

Prvá priebežná písomka z fyziky 1
LS 2022/2023 - riešenie

1. $x = A \sin(\omega t + \varphi)$

$v; a; \quad v = \frac{dx}{dt} = A\omega \cos(\omega t + \varphi)$

$a = \frac{dv}{dt} = -A\omega^2 \sin(\omega t + \varphi)$

$[A] = m; \quad [\omega] = \text{rad} \cdot \text{s}^{-1} = \text{s}^{-1}; \quad [\varphi] = \text{rad}$

2. $t_1 = 1 \text{ s}$

$N = 3$

$n = 100$

$t;$

$T = N t_1$

$f_0 = \frac{1}{T}; \quad \omega_0 = 2\pi f_0$

$2\pi n = \omega_0 t - \frac{1}{2} \varepsilon t^2$

$0 = \omega_0 - \varepsilon t$

$\varepsilon = \frac{\omega_0}{t}$

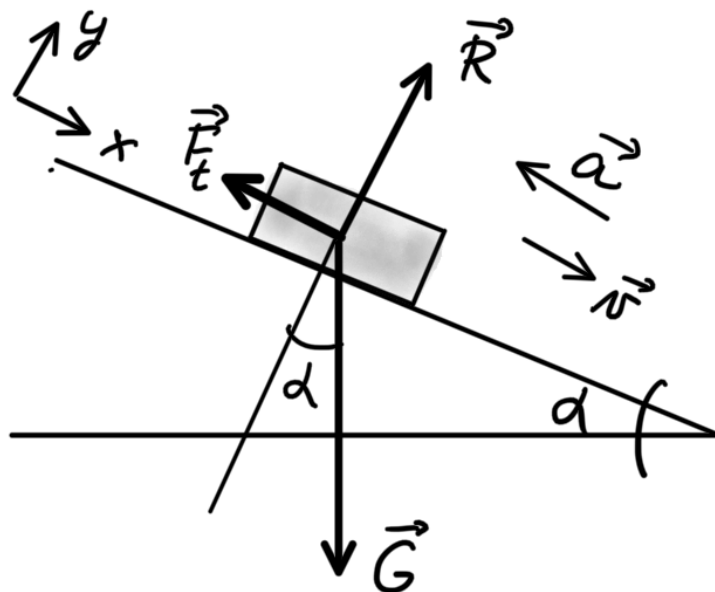
$2\pi n = \omega_0 t - \frac{1}{2} \frac{\omega_0}{t} t^2 = \frac{1}{2} \omega_0 t = \frac{1}{2} 2\pi f_0 t$

$t = \frac{2n}{f_0} = 2n N t_1 = 2 \cdot 100 \cdot 3 \cdot 1 \text{ s} = 600 \text{ s} = 10 \text{ min}$

3. $\frac{a, d}{\mu_j}$

$$m\vec{a} = \vec{G} + \vec{R} + \vec{F}_t$$

$$\underline{F_t = \mu R}$$



$$x: -ma = mg \sin \alpha - \mu R$$

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

$$R = mg \cos \alpha$$

$$\underline{-ma = mg \sin \alpha - \mu mg \cos \alpha}$$

$$\mu = \frac{a}{g \cos \alpha} + \tan \alpha$$

4. Môžu riešiť ako stratu mechanickej energie: $W_t = \frac{1}{2} m v_0^2 + mg \Delta h$

alebo ako prácu $W_t = \int_0^s \vec{F}_t ds = \mu m g s \cos \alpha$

V oboch prípadoch treba vyjadriť dráhu do zastavenia:

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

$$a \Delta h = \frac{1}{2} \frac{v_0^2}{a} \sin \alpha$$

$$W_t = \frac{1}{2} m v_0^2 \left(1 + \frac{g}{a} \sin \alpha \right)$$