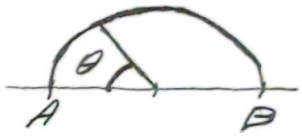
TP2

1.4) $m = 0,1\,kg \quad V_A = 25\,m/s$
$R = 4\,m$

a) $w = \frac{V}{R} = \frac{25}{4} = 6,25\ m/s$

b) $\alpha = \frac{dw}{dt} = \int_{t_0}^{t} \alpha\, dt = \int_{w_0}^{w(t)} dw$



$\Leftrightarrow \alpha(t - t_0) = w(t) - w_0$

- $w(t) = w_0 + \alpha t = 6,25 + \alpha t$
- $w(t) = \frac{d\theta}{dt} \Leftrightarrow \int_{t_0}^{t} w(t)\, dt = \int_{\theta_0}^{\theta(t)} d\theta \Leftrightarrow \int_{t_0}^{t} 6,25 + \alpha t = \theta(t) - \theta_0$

$\Leftrightarrow \theta(t) = \cancel{\theta_0}^{0} + 6,25t + \frac{\alpha}{2}t^2$

- $\theta(0,3) = \pi\ rad$

$\pi = 6,25(0,3) + \frac{\alpha}{2}(0,3)^2 \Leftrightarrow \alpha = 28,1\ rad/s^2$

- $\theta(t) = 6,25t + \frac{28,1}{2}t^2$

c) $F_c = m \times a_c$

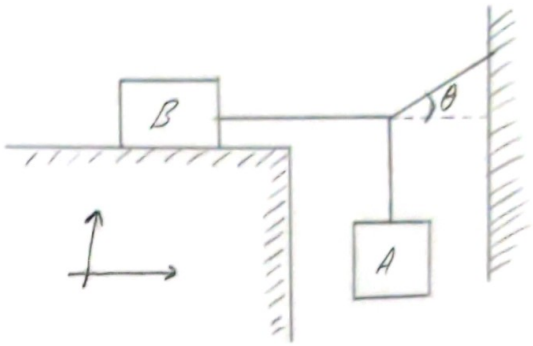
$a_c(0,3) = \frac{V_B^2}{R} = w_B^2 R$

$w(0,3) = 6,25 + 28,1(0,3) = 14,68\ rad/s$

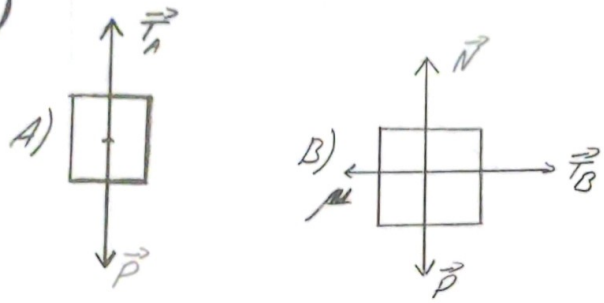
$F_c = (14,68)^2 \times 4 \times 0,1 = 86,2\ N$

2.1) m_A $\mu = 0,25$

m_B $\theta = 30°$



a)



b)

A) $\begin{cases} nn \mid \text{——} \\ yy \mid T_A - P_A = 0 \end{cases}$

B) $\begin{cases} nn \mid T_B - F_a = 0 \\ yy \mid N - P = 0 \end{cases}$

$T_A = T\,sen(\theta)$ e $T_B = T\cos(\theta)$

$$\begin{cases} T\cos(\theta) - \mu m_B g = 0 \\ T\,sen(\theta) - m_A g = 0 \end{cases} \Leftrightarrow \begin{cases} T\cos(\theta) = \mu m_B g \\ T\,sen(\theta) = m_A g \end{cases} \Leftrightarrow$$

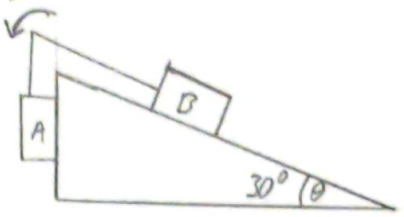
$$\Leftrightarrow \begin{cases} T\cos(\theta) = 0,25\, m_B g \\ T\,sen(\theta) = m_A g \end{cases}$$

$$tg(\theta) = \frac{m_A g}{m_B g\, 0,25} = \frac{m_A}{m_B\, 0,25}$$

$$\Leftrightarrow \frac{1}{\sqrt{3}} = \frac{m_A}{m_B 0,25} \Leftrightarrow \frac{0,25}{\sqrt{3}} = \frac{m_A}{m_B}$$

$$\Leftrightarrow \frac{m_A}{m_B} = 0,14$$

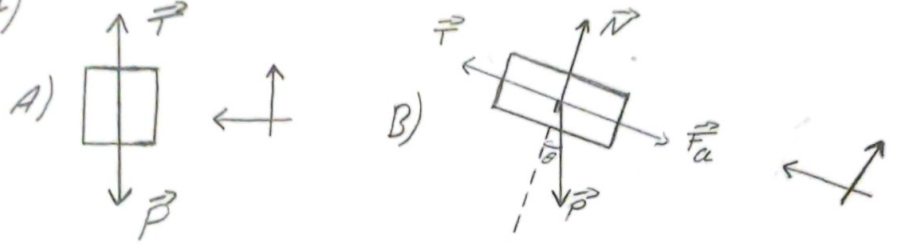
22)



$M_A = 2\ kg$

$M_B = 1\ kg$

a)



b)

A)

$$\begin{cases} nn \mid \text{——} \\ yy \mid T - P = -ma \end{cases}$$

B)

$$\begin{cases} xx \mid T - F_a - P\,sen(\theta) = ma \\ yy \mid N - P\cos(\theta) = 0 \end{cases}$$

c)

AB)

$$\begin{cases} T - \mu M_B g - M_B g\, sen(30) = M_B a \\ T - M_A g = -M_A a \end{cases} \Leftrightarrow$$

$$\Leftrightarrow \begin{cases} T - \left(M_B\left(\mu g + g\frac{1}{2}\right)\right) = M_B a \\ T = M_A(g-a) \end{cases} \Leftrightarrow \begin{cases} T = M_B\left(\mu g + g\frac{1}{2} + a\right) \\ T = M_A(g-a) \end{cases}$$

$$\Leftrightarrow \begin{cases} T = (\mu 9{,}8 + 4{,}9 + 3) \\ T = 2(9{,}8 - 3) \end{cases} \Leftrightarrow \begin{cases} 13{,}6 = \mu 9{,}8 + 7{,}9 \\ T = 13{,}6 \end{cases} \Leftrightarrow$$

$$\Leftrightarrow \begin{cases} 5.7 = \mu 9{,}8 \\ T = 13{,}6 \end{cases} \Leftrightarrow \begin{cases} \mu = 0{,}58 \\ T = 13{,}6 \end{cases}$$