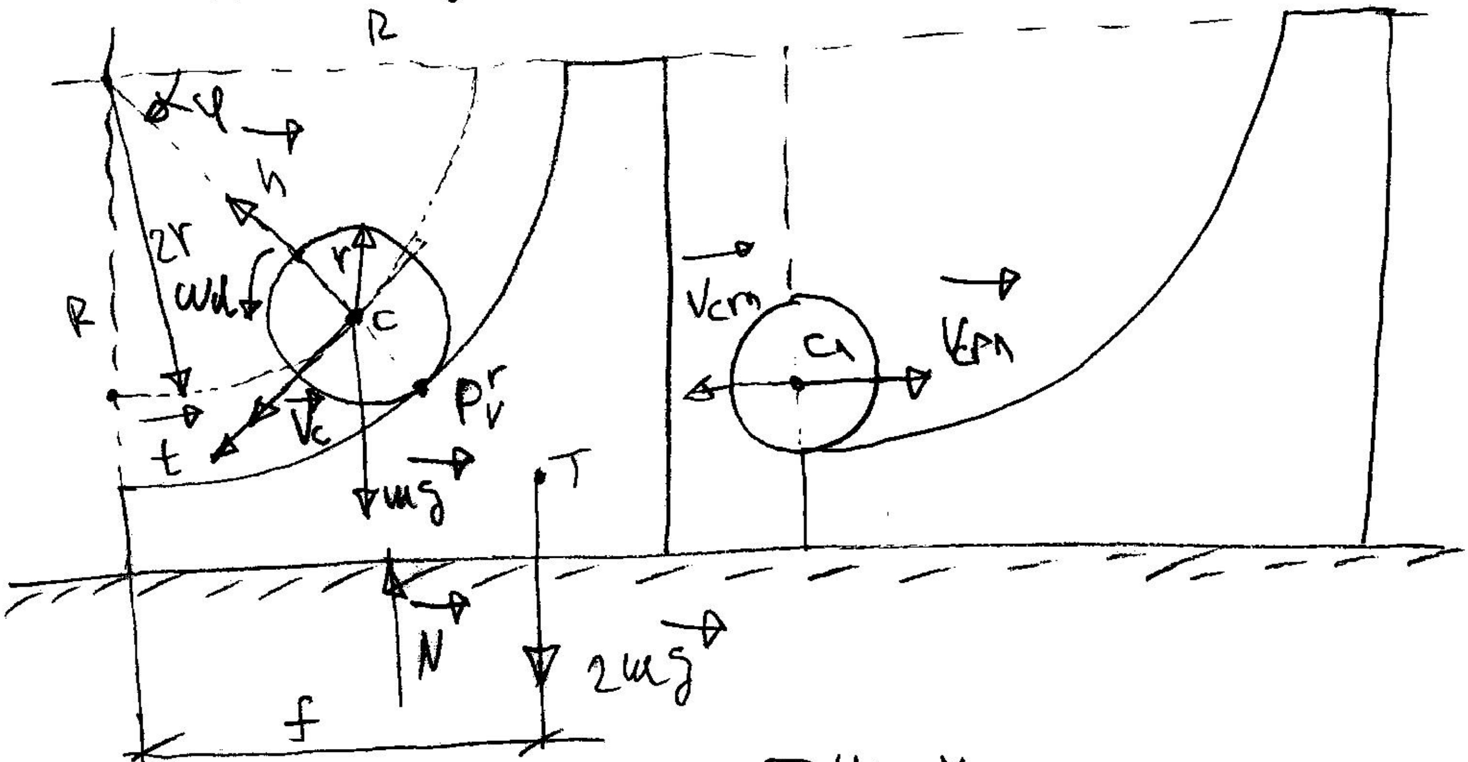
8.44 $M = 2m$

$R = 3r$

m, r

$t_0 = 0$ + мирУ

$\Delta x_P - V_P - ?$



$\sum m_i x_i = M x_c = const. = \sum m_i x_{i0}$

$(m + 2m) x_c = 2m(\cancel{f} + x_P) + m(x_P + 2r\cos\varphi) =$

$= \cancel{2m f} + m \cdot 2r$

$3m \, x_P = 2mr - 2mr\cos\varphi \; | : 3m$

$x_P = \frac{2}{3} r (1 - \cos\varphi)$

за $\varphi = \frac{\pi}{2}$ $\boxed{\Delta x_P = \frac{2}{3} r}$

$$x_P = \frac{2}{3} r(1-\cos\varphi) \quad \Big/ \cdot \frac{d}{dt}$$

$$\dot{x}_P = \frac{2}{3} r\dot{\varphi}\sin\varphi = V_P$$

$$V_{P1} = \dot{x}_P\Big|_{\varphi=\frac{\pi}{2}} = \frac{2}{3} r\,\dot{\varphi}_1 \Rightarrow \dot{\varphi}_1 = \frac{3}{2}\frac{V_{P1}}{r}$$

