

# Physics 2204

## Formulae and Constants

### Kinematics

$$\vec{v}_{av} = \frac{\Delta \vec{d}}{\Delta t} \quad \vec{d} = \vec{v}_1 t + \frac{1}{2} \vec{a} t^2 \quad \vec{d} = \vec{v}_2 t - \frac{1}{2} \vec{a} t^2$$

$$2\vec{a}\vec{d} = \vec{v}_2^2 - \vec{v}_1^2 \quad \vec{v}_2 = \vec{v}_1 + \vec{a}t \quad \vec{d} = \frac{1}{2}(\vec{v}_1 + \vec{v}_2)t$$

### Dynamics

$$\vec{F}_{net} = m\vec{a} \quad \vec{p} = m\vec{v} \quad \vec{F}_g = m\vec{g}$$

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

### Work, Power and Energy

$$E_k = \frac{1}{2}mv^2 \quad E_g = mgh \quad W = F\Delta d \quad P = \frac{W}{\Delta t} \quad \text{efficiency} = \frac{\text{output}}{\text{input}} \times 100\%$$

$$F = kx \quad E_e = \frac{1}{2}kx^2 \quad a = -\left(\frac{k}{m}\right)x$$

### Waves

$$f = \frac{1}{T} \quad f = \frac{\text{cycles}}{\text{time}} \quad v = f\lambda \quad \text{Mach \#} = \frac{v_{source}}{v_{sound}}$$

$$v_{sound} = 332 + 0.6T \quad n = \frac{c}{v} \quad n_1 \sin \theta_1 = n_2 \sin \theta_2 \quad f_b = |f_2 - f_1|$$

$$f = \frac{f_o v_s}{v_s \pm v_o} \quad \frac{I_1}{I_2} = \frac{r_2^2}{r_1^2} \quad f_2 = f_1 \left(1 \pm \frac{v}{c}\right) \quad n\lambda = \frac{dx_n}{L}$$

$$n\lambda = d \sin \theta_n \quad n\lambda = w \sin \theta_n$$

### Constants

$$g = 9.80 \text{ m/s}^2 \quad G = 6.67 \times 10^{-11} \text{ N} \cdot \text{m}^2/\text{kg}^2 \quad r_e = 6.38 \times 10^6 \text{ m}$$

$$M_e = 5.98 \times 10^{24} \text{ kg} \quad c = 3.00 \times 10^8 \text{ m/s}$$