

Physics 20

Equations and Other Useful Information

Miscellaneous

$$\vec{g} = 9.81 \frac{\text{m}}{\text{s}^2} \quad G = 6.67 \times 10^{-11} \frac{\text{N} \cdot \text{m}^2}{\text{kg}^2} \quad A_{\text{trap}} = \frac{1}{2}(b_1 + b_2)h \quad A_{\text{Triangle}} = \frac{1}{2}bh$$

$$C = 2\pi r \quad m = \frac{y_2 - y_1}{x_2 - x_1} \quad m_e = 5.98 \times 10^{-31} \text{ kg} \quad r_e = 6.38 \times 10^6 \text{ m}$$

Kinematics

$$\Delta d^{\dot{}} = d_2^{\dot{}} - d_1^{\dot{}} \quad \overset{\text{r}}{v} = \frac{\Delta d^{\dot{}}}{\Delta t} \quad \overset{\text{r}}{a} = \frac{\Delta \overset{\text{r}}{v}}{\Delta t}$$

$$\overset{\text{r}}{v}_f = \overset{\text{r}}{v}_i + \overset{\text{r}}{a}\Delta t \quad \Delta d^{\text{r}} = \frac{1}{2}(\overset{\text{r}}{v}_i + \overset{\text{r}}{v}_f)\Delta t \quad \Delta d^{\text{r}} = \overset{\text{r}}{v}_i\Delta t + \frac{1}{2}\overset{\text{r}}{a}\Delta t^2 \quad \overset{\text{r}}{v}_f^2 = \overset{\text{r}}{v}_i^2 + 2\overset{\text{r}}{a}\Delta d^{\dot{}}$$

Dynamics + Gravity

$$\vec{F}_{\text{net}} = m\vec{a} \quad \vec{F}_g = \vec{W} = m\vec{g} \quad F_k = \mu_k \cdot F_N \quad F_s = \mu_s \cdot F_N$$

$$F_g = \frac{Gm_1m_2}{r^2} \quad \overset{\text{r}}{g} = \frac{Gm_{\text{source}}}{r^2}$$

Circular Motion

$$f = \frac{\#cyc}{t}$$

$$T = \frac{t}{\#cyc}$$

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

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

$$v = \frac{2\pi r}{T}$$

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

$$a_c = \frac{4\pi^2 r}{T^2}$$

$$a_c = 4\pi^2 r f^2$$

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

$$F_c = \frac{4\pi^2 rm}{T^2}$$

$$F_c = 4\pi^2 m r f^2$$

$$\frac{T_A^2}{r_A^3} = K$$

$$\frac{T_A^2}{r_A^3} = \frac{T_B^2}{r_B^3}$$

$$v = \sqrt{\frac{Gm}{r}}$$

Work and Energy

$$W = \vec{F} \cdot \Delta \vec{d}$$

$$W = \Delta E$$

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

$$E_g = mgh$$

$$E_K = \frac{1}{2}mv^2$$

$$E_E = \frac{1}{2}kx^2$$

Oscillatory Motion

$$F_R = -kx$$

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

$$T = 2\pi\sqrt{\frac{m}{k}}$$

$$v_{\max} = A\sqrt{\frac{k}{m}}$$

Waves

$$v = f\lambda$$

$$f_D = \left(\frac{v_w}{v_w + mv_s} \right) f_s$$