

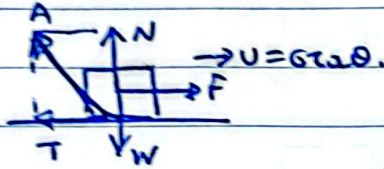
ΛΥΣΕΙΣ ΔΙΑΓΩΝΙΣΜΑΤΟΣ ΦΥΣΙΚΗΣ Α' ΛΥΚΕΙΟΥ 5-4-26

ΘΕΜΑ Α

A1) β A2) α A3) γ A4) γ A5) Σ, Λ, Λ, Λ, Λ

ΘΕΜΑ Β

B1)



$\rightarrow u = \sigma \omega R$

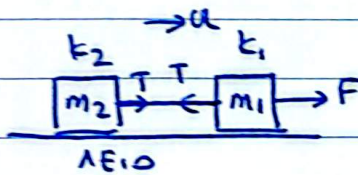
$$\Sigma F_y = 0 \Rightarrow N = W \Rightarrow N = 8\text{N}$$

$$\Sigma F_x = 0 \Rightarrow F = T \Rightarrow T = 6\text{N}$$

$$A = \sqrt{T^2 + N^2} = \sqrt{6^2 + 8^2} = 10\text{N}$$

$$T = \mu \cdot N \Rightarrow \mu = \frac{T}{N} = \frac{6}{8} = \frac{3}{4} \quad (\delta)$$

B2)



$\Pi_1 \text{ τὸ } k_1: F - T = m_1 a \quad (1)$

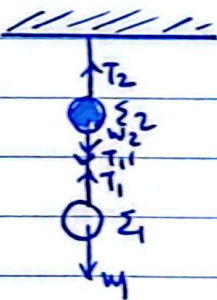
$\Pi_2 \text{ τὸ } k_2: T = m_2 a \quad (2)$

$$\frac{(1)}{(2)} \Rightarrow \frac{F - T}{T} = \frac{m_1 a}{m_2 a} \Rightarrow \frac{F - T}{T} = \frac{2m}{m} \Rightarrow \frac{F - T}{T} = 2 \Rightarrow F - T = 2T$$

$$\Rightarrow \boxed{F = 3T} \quad (\beta)$$

B3)

1)



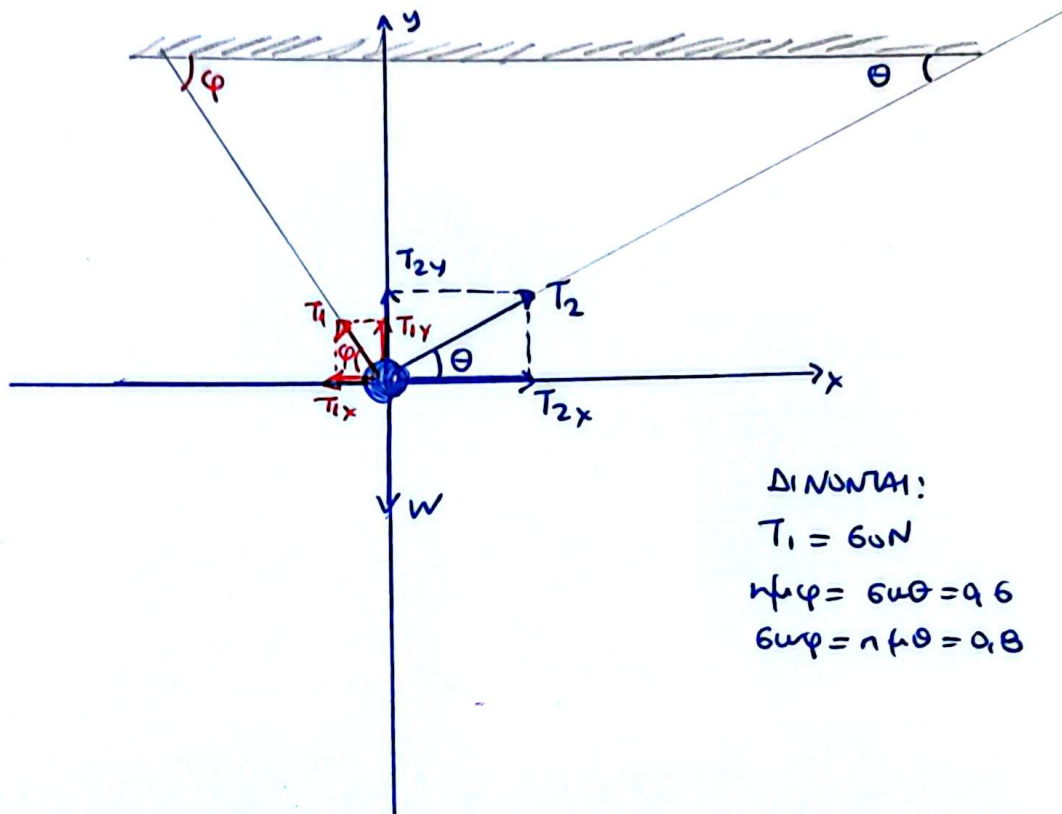
ΙΣΟΡΡΩΝΙΑ Σ1: $\Sigma F = 0 \Rightarrow T_1 = W_1 \Rightarrow \boxed{T_1 = 50\text{N}}$

