$$K \equiv \tfrac{1}{2} m v^2$$
$$K = \tfrac{1}{2} I \omega^2$$
$$U = m g y$$
$$U = \tfrac{1}{2} k x^2$$
$$U = -\frac{G m_1 m_2}{r}$$
$$\vec{\mathbf{p}} \equiv m \vec{v}$$
$$\vec{\mathbf{L}} = I \vec{\omega}$$
$$\vec{\mathbf{L}} \equiv \vec{\mathbf{r}} \times \vec{\mathbf{p}}$$
$$L = r_\perp p$$

$$x = x_o + v_o t + \tfrac{1}{2} a t^2$$
$$x = x_o + \frac{v_o + v}{2} t$$
$$v = v_o + a t$$
$$v^2 = v_o^2 + 2 a \Delta x$$

$$\theta = \theta_o + \omega_o t + \tfrac{1}{2} \alpha t^2$$
$$\theta = \theta_o + \frac{\omega_o + \omega}{2} t$$
$$\omega = \omega_o + \alpha t$$
$$\omega^2 = \omega_o^2 + 2 \alpha \Delta\theta$$

$$v = r \omega$$
$$a_t = r \alpha$$
$$a_c = \frac{v^2}{r}$$
$$a_c = r \omega^2$$
$$\vec{a} = \frac{1}{m} \sum \vec{\mathbf{F}}$$
$$F_g = m g$$
$$F_S = k |x|$$
$$g = \frac{G m}{r^2}$$
$$\vec{\mathbf{F}} = m \vec{\mathbf{g}}$$
$$F = \frac{G m_1 m_2}{r^2}$$
$$f_\kappa = \mu_\kappa F_N$$
$$f_s^{\text{MAX POSSIBLE}} = \mu_s F_N$$
$$\vec{\alpha} = \frac{1}{I} \sum \vec{\boldsymbol{\tau}}$$

$$\vec{\boldsymbol{\tau}} \equiv \vec{\mathbf{r}} \times \vec{\mathbf{F}}$$
$$\tau \equiv r_\perp F$$
$$I = m r^2$$
$$I = I_{cm} + m d^2$$
$$W = F_\parallel \Delta r$$
$$W = \vec{\mathbf{F}} \cdot \overrightarrow{\Delta \mathbf{r}}$$
$$W = \tau \Delta\theta$$
$$W = -\Delta U$$
$$F_x = -\frac{dU}{dx}$$
$$W = \Delta K$$
$$P \equiv \frac{dE}{dt}$$
$$P = \vec{\mathbf{F}} \cdot \vec{v}$$
$$\vec{\mathbf{J}} \equiv \vec{\mathbf{F}} \Delta t$$
$$\vec{\mathbf{J}} = \overrightarrow{\Delta \mathbf{p}}$$
$$\frac{d^2 x}{dt^2} = -(2\pi f)^2 x$$
$$x = x_{max} \cos(2\pi f t)$$
$$v = -v_{max} \sin(2\pi f t)$$
$$a = -a_{max} \cos(2\pi f t)$$
$$v_{max} = (2\pi f) x_{max}$$
$$a_{max} = (2\pi f)^2 x_{max}$$
$$T = 2\pi \sqrt{\frac{L}{g}}$$
$$T = 2\pi \sqrt{\frac{m}{k}}$$
$$f = \frac{1}{T}$$
$$\frac{\partial^2 y}{\partial x^2} = \frac{1}{v^2} \frac{\partial^2 y}{\partial t^2}$$
$$y = y_{max} \cos\left(\tfrac{2\pi}{\lambda} x - \tfrac{2\pi}{T} t\right)$$
$$v = \frac{\lambda}{T} = \lambda f$$
$$v = \sqrt{\frac{F_T}{\mu}}$$
$$\mu = \frac{m}{L}$$

$$I \propto (\text{Amplitude})^2$$
$$f_{BEAT} = f_{HIGH} - f_{LOW}$$
$$f' = \frac{v \pm v_R}{v \mp v_S} f$$
$$\rho = \frac{m}{V}$$
$$P = \frac{F}{A}$$
$$P = P_o + \rho g h$$
$$P_G = P - P_o$$
$$\dot{m} = \rho A v$$
$$\dot{m}_1 = \dot{m}_2$$
$$A_1 v_1 = A_2 v_2$$
$$P + \tfrac{1}{2} \rho v^2 + \rho g h = \text{constant}$$
$$Q = m c \Delta T$$
$$Q = m \ell$$
$$\Delta U = Q - W$$

Trigonometric Identities

$$(\sin\theta)^2 + (\cos\theta)^2 = 1$$
$$2 \sin\theta \cos\theta = \sin(2\theta)$$

Constants

$$g = 9.80 \frac{\text{N}}{\text{kg}} \quad \text{(near earth)}$$
$$a_g = 9.80 \frac{\text{m}}{\text{s}^2}$$
$$G = 6.67 \times 10^{-11} \frac{\text{N} \cdot \text{m}^2}{\text{kg}^2}$$
$$m_E = 5.97 \times 10^{24} \text{ kg}$$
$$r_E = 6.38 \times 10^6 \text{ m}$$
$$I_o = 1.00 \times 10^{-12} \frac{\text{W}}{\text{m}^2}$$
$$v_{sound} = 343 \frac{\text{m}}{\text{s}}$$
$$1.000 \text{ atm} = 1.013 \times 10^5 \text{ Pa}$$
$$\rho_{water} = 1.00 \times 10^3 \frac{\text{kg}}{\text{m}^3}$$
$$1.000 \text{ cal} = 4.186 \text{ J}$$
$$c_{water} = 4186 \frac{\text{J}}{\text{kg} \cdot \text{C}^\circ}$$