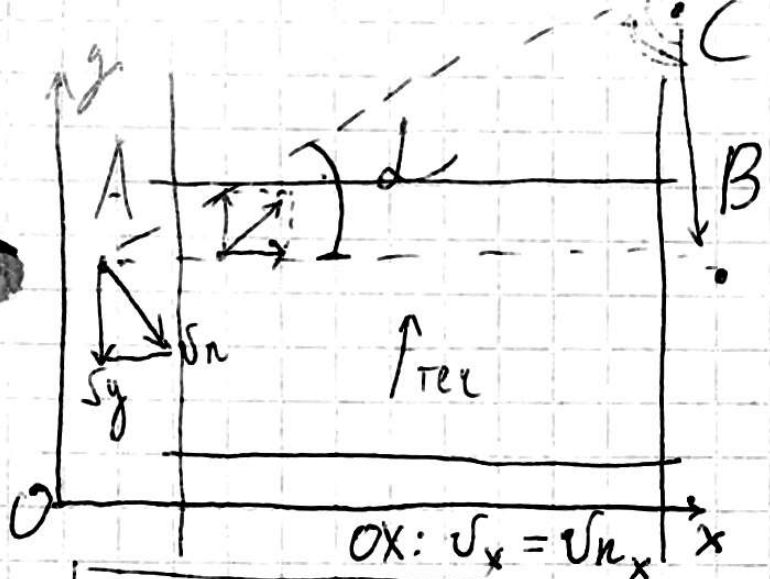
16/2/24

• Кинематика



$$\vec{v} = \vec{v}_n + \vec{v}_{теч}$$

Дано:

$v_т = 2$ км/ч

$v_л = 2{,}5$ км/ч

$v_{л\,отн}^{ср} - ?$

СИ:

Oy: $v_y = v_{ny} = 0$

$v_{ny} = v_т$

$v_{ny} = -2$ км/ч

$$t = \frac{AB}{\sqrt{v_л^2 - v_{ny}^2}}$$

$$CB = v_т \cdot \frac{AC}{\sqrt{v_т^2 + v_л^2}} =$$

$$= v_{св} \cdot t_{св}$$

$$v_л = \sqrt{v_{nx}^2 - v_{ny}^2}$$

$$v_{nx} = \sqrt{v_л^2 - v_{ny}^2}$$

$$\vec{v}_л = \vec{v}_{л\,в} + \vec{v}_т$$

Ox: $v_{л\,ox} = v_{л\,вх}$

Oy: $v_{л\,oy} = v_т + v_{л\,вy}$

$\parallel$ 0

$$t_{AC} = \frac{AC}{\sqrt{v_т^2 + v_л^2}}$$

$$\frac{AB}{\sqrt{v_л^2 - v_т^2}} = \frac{AC}{\sqrt{v_т^2 + v_л^2}} + \frac{CB}{v_{св}}$$

$$\frac{v_т}{v_л} = \operatorname{tg}\alpha = \frac{CB}{AB}$$

$$\frac{AB}{\sqrt{v_n^2 - v_T^2}} = \frac{\sqrt{AB^2 + AB\,tg\alpha}}{\sqrt{v_n^2 + v_T^2}} + \frac{AB\,tg\alpha}{v_{CB}} \cdot \frac{1}{v_{CB}} =$$

$$= \frac{1}{\sqrt{v_n^2 + v_T^2}} + \frac{\sqrt{1 + tg^2\alpha}}{\sqrt{v^2 + v_n^2}}$$

$$\frac{1}{v_{CB}} = \frac{1}{\sqrt{16,25 - 4}} - \frac{\sqrt{1 + \frac{4}{6,25}}}{\sqrt{4 + 6,25}}$$

$$\frac{1}{v_{CB}} = \frac{1}{1,5} - \frac{1,28}{3,2} = 0,26$$

$$v_{CB} = 3,75 \text{ км/ч}$$

② Дано:

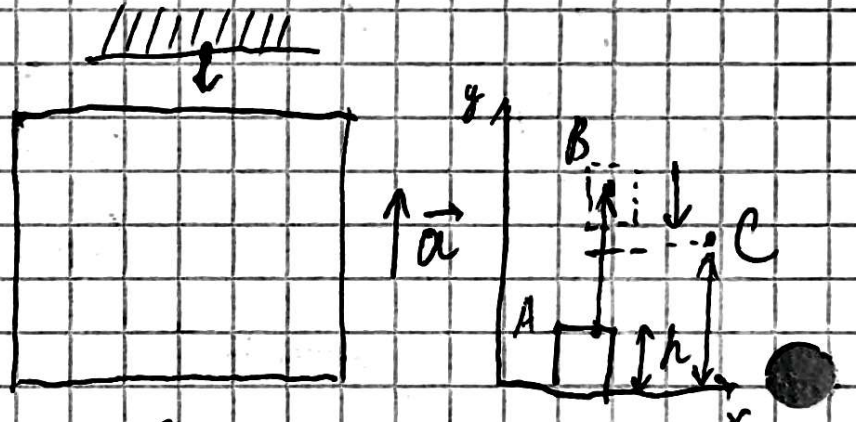
$v_0 = 0$

$a = 1,2 \text{ м/с}^2$

$t_1 = 2 \text{ с}, h = 2,4 \text{ м}$

$t_2 = (?)$

$S = ?$



$$S_1 = \frac{at_1^2}{2}$$

$$y = v_0 = at_1$$

$$y = y_0 + v_0 t + \frac{(g+a)t_0^2}{2}$$

$$S = OC = \frac{at^2}{2}$$

$$\frac{at^2}{2} = S_1 + h_1 + v_0 t_0 - \frac{gt_0^2}{2}$$

$$t = t_1 + t_0$$

$$\frac{a(t_1 + t_0)^2}{2} = \frac{at^2}{2} + h + at_1 t_0 -$$

$$- \frac{gt_0^2}{2}$$

$$1,2(2+t_б)^2 = \frac{1,2\cdot 2^2}{2} + 2,4 + 1,2 - 2t_б - 3t_б$$

$$1,2(2+t_б)^2 = 2,4 + 2,4 + 1,4t_б - 5t_б$$

$$4,8 + 4,8t_б + 1,2t_б^2 = 5,1 - 2,6t_б$$

$$1,2t_б^2 + 4,4t_б - 0,3 = 0$$

$$D = 5446 + 4\cdot 12\,3 = 5620$$

$$x_{1,2} = \frac{-44 \pm \sqrt{5600}}{24} = \frac{-44 \pm 2\sqrt{1406}}{24}$$

$$0,6t_б^2 + 2,4t_б + 2,4 = 5,1 - 2,6t_б$$

$$0,6t_б^2 + 5t_б + 2,4 = 0 \mid \cdot 10$$

$$6t_б^2 + 50t_б - 24 = 0$$

$$D = 2500 + 4\cdot 6\cdot 24 = 56^2$$

$$R_{1,2} = 0,5\,C\,t_б: \quad \frac{1,2\cdot 2^2}{2} - \frac{10\cdot 0,5^2}{2} =$$

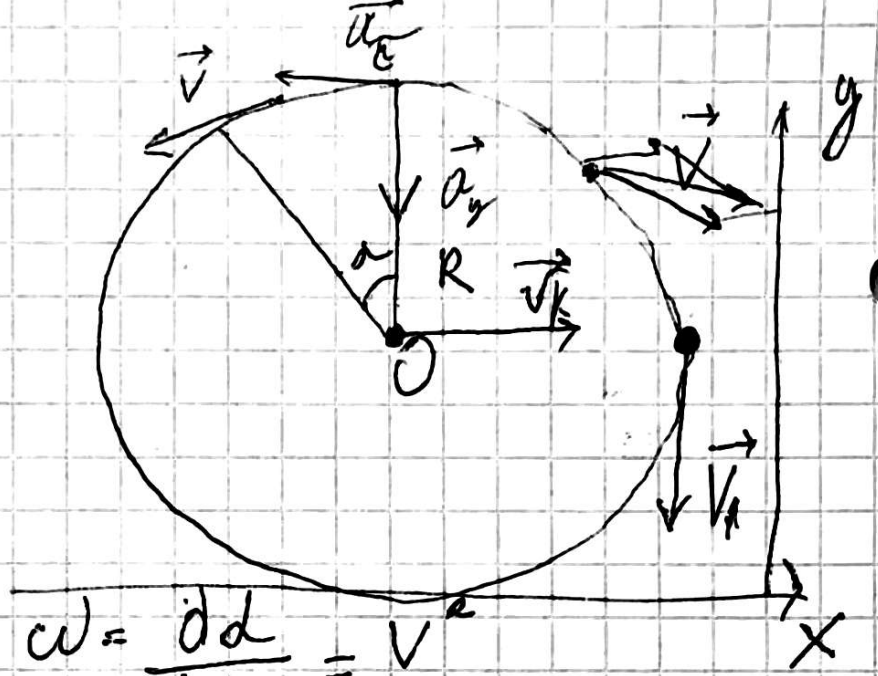
$$= 24 - 5\cdot 0,25 = 1,15\,Ч$$

Дано:

$\vec{V}_к =$

$R =$

$V - ?$



$\omega = \frac{d\alpha}{dt} = V^2$

$a_y = \frac{V^2}{R} = \omega^2 R$

$\vec{V} = \vec{V}_к + \vec{V}_1$

[OX: ~~$\vec{V}_к$ $\vec{V}_1$~~ $V_x = V_к$

OY: $V_y = -V_1$]

$\vec{V}_1 = \omega \cdot R$

$-V_{1x} = V_1 \cos\alpha$

$V_{1y} = V_1 \sin\alpha$

$V_к + R\omega(\cos(\omega t))$

$-\omega R \cdot \sin(\omega t)$

$\omega = \frac{V_к}{R}$

$-V_к + V_1 \cdot \cos(\omega t)$

OX: $V_x = V_к + V_1 \cos\alpha$

OY: $V_y = -V_1 \cdot \sin\alpha$

$-V_1 \cdot \sin(\omega t)$

• Ссылка на видео