$T_1 = T_1' = 50\text{N}$ Νόμος αβάρων κ' ή κ γινεται

ΙΣΟΡΡΩΝΙΑ Σ2: $\Sigma F = 0 \Rightarrow T_1' + W_2 = T_2 \Rightarrow$

$$50\text{N} + 100\text{N} = T_2 \Rightarrow \boxed{T_2 = 150\text{N}}$$

I1)



ΔΙΝΟΝΤΑΙ:

$$T_1 = 60\text{N}$$

$$\eta\mu\varphi = 6\mu\theta = 0,6$$

$$6\mu\varphi = \eta\mu\theta = 0,8$$

$$\bullet \Sigma F_x = 0 \Rightarrow T_{1x} = T_{2x} \Rightarrow T_1 6\mu\varphi = T_2 6\mu\theta \Rightarrow 60 \cdot 0,8 = T_2 \cdot 0,6 \Rightarrow$$

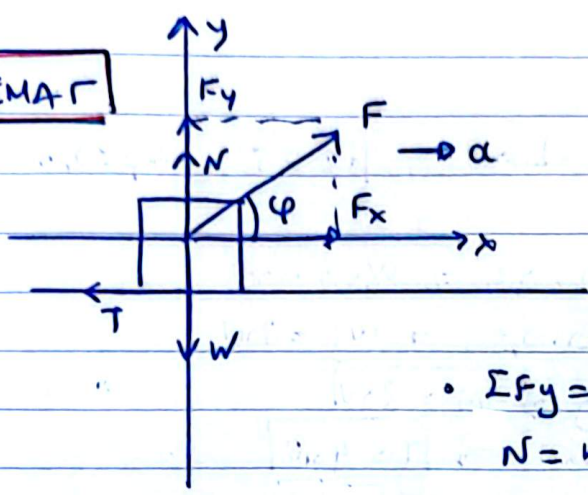
$$\Rightarrow \boxed{T_2 = 80\text{N}}$$

$$\bullet \Sigma F_y = 0 \Rightarrow T_{2y} + T_{1y} = W \Rightarrow T_2 \eta\mu\theta + T_1 \eta\mu\varphi = W \Rightarrow$$

$$\Rightarrow 80 \cdot 0,8 + 60 \cdot 0,6 = W \Rightarrow 64\text{N} + 36\text{N} = W \Rightarrow \boxed{W = 100\text{N}}$$

$$\text{Αρα } W = mg \Rightarrow 100 = 10 \cdot m \Rightarrow \boxed{m = 10\text{kg}}$$

ΘΕΜΑ Γ



$W = mg = 100\text{N}$
 $F_x = F \cos \varphi = 60\text{N}$
 $F_y = F \sin \varphi = 80\text{N}$

$\Sigma F_y = 0 \Rightarrow F_y + N = W \Rightarrow$
 $N = W - F_y \Rightarrow N = 100\text{N} - 80\text{N} \Rightarrow$
 $N = 20\text{N}$

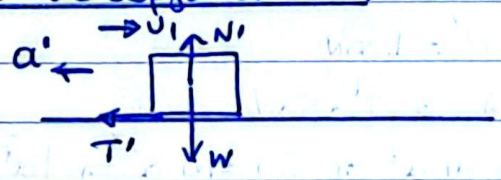
$\Gamma 1) T = \mu \cdot N \Rightarrow \mu = \frac{T}{N} = \frac{10\text{N}}{20\text{N}} \Rightarrow \boxed{\mu = 0,5}$

