

Sile: trenja, lepenja, teže [NALOGE] iz knjige

SILA IN POSPEŠEK, str. 83

Naloga 1: (str. 90)

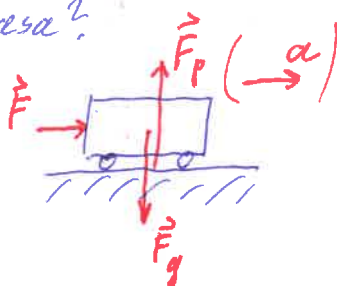
Telo se pod vplivom sile 50 N giblje s stalnim pospeškom 2 m/s^2 .

Kolikšna je njegova masa?

$$F = 50 \text{ N}$$

$$a = 2 \text{ m/s}^2 = 2 \cdot 10^{-2} \text{ m/s}^2$$

$$m = ?$$



$$\Sigma \vec{F} = m \cdot \vec{a}$$

$$F = m \cdot a \quad | \cdot \frac{1}{a}$$

$$m = \frac{F}{a}$$

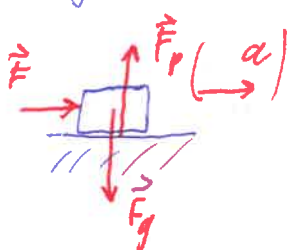
$$m = \frac{50 \text{ N}}{2 \cdot 10^{-2} \text{ m/s}^2} = 25 \cdot 10^2 \text{ kg}$$

Naloga 2: Telo z maso 10 kg potiskamo s silo 10 N, s kolikšnim pospeškom se telo giblje?

$$m = 10 \text{ kg}$$

$$F = 10 \text{ N}$$

$$a = ?$$



$$\Sigma \vec{F} = m \cdot \vec{a}$$

$$F = m \cdot a \quad | \cdot \frac{1}{m}$$

$$a = \frac{F}{m} = \frac{10 \text{ N}}{10 \text{ kg}} = 1 \text{ m/s}^2$$

$$(N = \text{kg} \cdot \frac{\text{m}}{\text{s}^2})$$

Naloga 3: S kolikšno stalno silo moramo potiskati telo z maso 100 kg, da se v času 10 s od začetka potiskanja premakne za 100 m v smeri sile? Telo v začetku miruje.

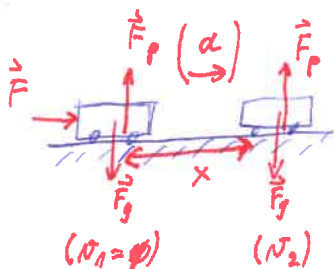
$$m = 100 \text{ kg}$$

$$t = 10 \text{ s}$$

$$x = 100 \text{ m}$$

$$v_1 = 0$$

$$F = ?$$



• SILA POTISKAJA:

$$\Sigma \vec{F} = m \cdot \vec{a}$$

$$F = m \cdot a$$

$$F = 100 \text{ kg} \cdot 2 \frac{\text{m}}{\text{s}^2}$$

$$F = 200 \text{ N}$$

• Pot opravljena (s pospeškom):

$$x = v_1 \cdot t + \frac{a \cdot t^2}{2}$$

$$x = 0 \cdot t + \frac{a t^2}{2}$$

$$x = \frac{1}{2} a t^2$$

$$a = \frac{2 \cdot x}{t^2} = \frac{2 \cdot 100 \text{ m}}{(10 \text{ s})^2} = 2 \frac{\text{m}}{\text{s}^2}$$

Naloga-4: Auto z maso 12t vozi s hitrostjo 30 m/s v vodoravni smeri. S kolikšno ~~hitrostjo~~ stalno sito ga moramo zavirati v vodoravni smeri, da se ustavi na oddaljenosti 20m od začetka zaviranja?

