

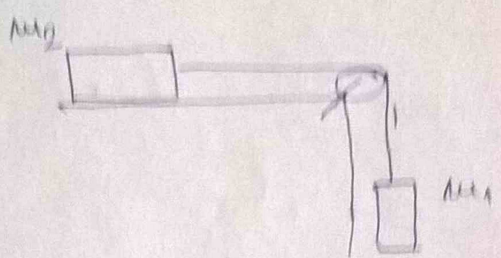
# Učenta

# Priloga I

1. Na tijelo mase  $m$  djeluje sile kao na slici. Odrediti pravac i smjer kretanja tijela kao i ubrzanje tijela?



2. Tijela mase  $m_1 = 4\text{kg}$  i  $m_2 = 2\text{kg}$  teže su jedno drugom i nalaze se na neravnoj površini. Koeficijent trenja između tijela i podloge 0,05? Koliko će ubrzanje tijela biti?



3. Tijelo oblika lotke poluprecnika  $\frac{2}{3}\text{m}$  potopjeno je u vodu gustine  $1000 \frac{\text{kg}}{\text{m}^3}$ . Kolika se masa tijela ako se kreće naviše sa ubrzanjem  $1 \frac{\text{m}}{\text{s}^2}$ . Smatrati da se tijelo otislo nalazi potopljeno u vodu i da se  $V_t = \frac{4}{3} r^3 \pi$ .

4. Kamen bačen sa mosta u horizontalnom pravcu bio je točice 4s na rastojanju 50m, od podnožja mosta. Sa koje je visine bačen kamen, kolikom brzinom i gdje se nalazio kamen posle 2s od bacanja (x, y)?

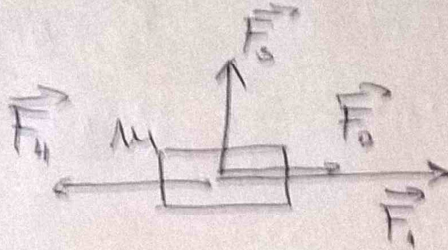
# I 4 BILTA I

11

1.  $m = 10 \text{ kg}$   
 $F_1 = 5 \text{ N}$   
 $F_2 = 3 \text{ N}$   
 $F_3 = 3 \text{ N}$   
 $F_4 = 4 \text{ N}$   


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 $a = ?$



## II Njutuar zaton

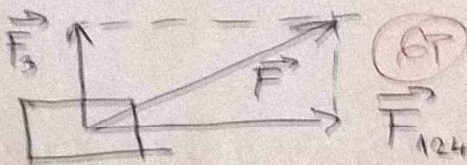
$$\vec{F} = m\vec{a} \Rightarrow F = ma \quad (1P)$$

$\vec{F} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \vec{F}_4$  (2P) SABIRAMO  $\vec{F}$  xolineare vektore

$$\vec{F}_{124} = \vec{F}_1 + \vec{F}_2 + \vec{F}_4 \quad (1P)$$

$$F_{124} = F_1 + F_2 - F_4 \quad (4P) \Rightarrow F_{124} = 4 \text{ N}$$

PRAVAC  $\vec{F}_{124}$  se isti, x smjer vektora  $\vec{F}_1, \vec{F}_2$



$$F^2 = F_3^2 + F_{124}^2$$

$$F^2 = 25 \text{ N}^2 \Rightarrow F = \sqrt{25 \text{ N}^2}$$

$$F = 5 \text{ N} \quad (6P)$$

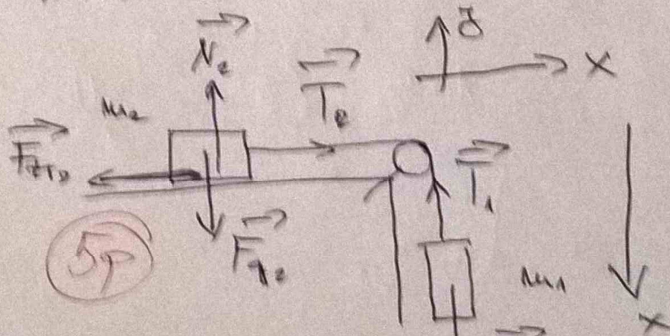
$$a = \frac{F}{m} \Rightarrow a = \frac{5 \text{ N}}{10 \text{ kg}} = \frac{5 \text{ kg} \frac{\text{m}}{\text{s}^2}}{10 \text{ kg}} \Rightarrow a = 0.5 \frac{\text{m}}{\text{s}^2}$$

Vektori  $\vec{F}$  i  $\vec{a}$  imaju isti pravac i smjer.

2.  $m_1 = 4 \text{ kg}$   
 $m_2 = 2 \text{ kg}$   
 $\mu = 0.05$   


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 $a = ?$



$T_1 = T_2 = T$  (LAKI dotur, neisteghira  $\mu$  x) SAVONACIJE LAKO  
 $a_1 = a_2 = a$  (neisteghira  $\mu$  x) (4P)

$$\vec{F} = m\vec{a}$$

1. Tijelo

$$\vec{F}_{g1} + \vec{T}_1 = m_1 \vec{a}_1 \quad (3P) \quad ; \quad F_{g1} = m_1 g$$

$$x: F_{g1} - T_1 = m_1 a_1 \Rightarrow \boxed{m_1 g - T = m_1 a} \quad (1) \quad (2P)$$

2. Tijelo

$$\vec{F}_{g2} + \vec{N}_2 + \vec{F}_{tr2} + \vec{T}_2 = m_2 \vec{a}_2 \quad (3P)$$