$\Gamma 2) \Sigma F_x = ma \Rightarrow F_x - T = ma \Rightarrow 60 - 10 = 10 \cdot a \Rightarrow \boxed{a = 5\text{m/s}^2}$

$\Gamma 3) s_1 = \frac{1}{2} a \Delta t_1^2 \Rightarrow \Delta t_1 = \sqrt{\frac{2s_1}{a}} = \sqrt{\frac{2 \cdot 10}{5}} \Rightarrow \Delta t_1 = \sqrt{4} \Rightarrow$
 $\boxed{\Delta t_1 = 2\text{s}}$

$v_1 = a \Delta t_1 \Rightarrow v_1 = 5 \cdot 2 \Rightarrow \boxed{v_1 = 10\text{m/s}}$

Όταν υατορηθεί η F:



$\Sigma F_y = 0 \Rightarrow N' = W \Rightarrow N' = 100\text{N}$
 $T' = \mu \cdot N' \Rightarrow T' = 0,5 \cdot 100\text{N}$
 $\boxed{T' = 50\text{N}}$

$\Sigma F_x = ma' \Rightarrow T' = ma' \Rightarrow 50 = 10a' \Rightarrow \boxed{a' = 5\text{m/s}^2}$

ΜΕΤΩΣ ΕΠΙΒΡΑΔΥΝΗΣΗΣ

$\Gamma 4) \Delta t_2 = t_{\text{stop}} = \frac{v_{\text{max}}}{|a'|} = \frac{10}{5} \Rightarrow \boxed{\Delta t_2 = 2\text{sec}}$

$t_2 - t_1 = 2\text{sec} \Rightarrow t_2 - 2\text{sec} \Rightarrow \boxed{t_2 = 4\text{sec}}$

$\Gamma 5) s_2 = s_{\text{stop}} = \frac{v_{\text{max}}^2}{2|a'|} = \frac{10^2}{2 \cdot 5} = \frac{100}{10} \Rightarrow \boxed{s_2 = 10\text{m}}$

$s_{\text{ολ}} = s_1 + s_2 = 10\text{m} + 10\text{m} \Rightarrow \boxed{s_{\text{ολ}} = 20\text{m}}$

ΘΕΜΑ Δ

$$m = 10 \text{ kg}, \quad W = mg = 100 \text{ N}, \quad \mu = 0,5 \quad \mu_{\text{sc}} = 0,6 \quad \sigma_{\text{sc}} = 0,8$$

A → Γ

$$W_x = W \cdot \mu_{\text{sc}} = 100 \cdot 0,6 \Rightarrow W_x = 60 \text{ N}$$

$$W_y = W \cdot \sigma_{\text{sc}} = 100 \cdot 0,8 \Rightarrow W_y = 80 \text{ N}$$

$$D1) \quad \Sigma F_y = 0 \Rightarrow N = W_y \Rightarrow \boxed{N = 80 \text{ N}}$$

$$T = \mu \cdot N = 0,5 \cdot 80 \text{ N} \Rightarrow \boxed{T = 40 \text{ N}}$$

$$D2) \quad \Sigma F_x = m a_1 \Rightarrow W_x - T = m a_1 \Rightarrow 60 - 40 = 10 \cdot a_1 \Rightarrow \\ 20 = 10 a_1 \Rightarrow \boxed{a_1 = 2 \text{ m/s}^2}$$

$$D3) \quad S_1 = \frac{1}{2} a_1 \Delta t_1^2 \Rightarrow 4 = \frac{1}{2} \cdot 2 \cdot \Delta t_1^2 \Rightarrow \Delta t_1^2 = 4 \Rightarrow$$

$$\Delta t_1 = \sqrt{4} \Rightarrow \Delta t_1 = 2 \text{ s} \quad \text{και} \quad v_1 = a_1 \Delta t_1 = 2 \cdot 2 \Rightarrow \\ \boxed{v_1 = 4 \text{ m/s}}$$

D4)

