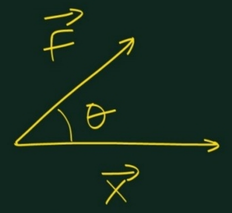
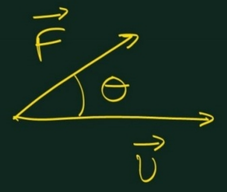
Έργο δύναμης



$$W_F = F \cdot x \cdot \sigma\upsilon\nu\theta$$

Ισχύς δύναμης

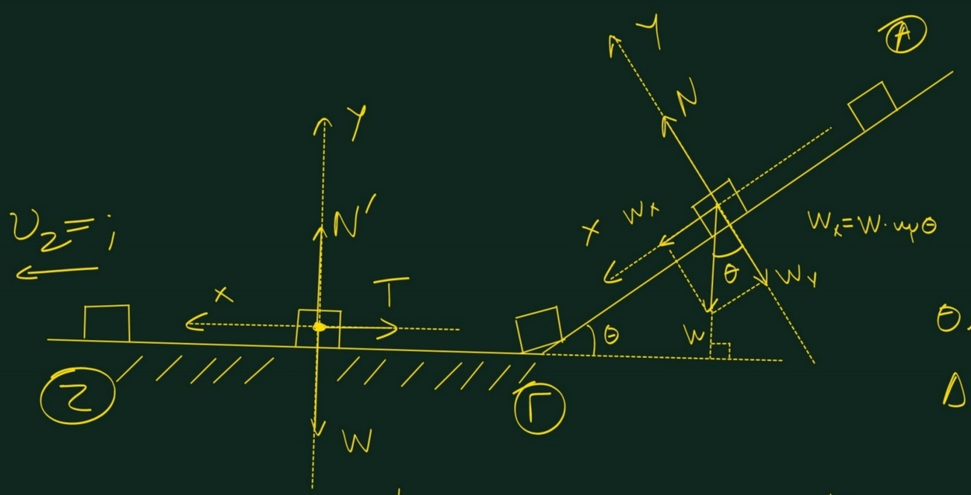


$$P_F = \frac{\Delta W_F}{\Delta t} = F \cdot \upsilon \cdot \sigma\upsilon\nu\theta$$

$$P_F = \frac{\Delta W_F}{\Delta t}$$

Ισχύς = ρυθμός παραγωγής έργου.

Άσκ. 6 σελ. 193.)



$\Sigma F_y = 0 \Rightarrow N' = W = mg$

$T = \mu N' \Rightarrow T = \mu \cdot m \cdot g$

ΘΜΚΕ : Α → Γ :

$\Delta K = \Sigma W \Rightarrow K_\Gamma - K_A = W_{W_x} + W_{W_y} + W_N \Rightarrow$

$(\vec{W}_y, \vec{N} \perp \Delta\vec{x})$

$K_\Gamma - 0 = W_{W_x} = W_x \cdot A\Gamma \Rightarrow$

$K_\Gamma = m \cdot g \cdot A\Gamma \cdot \eta\mu\theta$

ΘΜΚΕ : Γ → Ζ :

$\Delta K = \Sigma W \Rightarrow K_Z - K_\Gamma = W_{N'} + W_W + W_T \Rightarrow$

$(\vec{N}', \vec{W} \perp \Delta\vec{x})$

$K_Z - m \cdot g \cdot A\Gamma \cdot \eta\mu\theta = -T \cdot \Gamma Z \Rightarrow$

$K_Z = m \cdot g \cdot A\Gamma \cdot \eta\mu\theta - \mu \cdot m \cdot g \cdot \Gamma Z \Rightarrow$

$$\frac{1}{2}\cdot m\cdot v_2^2 = m\cdot g\cdot A\Gamma\cdot \eta\mu\theta - \gamma\cdot m\cdot g\cdot \Gamma Z \Rightarrow$$

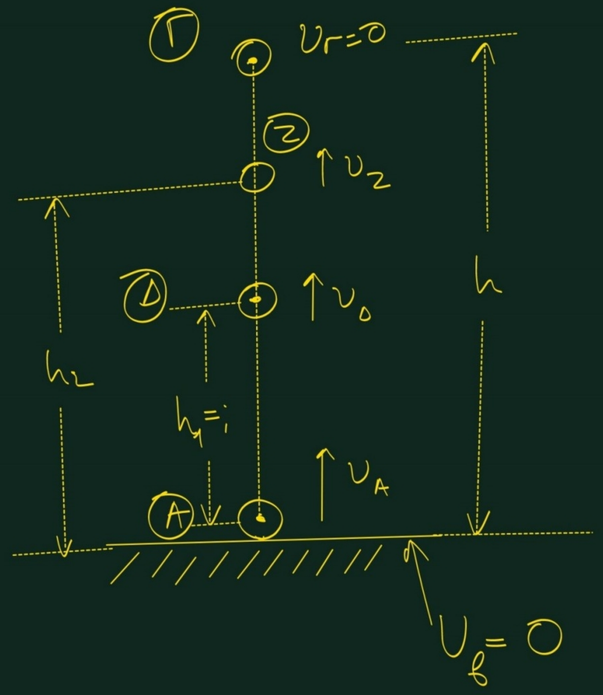
$$\frac{v_2^2}{2} = g\cdot A\Gamma\cdot \eta\mu\theta - \gamma\cdot g\cdot \Gamma Z \Rightarrow$$