\* tijelo se x može <sup>smo</sup> y duž x ose pa se  $\vec{a}_x = \vec{a}$  ;  $\vec{a}_y = \vec{0}$

$$x: \vec{F}_{tr2} + \vec{T}_2 = m_2 \vec{a}_{2x} = m_2 \vec{a}_2 \quad ; \quad F_{tr} = \mu \cdot N \quad (2P)$$

$$T_2 - F_{tr2} = m_2 a_2 \Rightarrow \boxed{T - \mu N_2 = m_2 a} \quad (2) \quad (2P)$$

$$y: \vec{F}_{g2} + \vec{N}_2 = m_2 \vec{a}_y = \vec{0} \quad ; \quad F_{g2} = m_2 g$$

$$F_{g2} - N_2 = 0 \Rightarrow \boxed{N_2 = m_2 g} \quad (2P)$$

$$\boxed{T - \mu m_2 g = m_2 a} \quad (2)$$

$$iz \quad (1) + (2) \Rightarrow m_1 g - \mu m_2 g = m_1 a + m_2 a$$

$$g(m_1 - \mu m_2) = a(m_1 + m_2)$$

$$a = \frac{g(m_1 - \mu m_2)}{m_1 + m_2} \quad (7P)$$

$$a = \frac{10 \frac{m}{s^2} \cdot (4kg - 0,1kg)}{6kg} = \frac{10 \frac{m}{s^2} \cdot 3,9kg}{6kg}$$

$$a = 6,5 \frac{m}{s^2}$$

3.

2''

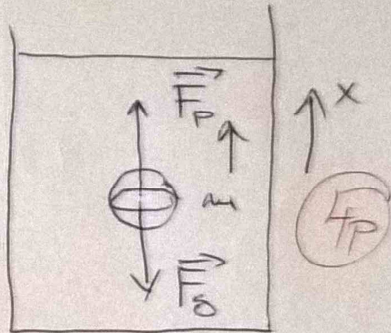
$$r = \frac{2}{\sqrt{\pi}} \text{ m } \quad \text{ii} \quad r = 2 \text{ m}$$

$$\rho_f = 1000 \frac{\text{kg}}{\text{m}^3}$$

$$a = 1 \frac{\text{m}}{\text{s}^2}$$

$$V_t = \frac{4}{3} r^3 \pi$$

$$m = ?$$



$$\vec{F} = m\vec{a}$$

$$\vec{F}_p + \vec{F}_g = m\vec{a} \quad (2P)$$

$$F_p - F_g = ma \quad (4P)$$

$$\rho_f V_t \cdot g - mg = ma$$

$$\rho_f V_t \cdot g = ma + mg = m(a+g)$$

$$\rho_f V_t \cdot g = m(a+g)$$

$$m = \frac{\rho_f \cdot V_t \cdot g}{a+g} \quad (6P)$$

$$m = \frac{1000 \frac{\text{kg}}{\text{m}^3} \cdot \frac{32}{3} \text{ m}^3 \cdot 10 \frac{\text{m}}{\text{s}^2}}{11 \frac{\text{m}}{\text{s}^2}}$$

$$m = 9697 \text{ kg} \quad r = \frac{2 \text{ m}}{\sqrt{\pi}} \text{ ii} \quad \text{SA } r = 2 \text{ m}$$

$$m_2 = 30450 \text{ kg} \quad r = 2 \text{ m}$$

(5P)

$$F_p = \rho_f \cdot V_t \cdot g ; \quad F_g = mg$$

$$V_t = \frac{4}{3} \left( \frac{2 \text{ m}}{\sqrt{\pi}} \right)^3 \pi =$$

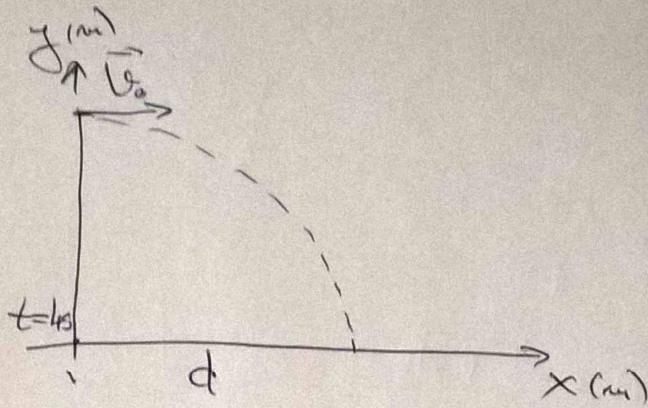
$$= \frac{4}{3} \cdot \frac{(2)^3}{(\sqrt{\pi})^3} \pi =$$

$$= \frac{4}{3} \cdot \frac{8 \text{ m}^3}{\pi} \cdot \pi = \frac{32}{3} \text{ m}^3$$

$$\text{ii } V_t = \frac{32}{3} \pi \text{ m}^3$$

$$F_p \quad \leftarrow \quad (4P)?$$

4.  $t_{\max} = 4s$   
 $d = 50m$   
 $h = ?$   
 $v_0 = ?$



a)

$$v_0 = v_{0x} = \frac{x}{t} = \frac{d}{t_{\max}} \quad 2p$$

$$v_0 = \frac{50m}{4s} = 12,5 \frac{m}{s}$$

$$v_0 = 12,5 \frac{m}{s} \quad 3p$$

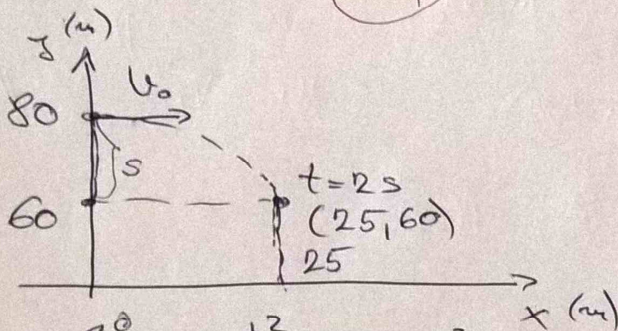
$$h = v_{0y} t_{\max} + \frac{g t_{\max}^2}{2} \quad \text{for } v_{0y} = 0$$

