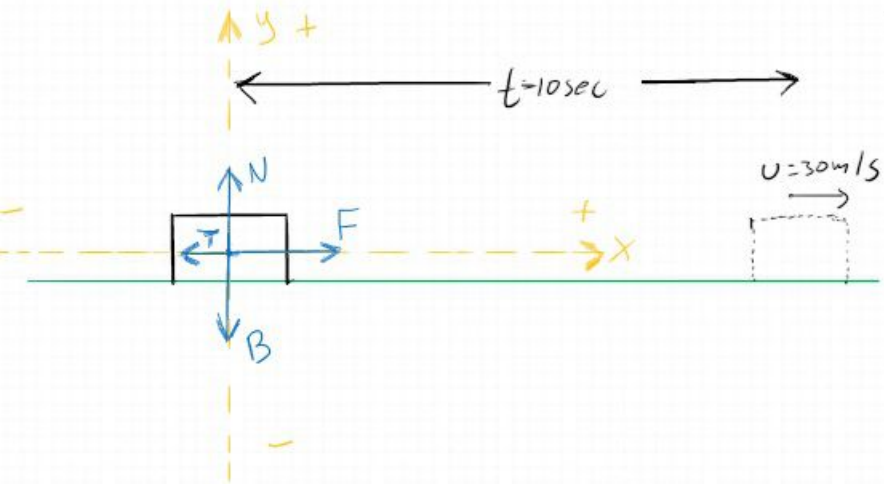


# 'Agency 1

$$\begin{array}{l|l} v_0 = 0 & \text{a) } w = j \\ \mu = 0.2 & \text{b) } x = j \text{ } \dot{x} \text{ em } t = 10 \text{ sec} \\ F = 100 \text{ N} & \text{c) } v = j \text{ } -11- \\ a = 3 \text{ m/s}^2 & \text{d) } z = j \text{ } (\text{posição em } t = 10 \text{ sec}) \\ g = 10 \text{ m/s}^2 & \\ T = \mu N & \end{array}$$



a)

'Análise y:  $\sum \vec{f}_y = \vec{0} \Rightarrow \vec{B} + \vec{N} = \vec{0}$

$$-B + N = 0 \Rightarrow B = N$$

$$N = m \cdot g \quad (1)$$

'Análise x:  $\sum \vec{f}_x = m \cdot \vec{a} \Rightarrow \vec{F} + \vec{T} = m \cdot \vec{a}$

$$\left. \begin{array}{l} F = T = m \cdot a \\ T = \mu \cdot N \\ (1) \end{array} \right\} \begin{array}{l} F - \mu \cdot N = m \cdot a \Rightarrow \\ \Rightarrow F - \mu \cdot m \cdot g = m \cdot a \Rightarrow \end{array}$$

$$\Rightarrow F = m \cdot a + \mu \cdot m \cdot g \Rightarrow$$

$$\Rightarrow m = \frac{F}{a + \mu g} \Rightarrow$$

$$\Rightarrow m = \frac{100}{3 + 0.2 \cdot 10} \text{ kg} \Rightarrow$$

b)  $x = x_0 + v_0 t + \frac{1}{2} a t^2$

$$x_{t=10} = \cancel{x_0} + \cancel{v_0} t + \frac{1}{2} a t^2 = \frac{1}{2} 3 \cdot 10^2 \text{ m} = 150 \text{ m}$$

c)  $v = v_0 + a t$



Aξoves y:  $\sum f_y = 0 \Rightarrow B + N = 0$

$-B + N = 0 \Rightarrow B = N$

$N = m \cdot g$  (1)

Aξoves x:  $\sum F_x = m \cdot \vec{a} \Rightarrow \vec{F} + \vec{T} = m \vec{a}$

