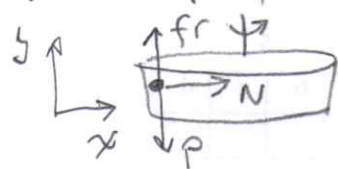


1) $R = 3\text{ m}$; $\mu_e = 0,43$; $\mu_d = 0,15$

a) De perfil:



Fuerza	Agente
N	cilindro
fr	cilindro
P	la tierra

b) $\sum F_x: N = m \frac{v^2}{R}$ (1)

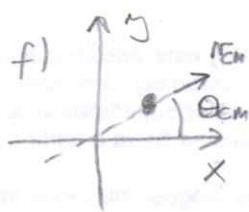
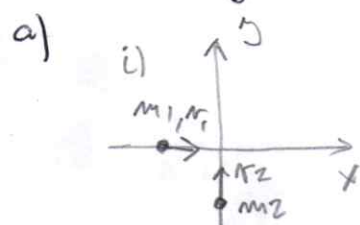
$\sum F_y: fr - P = 0 \Rightarrow fr = mg = \mu_e N \Rightarrow N = \frac{mg}{\mu_e}$ (2)

Reempl. (2) en (1): $\frac{mg}{\mu_e} = m \frac{v^2}{R} \Rightarrow v = \sqrt{\frac{gR}{\mu_e}} \Rightarrow \boxed{v \approx 8,27 \text{ m/s}}$

c) $\omega = v/R \Rightarrow \omega = \frac{1}{R} \sqrt{\frac{gR}{\mu_e}} = \sqrt{\frac{g}{R\mu_e}} \Rightarrow \boxed{\omega \approx 2,76 \text{ 1/s}}$

d) $a_c = \frac{v^2}{R} = \frac{g}{\mu_e} \Rightarrow \boxed{a_c = 22,79 \text{ m/s}^2}$

2) $m_1 = 70 \text{ kg}$; $v_1 = 5 \text{ m/s}$; $m_2 = 78 \text{ kg}$; $v_2 = 4 \text{ m/s}$



$\sum \vec{F}_{ext} = 0 \Rightarrow \Delta \vec{p} = 0 \Rightarrow \vec{p}_i = \vec{p}_f$

x) $p_{xi} = p_{xf} \Rightarrow m_1 v_{1x} + m_2 v_{2x} = (m_1 + m_2) v_{cmx}$
 $m_1 v_1 + 0 = (m_1 + m_2) v_{cmx}$

$\Rightarrow v_{cmx} = \frac{m_1}{m_1 + m_2} \cdot v_1 \approx 2,36 \text{ m/s}$

y) $p_{yi} = p_{yf} \Rightarrow m_1 v_{1y} + m_2 v_{2y} = (m_1 + m_2) v_{cmy}$

$0 + m_2 v_2 = (m_1 + m_2) v_{cmy} \Rightarrow v_{cmy} = \frac{m_2}{m_1 + m_2} \cdot v_2 \approx 2,11 \text{ m/s}$

$|v_{cm}| = \sqrt{v_{cmx}^2 + v_{cmy}^2} = \frac{\sqrt{m_1^2 v_1^2 + m_2^2 v_2^2}}{m_1 + m_2} \approx 3,168 \text{ m/s}$

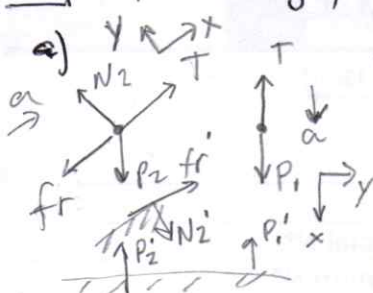
$\theta_{cm} = \arctg\left(\frac{v_{cmy}}{v_{cmx}}\right) = \arctg\left(\frac{m_2 v_2}{m_1 v_1}\right) \approx 41,715^\circ$

b) $v_{cmf} = v_{cmi}$

c) $W_T = \Delta E_c$

d) $E_{ci} = \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2 = 1499 \text{ J}$; $E_{cf} = \frac{1}{2} (m_1 + m_2) v_{cm}^2 = \frac{1}{2} \frac{m_1^2 v_1^2 + m_2^2 v_2^2}{m_1 + m_2} \approx 742,7 \text{ J}$

3) $m_1 = 100 \text{ kg}$; $m_2 = 50 \text{ kg}$; $\theta = 37^\circ$; $\mu_e = 0,7$; $\mu_d = 0,3$



b) B1: $\sum F_x: m_1 g - T = m_1 a$

B2: $\sum F_x: T - fr - m_2 g \sin \theta = m_2 a$

$\sum F_y: N_2 - m_2 g \cos \theta = 0$

$a = \frac{m_1 - m_2 (\mu_d \cos \theta + \sin \theta)}{m_1 + m_2} \cdot g$

$a \approx 3,78 \text{ m/s}^2$

$T = m_1 (g - a) \approx 601,52 \text{ N}$

c) $fr = -\mu_d N = -\mu_d m_2 g \cos \theta \approx -117,4 \text{ N}$

d) $m_1 g = m_1 a \Rightarrow a = g = 9,8 \text{ m/s}^2$