$$h = \frac{10 \frac{m}{s^2} \cdot (4s)^2}{2} = \frac{10 \frac{m}{s^2} \cdot 16s^2}{2}$$

$$h = 80m \quad 2p$$

10p

b)



$$s = v_{0y} t + \frac{g t^2}{2} = \frac{g t^2}{2} \quad 3p$$

$$s = \frac{10 \frac{m}{s^2} \cdot (2s)^2}{2} = \frac{10 \frac{m}{s^2} \cdot 4s^2}{2}$$

$$s = 20m$$

$$y = h - s$$

$$y = 60m \quad 2p$$

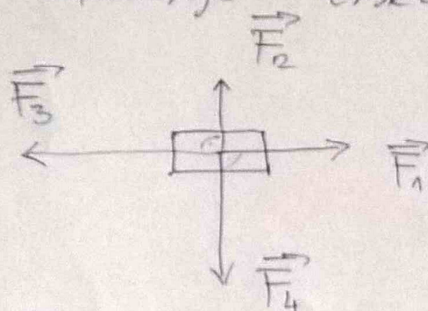
10p

$$v_0 = \frac{x}{t} \Rightarrow x = v_0 t \quad 3p$$

$$x = 12,5 \frac{m}{s} \cdot 2s = 25m$$

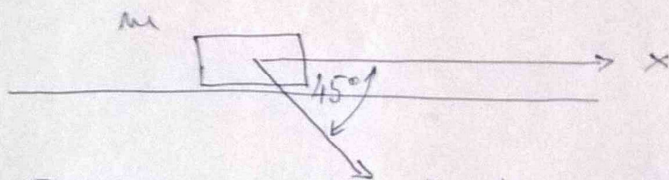
$$x = 25m \quad 2p$$

1. NA TIJELO MASE  $10\text{ kg}$  djeluju sile kao na slici. Odrediti PRAVAC i SMJER KRETANJA tijela kao i ubrzanje tijela?



$$\begin{aligned} F_1 &= 4\text{ N} \\ F_2 &= 2\text{ N} \\ F_3 &= 5\text{ N} \\ F_4 &= 5\text{ N} \end{aligned}$$

2. NA TIJELO MASE  $2\text{ kg}$  koje miruje na glatkoj horizontalnoj podlozi počine da djeluje sila od  $10\text{ N}$  kao na slici. Kako će kretanje tijela? Naći ubrzanje tijela? Koliki će put preći tijelo za  $5\text{ s}$  od početka kretanja? Kolika će težina tijela?

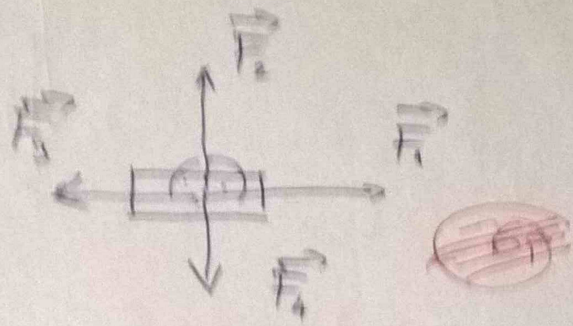


3. Tijelo mase  $500\text{ kg}$  kreće se po horizontalnoj ravni ravnomjerno pravolinijski. Na tijelo djeluje u pravcu kretanja vučna sila od  $50\text{ N}$ . Naći koeficijent trenja tijela i podloge.

4. Sa mosta visokog  $10\text{ m}$  bačen će kamen u horizontalnom pravcu brzinom  $40\frac{\text{m}}{\text{s}}$ . Posle koliko vremena će pasti u vodu? Kolika će brzina tijela pri udaru u vodu?

9.

- $m = 10 \text{ kg}$
- $F_1 = 4 \text{ N}$
- $F_2 = 2 \text{ N}$
- $F_3 = 5 \text{ N}$
- $F_4 = 5 \text{ N}$



$a = ?$

$\vec{F} = m\vec{a}$ ;  $F = ma$  (4P) istia pravaca

$\vec{F} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \vec{F}_4 = (\vec{F}_1 + \vec{F}_3) + (\vec{F}_2 + \vec{F}_4)$  (2P)

$\vec{F}_{13} = \vec{F}_1 + \vec{F}_3$  (1P) pravac  $\vec{F}_{13}$  je isti kao  $\vec{F}_1, \vec{F}_3$

$F_{13} = F_3 - F_1$  a smjer isti kao  $\vec{F}_3$

$F_{13} = 1 \text{ N}$  (2P)

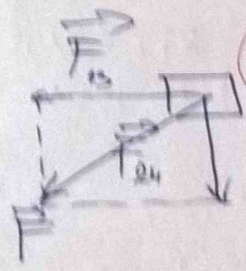
$\vec{F}_{24} = \vec{F}_2 + \vec{F}_4$

$F_{24} = F_4 - F_2$

$F_{24} = 3 \text{ N}$  (2P)

pravac  $\vec{F}_{24}$  je isti kao  $\vec{F}_2, \vec{F}_4$   
a smjer kao  $\vec{F}_4$

$\vec{F} = \vec{F}_{13} + \vec{F}_{24}$



(6P) pravac i smjer sile određuje pravac i smjer ubrzanja (kretanja)

$F^2 = F_{13}^2 + F_{24}^2$

$F^2 = 10 \text{ N}^2$

$F = \sqrt{10} \text{ N}$

(6P)

