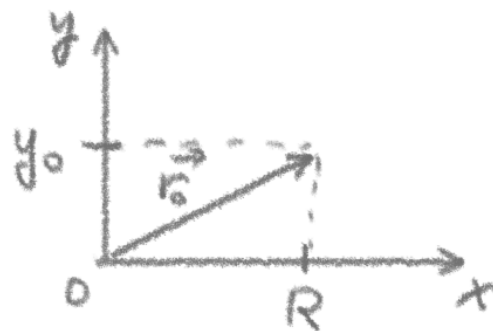


F1 - LS 2024, písomka 1, riešenie

1. $\vec{r} = x\vec{i} + y\vec{j}$
 $x = R \cos \omega t$
 $y = y_0 + R \sin \omega t$



$$t=0 \Rightarrow x(0) = R \cos 0 = R$$

$$y(0) = y_0 + R \sin 0 = y_0$$

$$\vec{r}(0) = R\vec{i} + y_0\vec{j}$$

$$v = \sqrt{v_x^2 + v_y^2}$$

$$v_x = \frac{dx}{dt} = -\omega R \sin \omega t$$

$$v_y = \frac{dy}{dt} = \omega R \cos \omega t$$

$$v = \sqrt{R^2 \omega^2 \sin^2 \omega t + R^2 \omega^2 \cos^2 \omega t} = R\omega \sqrt{\sin^2 \omega t + \cos^2 \omega t}$$

$$v = R\omega$$

Ide o rovnomerný pohyb, pretože veľkosť rýchlosti nezávisí od času.

2. v_0, t, D

$$N_j$$

$$s = v_0 t - \frac{1}{2} a t^2$$

$$0 = v_0 - a t$$

$$a = \frac{v_0}{t}$$

$$s = v_0 t - \frac{1}{2} \frac{v_0}{t} t^2 = \frac{1}{2} v_0 t$$

$$s = Na = N\pi D$$

$$N = \frac{s}{\pi D} \Rightarrow N = \frac{v_0 t}{2\pi D}$$

3.

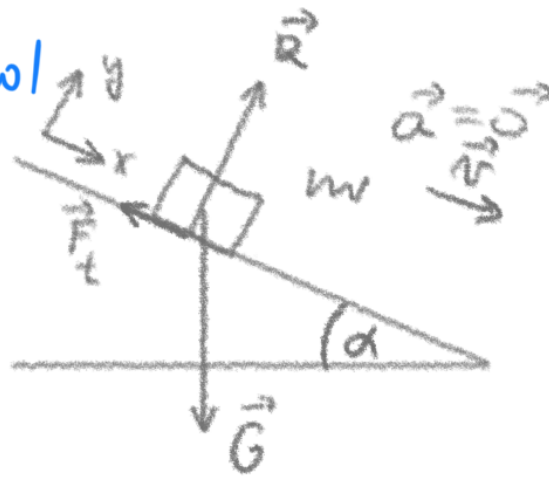
$$\underline{m, d}$$

$$\mu, F$$

$$x: 0 = mg \sin d - \mu R$$

$$y: 0 = -mg \cos d + R$$

ij nadol



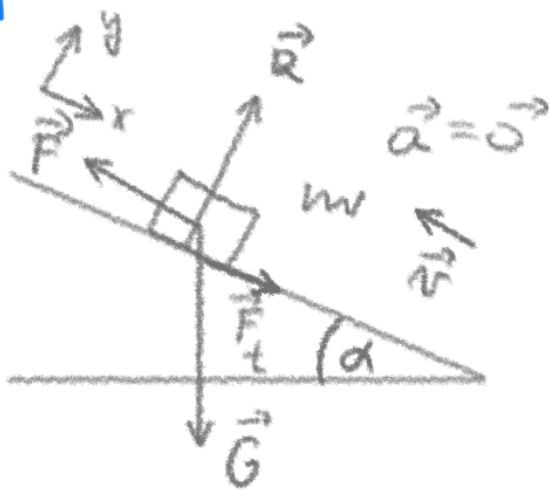
$$\vec{0} = \vec{G} + \vec{R} + \vec{F}_t$$

$$R = mg \cos d$$

$$0 = mg \sin d - \mu mg \cos d$$

$$\mu = \frac{\sin d}{\cos d} = \tan d$$

ii) nahor



$$\vec{0} = \vec{G} + \vec{R} + \vec{F}_t + \vec{F}$$

$$x: 0 = mg \sin d + \mu R - F$$

$$y: 0 = -mg \cos d + R$$

$$R = mg \cos d$$

$$0 = mg \sin d + \mu mg \cos d - F$$

$$F = mg (\sin d + \mu \cos d) = mg (\sin d + \tan d \cos d) = mg (\sin d + \sin d)$$

$$F = 2mg \sin d$$

4.

$$\underline{s, t}$$

$$P;$$

$$P = F \cdot r = F \frac{s}{t}$$

$$P = \frac{2mg s}{t} \sin d$$