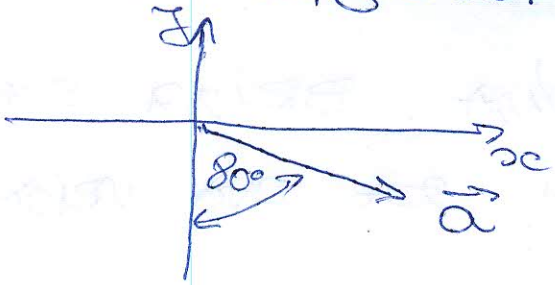
Pismeni zadatak iz fizike

Grupa $\underline{II_3}$ $\boxed{\underline{I_3}}$ Učenik _____

1. a) Razložiti vektor $\vec{a}$ na komponente duž x,y ose.

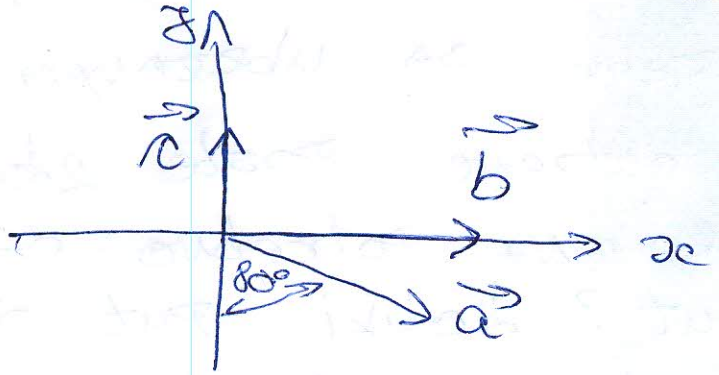


$a = 5$

$\sin 80° = 0{,}985$

$\cos 80° = 0{,}174$

b) Sabrati vektore $\vec{a}, \vec{b}, \vec{c}$

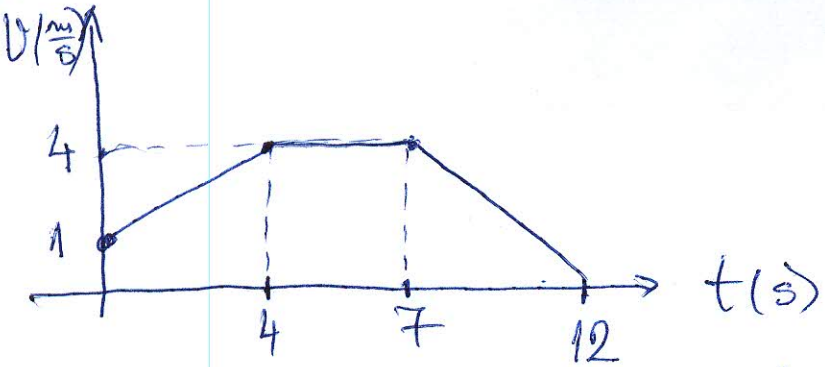


$a = 5$

$b = 4$

$c = 3$

2. Na osnovu datog grafika $v(t)$ nacrtati grafik $a(t)$ i naći predeni put u prvih 5 s kretanja.



3. Sprinter pretrči stazu dužine 200m za 20s. Na stazi je duvao nepovoljan vetar u smeru od starta ka cilju. Brzina sprintera u odnosu na vetar.

je $8\frac{m}{s}$. Stigavši do cilja okreće se i vraća nazad na start.

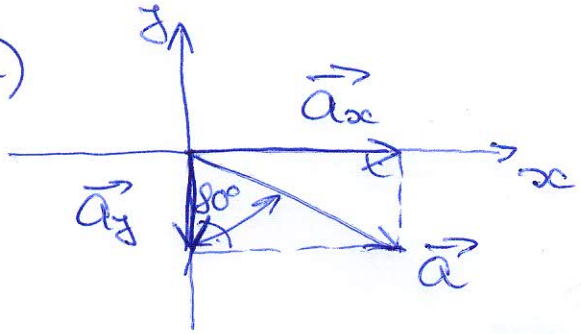
a) Kolika je brzina vjetra?

b) Koliko je trajala kretanje sprintera sa cilja na start?

c) Kolika je srednja brzina sprintera u odnosu na stazu za svo vrijeme kretanja?