$F = ma$

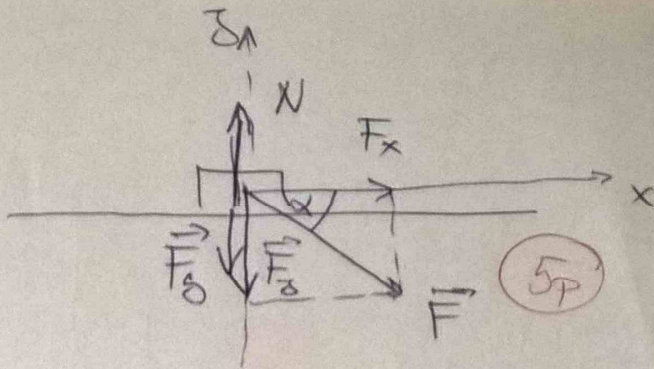
$a = \frac{F}{m}$

$a = \frac{\sqrt{10}}{10} \frac{\text{kg}}{\text{s}^2}$

(5P)

$a = \frac{\sqrt{10}}{10} \frac{\text{kg}}{\text{s}^2}$  ili  $a = 0,316 \frac{\text{kg}}{\text{s}^2}$

2.  $\alpha = 45^\circ$   
 $m = 2 \text{ kg}$   
 $F = 10 \text{ N}$   
 $v_0 = 0 \frac{\text{m}}{\text{s}}$   
 $t = 5 \text{ s}$



$a = ?$ ,  $s = ?$

$Q = ?$

$\vec{F}_R = m\vec{a}$  (2P)

$F_R = ma$

$\vec{N} + \vec{F}_g + \vec{F} = m\vec{a}$  (2P)

$\vec{F} = \vec{F}_x + \vec{F}_\alpha$

$\vec{N} + \vec{F}_g + \vec{F}_x + \vec{F}_\alpha = m\vec{a}$

x:  $\vec{F}_x = m\vec{a}$

$F_x = ma$

$a = \frac{F_x}{m} \Rightarrow a = \frac{\frac{\sqrt{2}}{2} \cdot 10 \text{ N}}{2 \text{ kg}} = \frac{\sqrt{2} \cdot 10 \frac{\text{kg} \cdot \text{m}}{\text{s}^2}}{4 \text{ kg}}$  (3P)

$a = \frac{\sqrt{2}}{2} \cdot 5 \frac{\text{m}}{\text{s}^2}$  (2P)

$a = \text{const.} \Rightarrow$  kretanje je **PRAVOLINIJSKO**  
 ubrzano **PRAVOLINIJSKO**

$s = v_0 t + \frac{at^2}{2} = \frac{at^2}{2} \Rightarrow$

$s = \frac{at^2}{2}$

$s = \frac{\frac{\sqrt{2}}{2} \cdot 5 \frac{\text{m}}{\text{s}^2} \cdot (5 \text{ s})^2}{2} \Rightarrow$

$s = 43,75 \text{ m}$  (4P)

y:  $\vec{N} + \vec{F}_g + \vec{F}_\alpha = \vec{0}$  ( $a_y = 0$  nema kretanja do z gornje)

$N - F_g - F_\alpha = 0 \Rightarrow N = F_g + F_\alpha$ ;  $F_g = mg$  (2P)

$N = mg + F_\alpha$  (2P)  $N = 2 \text{ kg} \cdot 10 \frac{\text{m}}{\text{s}^2} + \frac{\sqrt{2}}{2} \cdot 10 \text{ N}$

$Q = N$

$Q = 27 \text{ N}$  (2P)

$\cos \alpha = \frac{F_x}{F}$ ;  $\cos 45^\circ = \frac{\sqrt{2}}{2}$

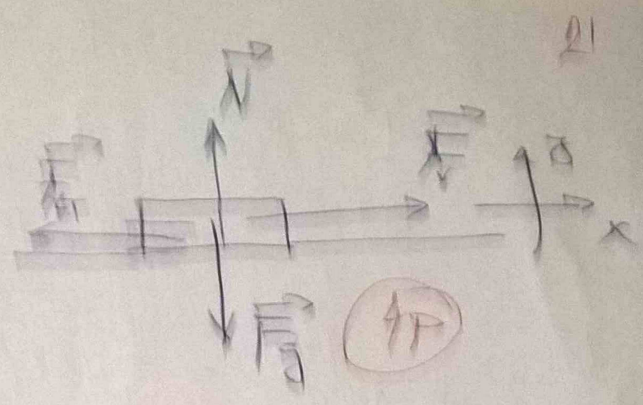
$F_x = F \cdot \cos \alpha$

$F_x = \frac{\sqrt{2}}{2} F$  (2P)

$\sin \alpha = \frac{F_\alpha}{F}$

$F_\alpha = \frac{\sqrt{2}}{2} F$   
 $F_x = F_\alpha$  (2P)

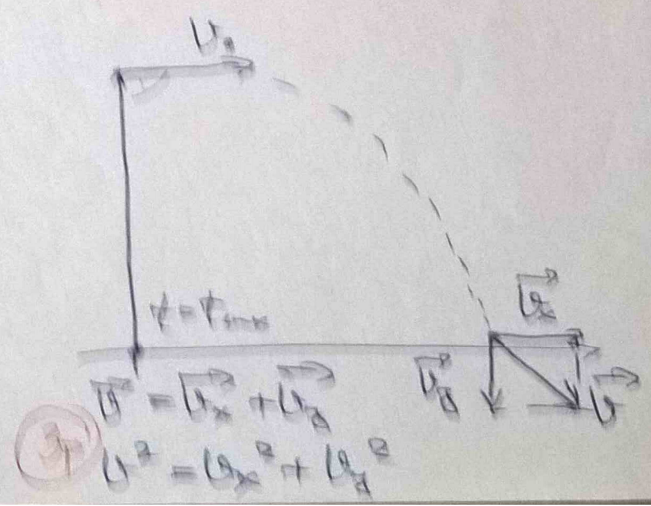
3.  $m = 4 \text{ kg}$   
 $\mu = 0.1$   
 $F = 5 \text{ N} = 40 \text{ N}$   
 $\mu = 0$