$$\frac{v_2^2}{2} = 10\cdot 6\cdot \frac{1}{2} - 0{,}2\cdot 10\cdot 6 \Rightarrow$$

$$\frac{v_2^2}{2} = 30 - 12 \Rightarrow \frac{v_2^2}{2} = 18 \Rightarrow$$

$$v_2^2 = 36 \Rightarrow \boxed{v_2 = 6\,m/s}$$

Ασκ. 13 σελ. 194.



Α. ΑΔΜΕ: Α → Γ:

$K_A + U_A = K_\Gamma + U_\Gamma \Rightarrow$

$K_A = m \cdot g \cdot h$

ΑΔΕ: Α → Δ:

$K_A + U_A = K_\Delta + U_\Delta \Rightarrow$

$K_A + 0 = \frac{K_A}{2} + mgh_1 \Rightarrow$

$mgh = \frac{mgh}{2} + mg \cdot h_1 \Rightarrow$

$h = \frac{h}{2} + h_1 \Rightarrow 40 = 20 + h_1 \Rightarrow$

$h_1 = 20\,m.$

Β. Ορμή: $p = mU$.

$p_2 = \frac{p_A}{2} \Rightarrow m \cdot U_2 = \frac{m \cdot U_A}{2} \Rightarrow$

$U_2 = \frac{U_A}{2} \Rightarrow$

$\frac{1}{2} m \cdot U_2^2 = \frac{1}{2} \cdot m \cdot \left(\frac{U_A}{2}\right)^2 \Rightarrow$

$K_2 = \frac{1}{4} \cdot \frac{1}{2} m U_A^2 \rightarrow K_2 = \frac{1}{4} \cdot K_A \Rightarrow$

$K_2 = \frac{K_A}{4}$

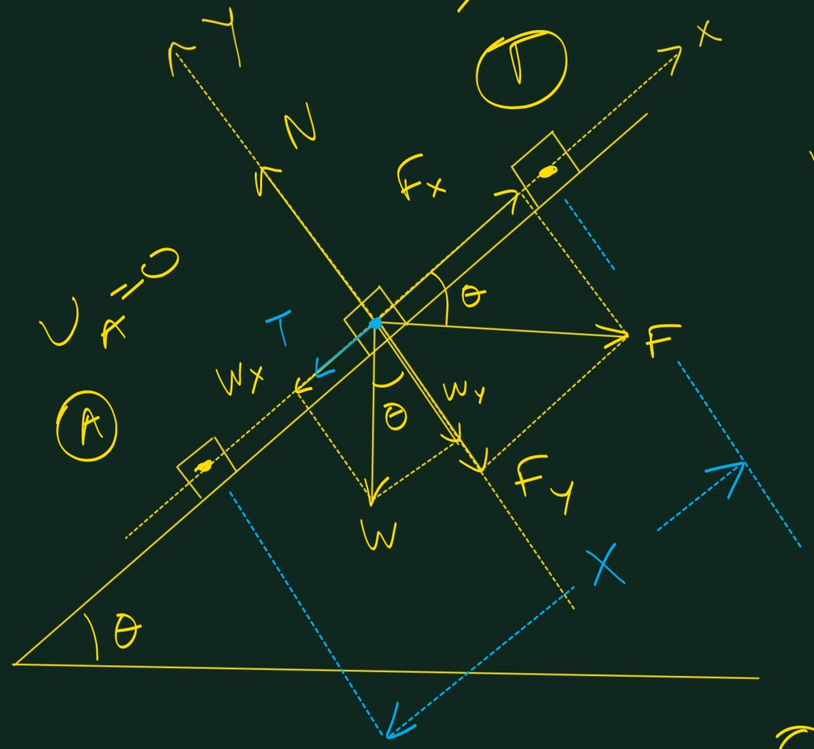
ΑΔΕ: Α → Ζ:

$K_A + U_A = K_2 + U_2 \Rightarrow$

$K_A + 0 = \frac{K_A}{4} + mgh_2 \Rightarrow h_2 = \frac{3h}{4} \Rightarrow$

$h_2 = 30\,m$

Άσκ. 16 σελ. 194.)