4. Tijelo se kreće brzinom $5\frac{m}{s}$ i počinje da se kreće sa ubrzanjem $4\frac{m}{s^2}$. Kolikom brzinom dostigne poslije 2km? Koliko mu je vremena potrebno da pređe toliki put? Koliki put je prešlo u posljednjoj sekundi posmatranog ubrzanog kretanja?

1. a)



$a = 5$

$\vec{a} = \vec{a_x} + \vec{a_y}$

$\sin 80° = \frac{a_x}{a} \Rightarrow$

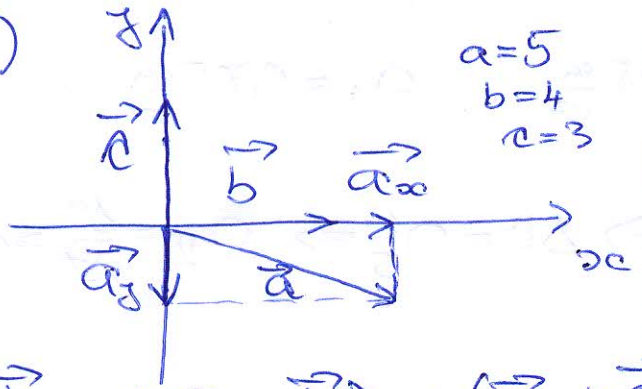
$a_x = a \sin 80°$

$a_x = 5 \cdot 0,985 = 4,925 \Rightarrow a_x = 4,925$

$\cos 80° = \frac{a_y}{a} \Rightarrow a_y = a \cos 80°$

$a_y = 5 \cdot 0,174 = 0,87 \Rightarrow a_y = 0,87$

b)



$a = 5$
$b = 4$
$c = 3$

$\vec{d} = \vec{a} + \vec{b} + \vec{c}$

$\vec{a} = \vec{a_x} + \vec{a_y}$

$\vec{d} = \vec{a_x} + \vec{a_y} + \vec{b} + \vec{c}$

$\vec{d} = (\vec{a_x} + \vec{b}) + (\vec{a_y} + \vec{c})$

$\vec{d} = \vec{d_x} + \vec{d_y}$

$\vec{d_x} = \vec{a_x} + \vec{b}$; $\vec{d_y} = \vec{a_y} + \vec{c}$

$\vec{d_x} = \vec{a_x} + \vec{b}$

$d_x = a_x + b$

$d_x = 8,925$

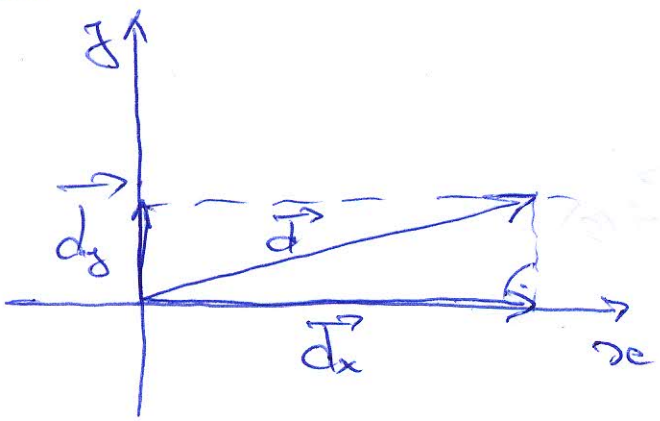
PRAVAC i SMJER isti kao $\vec{a_x}, \vec{b}$

$\vec{d_y} = \vec{a_y} + \vec{c}$

$d_y = c - a_y$

$d_y = 2,13$

PRAVAC i SMJER vektora $\vec{c}$



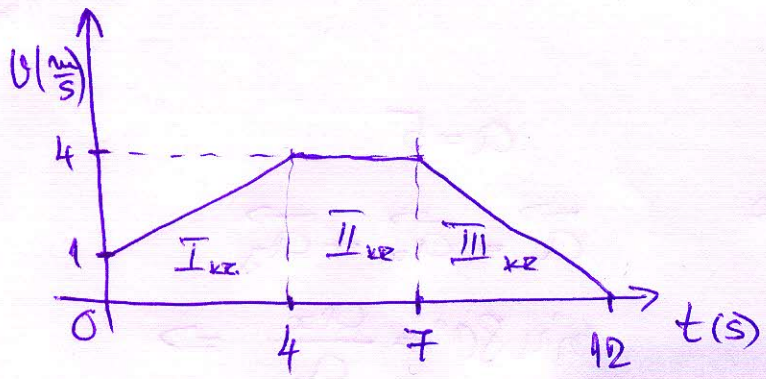
$\vec{d} = \vec{d_x} + \vec{d_y}$

$d^2 = d_x^2 + d_y^2$

$d = \sqrt{d_x^2 + d_y^2}$

$d = 9,176$

2.



a)

I kr.