$$2r\dot{\varphi} = r\omega_d \Rightarrow \boxed{\omega_d = 2\dot{\varphi}}$$

$$V_{Cr} = r\omega_d = 2r\dot{\varphi}$$

$$T_1 - \underset{0}{\underline{T_0}} = \sum_i A_i = 2mgr$$

ДИСК ПРИЗМА

$$T_1 = T_1^d + T_1^P$$

$$T_1^P = \frac{1}{\cancel{2}}\cancel{2}m V_{P1}^2 = m V_{P1}^2$$

ПРЕНОСНА БРЗИНА ТАЧКЕ C

БРЗИНА ПРИЗМЕ

$$\left| V_{CP1} = V_{P1} \right|$$

$$T_1^d = \frac{1}{2} J_C\omega_d^2 + \frac{1}{2}m\left(V_{Cr1} - V_{CP1}\right)^2 =$$

$$= \frac{1}{\cancel{2}}\frac{1}{2}mr^2\cdot\cancel{4}\dot{\varphi}_1^2 + \frac{1}{2}m\left(2r\dot{\varphi}_1 - \frac{2}{3}r\dot{\varphi}_1\right)^2 =$$

$$= mr^2\dot{\varphi}_1^2 + \frac{1}{\cancel{2}}m\frac{\cancel{16}^{\,8}}{9}r^2\dot{\varphi}_1^2 = mr^2\dot{\varphi}_1^2\left(1+\frac{8}{9}\right) = \frac{17}{9}mr^2\dot{\varphi}_1^2$$

$$= \frac{17}{\cancel{9}}m\cancel{r^2}\frac{\cancel{9}}{4}\frac{V_{P1}^2}{\cancel{r^2}} = \frac{17}{4}mV_{P1}^2$$

$$T_1 = mV_{r1}^2 + \frac{17}{4} m V_{r1}^2 = \frac{21}{4} m V_{r1}^2$$

$$\frac{21}{4} m V_{r1}^2 = 2mgr \Rightarrow \boxed{V_{r1} = \sqrt{\frac{8gr}{21}}}$$