$$F_x = F \cdot \sigma\upsilon\nu\theta = 100 \cdot 0{,}8 = 80\ N$$

$$F_y = F \cdot \eta\mu\theta = 100 \cdot 0{,}6 = 60\ N$$

$$W_x = W \cdot \eta\mu\theta = m \cdot g \cdot \eta\mu\theta = 5 \cdot 10 \cdot 0{,}6 = 30N$$

$$W_y = W \cdot \sigma\upsilon\nu\theta = m \cdot g \cdot \sigma\upsilon\nu\theta = 5 \cdot 10 \cdot 0{,}8 = 40N$$

$$\Sigma F_y = 0 \Rightarrow N - F_y - W_y = 0 \Rightarrow$$

$$N = F_y + W_y \Rightarrow N = 60 + 40 \Rightarrow N = 100N$$

$$T = \mu \cdot N = 0{,}4 \cdot 100 \Rightarrow T = 40N.$$

$$\mu_{\sigma\tau,max} = \mu_{ολίσθησης} = \mu = 0{,}4.$$

ΘΜΚΕ: $(A) \to (\Gamma)$: $\Delta K = \Sigma W \Rightarrow$

$$K_\Gamma - \cancel{K_A}^{0} = W_{W_x} + \cancel{W_{W_y}}^{0} + W_{F_x} + \cancel{W_{F_y}}^{0} + \cancel{W_N}^{0} + W_T \Rightarrow$$

$$\left(\vec{W_y}, \vec{F_y}, \vec{N} \perp \Delta\vec{x}\right)$$

$$\frac{1}{2}m\cdot v_r^2 = -W_x\cdot x - T\cdot x + F_x\cdot x \Rightarrow$$

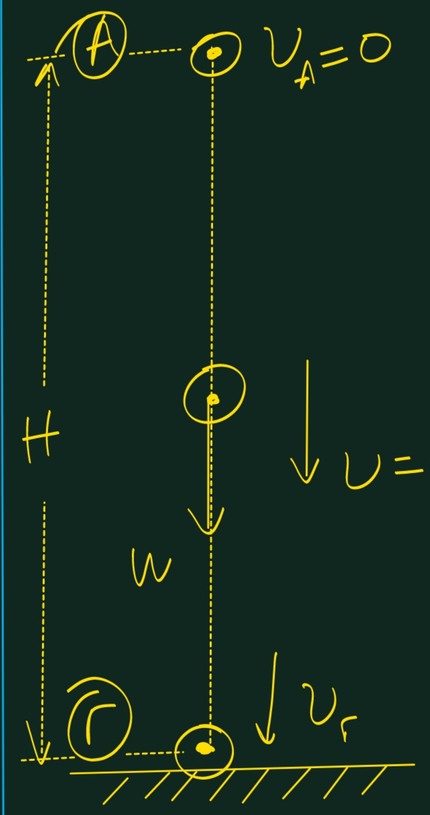
$$\frac{1}{2}\cdot \cancel{5}\cdot v_r^2 = -30\cdot\cancel{5} - 40\cdot\cancel{5} + 80\cdot\cancel{5} \Rightarrow$$

$$\frac{v_r^2}{2} = 80-70 \Rightarrow \frac{v_r^2}{2} = 10 \Rightarrow$$

$$v_r^2 = 20 \Rightarrow v_r = \sqrt{20} = \sqrt{4\cdot 5} \Rightarrow$$

$$v_r = 2\sqrt{5}\ m/s.$$

Α 6ω. 17 σελ. 194)



Α. ΘΜΚΕ: Α → Γ:

$\Delta K = \Sigma W \Rightarrow$

$K_r - K_A = W_w \Rightarrow$

$\frac{1}{2}m\cdot v_r^2 - 0 = m\cdot g\cdot H \Rightarrow$

$v_r^2 = 2\cdot g\cdot H = 2\cdot 10\cdot 20 \Rightarrow$

$v_r^2 = 400 \Rightarrow$ **$v_r = 20\ m/s.$**

Β. Γενικά ισχύει:

$\Delta U = -\Delta W_F$

↑ μεταβολή δυναμικής ενέργειας

↑ έργο δύναμης πεδίου.

$(F=w)$

$$\Delta U = -\Delta W_w \Rightarrow$$

$$\frac{\Delta U}{\Delta t} = -\frac{\Delta W_w}{\Delta t} \Rightarrow$$

$$\frac{\Delta U}{\Delta t} = -P_w = -w \cdot v \cdot \text{συν} 0^\circ \Rightarrow$$

$$\frac{\Delta U}{\Delta t} = -m \cdot g \cdot g \cdot t \cdot 1 \Rightarrow$$

$$\frac{\Delta U}{\Delta t} = -m \cdot g^2 \cdot t \Rightarrow \frac{\Delta U}{\Delta t} = -100t \ (SI)$$

$\downarrow$

Watt

Χρόνος πτώσης: $H = \frac{1}{2} g \cdot t_1^2 \Rightarrow 20 = \frac{1}{2} \cdot 10 \cdot t_1^2 \Rightarrow$

$5t_1^2 = 20 \Rightarrow t_1^2 = 4 \Rightarrow t_1 = 2 sec.$

Για $t = 0$ sec είναι: $\frac{\Delta U}{\Delta t} = 0$ Watt

Για $t = 2$ sec είναι: $\frac{\Delta U}{\Delta t} = -200$ W.