Physics 2204 Data Sheet − Formulae and Constants

Kinematics

$$\vec{v}_{av} = \frac{\Delta \vec{d}}{\Delta t} \qquad \vec{d} = \left(\frac{\vec{v}_1 + \vec{v}_2}{2} \right) t \qquad \vec{d} = \vec{v}_1 t + \tfrac{1}{2} \vec{a} t^2 \qquad \vec{d} = \vec{v}_2 t - \tfrac{1}{2} \vec{a} t^2 \qquad 2\vec{a}\vec{d} = \vec{v}_2{}^2 - \vec{v}_1{}^2 \qquad \vec{v}_2 = \vec{v}_1 + \vec{a} t$$

Dynamics

$$\vec{F}_{net} = m\vec{a} \qquad \vec{F}_f = \mu \vec{F}_N \qquad \vec{F}_g = m\vec{g}$$

$$\vec{F}_f = \mu \vec{F}_N \qquad \vec{F}_g = G \frac{m_1 m_2}{r^2} \qquad \vec{p} = m\vec{v} \qquad \vec{F}\Delta t = m\Delta \vec{v}$$

Work, Power and Energy

$$W = \vec{F}\Delta \vec{d} \qquad P = \frac{W}{\Delta t} \qquad W = \Delta E \qquad efficiency = \frac{output}{input} \times 100\%$$

$$E_k = \tfrac{1}{2} m v^2 \qquad E_g = mgh \qquad F = kx \qquad E_e = \tfrac{1}{2} k x^2 \qquad a = -\left(\frac{k}{m} \right) x$$

Waves

$$f = \frac{cycles}{time} \qquad f = \frac{1}{T} \qquad v = f\lambda \qquad v_{sound} = 332 + 0.6T \qquad Mach\ \# = \frac{v_{source}}{v_{sound}} \qquad n = \frac{c}{v}$$

$$n_1 \sin\theta_1 = n_2 \sin\theta_2 \qquad f_b = \left| f_2 - f_1 \right| \qquad f = \frac{f_o}{1 \pm \frac{v_0}{v_s}} \qquad f = \frac{f_o}{1 \pm \frac{v}{c}} \qquad \frac{I_1}{I_2} = \frac{r_2{}^2}{r_1{}^2}$$

$$n\lambda = w \sin\theta_n \qquad (n + \frac{1}{2})\lambda = w \sin\theta_n \qquad n\lambda = d \sin\theta_n$$

Constants

$$g = 9.80 m/s^2 \qquad G = 6.67 \times 10^{-11} N \cdot {}^{m^2}\!/_{kg^2} \qquad r_e = 6.38 \times 10^6 m \qquad M_e = 5.98 \times 10^{24} kg \qquad c = 3.00 \times 10^8 m/s$$

Quadratic Formula

$$\text{If } ax^2 + bx + c = 0, \text{ then } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$