$\vec{F} = m \vec{a}$   
 $\vec{F}_x + \vec{F}_y + \vec{N} + \vec{F}_g = m \vec{a}$  (3P)  
 $\vec{v} = \vec{a} \cdot t \Rightarrow \vec{a} = \vec{v}$  (3P)  
 $F_x + F_y = m a$  (1P) ;  $a = v$  (3P)  
 $F = F_f = 0$  (1P) ;  $F_f = \mu \cdot N$  (1P)  
 $F_x = F_y = 4 \text{ N} \Rightarrow F_y = 4 \text{ N}$

3.  $\vec{F}_x + \vec{N} = \vec{v}$  (1P)  
 $\vec{F}_y - N = 0$  (1P)  $\Rightarrow N = F_y = mg$   
 $F_x = \mu N = \mu \cdot mg$  (3P) ;  $F_y = mg$   
 $\mu = \frac{F_x}{mg} \Rightarrow \mu = \frac{1000 \text{ N}}{5000 \text{ N} \cdot 10 \frac{\text{m}}{\text{s}^2}} = 1$  (1P)  
 $\mu = 1$

4.  $h = 10 \text{ m}$   
 $v_0 = 40 \text{ m/s}$   
 $t_{\text{max}} = ?$   
 $v_{\text{max}} = ?$



due  $\vec{v}$   $\vec{v}$   $v_{y0} = 0$ ;  $S = h \Rightarrow t = t_{\max}$ ;  $v_{y0} = 0$

$$S = v_{y0} t + \frac{gt^2}{2} \quad (3P)$$

$$h = \frac{gt_{\max}^2}{2} \Rightarrow (4) 2h = gt_{\max}^2 \Rightarrow t_{\max} = \sqrt{\frac{2h}{g}} \quad (3P)$$

$$t_{\max} = \sqrt{\frac{2 \cdot 10 \text{ m}}{10 \frac{\text{m}}{\text{s}^2}}} = \sqrt{2 \text{ s}^2} \quad (2P)$$

$$t_{\max} = \sqrt{2} \text{ s} = 1,41 \text{ s}$$

$$\vec{v} = \vec{v}_x + \vec{v}_y \quad ; \quad v_x = v_0 = 40 \frac{\text{m}}{\text{s}}$$

$$v_y = v_{y0} + gt_{\max} = gt_{\max} \quad (4P)$$

$$v_y = 14,1 \frac{\text{m}}{\text{s}} = \sqrt{2} \cdot 10 \frac{\text{m}}{\text{s}}$$

$$v^2 = \left(14,1 \frac{\text{m}}{\text{s}}\right)^2 + \left(40 \frac{\text{m}}{\text{s}}\right)^2 = \left(\sqrt{2} \cdot 10 \frac{\text{m}}{\text{s}}\right)^2 + \left(40 \frac{\text{m}}{\text{s}}\right)^2 = \quad (3P)$$

$$= 200 \frac{\text{m}^2}{\text{s}^2} + 1600 \frac{\text{m}^2}{\text{s}^2} = 1800 \frac{\text{m}^2}{\text{s}^2}$$

$$v = 42,42 \frac{\text{m}}{\text{s}}$$

# I<sub>3</sub> GRUPA 2.

1. (25)

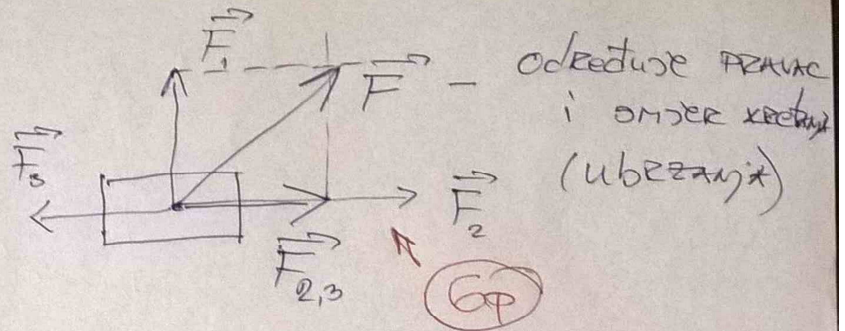
$$m = 10 \text{ kg}$$

$$F_1 = 4 \text{ N}$$

$$F_2 = 5 \text{ N}$$

$$F_3 = 2 \text{ N}$$

$$a = ?$$



## II Njutnov ZAKON

$$\vec{F} = m\vec{a} \Rightarrow F = ma \quad (1P)$$

$$\vec{F} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 = m\vec{a} \quad (2P)$$

istog PRAVCA,

$$\vec{F}_{23} = \vec{F}_2 + \vec{F}_3 \quad (1P)$$

$$F_{23} = F_2 - F_3$$

$$\boxed{F_{23} = 3 \text{ N}} \quad (4P)$$

Suprotnog smjera se sabiraju tako isto PRAVAC

se ne mijenja, smjer većeg vektora.

$$\vec{F} = \vec{F}_1 + \vec{F}_{23} \quad (1P)$$

- metodom PARALOGRAMA

$$F^2 = F_1^2 + F_{23}^2 \Rightarrow F = \sqrt{F_1^2 + F_{23}^2} \quad (4P)$$

$$F = \sqrt{16 \text{ N}^2 + 9 \text{ N}^2} = \sqrt{25 \text{ N}^2}$$

$$\boxed{F = 5 \text{ N}} \quad (1P)$$

$$F = m \cdot a \Rightarrow a = \frac{F}{m} \quad (5P)$$

$$a = \frac{5 \text{ N}}{10 \text{ kg}} = \frac{5 \cdot \frac{\text{kg}}{\text{s}^2}}{10 \text{ kg}} = 0.5 \frac{\text{m}}{\text{s}^2}$$

$$\boxed{a = 0.5 \frac{\text{m}}{\text{s}^2}}$$

2.2 (30)