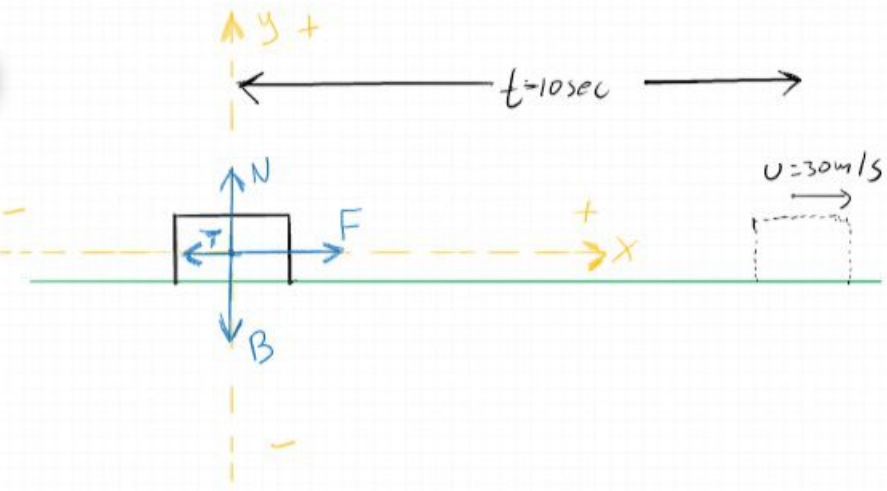
$$\left. \begin{array}{l} F - T = m \cdot a \\ T = \mu \cdot N \end{array} \right\} \begin{array}{l} F - \mu \cdot N = m \cdot a \Rightarrow \\ \Rightarrow F - \mu \cdot m \cdot g = m \cdot a \Rightarrow \end{array}$$

$\Rightarrow F = m \cdot a + \mu \cdot m \cdot g \Rightarrow$

$\Rightarrow m = \frac{F}{a + \mu \cdot g} \Rightarrow$

$\Rightarrow m = \frac{100}{3 + 0,2 \cdot 10} \text{ kg} \Rightarrow$

$\Rightarrow m = 20 \text{ kg}$



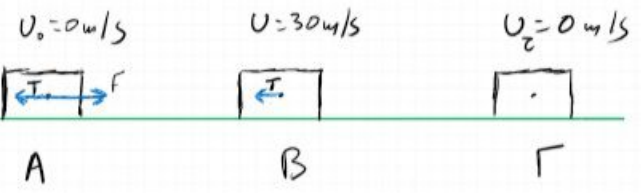
b)  $x = x_0 + v_0 \cdot t + \frac{1}{2} a t^2$

$x_{t=10} = x_0 + v_0 \cdot t + \frac{1}{2} a t^2 = \frac{1}{2} 3 \cdot 10^2 \text{ m} = 150 \text{ m}$

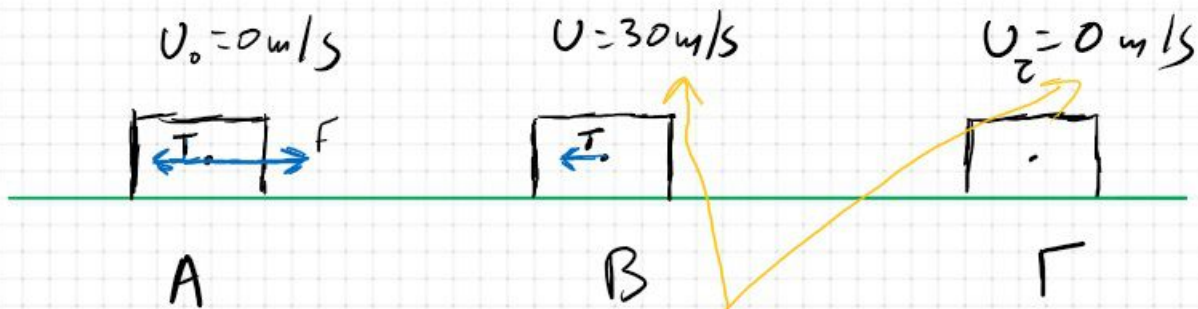
c)  $v = v_0 + a t$

$v_{t=10} = v_0 + a t = 3 \cdot 10 \text{ m/s} = 30 \text{ m/s}$

d)



d)



$$v_z = v_{\text{apx}} + at \leadsto v_z = v_{\text{apx}} - a'z \Rightarrow$$

$$v_z^0 = v_{\text{apx}} - \frac{\mu \cdot N}{m} \cdot z \Rightarrow v_{\text{apx}} = \frac{\mu \cdot m \cdot g}{m} \cdot z$$

