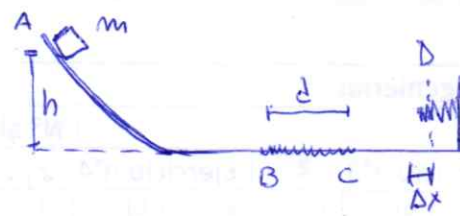


3)  $m = 10 \text{ kg}$   
 $\Delta x = 0,3 \text{ m}$   
 $k = 2250 \text{ N/m}$   
 $d = 6 \text{ m}$   
 $h = 3 \text{ m}$



a)  $W_{fnc} = \Delta E_m$

$F_{za}$  conservativa  $\rightarrow E_p$  associada

b)  $\mu_d$ ?

TTEM e/A  $\rightarrow$  D:  $-f_r \cdot d = \frac{1}{2} k \Delta x^2 - mgh \Rightarrow \mu_d m g d = \frac{1}{2} k \Delta x^2 - mgh$

$\Rightarrow \mu_d = \frac{mgh - \frac{1}{2} k \Delta x^2}{m g d} = \frac{h}{d} - \frac{k \Delta x^2}{2 m g d} \Rightarrow \boxed{\mu_d \approx 0,328}$

c) TTEM e/A  $\rightarrow$  B:  $0 = \frac{1}{2} m v_B^2 - mgh \Rightarrow v_B = \sqrt{2gh} \Rightarrow \boxed{v_B \approx 7,67 \text{ m/s}}$

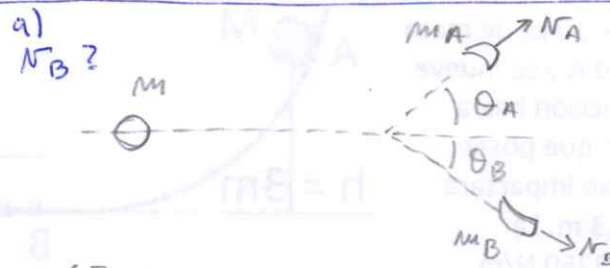
TTEM e/A  $\rightarrow$  C:  $-\mu_d m g d = \frac{1}{2} m v_C^2 - mgh$

$\frac{1}{2} k \Delta x^2 - mgh = \frac{1}{2} m v_C^2 - mgh \Rightarrow \frac{1}{2} k \Delta x^2 = \frac{1}{2} m v_C^2$

$\Rightarrow v_C = \sqrt{\frac{k}{m} \cdot \Delta x} \Rightarrow \boxed{v_C = 4,5 \text{ m/s}}$

4)

$m = 1 \text{ kg}$   
 $v_i = 2 \text{ m/s}$   
 $m_A = 0,4 \text{ kg}$   
 $v_A = 1 \text{ m/s}$   
 $\theta_A = 53^\circ$



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

$p_{xi} = p_{xf} \Rightarrow m v_i = m_A v_A \cos \theta_A + m_B v_{Bx} \quad (1)$

$p_{yi} = p_{yf} \Rightarrow 0 = m_A v_A \sin \theta_A + m_B v_{By} \quad (2)$

de (1):  $v_{Bx} = \frac{m v_i - m_A v_A \cos \theta_A}{m_B} \approx 2,93 \text{ m/s}$

de (2):  $v_{By} = \frac{-m_A v_A \sin \theta_A}{m_B} \approx -0,53 \text{ m/s}$

$\vec{v}_B = \langle 2,93; -0,53 \rangle \text{ (m/s)}$

b)  $\vec{I}_{BA} = \langle I_{BAx}; I_{BAy} \rangle$

$I_{BAx} = \Delta p_{Ax} = p_{Ax} - p_{Ax} = m_A v_A \cos \theta_A - m_A v_{ix} = m_A (v_A \cos \theta_A - v_i) \approx -0,56 \text{ kg m/s}$

$I_{BAy} = m_A v_A \sin \theta_A - m_A v_{iy} = m_A v_A \sin \theta_A \approx 0,32 \text{ kg m/s}$

$\Rightarrow \vec{I}_{BA} = \langle -0,56; 0,32 \rangle \text{ (kg m/s)}$

c)  $E_{mi} = \frac{1}{2} m v_i^2 = 2 \text{ J}$

$E_{mf} = \frac{1}{2} m_A |v_A|^2 + \frac{1}{2} m_B |v_B|^2 \approx 2,86 \text{ J}$

$E_{mf} > E_{mi}$