$v_1 = 1\frac{m}{s}$ $\quad v_2 = 4\frac{m}{s}$

$t_1 = 0s$ $\quad t_2 = 4s$

Pošto je zavisnost $v(t)$ PRAVA Linija $\Rightarrow a = const.$

$$a = \frac{\Delta v}{\Delta t} = \frac{v_2 - v_1}{t_2 - t_1}$$

$$a_1 = \frac{v_2 - v_1}{t_2 - t_1}$$

$$a_1 = \frac{4\frac{m}{s} - 1\frac{m}{s}}{4s - 0s} = \frac{3}{4}\frac{m}{s^2} = 0,75\frac{m}{s^2} \; ; \quad a_1 = 0,75\frac{m}{s^2}$$

II kr. $\quad v = 4\frac{m}{s} = const. \Rightarrow \Delta v = 0\frac{m}{s} \Rightarrow a_2 = \frac{\Delta v}{\Delta t} = 0\frac{m}{s^2}$

$$a_2 = 0\frac{m}{s^2}$$

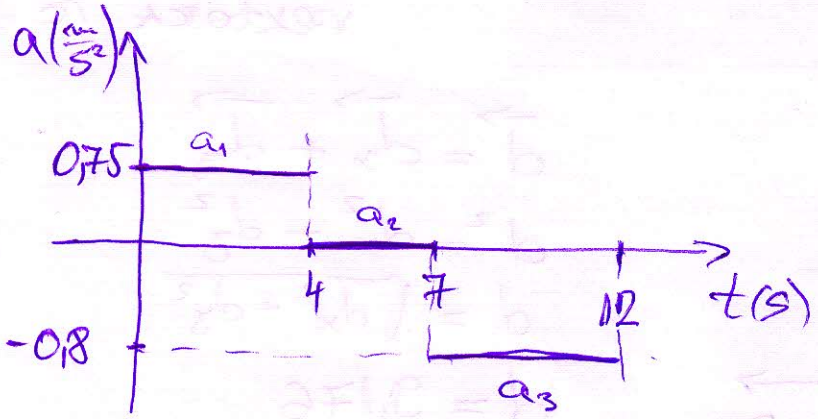
III kr.

$v_1 = 4\frac{m}{s}$ $\quad v_2 = 0\frac{m}{s}$

$t_1 = 7s$ $\quad t_2 = 12s$

$$a_3 = \frac{v_2 - v_1}{t_2 - t_1}$$

$$a_3 = \frac{0\frac{m}{s} - 4\frac{m}{s}}{12s - 7s} = \frac{-4\frac{m}{s}}{5s} = -0,8\frac{m}{s^2}$$



$t = 5s$ — Prvo kretanje 4s, od drugog kretanja 1s.

$s = ?$

$s = s_1 + s_2$; $t_1 = 4s$; $t_2 = 1s$

I kr.

$$s_1 = v_{01} t_1 + \frac{a_1 t_1^2}{2} \quad ; \quad v_{01} = 1\frac{m}{s}$$

$$s_1 = 1\frac{m}{s} \cdot 4s + \frac{0{,}75\frac{m}{s^2} \cdot (4s)^2}{2}$$

$$s_1 = 4m + 6m = 10m \Rightarrow s_1 = 10m$$

II kr.

$v_2 = 4\frac{m}{s}$; $t_2 = 1s$

$$v_2 = \frac{s_2}{t_2} \Rightarrow s_2 = v_2 \cdot t_2$$

$$s_2 = 4\frac{m}{s} \cdot 1s = 4m \Rightarrow s_2 = 4m$$

$s = s_1 + s_2$

$s = 14m$.

