ZADAĆA

1. $\vec{v}_0 = v_{0x}\vec{i}$ $\vec{a} = -a_{0x}\vec{i} - a_y\vec{j}$ $\Rightarrow v_{0y} = 0$

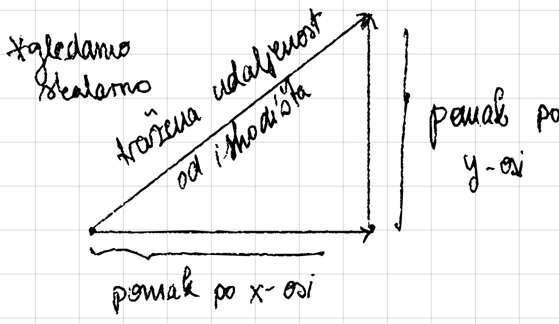
$v_{0x} = 4\,m/s$

$a_{0x} = 3\,m/s^2$ * $\vec{v}[t] = \vec{v}[t_0] + \vec{a}_0\,(t-t_0)$

$a_{0y} = 2\,m/s$

$r[t] = ? \to s$

$$\underbrace{\vec{r}[t] - \vec{r}[t_0]}_{\Delta\vec{r}} = \vec{v}_0[t_0]\,(t-t_0) + \frac{\vec{a}_0}{2}(t-t_0)^2$$



$y = \cancel{v_{0y}t} + a_{0y}t^2/2$, $\underbrace{\phantom{v_{0y}t}}_{0}$

$\cancel{a = \frac{\Delta v}{\Delta t} \to t = \frac{v_{0x}}{a_{0x}}}$

$= v_{0x}t + a_{0x}t^2/2$

$t_0 = 0 \to t - t_0 = t$

$$\vec{v}[t] = (v_{0x} - a_{0x}(t-t_0))\cdot\vec{i} + (0 - a_{0y}\cdot(t-t_0))\cdot\vec{j}$$

$$\vec{v}[t] = (v_{0x} - a_{0x}\cdot t)\vec{i} - a_{0y}\cdot t\cdot\vec{j}$$

$$\vec{r}[t] = \int_0^t (v_{0x} - a_{0x}t)\,dt\cdot\vec{i} - \int_0^t a_{0y}\cdot t\,\vec{j} = \left(v_{0x} - a_{0x}\cdot\frac{1}{2}t^2\right)\vec{i} - a_{0y}\cdot\frac{1}{2}t^2\vec{j}$$

$\Rightarrow$ udaljenost, znači iznos: $\|r[t]\| = \sqrt{\left(v_{0x} - a_{0x}\cdot\frac{1}{2}t^2\right)^2 + \left(-a_{0y}\cdot\frac{1}{2}t^2\right)^2}$

$$= \|r[t]\| = \sqrt{\left(v_{0x} - a_{0x}\cdot\left(\frac{v_{0x}}{a_{0x}}\right)^2\cdot\frac{1}{2}\right)^2 + \left(-a_{0y}\cdot\frac{1}{2}\cdot\left(\frac{v_{0x}}{a_{0x}}\right)^2\right)^2}$$

$$\cancel{= \sqrt{\left(4 - 3\cdot\frac{16}{9}\cdot\frac{1}{2}\right)^2 + \left(-2\cdot\frac{1}{2}\cdot\frac{16}{9}\right)^2}} = 2,22$$

1. način?

$$\cancel{\vec{r}[t] = \left(v_{0x} - a_{0x}\cdot\frac{1}{2}\cdot\frac{16}{9}\right)\vec{i} - a_{0y}\cdot\frac{1}{2}\cdot\frac{16}{9}\vec{j} = \left(4 - 3\cdot\frac{8}{9}\right)\vec{i} - 2\cdot\frac{8}{9}\vec{j}}$$

$$\cancel{\vec{r}[t] = \left(4 - \frac{8}{3}\right)\vec{i} - \frac{16}{9}\vec{j} \Rightarrow \|\vec{r}[t]\| = \sqrt{\frac{16}{9} + \frac{256}{81}} = 2,22}$$

$\vec{v}_0 = v_{0x}\vec{i}$ $\quad \vec{a} = -a_{0x}\vec{i} - a_y\vec{j}$ $\quad \Rightarrow v_{0y} = 0$

$v_{0x} = 4\,m/s$

$a_{0x} = 3\,m/s^2$

$a_{0y} = 2\,m/s$

$r[t] = ? \rightarrow s$

$a[t] = \frac{dv}{dt} \rightarrow dv = a[t]\cdot dt' \int_0^t$

$v[t] - v_0 = \int_0^t a[t]\,dt'$

$v[t] = v_0 + a_0 \cdot t'\Big|_0^t$

$\hookrightarrow v_x[t] = v_{0x} + a_{0x}\cdot t$

$$\underbrace{\vec{r}[t] - \vec{r}[t_0]}_{\Delta\vec{r}} = \vec{v}_0[t_0](t-t_0) + \frac{\vec{a}_0}{2}(t-t_0)^2$$

$t_0 = 0 \rightarrow t - t_0 = t$

$$\vec{v}[t] = \left(v_{0x} - a_{0x}(t-t_0)\right)\cdot\vec{i} + \left(0 - a_{0y}\cdot(t-t_0)\right)\cdot\vec{j}$$

$$\vec{v}[t] = \left(v_{0x} - a_{0x}\cdot t\right)\vec{i} - a_{0y}\cdot t\cdot\vec{j}$$

$$\vec{r}[t] = \underbrace{\int_0^t (v_{0x} - a_{0x}t)\,dt\,\vec{i}}_{x\text{-smjer}} - \int_0^t a_{0y}\cdot t\,\vec{j}$$

$\Rightarrow \vec{r}_x[t] = \int_0^t v_{0x}\,dt - \int_0^t a_{0x}t\,dt$ $\quad \Rightarrow \vec{r}_y[t] = -a_{0y}\frac{t^2}{2}$ $\quad \frac{1}{2}\cancel{2}\cdot\frac{16}{9} = \frac{16}{9}$

$\Rightarrow \vec{r}_x[t] = v_{0x}t - a_{0x}\frac{t^2}{2}$ $\quad = |\vec{r}[t]| = \sqrt{\left(v_{0x}t - a_{0x}t^2/2\right)^2 + \left(-\frac{a_{0y}}{2}t^2\right)^2}$

* → treba provjeriti kada za x-smjer izraz postiže MAX t

· derivacija → derivacija puta / vremena ⇒ brzina

$v_x[t] = \frac{dx}{dt} = 0 \rightarrow v_x[t] = v_{0x} - a_{0x}\cdot t = 0$

$4 - 3t \Rightarrow t = \frac{4}{3}\,s$

$$\boxed{\vec{r}[t] = 3{,}2049\,m}$$