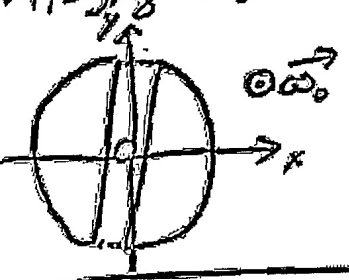
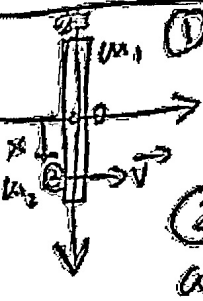
$m_1 = 3kg$ $m_2 = 1.5kg$



Conservare moment unghiular

$L_0 = I\omega_0 = \frac{m_1 r^2}{2}\omega_0 = L_1 = \frac{m_1 r^2}{2}\omega + m_2 r^2 \omega$

$\frac{m_1 r^2 \omega_0}{2} = r^2\omega\left(\frac{m_1}{2} + m_2\right)$ $\omega = \frac{m_1\omega_0}{m_1 + 2m_2} = \frac{3}{3}\frac{rad}{s} = 4.5\frac{rad}{s}$



① $m_2 v = (m_1 + m_2)v_{cm}$ $v_{cm} = \frac{m_2}{m_1+m_2}v$ ② $r_{cm} = \frac{x m_2}{m_1+m_2}$

$(x - r_{cm})m_2 v = I\omega = \left(\frac{m_1\ell^2}{12} + r_{cm}^2 m_1 + m_2(x - r_{cm})^2\right)\omega$ $\omega = \frac{(x - r_{cm})m_2 v}{I}$

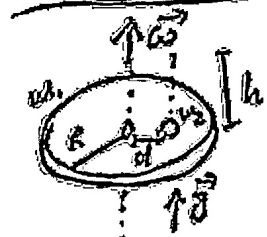
② $m_1 = m_2 = m$ $x = \ell$ $r_{cm} = \frac{\ell}{2}$ $r_{cm} m v = I\omega = \left(\frac{m\ell^2}{12} + \frac{m\ell^2}{4}\right)\omega$

$\omega = \frac{r_{cm} v}{\frac{\ell^2}{12} + r_{cm}^2}$ $J = \Delta p = m\omega r - mv$

$J_x = \Delta p_x = -m_2 v$

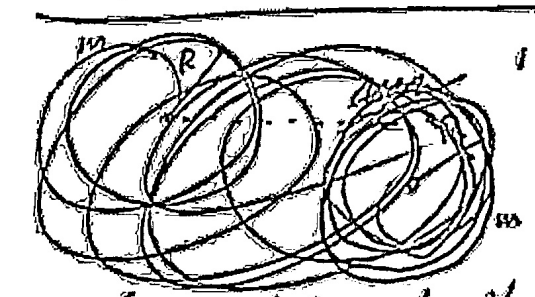
$I\omega = I'\omega'$ $\frac{m_1\ell^2}{12}\omega = \left(\frac{m_1\ell^2}{12} + \frac{m_2\ell^2}{4}\right)\omega'$ $\omega' = \frac{m_1\omega}{m_1 + 3m_2}$

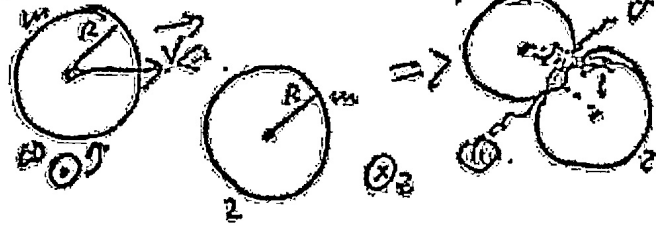
$J_y = \Delta p_y = m_2\omega\frac{\ell}{2}$ $J = \sqrt{J_x^2 + J_y^2}$ $\theta = \arcsin\frac{J_x}{J}$



$I_0\omega = I_1\omega'$ $\frac{1}{2}m_1 R^2\omega = \left(\frac{1}{2}m_1 R^2 + m_2 d^2\right)\omega'$ $\omega' = \frac{m_1 R^2\omega}{m_1 R^2 + 2m_2 d^2}$

$J_y = m_2\sqrt{2gh}$ Impulsul unghiular = $J_y d$





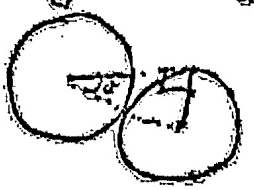
1: m, R, $V = V$, $\omega = 0$

2: m, R, $V = 0$ $\omega = 0$

1&2: $C_M \equiv O$, $V = V_{cm}$, $\omega =$

$m V = 2m V_{cm}$ $V_{cm} = \frac{V}{2}$ Polul: O $L_i = RmV\sin\theta - I\omega = \frac{\sin\theta}{2}RmV - \frac{1}{2}mR^2\omega$

$L_f = 0$ $\Rightarrow \frac{\sin\theta}{2}RmV = \frac{mR^2\omega}{2}$ $\omega = \frac{2V\sin\theta}{R}$ $\omega = \frac{V}{R}$



$2R\sin\theta = R$

$\sin\theta = \frac{1}{2}$

$\theta = \frac{\pi}{6}$

$\frac{GM}{R^2} = \frac{V^2}{R}$ $T = \frac{2\pi R}{V}$ $T^2 = \frac{4\pi^2 R^2}{V^2} = \frac{4\pi^2}{GM}R^3$

$p = m v_{cm} = 0$ $L = 3RmV_0$

$\frac{mV^2}{R} = \frac{GMm}{R^2} + \frac{2Gm^2}{(2R\sin\frac{\pi}{3})^2} = \frac{GMm}{R^2} + \frac{2Gm^2}{3R^2}$ $V_0 = \sqrt{\frac{G}{R}\left(M + \frac{2}{3}m\right)}$

$T = \frac{2\pi r}{V_0}$

$E_p = 0$ $\frac{1}{\mu} = \frac{1}{M} + \frac{3}{m} = \frac{m + 3M}{Mm}$ $\mu = \frac{Mm}{m + 3M}$ $E_p = -3\frac{GMm}{R} + 3\frac{Gm^2}{\sqrt{3}R}$