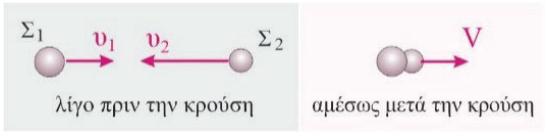
Λύσεις κριτηρίου 8

ΘΕΜΑ Α

Α1. (β) **Α2.** (β) **Α3.** (γ) **Α4.** (δ) **Α5.** α. Λ β. Σ γ. Λ δ. Σ ε. Λ

ΘΕΜΑ Β

Β1. (i)

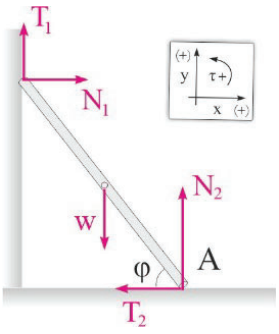


$$\Delta P_1 = m_1 V - m_1 \upsilon_1 = -0,6 m_1 \upsilon_1 \Rightarrow \upsilon_1 = 2,5V$$

$$A\Delta O: m_1\upsilon_1 - m_2\upsilon_2 = (m_1 + m_2)V \Rightarrow \upsilon_2 = 2\upsilon_1$$

$$K_2 = \frac{1}{2} m_2 \upsilon_2^{\,2} = \frac{1}{2}\frac{m_1}{4}(2\upsilon_1)^2 = K_1 \Rightarrow \frac{K_1}{K_2} = 1$$

Β2. (ii)



$$\Sigma F_x = 0 \Rightarrow N_1 = T_2 \Rightarrow N_1 = 2T_1 \Rightarrow T_1 = \frac{N_1}{2} \Rightarrow \mu_\sigma N_1 = \frac{N_1}{2} \Rightarrow \mu_\sigma = 0,5$$

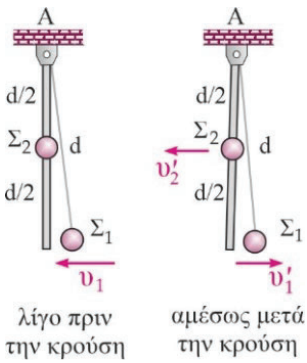
$$T_2 = \mu_\sigma N_2 = 0,5 N_2 \Rightarrow N_2 = 2T_2 = 4T_1$$

$$\Sigma F_y = 0 \Rightarrow w = N_2 + T_1 = 5T_1$$

$$\Sigma\tau_{(A)} = 0 \Rightarrow w\frac{L}{2}\sigma\upsilon\nu\varphi = N_1 L\eta\mu\varphi + T_1 L\sigma\upsilon\nu\varphi \Rightarrow$$

$$\frac{5T_1}{2}\sigma\upsilon\nu\varphi = 2T_1\eta\mu\varphi + T_1\sigma\upsilon\nu\varphi \Rightarrow \varepsilon\varphi\varphi = 0,75$$

Β3. (iii)



$$A\Delta ME: m_1 g d = \frac{1}{2} m_1 \upsilon_1^{\,2} \Rightarrow \upsilon_1 = \sqrt{2gd}$$

$$A\Delta ME: \frac{1}{2} m_1 \upsilon_1'^{\,2} = m_1 g h \Rightarrow \upsilon_1' = \sqrt{2gh} = \frac{\sqrt{2gd}}{2} \Rightarrow \upsilon_1' = \frac{\upsilon_1}{2}$$

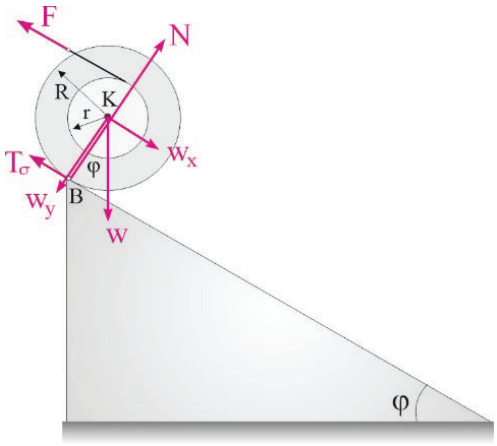
$$L_{\alpha\rho\chi} = L_{\tau\varepsilon\lambda} \Rightarrow m_1\upsilon_1 d = -m_1\upsilon_1' d + m_2\upsilon_2'\frac{d}{2} \Rightarrow \upsilon_2' = \frac{3m_1\upsilon_1}{m_2}$$

$$K_{\alpha\rho\chi} = K_{\tau\varepsilon\lambda} \Rightarrow \frac{1}{2} m_1 \upsilon_1^{\,2} = \frac{1}{2} m_1 \upsilon_1'^{\,2} + \frac{1}{2} m_2 \upsilon_2'^{\,2} \Rightarrow m_2 = 12 m_1$$

ΘΕΜΑ Γ

Γ1.

$$\Sigma\tau_{(B)} = 0 \Rightarrow w\eta\mu\varphi R = F(r+R) \Rightarrow r = \frac{R}{3} = 0,04m$$



