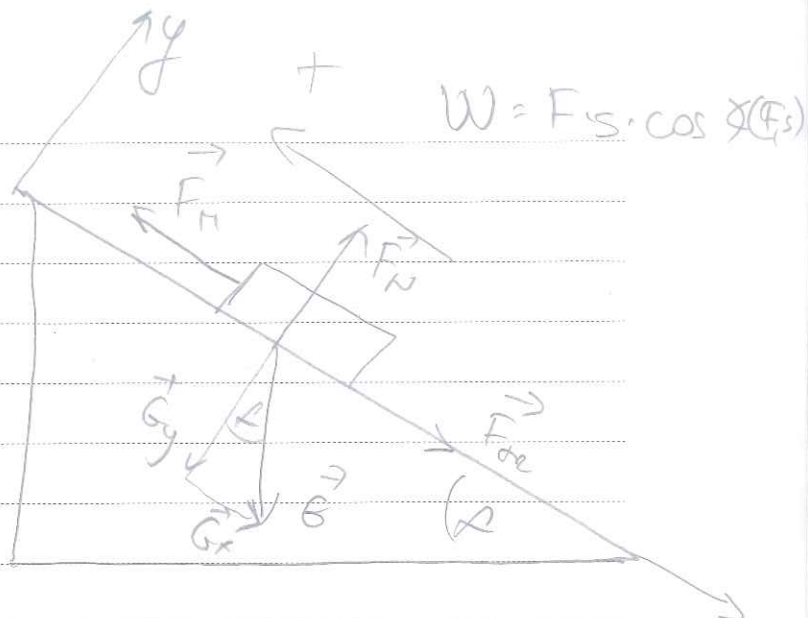


1.) $m_A = 1200 \text{ kg}$
 $\alpha = 5^\circ$
 $s = 290 \text{ m}$
 $F_{tr} = 524 \text{ N}$
 $W_{\text{uk}} = +150 \text{ kJ}$
 $F_H = ?$



$$W_{\text{uk}} = W_H + W_{F_{tr}} + W_{G_x} + W_{F_N} \rightarrow \text{duž } x\text{-osi}$$

$$W_{\text{uk}} = F_H \cdot s \cdot \cos 0^\circ + F_{tr} \cdot s \cdot \cos 180^\circ + G_x \cdot s \cdot \cos 180^\circ + F_N \cdot s \cdot \cos 90^\circ$$

$\hookrightarrow G_x = G \cdot \sin \alpha$

$$150000 = F_H \cdot 290 - 524 \cdot 290 - (1200 \cdot 9.81 \cdot \sin 5^\circ) \cdot 290$$

$$F_H = \frac{150000 + 524 \cdot 290 + 1200 \cdot 9.81 \cdot 290 \cdot \sin 5^\circ}{290}$$

$$F_H = \underline{\underline{2,07 \cdot 10^3 \text{ N}}}$$

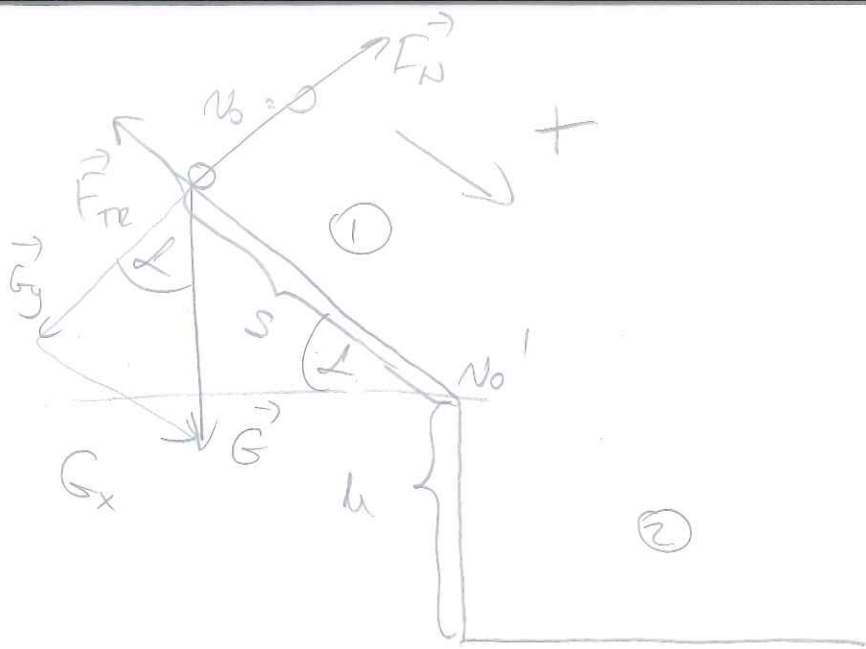


2.1 $\alpha = 25,0^\circ$

$\mu = 0,200$

$s = 10,4 \text{ m}$

$h = 3,50 \text{ m}$



(2) $v_0' = ?$

(1) ZOE:

$$W_{\text{tot}} = \Delta E_k$$

$$G_x \cdot s \cdot \cos 0^\circ + F_{\text{re}} \cdot s \cdot \cos 180^\circ + F_N \cdot s \cdot \cos 90^\circ = \Delta E_k$$

$$\mu mg \sin 25^\circ - \mu \mu mg \cos 25^\circ \cdot s = \frac{1}{2} \mu v_0'^2 - \frac{1}{2} \mu v_0^2 / 2$$

$$2gs (\sin 25^\circ - \mu \cos 25^\circ) = v_0'^2 - v_0^2$$

$$v_0'^2 = \cancel{v_0^2} + 2gs (\sin 25^\circ - \mu \cos 25^\circ) / \cancel{v}$$

$$v_0' = \sqrt{2 \cdot 9.81 \cdot 10,4 \cdot [\sin 25^\circ - 0,200 \cdot \cos 25^\circ]}$$

$$v_0' = \underline{\underline{7,01 \text{ m/s}}}$$

3.) $m_{\text{ut}} = 136 \text{ kg}$

$v_0 = 0 \text{ m/s}$

$h = 16 \text{ m}$

~~$v_c = 5,0 \text{ m/s}$~~

$v_c = 5,0 \text{ m/s}$

$W_{pj} = ?$

$W_{pj} = W_c$

$W_{pj} = \Delta E_{kc} + \Delta E_{pc}$

$W_{pj} = \left(\frac{1}{2} m v_c^2 - \frac{1}{2} m v_0^2 \right) + (mgh - m g \cdot 0)$

(B)

$W_{pj} = \frac{1}{2} m v_c^2 + mgh$

$= \frac{1}{2} \cdot 136 \cdot 5^2 + 136 \cdot 9,81 \cdot 16$

$W_{pj} = 2,3 \cdot 10^4 \text{ J}$

4.) $v_0 = 13,0 \text{ m/s}$

$h_z = 5,20 \text{ m}$

$E_{\text{voda}} = E_{\text{točka pustišta}}$

$v_{T.P.} = ?$

$E_{kv} + E_{gp_v} = E_{k_{TP}} + E_{g_{TP}}$

$\frac{1}{2} m v_v^2 + m g h_v = \frac{1}{2} m v_{T.P.}^2 + m g h_{T.P.} / : 2$

(u)

