

Λύσεις κριτηρίου 7

ΘΕΜΑ Α

A1. (δ) A2. (α) A3. (β) A4. (γ) A5. α. Λ β. Λ γ. Σ δ. Σ ε. Σ

ΘΕΜΑ Β

B1. (iii)

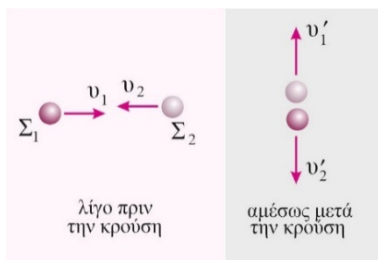
$$K_2 = 3K_1 \Rightarrow \frac{1}{2}m_2v_2^2 = 3\frac{1}{2}m_1v_1^2 \quad (1)$$

$$\text{ΑΔΟ}(x): P_{\text{αρχ},x} = P_{\text{τελ},x} \Rightarrow m_1v_1 - m_2v_2 = 0 \quad (2)$$

Από (1) και (2) προκύπτει :

$$v_2 = 3v_1 \quad \text{και} \quad m_1 = 3m_2$$

$$\text{ΑΔΟ}(y): P_{\text{αρχ},y} = P_{\text{τελ},y} \Rightarrow 0 = m_1v_1 - m_2v_2 \Rightarrow v_2 = v_1$$

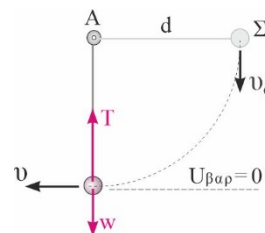


B2. (ii)

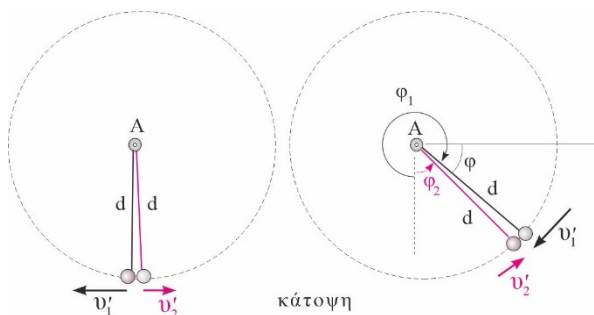
$$F_k = T - w = \frac{mv^2}{d} \Rightarrow 4mg - mg = \frac{mv^2}{d} \Rightarrow v = \sqrt{3gd}$$

$$\text{ΑΔΜΕ}: \frac{1}{2}mv_0^2 + mgd = \frac{1}{2}mv^2 \Rightarrow v_0 = \sqrt{gd}$$

$$\frac{L}{L} = \frac{v}{mv_0d} = \frac{v}{v_0} \Rightarrow L = \sqrt{\quad}$$



B3. (i)



$$L_2 = 2L_1 \Rightarrow m_2 |v_2| d = 2m_1 |v_1| d \Rightarrow |v_2| = |v_1|$$

$$v_1' = \frac{m_1 - m_2}{m_1 + m_2} v_1 + \frac{2m_2}{m_1 + m_2} v_2 \Rightarrow$$

$$v_1' = -\frac{5}{3} v_1 \quad (v_2 = -v_1)$$

$$v_2' = \frac{2m_1}{m_1 + m_2} v_1 + \frac{m_2 - m_1}{m_1 + m_2} v_2 \Rightarrow$$

$$v_2' = \frac{1}{3} v_1$$

$$\varphi_1 + \varphi_2 = 2\pi \Rightarrow \omega_1 t + \omega_2 t = \frac{|v_1'|}{d} t + \frac{v_2'}{d} t = 2\pi \Rightarrow t = \frac{\pi d}{v_1}, \quad \varphi_2 = \omega_2 t = \frac{v_2'}{d} t = \frac{v_1}{3d} \frac{\pi d}{v_1} \Rightarrow \varphi_2 = \frac{\pi}{3} \text{ rad}$$

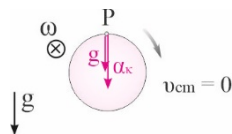
$$\varphi = \frac{\pi}{2} - \varphi_2 = \frac{\pi}{6} \Rightarrow \varphi = 30^\circ$$

ΘΕΜΑ Γ

Γ1. $\theta = \omega t = 80 \text{ rad}, \quad N = \frac{\theta}{2\pi} = \frac{40}{\pi}$ στροφοές

$$y = v_0 t - \frac{1}{2} g t^2 = 0 \Rightarrow t = \frac{2v_0}{g} = 2 \text{ s}$$