Γ2. $\Sigma F_x = 0 \Rightarrow w_x = T_\sigma + F \Rightarrow T_\sigma = 1N$

$$\Sigma F_y = 0 \Rightarrow w_y = N = 3N \qquad T_\sigma = \mu_\sigma N \Rightarrow \mu_\sigma = \frac{1}{3}$$

Γ3. $\alpha_{cm} = \alpha_{\gamma\omega\nu} R = 6m/s^2$

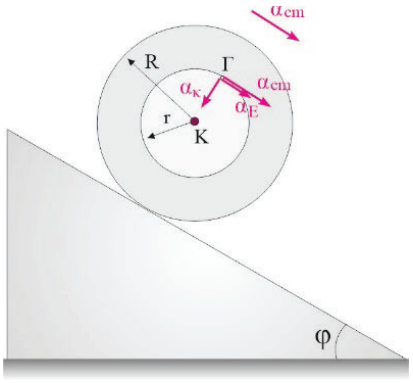
$$\upsilon_{cm} = \alpha_{cm} t \Rightarrow t = 0,5s$$

$$d = \frac{1}{2}\alpha_{cm} t^2 = \frac{3}{4}m$$

Γ4. $\alpha_\varepsilon = \alpha_{\gamma\omega\nu} r = 2m/s^2$

$$\alpha_\kappa = \frac{\upsilon^2}{r} = \omega^2 r = \left(\alpha_{\gamma\omega\nu} t\right)^2 r \Rightarrow \alpha_\kappa = 25m/s^2,$$

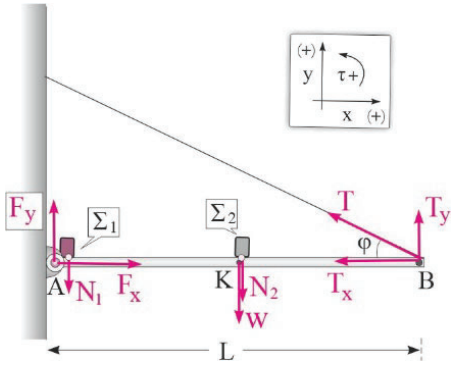
$$\alpha_\Gamma = \sqrt{\left(\alpha_{cm} + \alpha_\varepsilon\right)^2 + \alpha_\kappa{}^2} = \sqrt{689} \Rightarrow \alpha_\Gamma = 26,25m/s^2$$



ΘΕΜΑ Δ

Δ1. $\Sigma\tau_{(A)} = 0 \Rightarrow Mg\frac{L}{2} + N_2\frac{L}{2} = T\eta\mu\varphi L \Rightarrow T = 30N$

με $N_2 = m_2 g \Rightarrow N_2 = 10N$



Δ2. $t_1 = t_2 \Rightarrow \frac{KA}{|\upsilon_1'|} = \frac{KB}{\upsilon_2'} \Rightarrow |\upsilon_1'| = \upsilon_2' \Rightarrow \upsilon_1' = -\upsilon_2'$

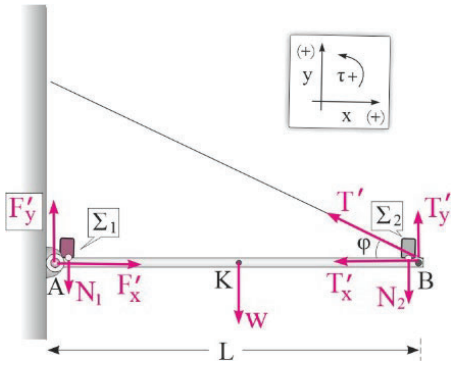
$$\upsilon_1' = -\upsilon_2' \Rightarrow \frac{m_1 - m_2}{m_1 + m_2}\upsilon_0 = -\frac{2m_1}{m_1 + m_2}\upsilon_0 \Rightarrow$$

$$m_1 = \frac{m_2}{3} = \frac{1}{3}kg$$

Δ3. $\upsilon_1' = \frac{m_1 - m_2}{m_1 + m_2}\upsilon_0 = -\frac{\upsilon_0}{2}$

$$t_{ολ} = \frac{AK}{\upsilon_0} + \frac{KA}{|\upsilon_1'|} = \frac{\frac{L}{2}}{\upsilon_0} + \frac{\frac{L}{2}}{\frac{\upsilon_0}{2}} \Rightarrow \upsilon_0 = 1 m/s$$

Δ4. $\Sigma\tau_{(A)} = 0 \Rightarrow Mg\frac{L}{2} + N_2 L = T'\eta\mu\varphi L \Rightarrow T' = 40N$



$$\Sigma F_y = 0 \Rightarrow w + N_1 + N_2 = F_y' + T_y' \Rightarrow F_y' = \frac{40}{3} N$$

με $N_1 = m_1 g \Rightarrow N_1 = \frac{10}{3} N$

$$F' = \sqrt{F_x'^2 + F_y'^2} = \frac{\sqrt{12400}}{3} \Rightarrow F' = 37N$$