Useful Formula

Circular motion

$\mathbf{a} = \dfrac{\mathbf{v}^2}{\mathbf{r}}$

Friction

$f_s \le \mu_s N$

$f_k = \mu_k N$

Center of mass

$\vec{\mathbf{r}}_{\mathbf{cm}} = \dfrac{1}{M}\sum m_n \vec{r}_n$

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

$\vec{v}_{av} = \Delta\vec{r} / \Delta t$

$\vec{a}_{av} = \Delta\vec{v} / \Delta t$

$\vec{J} = \Delta\vec{p} = F_{av}\Delta t$

$\vec{a}$ is constant

$\vec{v} = \vec{v}_0 + \vec{a}t$

$\vec{x} = \vec{x}_0 + \vec{v}_0 t + \frac{1}{2}\vec{a}t^2$

$\vec{v}^{\,2} = \vec{v}_0^{\,2} + 2\vec{a}(\vec{x} - \vec{x}_0)$

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

$\omega_{av} = \Delta\theta / \Delta t$

$\vec{\alpha}_{av} = \Delta\vec{\omega} / \Delta t$

$\mathbf{s} = \mathbf{r}\theta$

$\vec{\alpha}$ is constant

$\vec{\omega} = \vec{\omega}_0 + \vec{\alpha}t$

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

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

$\mathrm{W} = \int \vec{\mathrm{F}} \bullet \mathrm{d}\vec{\mathrm{r}}$

$\mathrm{Ke} = \frac{1}{2}mv^2$

$F_G = mg$

$\mathrm{U}_G = mgh$

$F_s = -kx$

$\mathrm{U}s = \frac{1}{2}kx^2$

$\vec{F} = -\dfrac{\partial U}{\partial r}\hat{r}$