta T \qquad W = F_{avg}d = \Delta E \qquad P = \frac{W}{t}$$

$$\%\, efficiency = \frac{energy\, output}{\text{energy input}} \times 100\% = \frac{\text{Power output}}{\text{Power input}} \times 100\%$$

Electrical Circuits

$$I = \frac{Q}{t} \qquad V = IR \qquad P = VI = I^2R = \frac{V^2}{R} \qquad P = \frac{\Delta E}{t} \qquad V_{terminal} = \mathcal{E} - Ir$$

Waves

$$T = \frac{1}{f} \qquad v = f\lambda \qquad \frac{\lambda_1}{\lambda_2} = \frac{v_1}{v_2} = \frac{n_2}{n_1} = \frac{\sin\theta_i}{\sin\theta_r} \qquad v_{max} = A\sqrt{\frac{k}{m}} \qquad T = 2\pi\sqrt{\frac{m}{k}} \qquad T = 2\pi\sqrt{\frac{\ell}{g}}$$

Data Analysis

$$\%\, error = \frac{|\, true - experimental\,|}{true} \times 100\%$$

Constants & Conversions

μm = 10^{-6}m nm=10^{-9}m 1 in = 2.54 cm 1 mile = 1609 m

g = 9.8 m/s^2 c = 3.00 x 10^8 m/s v_{sound} = 343m/s

G = 6.67 x 10^{-11} Nm^2/kg^2 $c_{(H2O)}$ = 4200 J/kgK

r_{earth} = 6.38 x 10^6 m m_{earth} = 5.98 x 10^{24} kg r_{moon} = 1.74 x 10^6 m m_{moon} = 7.35 x 10^{22} kg