

Кинематика вращательного движения.

КОД:

N.P.1

$$v_1 = 6 \frac{\text{м}}{\text{с}}$$

$$v_2 = 5,5 \frac{\text{м}}{\text{с}}$$

$$r_2 = R - 0,15 \text{ (м)}$$

$$r_1 = R$$

R - ?

$$v_1 = \frac{2\pi r_1}{T}$$

$$T = \frac{2\pi r_1}{v_1}$$

$$v_2 = \frac{2\pi r_2}{T}$$

$$T = \frac{2\pi r_2}{v_2}$$

$$\frac{2\pi r_1}{v_1} = \frac{2\pi r_2}{v_2}$$

$$\frac{R}{v_1} = \frac{(R - 0,15)}{v_2}$$

$$R \cdot v_2 = R v_1 - 0,15 v_1$$

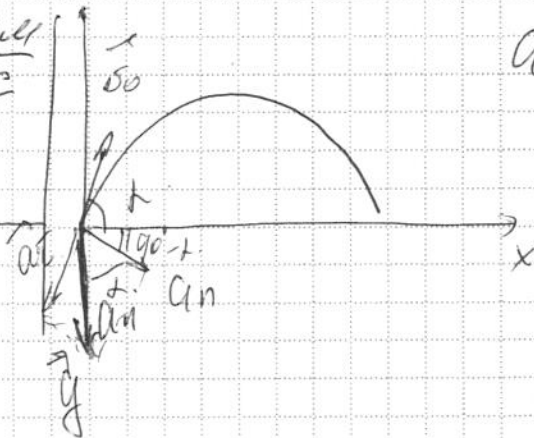
$$R = \frac{0,15 v_1}{v_1 - v_2} = \frac{0,15 \cdot 6 \frac{\text{м}}{\text{с}}}{6 \frac{\text{м}}{\text{с}} - 5,5 \frac{\text{м}}{\text{с}}} = 1,8 \text{ м}$$

N.P.2

$$v = 10^3 \frac{\text{м}}{\text{с}}$$

$$\alpha = 60^\circ$$

R - ?



$$a_n = g \cdot \cos \alpha$$

$$a_n = \frac{v^2}{R}$$

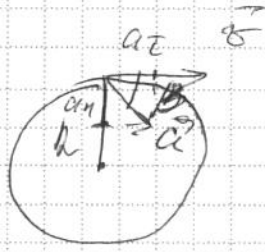
$$\frac{v^2}{R} = g \cdot \cos \alpha$$

$$R = \frac{v^2}{g \cos \alpha} = \frac{(10^3)^2}{10 \cdot \cos 60^\circ} \approx 204 \cdot 10^3 \text{ м}$$

N 8.3

$$\beta = 30^\circ$$

$$\beta = (\vec{v}, \vec{a})$$



$$a_n = a \cdot \sin \beta$$

$$a_t = a \cdot \cos \beta$$

$$\frac{a_n}{a_t} = \frac{a \sin \beta}{a \cos \beta} = \tan \beta = \frac{\sqrt{3}}{3}$$

$$\frac{a_n}{a_t} = ?$$

N 8.4

$$\sigma = kt \quad \left| \begin{array}{l} a = \sqrt{a_n^2 + a_t^2} \\ R \\ a_t = k \\ a(t) = ? \end{array} \right.$$

$$a_n = \frac{\sigma^2}{R} = \frac{k^2 t^2}{R}$$

$$a = \sqrt{\frac{k^4 t^4}{R^2} + k^2} = k \sqrt{\frac{k^2 t^4}{R^2} + 1} = \frac{k}{R} \sqrt{k^2 t^4 + R^2}$$

N 8.5

$$R = 0,2 \text{ м}$$

$$a_t = 0,05 \frac{\text{м}}{\text{с}^2}$$

$$a_n = 2a_t$$

$$v_0 = 0 \frac{\text{м}}{\text{с}}$$

t = ?

$$\sigma = a_t t$$

$$a_n = \frac{\sigma^2}{R} = \frac{a_t^2 t^2}{R}$$

$$2a_t = \frac{a_t^2 t^2}{R}$$

$$t = \sqrt{\frac{2a_t \cdot R}{a_t^2}} =$$

$$= \sqrt{\frac{0,2 \text{ м}}{0,05 \frac{\text{м}}{\text{с}^2}}} = 2 \text{ (с)}$$

№ 6.

КОД:

Дано:

$$\alpha = 60^\circ$$

$$R_0 = 64 \cdot 10^5 \text{ м}$$



$$R = R_0 \cos \alpha = 64 \cdot 10^5 \text{ м} \cdot \cos 60^\circ = 32 \cdot 10^5 \text{ м}$$

$$\nu = \frac{2\pi R}{T} = \frac{2 \cdot 3,14 \cdot 32 \cdot 10^5}{24 \cdot 3600} = 233 \frac{\text{м}}{\text{с}}$$

ν - ?

a_n - ?

$$a_n = \frac{\nu^2}{R} = \frac{(233 \frac{\text{м}}{\text{с}})^2}{32 \cdot 10^5 \text{ м}} = 1,7 \cdot 10^{-2} \frac{\text{м}}{\text{с}^2}$$

№ 7

$$R = 0,05 \text{ м}$$

$$t = 10 \text{ с}$$

$$S = 0,5 \text{ м}$$

$$\nu_0 = 0 \frac{\text{м}}{\text{с}}$$

ω - ?

$$S = \nu_0 t + \frac{a_{\tau} t^2}{2} \Rightarrow a_{\tau} = \frac{2S}{t^2}$$

$$a_{\tau} = \frac{2 \cdot 0,5 \text{ м}}{100 \text{ с}^2} = 10^{-2} \frac{\text{м}}{\text{с}^2}$$

$$a_{\tau} = \varphi \cdot R \quad \varphi = \frac{a_{\tau}}{R} = \frac{10^{-2} \frac{\text{м}}{\text{с}^2}}{5 \cdot 10^{-2} \text{ м}} = 0,2 \frac{1}{\text{с}^2}$$

$$\omega = \omega_0 + \varphi t = 0 + 0,2 \cdot 10 = 2 \frac{1}{\text{с}}$$

№ 9

$$\nu_1 = 1200 \frac{\text{об}}{\text{мин}}$$

$$\nu_1 = \nu_2$$

$$R_1 = 0,08 \text{ м}$$

$$\nu_1 = 2\pi R_1 \nu_1 = 2 \cdot 3,14 \cdot 0,08 \cdot \frac{1200}{60} = 10,048 \frac{\text{м}}{\text{с}}$$

$$R_2 = 0,32 \text{ м}$$

$$\nu_2 = 10,048 \frac{\text{м}}{\text{с}}$$

$$R_3 = 0,11 \text{ м}$$

$$\omega_2 = \frac{\nu_2}{R_2} = \frac{10,048 \frac{\text{м}}{\text{с}}}{0,32 \text{ м}} = 31,4 \frac{1}{\text{с}} = \omega_3$$

$$R_4 = 0,55 \text{ м}$$

$$\nu_3 = \omega_3 \cdot R_3 = 31,4 \cdot 0,11 = 3,454 \frac{\text{м}}{\text{с}} = \nu_4 \quad \nu_4 = \frac{\nu_4}{2\pi R_4} =$$

ν_n - ? ω_n - ?

$$= \frac{3,454}{2 \cdot 3,14 \cdot 0,55} = 1 \frac{1}{\text{с}} \quad \omega_4 = \frac{\nu_4}{R_4} = 6,18 \frac{1}{\text{с}}$$