Γ → Δ

$$\Sigma F_y = 0 \Rightarrow N' = W \Rightarrow N' = 100 \text{ N}$$

$$T' = \mu \cdot N' = 0,5 \cdot 100 \text{ N} \Rightarrow T' = 50 \text{ N}$$

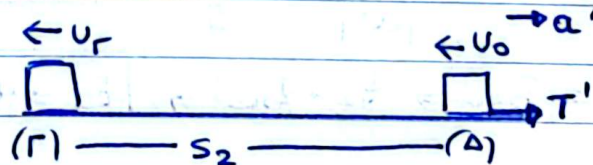
$$\Sigma F_x = m a' \Rightarrow T' = m a' \Rightarrow 50 = 10 a' \Rightarrow \boxed{a' = 5 \text{ m/s}^2}$$

$$(ΓΔ) = S_2 = \frac{v_{\text{sc}}^2}{2|a'|} = \frac{4^2}{2 \cdot 5} = \frac{16}{10} \Rightarrow \boxed{S_2 = 1,6 \text{ m}}$$

ΜΕΤΡΩ
ΕΝΙΣΘΑΔΙΑΣΗ

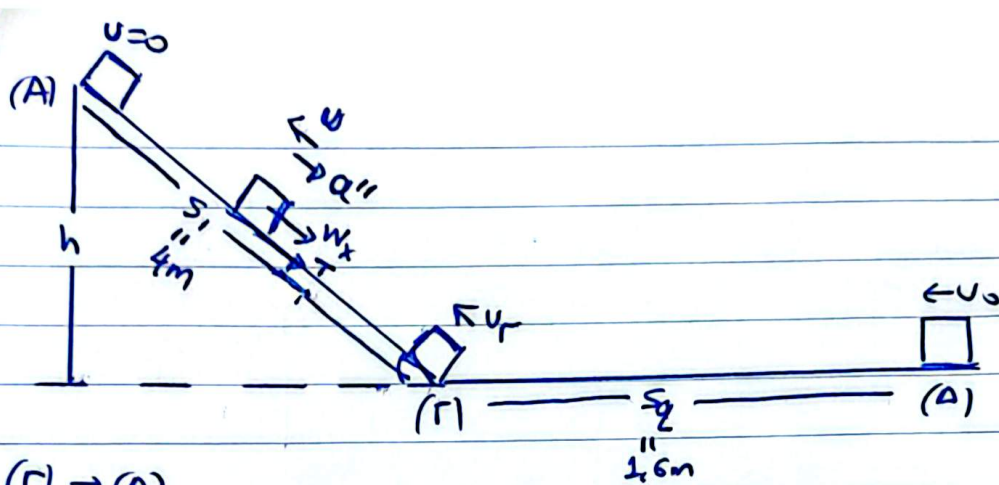
D5)

Δ → Γ



$$\bullet \quad S_2 = \frac{v_0^2 - v_r^2}{2|a'|} \Rightarrow v_0^2 - v_r^2 = 2|a'|S_2 \Rightarrow v_0^2 = v_r^2 + 2|a'|S_2$$

$$\Rightarrow v_0 = \sqrt{v_r^2 + 2|a'|S_2} \quad (1)$$



(Γ) → (A)

$$\Sigma F_x = ma'' \Rightarrow W_x + T = ma'' \Rightarrow 60 + 40 = 10 a'' \Rightarrow$$

$$\Rightarrow 100 = 10 a'' \Rightarrow a'' = 10 \text{ m/s}^2, \text{ ΜΕΤΡΟ ΕΠΙΒΡΑΔΥΝΣΗΣ}$$

$$s_f = s_{\text{stop}} = \frac{v_\Gamma^2}{2|a''|} \Rightarrow 4 = \frac{v_\Gamma^2}{2 \cdot 10} \Rightarrow v_\Gamma^2 = 80 \text{ ή } v_\Gamma = \sqrt{80} \text{ m/s} \quad (2)$$

Από (1) ⁽²⁾ $u_0 = \sqrt{80 + 2 \cdot 5 \cdot 1,6} = \sqrt{96} \text{ m/s}$ ή

$$u_0 = \sqrt{96} = \sqrt{16 \cdot 6} = 4\sqrt{6} \text{ m/s} \Rightarrow$$

$$u_0 = \sqrt{96} \text{ m/s} = 4\sqrt{6} \text{ m/s}$$