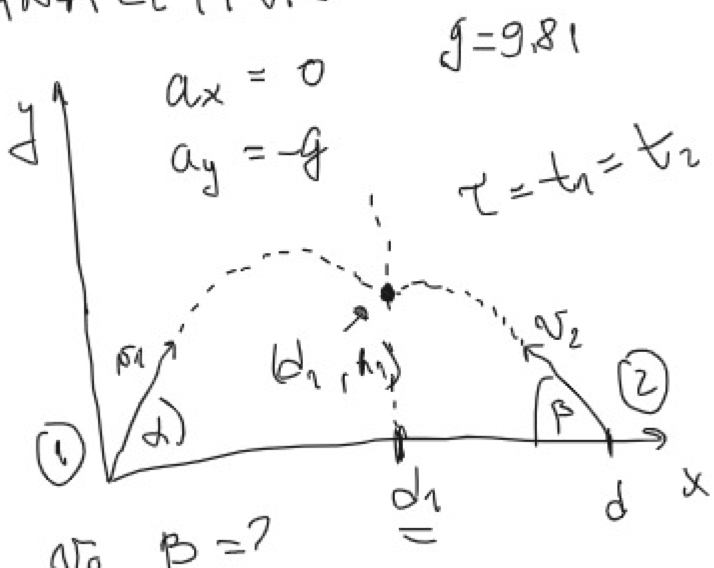
ANALITIČKI



$v_2, \beta = ?$

1
$$\begin{cases} x_1 = v_1 \cos\alpha\, t \\ y_1 = -\frac{1}{2} g t^2 + v_1 \sin\alpha\, t \end{cases}$$

2
$$\begin{cases} x_2 = d - v_2 \cos\beta\, t = d_1 \\ y_2 = -\frac{1}{2} g t^2 + v_2 \sin\beta\, t = h_1 \end{cases}$$

$t_1 = t_2 = \tau$ ✓

$x_1(\tau) = x_2(\tau) = d_1$

$y_1(\tau) = y_2(\tau)$

$d_1 = v_1 \cos\alpha\, \tau \rightarrow \tau = \frac{d_1}{v_1 \cos\alpha}$

$d_1 = d - v_2 \cos\beta\, \tau$

$$\left[d_1 = d - v_2 \cos\beta \frac{d_1}{v_1 \cos\alpha} \right] \quad (1)$$

miro

$$\cancel{-\frac{1}{2}g\tau^2} + v_1 \sin\alpha\,\tau = \cancel{-\frac{1}{2}g\tau^2} + v_2 \sin\beta\,\tau$$