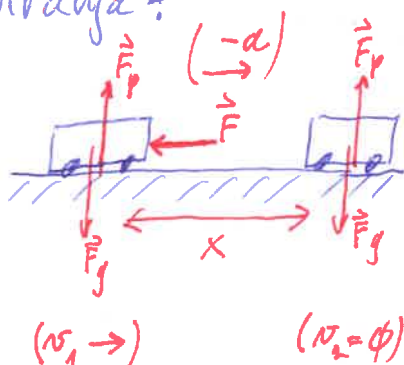
$$m = 12t = 1200 \text{ kg}$$

$$v_1 = 30 \frac{\text{m}}{\text{s}}$$

$$x = 20 \text{ m}$$

$$v_2 = \phi$$

$$F = ?$$



• SILA (zaviranja)

$$\Sigma \vec{F} = m \cdot \vec{a}$$

$$F = m \cdot a$$

$$F = 1200 \text{ kg} \cdot 22,5 \frac{\text{m}}{\text{s}^2}$$

$$F = 27000 \text{ N}$$

$$F = 27 \text{ kN}$$

• Pospešek (pri opravljeni poti):

$$v_2^2 = v_1^2 + 2 \cdot a \cdot x$$

$$v_2^2 - v_1^2 = 2 \cdot a \cdot x$$

$$a = \frac{v_2^2 - v_1^2}{2 \cdot x}$$

$$a = \frac{\phi - (30 \frac{\text{m}}{\text{s}})^2}{2 \cdot 20 \text{ m}}$$

$$a = -22,5 \frac{\text{m}}{\text{s}^2}$$

Naloga-5: Dvigalo z maso 10t se spušča s stalno hitrostjo, obešeno je na jekleno vrv, ki je lahko obremenjena največ s silo 150kN. Kolikšna je lahko največja sprememba hitrosti dvigala med ustavljanjem v sekundi?

$$m = 10t = 10 \cdot 10^3 \text{ kg}$$

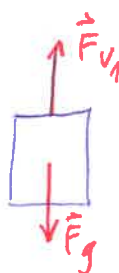
$$F_{v2} = 150 \text{ kN} = 150 \cdot 10^3 \text{ N}$$

$$\Delta v (\Delta t = 1 \text{ s}) = ?$$

$$\hookrightarrow \frac{\Delta v}{\Delta t} = a \Rightarrow a = ?$$

(1) enakomerno spuščanje

$$\vec{v} = \text{konst.}$$

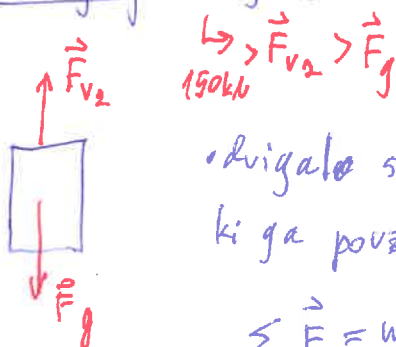


$$\Sigma \vec{F} = \phi$$

$$F_{v1} + F_g = \phi$$

$$F_{v1} = -F_g$$

(2) ustavljanje dvigala:



• dvigalo se ustavlja s pospeškom a , ki ga povzroča rezultanta $\vec{F}$:

$$\Sigma \vec{F} = m \cdot \vec{a}$$

$$F_{v2} - F_g = m \cdot a$$

$$a = \frac{F_{v2} - F_g}{m} = \frac{150 \cdot 10^3 \text{ N} - 100 \cdot 10^3 \text{ N}}{10 \cdot 10^3 \text{ kg}}$$

$$a = \frac{(150 - 100) \frac{\text{m}}{\text{s}^2}}{10} = \frac{50}{10} \frac{\text{m}}{\text{s}^2} = 5 \frac{\text{m}}{\text{s}^2}$$

Rešitev/Odgovor:

- v 1 sekundi se hitrost spremeni za 5 m/s.

$$F_g = m \cdot g$$

$$F_g = 10 \cdot 10^3 \cdot 10 \frac{\text{m}}{\text{s}^2}$$

$$F_g = 100 \cdot 10^3 \text{ N}$$