$m = 2 \text{ kg}$

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

$F = 10 \text{ N}$

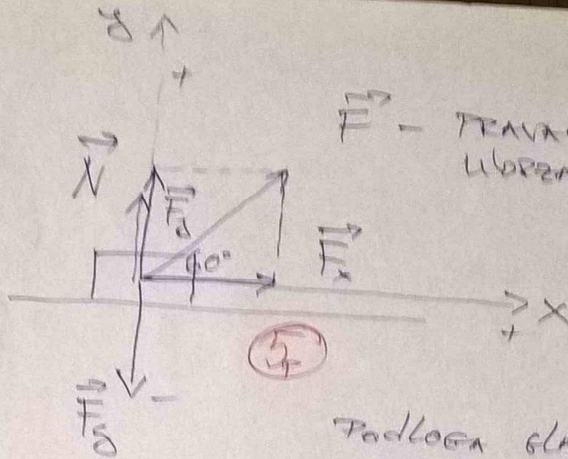
$\alpha = 60^\circ$

$t = 5 \text{ s}$

$a = ?$

$s = ?$

$Q = ?$



$\vec{F}$  - PRÁVKE i smere  
UBRZENA) (VFETNY

Podloga GLATA  $\Rightarrow$   
NEMA sil tření

II Newtonov zákon

$\vec{F}_u = m\vec{a}$  (2p)

$\vec{F} + \vec{N} + \vec{F}_g = m\vec{a}$  (2p)

$\vec{F}_x + \vec{F}_y + \vec{N} + \vec{F}_g = m\vec{a}$  (3p)

$\vec{F} = \vec{F}_x + \vec{F}_y$

$\sin 60^\circ = \frac{\sqrt{3}}{2}$ ;  $\cos 60^\circ = \frac{1}{2}$

$\sin 60^\circ = \frac{F_y}{F}$

$F_y = F \cdot \sin 60^\circ$

$F_y = \frac{\sqrt{3}}{2} F$  (2p)

$\cos 60^\circ = \frac{F_x}{F}$

$F_x = F \cdot \cos 60^\circ$

$F_x = \frac{1}{2} F$  (2p)

x: osa

$\vec{F}_x = m\vec{a}$

$F_x = ma$  (3p)

$\frac{1}{2} F = ma$

$a = \frac{F}{2m}$

$a = \frac{10 \text{ N}}{2 \cdot 2 \text{ kg}} = \frac{10 \cdot \frac{\text{m}}{\text{s}^2}}{4 \text{ kg}}$

$a = 2,5 \frac{\text{m}}{\text{s}^2} \Rightarrow$  Tělo se vřeče rovnoměrně  
(2p) ubrzkavo přávolinově. (2p)

$s = v_0 t + \frac{at^2}{2} = \frac{at^2}{2}$  (4p)

$s = \frac{2,5 \frac{\text{m}}{\text{s}^2} \cdot (5 \text{ s})^2}{2} = \frac{2,5 \frac{\text{m}}{\text{s}^2} \cdot 25 \text{ s}^2}{2}$

$s = 31,25 \text{ m}$

$$Q = N \quad (1 \text{ p})$$

II Njutnov zakon

$\vec{g}$ : oša (NEMA KRETANJA PA JE  $\vec{a}_g = \vec{0}$ )

$$\vec{F}_{uz} = m\vec{a}_g = \vec{0}$$

$$\vec{F}_g + \vec{N} + \vec{F}_z = \vec{0} \Rightarrow \vec{N} + \vec{F}_z - \vec{F}_g = \vec{0}$$

$$F_g = mg$$

$$N + \frac{\sqrt{3}}{2} F - mg = 0 \quad (5 \text{ p})$$

$$N = mg - \frac{\sqrt{3}}{2} F$$

$$N = 2 \text{ kg} \cdot 10 \frac{\text{m}}{\text{s}^2} - \frac{\sqrt{3}}{2} 10 \text{ N} = 11,34 \text{ N}$$

$$Q = N = 11,34 \text{ N}$$

3.  $(25 \text{ p})$   
 $m = 500 \text{ kg}$

$$T = ?$$

a)  $a = 1 \frac{\text{m}}{\text{s}^2}$

II Njutnov zakon

$$\vec{T} + \vec{F}_g = m\vec{a}$$

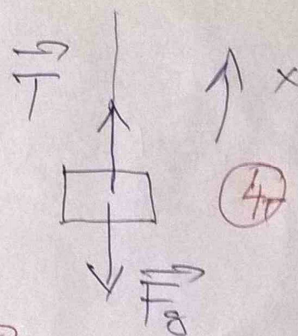
$$T - F_g = ma$$

$$T = ma + mg = m(a + g)$$

$$T = m(a + g)$$

$$\dots T = 500 \text{ kg} \left( 1 \frac{\text{m}}{\text{s}^2} + 10 \frac{\text{m}}{\text{s}^2} \right)$$

$$T = 5500 \text{ N} \quad (2 \text{ p})$$



$$\vec{F} = m\vec{a}$$

$$F_g = mg$$

$$\leftarrow (2 \text{ p})$$

$$\leftarrow (2 \text{ p})$$

$$(4 \text{ p})$$

b) RAVNOMJERNO  $\Rightarrow \vec{v} = \text{const} \Rightarrow \vec{a} = \vec{0}$