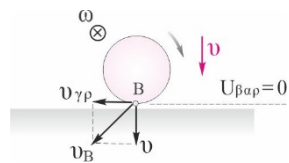
Γ2. $\alpha_p = \alpha_k + g = \omega^2 r + g = 170 \text{ m/s}^2$



Γ3. ΑΔΜΕ: $\frac{1}{2} m v_0^2 + 0 = \frac{1}{2} m v^2 + 0 \Rightarrow v = v_0 = 10 \text{ m/s}$

$$v_B = \sqrt{v_{\gamma p}^2 + v^2} = \sqrt{(\omega r)^2 + v^2} \Rightarrow v_B = \sqrt{116} \text{ m/s}$$

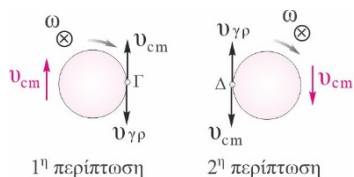
$$\varepsilon \vartheta = \frac{v}{v_{\gamma p}} = 2,5$$



Γ4. 1^η περίπτωση:

$$v_\Gamma = v_{cm} - v_{\gamma p} = 0 \Rightarrow v_0 - g t_1 = \omega r \Rightarrow t_1 = 0,6 \text{ s}$$

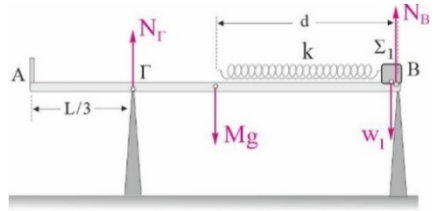
2^η περίπτωση:



$$v_{\Delta} = |v_{cm}| - v_{\gamma\pi} = 0 \Rightarrow |v_0 - gt_2| = gt_2 - v_0 = \omega r \Rightarrow t_2 = 1,4s$$

ΘΕΜΑ Δ

Δ1. $\Sigma\tau_{(B)} = 0 \Rightarrow Mg \frac{L}{2} = N_{\Gamma} \frac{2L}{3} \Rightarrow M = 4kg$



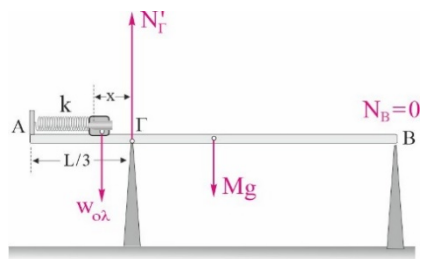
$$\Sigma F = 0 \Rightarrow N_B + N_{\Gamma} = Mg + m_1g \Rightarrow m_1 = 3,9kg$$

Δ2. $\Sigma\tau_{(\Gamma)} = 0 \Rightarrow Mg \frac{L}{6} = (m_1 + m_2)gx \Rightarrow$

$$x = \frac{L}{6} = 0,5m$$

αριστερά του σημείου Γ.

$$T = \mu N = \mu(m_1 + m_2)g = 10N$$



$$\Theta MKE: 0 - \frac{1}{2}(m_1 + m_2)V^2 = -T\left(\frac{2L}{3} + x\right) - \frac{1}{2}k\left(\frac{L}{2} - \frac{L}{3} + x\right)^2 \Rightarrow V = 5m/s$$

Δ3. $\Lambda\Delta O: m_2v_0 = (m_1 + m_2)V \Rightarrow v_0 = 200m/s$

$$Q_1 = \frac{1}{2}m_2v_0^2 - \frac{1}{2}m_1v^2 = 1950J, \quad Q_2 = |W_T| = T\left(\frac{2L}{3} + x\right) \Rightarrow Q_2 = 25J$$

$$Q_{\text{ολ.}} = Q_1 + Q_2 = 1975J \quad \dot{\eta} \quad Q_{\text{ολ.}} = E_{\text{αρχ.}} - E_{\text{τελ.}} = \frac{1}{2}m_2v_0^2 - \frac{1}{2}k\left(\frac{L}{3}\right)^2 \Rightarrow Q_{\text{ολ.}} = 1975J$$

Δ4. $\Theta MKE: \frac{1}{2}(m_1 + m_2)v^2 - \frac{1}{2}(m_1 + m_2)V^2 = -T\frac{L}{2} \Rightarrow v = \sqrt{17,5}m/s$

$$\frac{dQ}{dt} = \frac{d|W_T|}{dt} = \frac{Tdx}{dt} = Tv \Rightarrow \frac{dQ}{dt} = 42J/s$$