$\boxed{\text{УРАДИТИ 8.55!}}$

8.52

1: $2m$

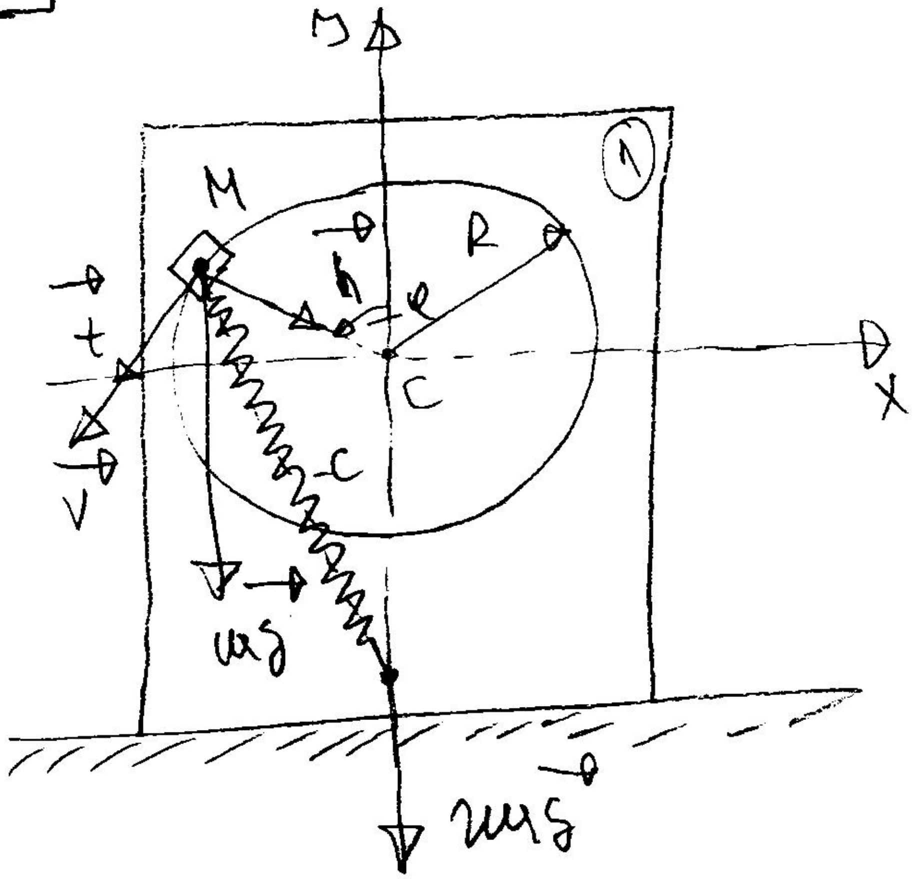
2: m

$c = \frac{2mg}{R}$

$l_0 = R$

$t_0 = 0$ мирује

$V_1 - ?$



$$T_1 - \underbrace{T_0}_{0} = \sum_i A_i$$

$$T_1 = \sum_i A_i = 2mgR + \frac{1}{2}c(2R)^2 = 2mgR + \frac{1}{2}\frac{2mg}{R}4R^2$$

$$= 6mgR$$

$$\vec{K}_1 - \vec{K}_0 = \sum_i \vec{I}_i^s$$

$$x: K_{1x} - \underbrace{K_{0x}}_{0} = 0 \Rightarrow K_{1x} = 0$$

$$2mV_1 + m(V_{2p} + V_{2r}) = 0 \qquad (V_{2p} = V_1)$$

$$3mV_1 = -mV_{2r} \Rightarrow \quad V_{2r} = -3V_1$$

$$T_1 = \frac{1}{2}2mV_1^2 + \frac{1}{2}m(V_{2P}+V_{2r})^2 =$$

$$= mV_1^2 + \frac{1}{2}m(V_1 - 3V_1)^2 =$$

$$= mV_1^2 + 2mV_1^2 = 3mV_1^2$$

$$\cancel{3}^1\cancel{m}V_1^2 = \cancel{6}^2\cancel{m}gR \Rightarrow \boxed{V_1 = \sqrt{2gR}}$$

$$V_{2r} = -3V_1 = -3\sqrt{2gR}$$

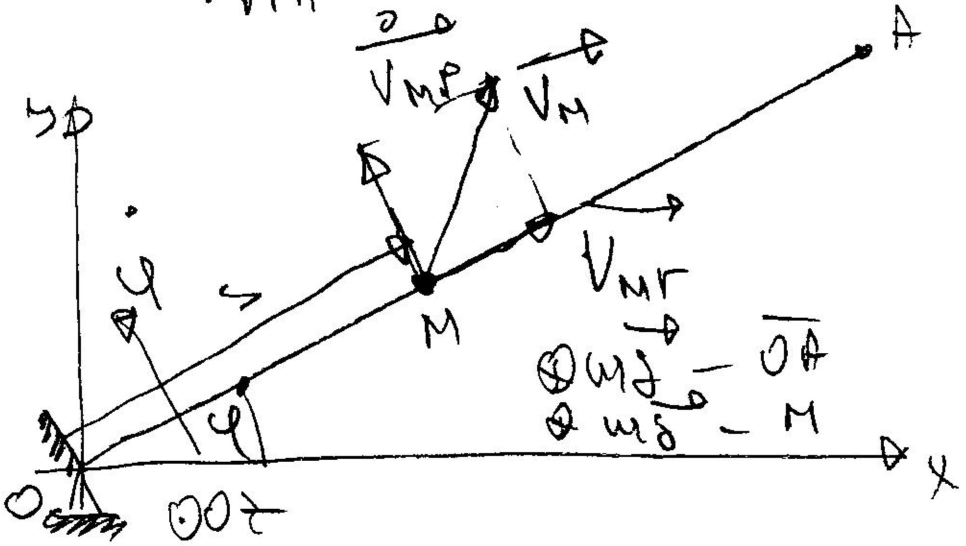
$\boxed{\text{УРАДИТИ 8.59!}}$

8.60 $OA : l, m$

$M : m$

$t_0 = 0 : \omega_0,\ V_{M0} = 0$

$V_{M1} - ?$



$$\frac{dL_{Oz}}{dt} = \sum_i M_{Oz}(\vec{F}_i^{es}) = 0 \Rightarrow L_{Oz} = \text{const.}$$