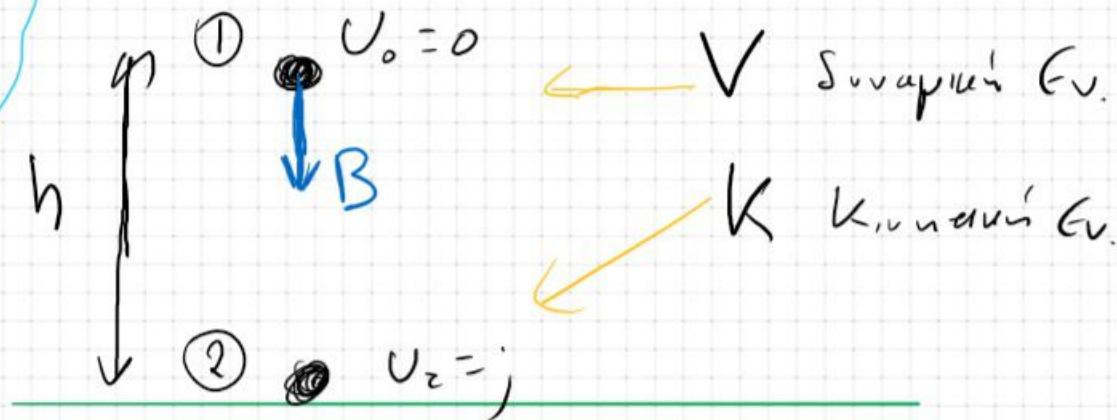
$$\Rightarrow z = \frac{v_{\text{apx}}}{\mu \cdot g} = \frac{30 \text{ m/s}}{0,2 \cdot 10 \text{ m/s}^2} \Rightarrow z = \underline{\underline{15 \text{ sec}}}$$

$$\left. \begin{aligned} \rightarrow \rightarrow \\ \sum f_x = m \cdot a' \Rightarrow \\ -T = m \cdot a' \Rightarrow \\ a' = -\frac{T}{m} \Rightarrow \\ a' = \frac{\mu \cdot N}{m} \end{aligned} \right\}$$

## 'Ασκηση 2

$$\Sigma \omega \mu \alpha \quad h = 1,8 \text{ m} \quad \left| \quad U_{\text{εξαρτά}} = \right.$$
$$g = 10 \text{ m/s}^2$$

$$\begin{aligned} W &= F \cdot x = \\ &= B \cdot h = \\ &= mgh \end{aligned}$$



$$\left. \begin{aligned} K &= \frac{1}{2} m v^2 \\ V &= m \cdot g \cdot h \end{aligned} \right\} \oplus M E = V + K$$

ΑΔΜΕ

$$M E_1 = M E_2$$

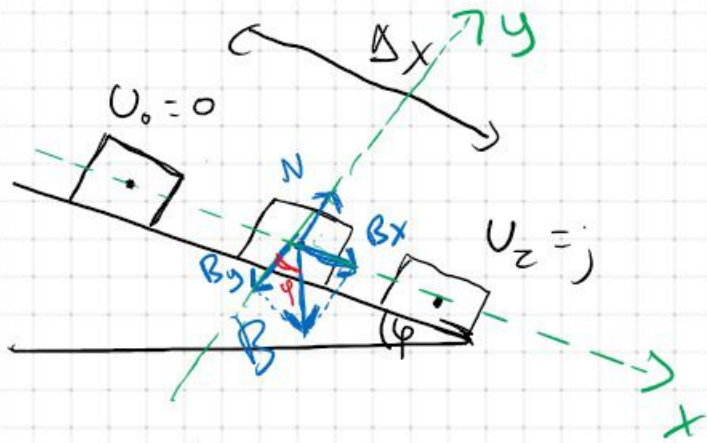
$$V_1 + K_1 = V_2 + K_2$$

$$mgh = \frac{1}{2} m v_2^2 \Rightarrow$$

$$\Rightarrow v = \sqrt{2gh} =$$

$$= \sqrt{2 \cdot 10 \text{ m/s}^2 \cdot 1,8 \text{ m}} = 6 \text{ m/s}$$

# Акция 3



$$\begin{aligned} \varphi &= 30^\circ \\ g &= 10 \text{ m/s}^2 \\ \Delta x &= 10 \text{ m} \\ T &= 0 \end{aligned}$$

$$U_{bx} = v$$

$$B_x = B \cdot \sin \varphi = m \cdot g \sin \frac{\pi}{6} = \frac{mg}{2}$$

$$B_y = B \cdot \cos \varphi = mg \cos \frac{\pi}{6}$$

$$W = \Delta K \quad \frac{1}{2} m U^2$$

$$\hookrightarrow B_x \cdot \Delta x = K_z - K_a \stackrel{0}{=} \Rightarrow$$

$$\Rightarrow B_x \cdot \Delta x = \frac{1}{2} m U_z^2 \Rightarrow$$

$$\Rightarrow \frac{mg}{2} \Delta x = \frac{1}{2} m U_z^2 \Rightarrow U_z = \sqrt{g \cdot \Delta x} \Rightarrow$$

$$\Rightarrow \sqrt{10 \text{ m/s}^2 \cdot 10 \text{ m}} = \sqrt{100 \text{ m}^2/\text{s}^2} \Rightarrow$$

$$\Rightarrow \boxed{U_z = 10 \text{ m/s}}$$