$[v] = LT^{-1}$
$[\eta] = L^{-1}MT^{-1}$
$[R] = L$
$\left[\frac{\Delta p}{\ell}\right] = L^{-2}MT^{-2}$

$\Pi = v^{a_1}\eta^{a_2}R^{a_3}\left(\frac{\Delta p}{\ell}\right)^{a_4} = (LT^{-1})^{a_1}(L^{-1}MT^{-1})^{a_2}L^{a_3}(L^{-2}MT^{-2})^{a_4} = L^0M^0T^0$

$L: \; a_1 - a_2 + a_3 - 2a_4 = 0$
$M: \; a_2 + a_4 = 0$
$T: \; -a_1 - a_2 - 2a_4 = 0$

$\begin{pmatrix} 1 & -1 & 1 & -2 \\ 0 & 1 & 0 & 1 \\ -1 & -1 & 0 & -2 \end{pmatrix}$ $\quad h = 3$
$\quad i = 4 - 3 = 1$
1 MONOMIO

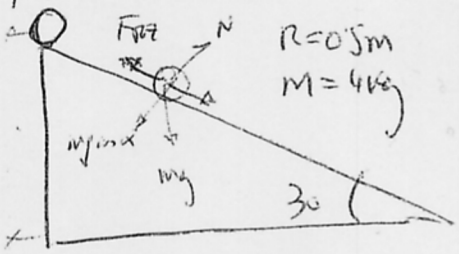
tomando $a_1 = 1 \Rightarrow a_2 = 1, \; a_3 = -2 \; a_4 = -1$

$\Pi = v\eta' R^{-2}\left(\frac{\Delta p}{\ell}\right)^{-1} = \frac{v R^2 \ell}{R^2 \Delta p}$

$F(\Pi) = 0 \Rightarrow \Pi = K \Rightarrow K = \frac{v\eta\ell}{R^2\Delta p} \Rightarrow \boxed{v = \frac{K R^2 \Delta p}{\eta \ell}}$

MODELO	PROTOTIPO
$\eta_M = 2\eta_P$	η_P
$v_M = 3 m/s$	$v_P = ?$
$R_M = \frac{R_P}{2}$	R_P
$\left(\Delta p/\ell\right)_M = \left(\Delta p/\ell\right)_P$	

$\Pi_M = \Pi_P \quad \frac{v_M \eta_M}{R_M^2\left(\frac{\Delta p}{\ell}\right)_M} = \frac{v_P \eta_P}{R_P^2\left(\frac{\Delta p}{\ell}\right)_P} \Rightarrow \boxed{v_P = \left(\frac{R_P}{R_M}\right)^2\left(\frac{\eta_M}{\eta_P}\right) v_M = 24 \, m/s}$



$mg \operatorname{sen}\alpha - F_{roz} = ma$

$F_{roz} \cdot R = \frac{1}{2} M R^2 \frac{a}{R} \Rightarrow F_{roz} = \frac{1}{2} Ma$

$mg \operatorname{sen}\alpha - \frac{1}{2} Ma = ma \Rightarrow \boxed{a = \frac{2}{3} g \operatorname{sen}\alpha}$

$F_{roz} = \frac{1}{2} 4 \cdot 3\hat{3} = 6\hat{6} N \quad | \quad a = \frac{2}{3} 10 \frac{1}{2} = 3\hat{3} m/s^2$

$v^2 = 2a\ell = 2 \cdot \frac{10}{3} \cdot 60 = 400 \Rightarrow \boxed{v = \sqrt{400} = 20 m/s} \Rightarrow \omega = \frac{v}{R} = \frac{20}{0'5} = 40$

$\ell = \frac{h}{\operatorname{sen}\alpha} = \frac{30}{1/2} = 60 m$

$E_{CR} = \frac{1}{2} I \omega^2 = \frac{1}{2}\frac{1}{2} 4 \left(\frac{1}{2}\right)^2 40^2 = 400 J$

3) caída del choque $E_M = CTE$

$mgh = \frac{1}{2} m v^2 \Rightarrow v = \sqrt{2gh} = \sqrt{2 \cdot 10 \cdot 5} = \boxed{10 m/s}$

choque: $\vec{p} = CTE \Rightarrow m_1 v_1 + 0 = (m_1 + m_2) v_F \rightarrow v_F = \frac{m_1}{m_1 + m_2} v_1 = \frac{1}{10} 10 = \boxed{1 m/s}$

después choque $\Delta E_M = W_{roz} \Rightarrow \frac{1}{2}(m_1 + m_2) v_F^2 = \frac{1}{2} K x^2 + \mu_c (m_1 + m_2) g \ell \quad (*)$

$E_{m\,inicial} = \frac{1}{2} m_1 v_1^2 = \frac{1}{2} 700 \cdot 10^2 = 3500 J \qquad E_{m_F} = \frac{1}{2}(m_1 + m_2) v_F^2 = \frac{1}{2} 100 \, 1^2 = 248 J$

$\boxed{E_{m_F} < E_{m_i} \Rightarrow \text{NO SE CONSERVA}}$

Despejando μ_c de la ecuación $(*)$

$\boxed{\mu_c = \frac{\frac{1}{2} 100 \, 49 - \frac{1}{2} 10^4 (24 \cdot 10^{-2})^2}{100 \cdot 10} = 0'43}$

- FEBRERO 2009 -