$$L_{Oz}(t_0) = L_{Oz}(t_1)$$

$$L_{Oz}^{\overline{OA}}(t_0) = J_{Oz}\,\omega_0 = \frac{1}{3} m l^2 \omega_0$$

$$L_{Oz}^{M}(t_0) = m\, s\, V_{A0} = 0$$

$$L_{Oz}(t_0) = \frac{1}{3} m l^2 \omega_0$$

$$L_{Oz}^{\overline{OA}}(t_1) = J_{Oz}\,\omega_1 = \frac{1}{3} m l^2 \omega_1$$

$$L_{Oz}^{M}(t_0) = m l\, V_{A1} = m l \cdot l \omega_1 = m l^2 \omega_1$$

$$L_{Oz}(t_1) = \frac{4}{3} m l^2 \omega_1$$

$$\frac{1}{\cancel{3}} \cancel{m l^2} \omega_0 = \frac{4}{\cancel{3}} \cancel{m l^2} \omega_1 \Rightarrow \boxed{\omega_1 = \frac{\omega_0}{4}}$$

$$T_1 - T_0 = \sum_i A_i = 0$$

$$T_1 = T_0$$

$$T_0 = T_0^{\overline{OA}} + \underbrace{T_0^{M}}_{=0} = T_0^{\overline{OA}} = \frac{1}{2} J_{Oz} \omega_0^2 = \frac{1}{2}\,\frac{1}{3} m l^2 \omega_0^2 =$$

$$= \frac{1}{6} m l^2 \omega_0^2$$

$$T_1 = T_1^{\overline{OA}} + T_1^{M} = \frac{1}{2} J_{Oz} \omega_1^2 + \frac{1}{2} m V_{M1}^2 =$$

$$= \frac{1}{6} m l^2 \omega_1^2 + \frac{1}{2} m V_{M1}^2$$

$$\frac{1}{6} m l^2 \omega_0^2 = \frac{1}{6} m l^2 \omega_1^2 + \frac{1}{2} m V_{M1}^2$$

$$\frac{1}{\cancel{6}_3} \cancel{m} l^2 (\omega_0^2 - \omega_1^2) = \frac{1}{\cancel{2}} \cancel{m} V_{M1}^2$$

$$\frac{1}{3} l^2 \left(\omega_0^2 - \frac{\omega_0^2}{16}\right) = V_{M1}^2$$

$$V_{M1}^2 = \frac{1}{\cancel{3}} l^2 \frac{\overset{5}{\cancel{15}} \omega_0^2}{16} = \frac{5 l^2 \omega_0^2}{16}$$