$$\left[v_1 \sin\alpha = v_2 \sin\beta \right] \quad (2)$$

Код

v_2 і β, знаємо τ

$x_2 = d_1 t$

$y_2 = h_1 t$

$$x_2 - d_1 = (d - v_2 \cos\beta\, t) - d_1 = 0$$

τ

v_2, β

#β: $\sim \operatorname{tg}\beta$

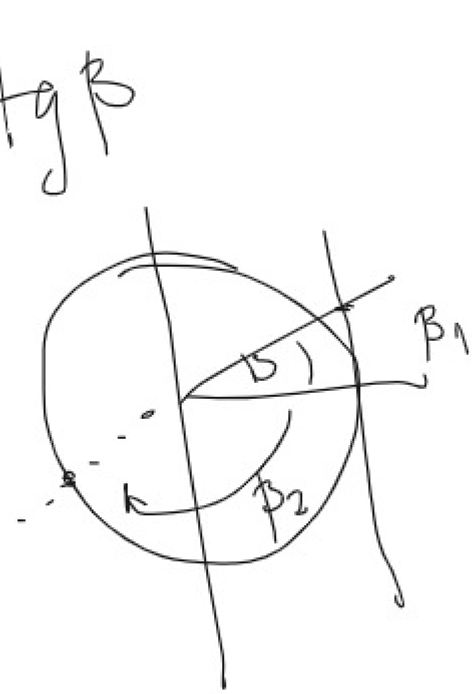
$\beta =$

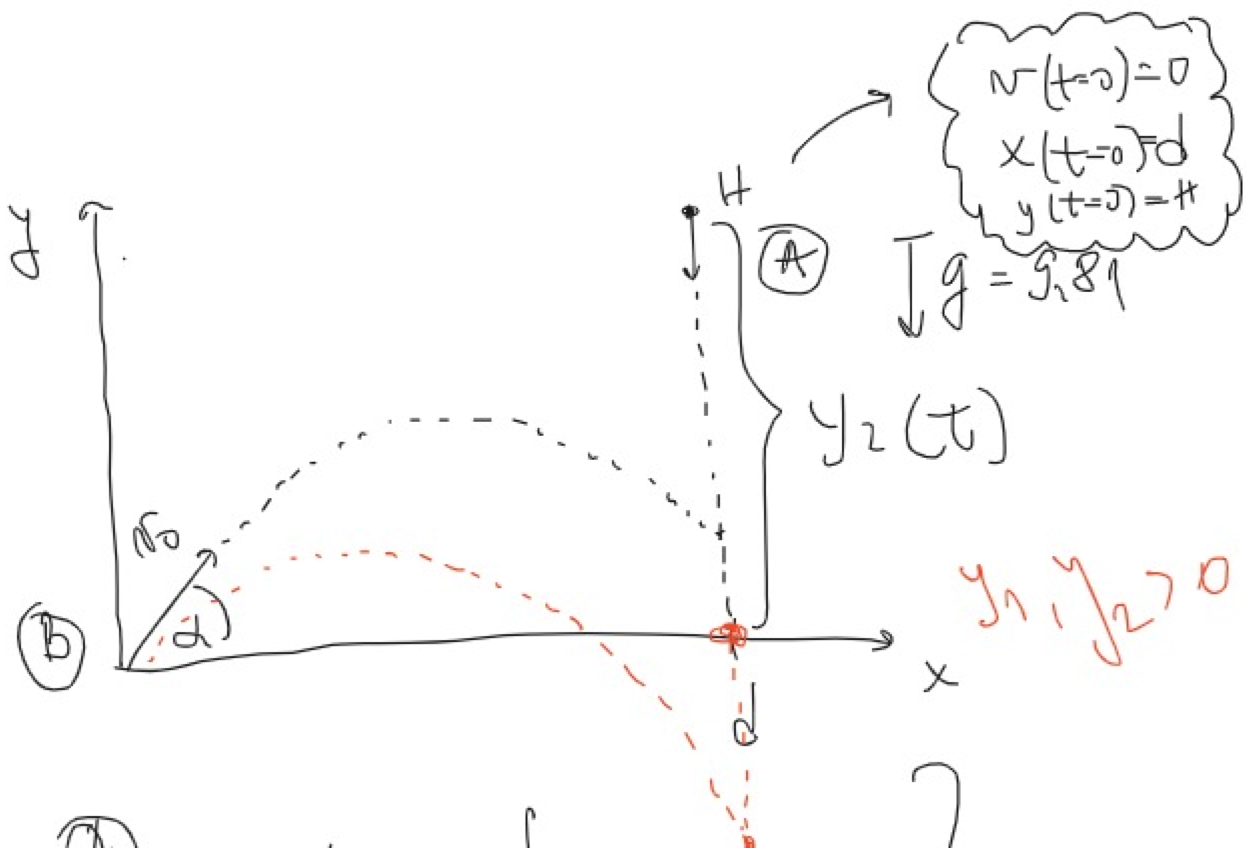
$$\frac{v_1}{v_2} \sin\alpha = \sin\beta$$

$$d - d_1 = v_2 \cos\beta \frac{d_1}{v_1 \cos\alpha}$$

$$\frac{v_1 \cos\alpha}{v_2 d_1}(d - d_1) = \cos\beta$$

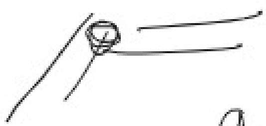
$$\frac{\frac{v_1}{v_2}\sin\alpha}{\frac{v_1 \cos\alpha}{v_2 d_1}(d - d_1)} = \operatorname{tg}\beta$$





(A):

$$\left.\begin{aligned} x_1 &= d \\ y_1 &= H - \frac{1}{2}gt^2 \end{aligned}\right\}$$



$a_x = 0$

$a_y = -g$

$\frac{dv_i}{dt} \stackrel{def}{=} a_i$

$a_x = \frac{dv_x}{dt} = 0$

$\int dv_x = 0 \int dt = 0 + C$

poč. uslov:

$v_x(t) = C$

$v_x(t) = 0$

$\frac{dx_1}{dt} = v_x$

$x_1 = d$

$a_y = -g$

$\int dv_y = -g \int dt$

$v_y = -gt + C$

$C = 0$

$v_y(t) = -gt$

$\frac{dy}{dt} = -gt$

$\int dy = \int -gt\, dt$

$y = -g\frac{t^2}{2} + C$

$y_1 = -g\frac{t^2}{2} + H$

B

$$x_2 = v_0 \cos\alpha\, t$$

$$y_2 = -\frac{1}{2} g t^2 + v_0 \sin\alpha\, t$$

$$x_1 = x_2 = d$$

$$y_1 = y_2$$

$$t_1 = t_2 = \tau$$

$$x_2 = v_0 \cos\alpha\, \tau = d$$

$$\boxed{\tau = \frac{d}{v_0 \cos\alpha}}$$

$t = \tau$:

$$H - \cancel{\frac{1}{2} g \tau^2} = \cancel{-\frac{1}{2} g \tau^2} + v_0 \sin\alpha\, \tau$$

$$\boxed{\tau = \frac{H}{v_0 \sin\alpha}}$$

miro

$$\frac{d}{\cancel{v_0}\cos\alpha} = \frac{H}{\cancel{v_0}\sin\alpha}$$

$$\boxed{tg\,\alpha = \frac{H}{d}}$$

(v_5):

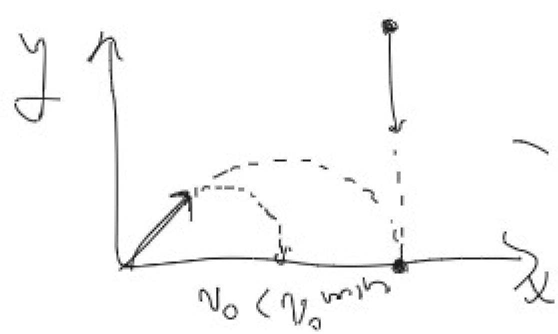
$$y_2 = -\frac{1}{2}g t^2 + v_0 \sin\alpha\, t$$

$$y_2 = -\frac{1}{2} g \frac{H^2}{v_0^2 \sin^2\alpha} + \cancel{v_0 \sin\alpha}\frac{H}{\cancel{v_0 \sin\alpha}}$$

$$H - y_2 = \frac{1}{2} g \frac{H^2}{\sin^2\alpha}\,\frac{1}{v_0^2}$$

$$0 \le y_2 \le H$$

$$y_2 = 0$$



$$\cancel{H} = \frac{1}{2} g \frac{H^{\cancel{2}}}{\sin^2\alpha}\,\frac{1}{v_0^2}$$

$$v_0^{min} = \sqrt{\frac{gH}{2\sin^2\alpha}}$$

$$y_2 = H$$

$$D \propto \frac{1}{v_0^2}$$

$$v_0 \to \infty \quad (v_0 \to c)$$

miro