

$$\sin\theta = \frac{\text{opp}}{\text{hyp}}$$

$$\cos\theta = \frac{\text{adj}}{\text{hyp}}$$

$$\tan\theta = \frac{\text{opp}}{\text{adj}}$$

$$v = v_0 + at$$

$$x = x_0 + v_0 t + \frac{1}{2} at^2$$

$$x = x_0 + \left(\frac{v_0 + v}{2}\right)t$$

$$v^2 = v_0^2 + 2a(x - x_0)$$

$$x - x_0 = \int_{t_0}^t v dt$$

$$v - v_0 = \int_{t_0}^t a dt$$

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

$$F_{\text{friction}} = \mu_k N$$

$$F_{\text{friction}} = \mu_s N$$

$$F_{\text{centripetal}} = \frac{mv^2}{r}$$

$$\frac{d(x^n)}{dx} = nx^{n-1}$$

$$\int x^n dx = \frac{x^{n+1}}{n+1}$$

circumference of circle = $2\pi r$

area of circle = πr^2

$$\text{quadratic equation} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\vec{F}_{\text{spring}} = -k(\vec{x} - \vec{x}_0)$$

$$\text{work} = \int \vec{F} \cdot d\vec{s}$$

$$\text{power} = \frac{dw}{dt}$$

$$\vec{A} \cdot \vec{B} = |\vec{A}||\vec{B}|\cos\theta = A_x B_x + A_y B_y + A_z B_z$$

$$s = r\theta$$

$$v = r\omega$$

$$a = r\alpha$$

$$\omega = \omega_0 + \alpha t$$

$$\theta = \theta_0 + \omega_0 t + \frac{1}{2} \alpha t^2$$

$$\theta = \theta_0 + \left(\frac{\omega + \omega_0}{2}\right)t$$

$$\omega = \omega_0^2 + 2\alpha(\theta - \theta_0)$$

$$KE_{\text{translation}} = \frac{1}{2} MV^2$$

$$KE_{\text{rotation}} = \frac{1}{2} I\omega^2$$

$$I = \sum m_i r_i^2 = \int r^2 dm$$

$$X_{\text{cm}} = \frac{\sum x_i m_i}{M} = \frac{\int x dm}{M}$$

$$I = I_{\text{cm}} + mh^2$$

$$\vec{\tau} = \vec{r} \times \vec{F} = I\vec{\alpha} = \frac{d\vec{L}}{dt}$$

$$\vec{L} = \vec{r} \times \vec{p} = I\vec{\omega}$$

$$\vec{F}_{\text{grav}} = -\frac{Gm_1 m_2}{r^2} \hat{r}$$