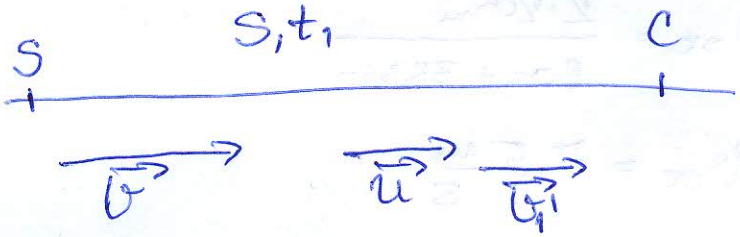
3.

$s = 200m$

$t_1 = 20s$

a) $v' = 8\frac{m}{s}$

$u = ?$



$$v = \frac{s}{t} \Rightarrow v = \frac{s}{t_1} \Rightarrow v = \frac{200m}{20s} = 10\frac{m}{s}$$

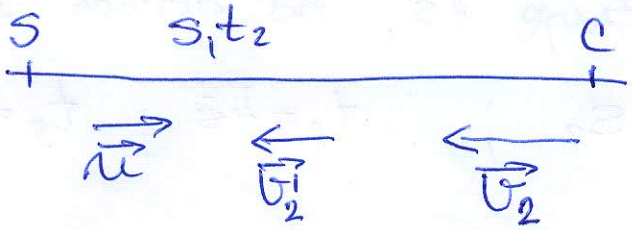
$\vec{v} = \vec{v_1'} + \vec{u}$ $\quad v_1' = v'$

$v = v' + u \Rightarrow u = v - v'$

$u = 10\frac{m}{s} - 8\frac{m}{s}$

$u = 2\frac{m}{s}$

b)



$v_2' = v_1' = v'$

$t_2 = ?$

$$v_2 = \frac{s_1}{t_2}$$

$$\vec{v_2} = \vec{v_2'} + \vec{u}$$

$$v_2 = v_2' - u = v' - u$$

$$\frac{s}{t_2} = v' - u \Rightarrow t_2 = \frac{s}{v' - u}$$

$$t_2 = \frac{200m}{8\frac{m}{s} - 2\frac{m}{s}} = \frac{200m}{6\frac{m}{s}}$$

$$t_2 = 33{,}33\ s.$$

$$v_{sr} = \frac{s_u}{t_u} = \frac{2s}{t_1 + t_2}$$

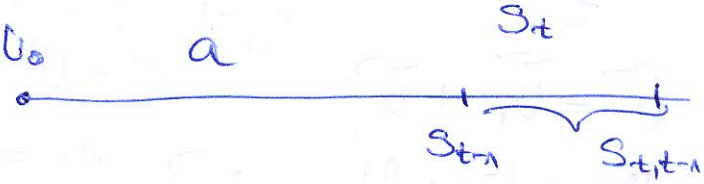
$$v_{sr} = \frac{2 \cdot 200m}{20s + 33{,}33s}$$

$$v_{sr} = 7{,}5\frac{m}{s}$$

4. $v_0 = 5\frac{m}{s}$

$a = 4\frac{m}{s^2}$

$s = 2km = 2000m$



$v = ?$

$t = ?$

$s_{t,t-1} = ?$

$$v^2 = v_0^2 + 2as$$

$$v = \sqrt{v_0^2 + 2as}$$

$$v = \sqrt{\left(5\frac{m}{s}\right)^2 + 2 \cdot 4\frac{m}{s^2} \cdot 2000m} = \sqrt{16025\frac{m^2}{s^2}}$$

$$\boxed{v = 126{,}6\frac{m}{s}}$$

$$a = \frac{v - v_0}{t} \Rightarrow t = \frac{v - v_0}{a}$$

$$t = \frac{126{,}6\frac{m}{s} - 5\frac{m}{s}}{4\frac{m}{s^2}} = \frac{121{,}6}{4}s$$

$$\boxed{t = 30{,}4s}$$

$$s_{t,t-1s} = s_t - s_{t-1s} \quad ; \quad s_t = s$$

$$s_{t-1s} = v_0(t-1s) + \frac{a(t-1s)^2}{2}$$

$$s_{t-1s} = 5\frac{m}{s} \cdot 29{,}4s + \frac{4\frac{m}{s^2} \cdot (29{,}4s)^2}{2}$$

$$s_{t-1s} = 147m + 1728{,}72m$$

$$s_{t-1s} = 1875{,}72m$$

$$s_{t,t-1s} = 2000m - 1875{,}72m$$

$$\boxed{s_{t,t-1s} = 124{,}28m}$$