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

$\vec{p}$ $\left(\frac{d\vec{p}}{dt} = \vec{F}\right)$

$\vec{F} = 0 \Rightarrow \vec{p} = \text{const}$

$\vec{\tau} = I\vec{\alpha} = \vec{r} \times \vec{F}$

$\vec{L} = I\vec{\omega}$ $\left(I = \sum_{i=1}^{n} m_i r_i^2\right)$

$= \vec{r} \times \vec{p}$

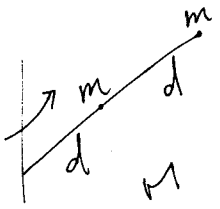
$\frac{d\vec{L}}{dt} = \vec{\tau}$

$K.E. = \frac{1}{2}mv^2 + \frac{1}{2}I\omega^2$

$= \frac{p^2}{2m} + \frac{L^2}{2I}$

$\omega = \frac{2\pi}{T}$

$\alpha = \frac{d\omega}{dt} = \frac{d\left(\frac{2\pi}{T}\right)}{dt} = \frac{-2\pi}{T^2}\frac{dT}{dt}$



$I = ?$

$K.E = ?$

$m = 0.85\,kg$

$d = 5.6\,cm.$

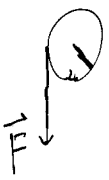
$M = 1.2\,kg$

$\omega = 0.3\ rad/s.$

棒子 $I = \frac{1}{3}ML^2$

$= \frac{1}{3}M(2d)^2$

Pulley



$I = 1 \times 10^{-3}\ kg \cdot m^2$

$r = 10\,cm$

$F = 0.50t + 0.3t^2$

$\omega_0 = 0.0t \quad t = 3.0\,s \quad \alpha, \omega = ?$

$\vec{\tau} = \vec{r} \times \vec{F} = I\vec{\alpha}$

$\vec{\alpha} = \frac{\vec{r} \times \vec{F}}{I} = \frac{(0.1)(0.50t + 0.3t^2)}{1.0 \times 10^{-3}}$

$= 50t + 30t^2 = 420\ rad/s^2$

$\omega = \int_0^3 \alpha\,dt = (25t^2 + 10t^3)\Big|_0^3 = 495\ rad/s.$