$v_v^2 + 2g \cdot h_v = v_{TP}^2 + 2g h_{TP}$

$v_{TP}^2 = 13^2 + 2 \cdot 9,81 \cdot 0 - 2 \cdot 9,81 \cdot 5,20$

$v_{TP} = 8,2 \text{ m/s}$

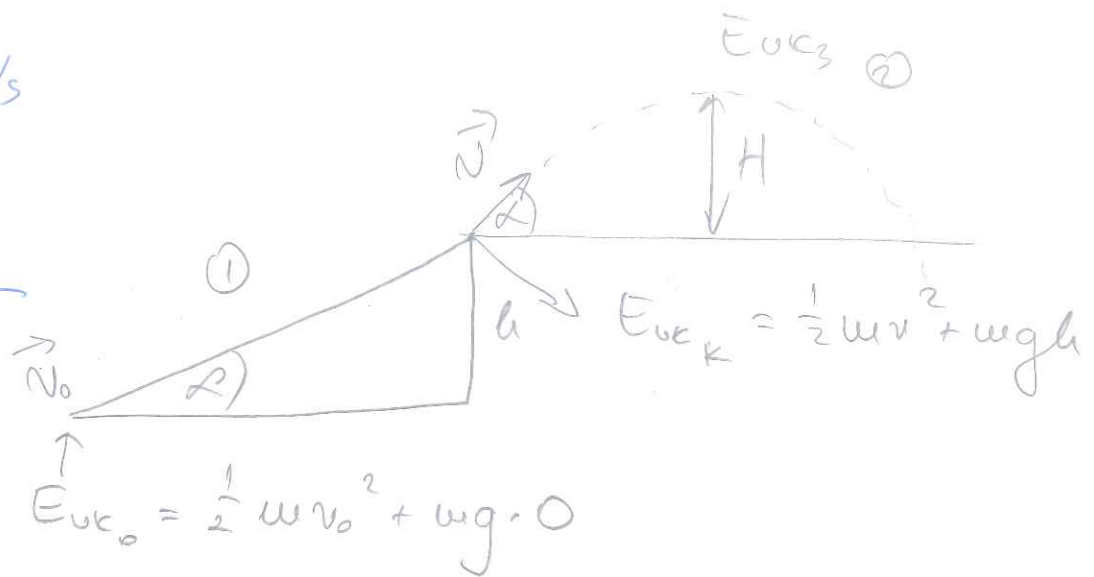


S. $v_0 = 5,4 \text{ m/s}$

$\angle = 48^\circ$

$h = 0,40 \text{ m}$

$H = ?$



①

$E_{mec0} = E_{mec2}$

$\frac{1}{2} m v_0^2 = \frac{1}{2} m v^2 + m g h \quad | : \cdot 2$

$v_0^2 - 2gh = v^2 \quad | \sqrt{\quad}$

$v = \sqrt{(5,4)^2 - 2 \cdot 9,81 \cdot 0,4} = \underline{\underline{4,6 \text{ m/s}}}$

②

② KOSI HITAC: $\angle = 48^\circ$

$v = 4,6 \text{ m/s}$

$H = \frac{v^2 \sin^2 \angle}{2g} = 0,5956 \text{ m} \approx \underline{\underline{0,60 \text{ m}}}$

ili zOE:

$E_{mec} = E_{mec3}$

$\frac{1}{2} m v^2 + m g h = \frac{1}{2} m \cdot v_x^2 + m g (h + H)$

$v_x = v \cdot \cos \angle$

$H = \frac{v^2 - v_x^2}{2g} = 0,60 \text{ m}$



6.) $m_H = 810 \text{ kg}$
 $v_0 = 0 \text{ m/s}$
 $v = 7.0 \text{ m/s}$
 $t = 3.5 \text{ s}$
 $h = 8.2 \text{ m}$

$v = 7.0 \text{ m/s}$
 $h = 8.2 \text{ m}$

$\bar{P} = ?$

$P = \frac{W}{t}$

$W_{\text{mek}} = \Delta E_c + \Delta E_{\text{gp}}$

$W_{\text{mek}} = \left(\frac{1}{2} m v^2 - \frac{1}{2} m v_0^2 \right) + (m g h - m g \cdot 0)$

$\bar{P} = \frac{\frac{1}{2} \cdot 810 \cdot 7^2 + 810 \cdot 9.81 \cdot 8.2}{3.5}$

$\bar{P} = \underline{\underline{2.4 \cdot 10^4 \text{ W}}}$

7.) $t = 2 \text{ min} = 120 \text{ s}$
 $h = 140 \text{ m}$

$m_1 = 65 \text{ kg}$

$\bar{P} = ?$

$\bar{P} = \frac{W}{t} = \frac{F_D \cdot s}{t}$

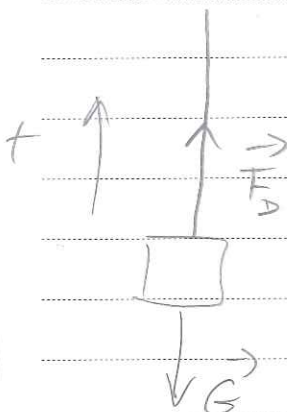
$\sum F_{\text{mek}} = 0$ (stalica bezna)

$F_D - G_{\text{mek}} = 0$

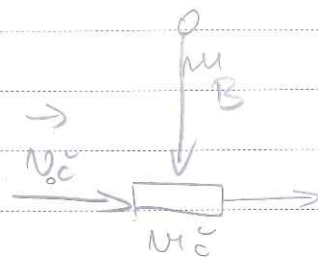
$F_D = G_{\text{mek}} = 4 \cdot G = 4 \cdot m_1 \cdot g$