① MOŽEMO u početnoj formuli staviti  $a=0$

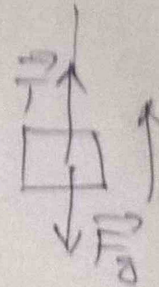
$$T = mg \quad (4) \quad \boxed{T = 5000 \text{ N}}$$

② 14

$$\vec{T} + \vec{F}_g - mg \vec{e}_y = \vec{0} \quad (3)$$

$$T - F_g = 0 \Rightarrow T = F_g \quad (5)$$

$$T = mg \Rightarrow T = 5000 \text{ N.}$$



$$\vec{a} = \vec{0} \quad (6)$$

4.3 20

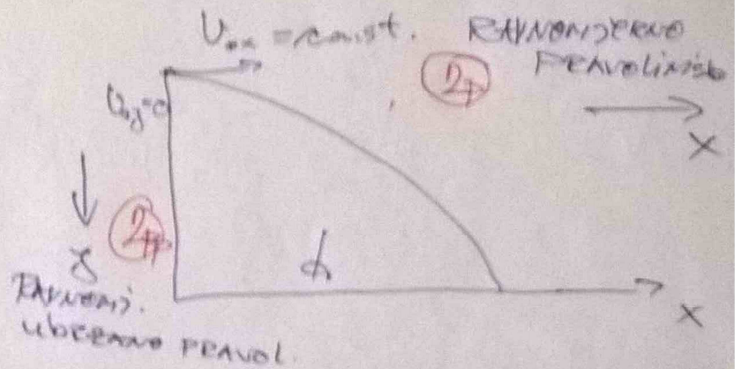
$$h = s_y = 10 \text{ m}$$

$$v_0 = v_{0x} = 20 \frac{\text{m}}{\text{s}}$$

$$t = ?$$

$$d = ?$$

$$v_{0x} = v_0 = \frac{d}{t} \equiv \frac{x}{t}$$



$$h = v_{0y} t + \frac{g t^2}{2} = g t^2 / 2$$

$$t = \sqrt{\frac{2h}{g}}$$

$$t = \sqrt{\frac{2 \cdot 10 \text{ m}}{10 \frac{\text{m}}{\text{s}^2}}} = \sqrt{2 \text{ s}^2}$$

$$\boxed{t = 1,41 \text{ s}}$$

$$v_0 = \frac{d}{t}$$

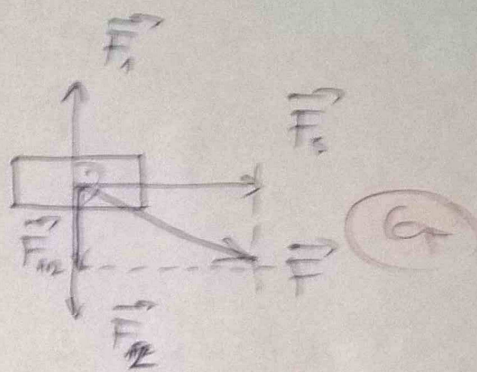
$$d = v_0 \cdot t$$

$$d = 20 \frac{\text{m}}{\text{s}} \cdot 1,41 \text{ s}$$

$$\boxed{d = 28,2 \text{ m}}$$

# I-3 GRUPA 1.

1. 25P  
 $m = 5 \text{ kg}$   
 $F_1 = 8 \text{ N}$   
 $F_2 = 12 \text{ N}$   
 $F_3 = 3 \text{ N}$   
                      
 $a = ?$



$\vec{F} = m\vec{a}$  ;  $F = ma = 1P$   
 $\vec{F} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 = m\vec{a}$  2P ;

$\vec{F}_{12} = \vec{F}_1 + \vec{F}_2$  1P *PRAMAK ISTI*  
 $F_{12} = F_2 - F_1$  3P *SMISER VESEK Vektora (F2)*  
 $F_{12} = 4 \text{ N}$  4P

$\vec{F} = \vec{F}_{12} + \vec{F}_3 = m\vec{a}$  *Metoda PARALELOGRAMA*

$F^2 = F_{12}^2 + F_3^2$

$F^* = \sqrt{16 \text{ N}^2 + 9 \text{ N}^2} = \sqrt{25 \text{ N}^2}$

$F = 5 \text{ N}$  5P

$F = ma$

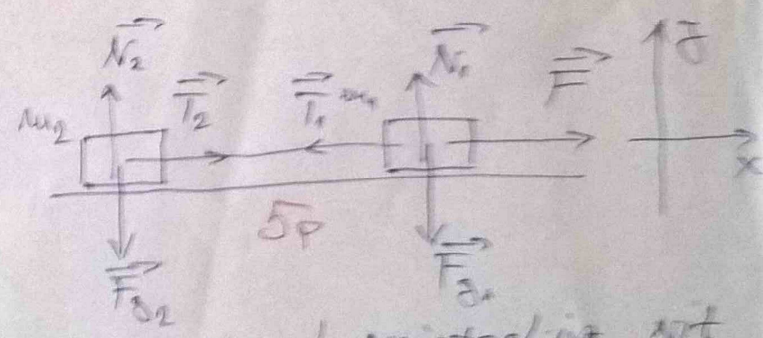
$a = \frac{F}{m}$

$a = \frac{5 \text{ N}}{5 \text{ kg}} = \frac{1 \text{ kg} \frac{\text{m}}{\text{s}^2}}{1 \text{ kg}}$

$a = 1 \frac{\text{m}}{\text{s}^2}$  5P

*SA DIZATI*  
 Tijelo se kreće u pravcu i smjeru djelovanja sile  $\vec{F}$ .

