$K \equiv \frac{1}{2} m v^2$

$K = \frac{1}{2} I \omega^2$

$U = m g y$

$U = \frac{1}{2} k x^2$

$U = -\frac{G m_1 m_2}{r}$

$\vec{p} \equiv m \vec{v}$

$\vec{L} = I \vec{\omega}$

$\vec{L} \equiv \vec{r} \times \vec{p}$

$L = r_\perp \, p$

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

$x = x_o + \frac{v_o + v}{2} t$

$v = v_o + a t$

$v^2 = v_o^2 + 2 a \Delta x$

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

$\theta = \theta_o + \frac{\omega_o + \omega}{2} t$

$\omega = \omega_o + \alpha t$

$\omega^2 = \omega_o^2 + 2 \alpha \Delta \theta$

$v = r \omega$

$a_t = r \alpha$

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

$a_c = r \omega^2$

$\vec{a} = \frac{1}{m} \sum \vec{F}$

$W = m g$

$F_S = k |x|$

$g = \frac{G m}{r^2}$

$\vec{\mathbf{F}} = m \vec{\mathbf{g}}$

$F = \frac{G m_1 m_2}{r^2}$

$f_k = \mu_k N$

$f_s^{\text{MAX POSSIBLE}} = \mu_s N$

$\vec{\alpha} = \frac{1}{I} \sum \vec{\tau}$

$\vec{\tau} \equiv \vec{r} \times \vec{F}$

$\tau \equiv r_\perp F$

$I = m r^2$

$I = I_{cm} + m d^2$

$W = F_\parallel \Delta r$

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

$W = \tau \Delta \theta$

$W = -\Delta U$

$F_x = -\frac{dU}{dx}$

$W = \Delta K$

$P \equiv \frac{dE}{dt}$

$P = \vec{F} \cdot \vec{v}$

$\vec{J} \equiv \vec{F} \Delta t$

$\vec{J} = \Delta \vec{p}$

$\frac{d^2 x}{dt^2} = -(2\pi f)^2 x$

$x = x_{max} \cos(2\pi f t)$

$v = -v_{max} \sin(2\pi f t)$

$a = -a_{max} \cos(2\pi f t)$

$v_{max} = (2\pi f) x_{max}$

$a_{max} = (2\pi f)^2 x_{max}$

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

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

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

$\frac{\partial^2 y}{\partial x^2} = \frac{1}{v^2} \frac{\partial^2 y}{\partial t^2}$

$y = y_{max} \cos\left(\frac{2\pi}{\lambda} x - \frac{2\pi}{T} t\right)$

$v = \frac{\lambda}{T} = \lambda f$

$v = \sqrt{\frac{F_T}{\mu}}$

$\mu = \frac{m}{L}$

$I \propto (\text{Amplitude})^2$

$f_{BEAT} = f_{HIGH} - f_{LOW}$

$f' = \frac{v \pm v_R}{v \mp v_S} f$

$\rho = \frac{m}{V}$

$P = \frac{F}{A}$

$P = P_o + \rho g h$

$P_G = P - P_o$

$\dot{m} = \rho A v$

$\dot{m}_1 = \dot{m}_2$

$A_1 v_1 = A_2 v_2$

$P + \frac{1}{2} \rho v^2 + \rho g h = \text{constant}$

$Q = m c \Delta T$

$Q = m \ell$

$\Delta U = Q - W$

Trigonometric Identities

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

$2 \sin\theta \cos\theta = \sin(2\theta)$

Constants

$g = 9.80 \frac{\text{N}}{\text{kg}}$ (near earth)

$a_g = 9.80 \frac{\text{m}}{\text{s}^2}$

$G = 6.67 \times 10^{-11} \frac{\text{N} \cdot \text{m}^2}{\text{kg}^2}$

$m_E = 5.97 \times 10^{24} \text{ kg}$

$r_E = 6.38 \times 10^6 \text{ m}$

$I_o = 1.00 \times 10^{-12} \frac{\text{W}}{\text{m}^2}$

$v_{sound} = 343 \frac{\text{m}}{\text{s}}$

$1.000 \text{ atm} = 1.013 \times 10^5 \text{ Pa}$

$\rho_{water} = 1.00 \times 10^3 \frac{\text{kg}}{\text{m}^3}$

$1.000 \text{ cal} = 4.186 \text{ J}$

$c_{water} = 4186 \frac{\text{J}}{\text{kg} \cdot \text{C}^\circ}$