$\bar{P} = \frac{4 \cdot m_1 \cdot g \cdot h}{t} = \frac{4 \cdot 65 \cdot 9.81 \cdot 140}{120}$

$\bar{P} = 3 \text{ kW}$



11.) $m_B = 91 \text{ kg}$
 $m_C = 510 \text{ kg}$
 $v_C = +11 \text{ m/s}$
 $v_C' = ?$



neelastičan
sudar

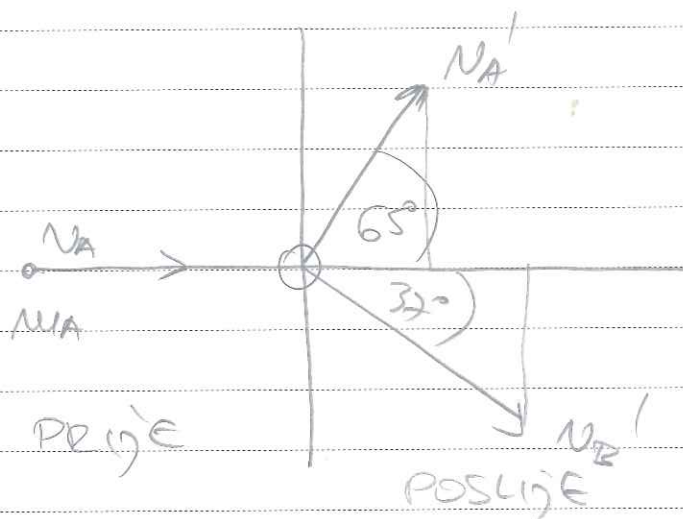
$$m_C \cdot v_C + m_B \cdot v_B = m_C \cdot v_C' + m_B \cdot v_B'$$

8

$$510 \cdot 11 + 0 = 510 \cdot v_C' + 91 \cdot v_B'$$

$$v_C' = \frac{510 \cdot 11}{510 + 91} = \underline{\underline{9,3 \text{ m/s}}}$$

12.) $m_A = 0,025 \text{ kg}$
 $v_A = 5,5 \text{ m/s}$
 $v_B = 0,0 \text{ m/s}$
 $m_B = 0,050 \text{ kg}$
 $\alpha = 65^\circ$
 $\beta = 37^\circ$



PRIJE

POSLIJE

X-OS : $v_A m_A + 0 \cdot m_B = m_A v_A' \cos 65^\circ + m_B v_B' \cos 37^\circ$

y-OS : $0 = m_A v_A' \sin 65^\circ - m_B v_B' \sin 37^\circ$

$$v_B' = \frac{m_A v_A' \sin 65^\circ}{m_B \sin 37^\circ}$$

$\Rightarrow v_A' = \underline{\underline{3,4 \text{ m/s}}}$

$v_B' = \underline{\underline{2,6 \text{ m/s}}}$



10.) $m_A = 120 \text{ kg}$
 $h_A = 0,65 \text{ m}$
 $m_E = 78 \text{ kg}$



$E_{gpe} = E_{k_e}$

20KG: $0 = m_A v_A - m_E \cdot v_E$

20E: $E_{gpe} = E_{k_e}$

$gh_A = \frac{1}{2} v_A^2$

$v_A = \sqrt{2gh_A}$

$v_A = 3,54 \text{ m/s}$

$gh_E = \frac{1}{2} v_E^2$

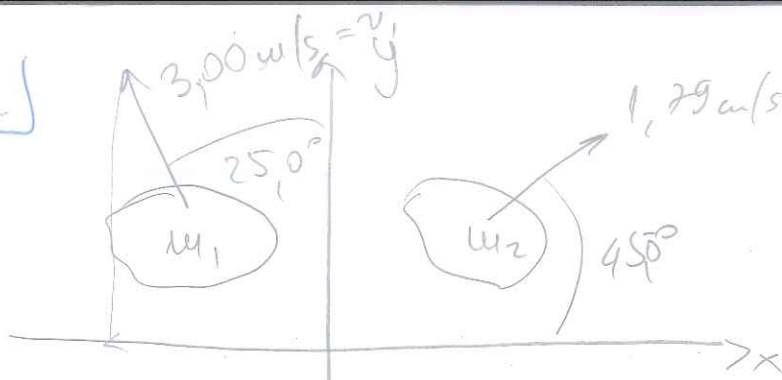
$m_E \cdot v_E = m_A \cdot v_A$

$v_E = \frac{m_A \cdot v_A}{m_E} = \frac{120 \cdot 3,54}{78} = 5,45 \text{ m/s}$

$gh_E = \frac{1}{2} v_E^2$

$h_E = \frac{v_E^2}{2g} = 1,5 \text{ m}$

9.]