$$\boxed{V_{M1} = l\omega_0 \frac{\sqrt{5}}{4}}$$

$\boxed{\text{УРАДИТИ 8.62!}}$

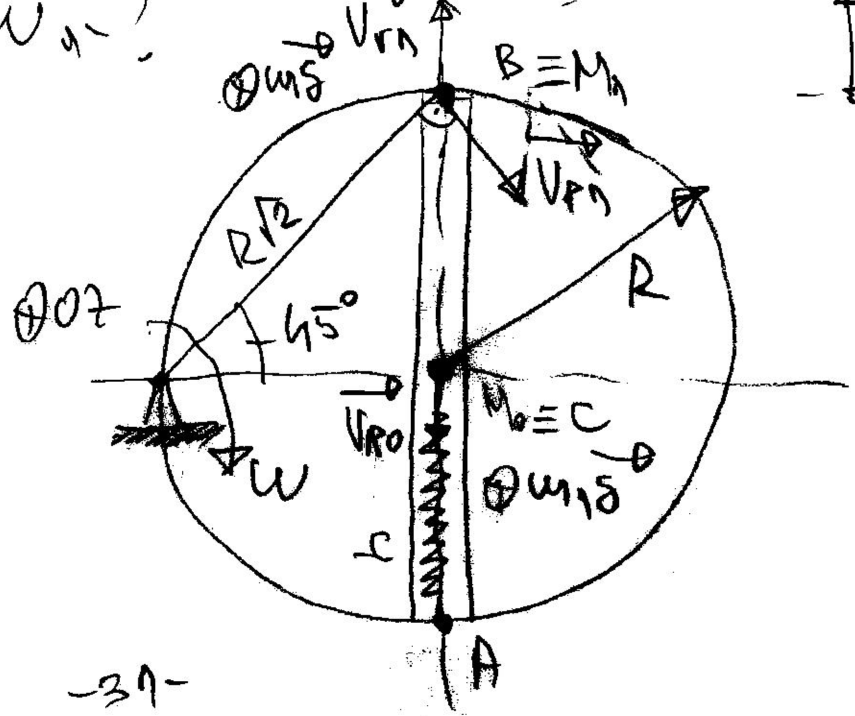
8.63

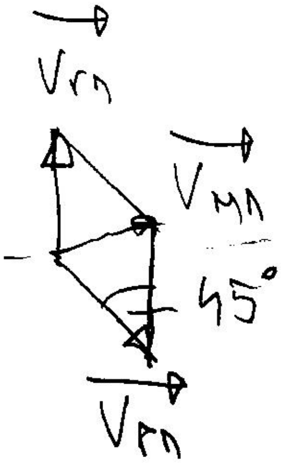
$d: m_1, R$

$M: m_1, c, l_0 = 2R$

$t_0 = 0: \omega_0 = 0, V_{V0} = 0$

$\omega_1 = ?$





$$\frac{dL_{Oz}}{dt} = \sum_i M_{Oz}(\vec{F}_i^e) = 0$$

$$L_{Oz} = const.$$

$$L_{Oz}(t_0) = L_{Oz}(t_1)$$

$$L_{Oz}(t_0) = L^{d}_{Oz}(t_0) + L^{M}_{Oz}(t_0) =$$

$$= J_{Oz}\omega_0 + m R V_{e0} =$$

$$= \left(\frac{1}{2} m_1 R^2 + m_1 R^2\right)\omega_0 + m R \cdot R\omega_0 =$$

$$= \left(\frac{3}{2} m_1 + m\right) R^2 \omega_0 = 0$$

$$L_{Oz}(t_1) = L^{d}_{Oz}(t_1) + L^{M}_{Oz}(t_1) =$$

$$= \frac{3}{2} m_1 R^2 \omega_1 - m R V_{r1} + m R\sqrt{2}\, V_{e1} =$$

$$= \frac{3}{2} m_1 R^2 \omega_1 - m R V_{r1} + m R\sqrt{2} \cdot R\sqrt{2}\,\omega_1 =$$

$$= R^2 \omega_1 \left(\frac{3}{2} m_1 + 2m\right) - m R V_{r1}$$

$$R^2 \omega_1 \left(\frac{3}{2} m_1 + 2m\right) - m R V_{r1} = 0$$

$$\boxed{V_{r1} = R\omega_1 \left(\frac{3}{2}\frac{m_1}{m} + 2\right)}$$

$$T_1 - \underbrace{T_0}_{=0} = \sum_i A_i = \frac{1}{2} c\left(\Delta l_0^2 - \Delta l_1^2\right) =$$

$$= \frac{1}{2} c\left[(R - 2R)^2 - \underbrace{(2R - 2R)^2}_{=0}\right] = \frac{1}{2} c R^2$$

$$T_1 = T_1^d + T_1^M = \quad \left| \vec{V}_{M1} = \vec{V}_{r1} + \vec{V}_{P1} \right|$$

$$= \frac{1}{2} J_{Oz} \omega_1^2 + \frac{1}{2} m V_{M1}^2 =$$

$$= \frac{1}{2}\frac{3}{2} m_1 R^2 \omega_1^2 + \frac{1}{2} m \left(V_{r1}^2 + V_{P1}^2 - 2 V_{r1} V_{P1} \cdot \cos 45^\circ\right)$$

$$= \frac{1}{6} m_1 R^2 \omega_1^2 + \frac{1}{2} m \left[R^2 \omega_1^2 \left(\frac{3}{2}\frac{m_1}{m} + 2\right)^2 + \right.$$

$$\left. + \left(R\sqrt{2}\omega_1\right)^2 - 2 R\omega_1 \left(\frac{3}{2}\frac{m_1}{m} + 2\right) R\sqrt{2}\omega_1 \cdot \frac{\sqrt{2}}{2}\right] = \ldots$$

$$= \frac{1}{8m} R^2 \omega_1^2 \left(8m^2 + 18 m m_1 + 9 m_1^2\right)$$

$$\frac{1}{8m} \cancel{R^2} \omega_1^2 \left(8m^2 + 18 m m_1 + 9 m_1^2\right) = \frac{1}{2} c \cancel{R^2}$$

$$\omega_1^2 = \frac{4mc}{\left(8m^2 + 18 m m_1 + 9 m_1^2\right)}$$

$$\omega_1 = 2\sqrt{\frac{mc}{8m^2 + 18 m m_1 + 9 m_1^2}}$$