2.  
 $T_1 = 5 \text{ N}$   
 $m_1 = 2 \text{ kg}$   
 $m_2 = 1 \text{ kg}$   
                      
 $F = ?$



II Njutnov zakon za 1. tijelo

$\vec{F}_1 = m_1 \vec{a}_1$   
 $\vec{F} + \vec{N}_1 + \vec{F}_{g1} + \vec{T}_1 = m_1 \vec{a}_1$  3P

Neistekajućim nit  
 $a_1 = a_2 = a = 4P$   
 zanemarljive mase  
 $T_1 = T_2 = T$

Tijelo se ne kreće duž y-ose pa je  $\vec{a}_y = \vec{0}$   
 odnosno  $\vec{N}_y + \vec{F}_{gy} = \vec{0}$  (kreće se duž x-ose)

duž x-ose:  $\vec{F} + \vec{T}_1 = m_1 \vec{a}_1$  5p  
 $F - T_1 = m_1 a_1$  odnosno  $\boxed{F - T = m_1 a}$  ①

2. Tijelo

$$\vec{F}_2 = m_2 \vec{a}_2$$

$$\vec{T}_2 + \vec{F}_{g2} + \vec{N}_2 = m_2 \vec{a}_2$$
 3p

$$\vec{T}_2 = m_2 \vec{a}_2$$

$$T_2 = m_2 a_2 \Rightarrow \boxed{T = m_2 a}$$
 ②

$$a = \frac{T}{m_2} \Rightarrow a = \frac{5N}{1kg} = \frac{5kg \frac{m}{s^2}}{1kg} = 5 \frac{m}{s^2}$$
 5p

$$\text{iz ①} \Rightarrow F = m_1 a + T$$

$$F = 2kg \cdot 5 \frac{m}{s^2} + 5N = 15N$$

$$\boxed{F = 15N}$$
 4p

Tijelo se ne kreće  
 duž y-ose pa je  
 $\vec{F}_{g2} + \vec{N}_2 = \vec{0}$

$$\boxed{a = 5 \frac{m}{s^2}}$$

$$l = 1 \text{ m}$$

$$\rho_f = 1000 \frac{\text{kg}}{\text{m}^3}$$

$$a = 2 \frac{\text{m}}{\text{s}^2} ; g \approx 10 \frac{\text{m}}{\text{s}^2}$$

$$m = ?$$

$$\vec{F} = m\vec{a} \quad 2 \text{ p}$$

$$\vec{F}_p + \vec{F}_g = m\vec{a} \quad 2 \text{ p}$$

$$F_g - F_p = ma \quad 2 \text{ p}$$

$$F_g = mg ; F_p = \rho_f \cdot V_t \cdot g \quad 4 \text{ p.} \quad (2+2) ; V_t = l^3$$

$$mg - \rho_f l^3 g = ma$$

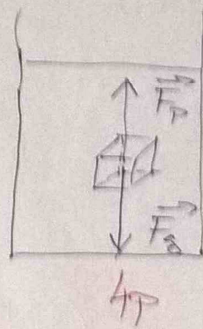
$$mg - ma = \rho_f l^3 g$$

$$m(g - a) = \rho_f l^3 g \Rightarrow$$

$$m = \frac{\rho_f l^3 g}{g - a}$$

$$m = \frac{1000 \frac{\text{kg}}{\text{m}^3} (1 \text{ m})^3 \cdot 10 \frac{\text{m}}{\text{s}^2}}{10 \frac{\text{m}}{\text{s}^2} - 2 \frac{\text{m}}{\text{s}^2}} = \frac{10000 \text{ kg} \frac{\text{m}}{\text{s}^2}}{8 \frac{\text{m}}{\text{s}^2}}$$

$$m = 1250 \text{ kg} \quad 11 \text{ p}$$



PRAVA i  
SMJER KRETANJA

4 p

$$t = 2 \text{ s}$$

$$d = 80 \text{ m}$$

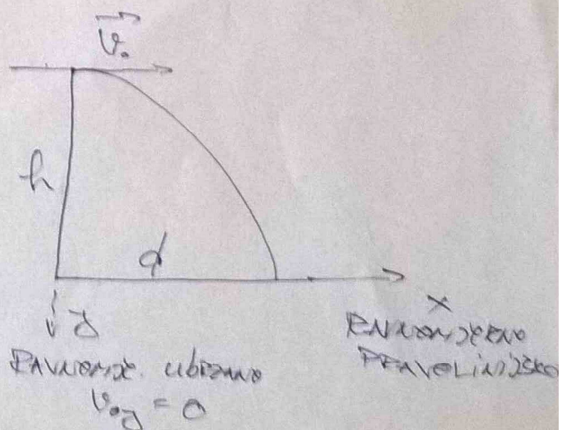
$$h = ? \quad v_0 = ?$$

$s = \frac{1}{2} a t^2$  - PRAVOUMJERNO  
PRAVOUMJERNO KRETANJE 2 p

$$v_0 = v_{0x} = \frac{d}{t} \quad 2 \text{ p}$$

$$v_0 = \frac{80 \text{ m}}{2 \text{ s}} \Rightarrow$$

$$v_0 = 40 \frac{\text{m}}{\text{s}} \quad 6 \text{ p}$$



PRAVOUMJERNO  
UBRZANO  
 $v_0 = 0$

PRAVOUMJERNO  
PRAVOUMJERNO  
KRETANJE

Решение известное же равномерное ускорение  $2g$

$$v_{0z} = 0 \quad 2g$$

$$h = v_{0z} t + \frac{gt^2}{2} = \frac{gt^2}{2}$$

$$h = \frac{10 \frac{\text{м}}{\text{с}^2} \cdot (2 \text{с})^2}{2} = \frac{10 \frac{\text{м}}{\text{с}^2} \cdot 4 \text{с}^2}{2}$$

$$\boxed{h = 20 \text{ м}} \quad \text{6P}$$