 $1.79 \text{ m/s} = v_2$ 20KG : $\vec{P} \uparrow \hat{e}$

$$\begin{array}{l} x\text{-os} \quad \Sigma = 0 \\ y\text{-os} \quad \Sigma = 0 \end{array}$$

$$m_3 \quad 1.30 \text{ kg} \\ \downarrow 3.07 \text{ m/s} = v_3$$

$$x\text{-os} : -m_1 v_1 \sin 25.0^\circ + m_2 v_2 \cos 45^\circ = 0$$

$$y\text{-os} : m_1 v_1 \cos 25^\circ + m_2 v_2 \sin 45^\circ - m_3 v_3 = 0$$

$$(\sin 45^\circ = \cos 45^\circ)$$

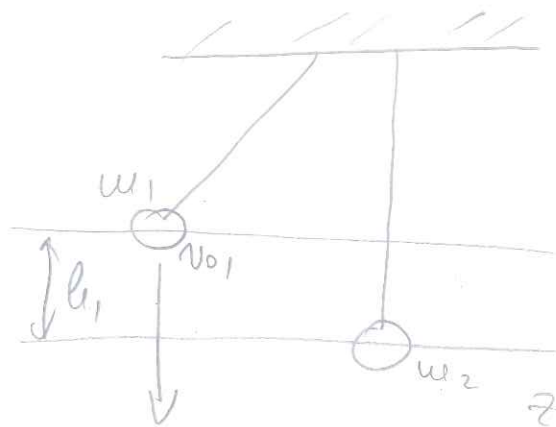
$$-m_1 \cdot 1.27 + m_2 \cdot 1.27 = 0 \Rightarrow m_1 = m_2$$

$$m_1 \cdot 2.72 + m_2 \cdot 1.27 - 3.991 = 0$$

$$m_2 = 1 \text{ kg} \Rightarrow m_1 = 1 \text{ kg}$$

✱

13.) $l_1 = 0,300 \text{ m}$
 $v_{01} = 5,00 \text{ m/s}$
 $m_1 = 1,50 \text{ kg}$
 $v_{02} = 0,00 \text{ m/s}$
 $m_2 = 4,60 \text{ kg}$



a) $v_{01}' = ?$

b) $v_1, v_2 = ?$

c) $h_1', h_2' = ?$

a)

$$2 \cdot \frac{1}{2} m_1 v_{01}^2 + m_1 g l_1 = \frac{1}{2} m_1 v_{01}'^2 + m_1 g l_2$$

$$v_{01}' = \sqrt{v_{01}^2 + 2 g l_1} = \underline{5,56 \text{ m/s}}$$

b) ZOE: $m_1 v_{01}' + m_2 \cdot 0 = m_1 v_1 + m_2 v_2$ (*)

ZOE: $\frac{1}{2} m_1 v_{01}'^2 + \frac{1}{2} m_2 \cdot 0^2 = \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2$

(2) $m_1 v_{01}'^2 = m_1 v_1^2 + m_2 v_2^2$

(1) $1,5 \cdot 5,56 = 1,5 v_1 + 4,6 v_2$

$8,34 = 1,5 v_1 + 4,6 v_2 \Rightarrow$

(2) $1,5 \cdot 5,56^2 = 1,5 v_1^2 + 4,6 v_2^2$

$46,37 = 1,5 v_1^2 + 4,6 v_2^2$

$46,37 = 1,5 \left(\frac{8,34 - 4,6 v_2}{1,5} \right)^2 - 4,6 v_2^2$

$v_1 = \underline{-2,83 \text{ m/s}}$

$v_2 = \underline{+2,73 \text{ m/s}}$

c) ZOE: $\frac{1}{2} m_1 v_1^2 + m_1 g \cdot 0 = \frac{1}{2} m_1 \cdot 0^2 + m_1 g \cdot h_1'$

$h_1' = \frac{v_1^2}{2g}$

$h_1' = \frac{v_1^2}{2g} = \underline{0,409 \text{ m}}$

$h_2' = \frac{v_2^2}{2g} = \underline{0,380 \text{ m}}$