

ΛΥΣΕΙΣ ΔΙΑΓΩΝΙΣΜΑΤΟΣ Β' ΛΥΚΕΙΟΥ  
(15-01-17)

Θεμα Α: 1. β, 2. α, 3. γ, 4. γ, 5. Λ, Λ, Ξ, Ξ, Ξ

Θεμα Β:

$$B_1. v_B' = \frac{m-4m}{m+4m} v = -\frac{3}{5}v$$

$$v_r' = \frac{2m}{m+4m} v = \frac{2}{5}v = \frac{10}{25}v$$

$$v_B'' = \frac{m-4m}{m+4m} \left(-\frac{3}{5}v\right) = \frac{9}{25}v$$

}  $\Rightarrow v_B'' < v_r'$

Άρα 2 κρούσεις... α

$$B_2. \text{ ADO: } mv = 3mV_1 \rightarrow V_1 = \frac{v}{3}$$

$$E_{\text{ανη}_1} = \frac{1}{2}mv^2 - \frac{1}{2}3m\left(\frac{v}{3}\right)^2 = \frac{1}{3}mv^2$$

$$\text{ADO: } 2mv = 3mV_2 \rightarrow V_2 = \frac{2v}{3}$$

$$E_{\text{ανη}_2} = \frac{1}{2}2mv^2 - \frac{1}{2}3m\left(\frac{2v}{3}\right)^2 = \frac{1}{3}mv^2$$

}  $\Rightarrow$

$$E_{\text{ανη}_1} = E_{\text{ανη}_2}, \text{ άρα } \alpha$$

$$B_3. \left. \begin{array}{l} v_A = v_{\text{cm}} + \omega r \\ v_B = v_{\text{cm}} - \omega r \end{array} \right\} \xrightarrow{(+)} v_{\text{cm}} = \frac{v_A + v_B}{2}$$

$$k' v_B = \frac{v_{\text{cm}}}{4} \text{ ή } v_r = \frac{7}{4} v_{\text{cm}}$$

$$\text{άρα } v_{\text{sp}} = \frac{3}{4} v_{\text{cm}} \rightarrow r = \frac{3}{4} R$$

α

ΘΕΜΑ Γ:

Γ<sub>1</sub>.  $x_{st} = \frac{v_0^2}{2a_{cm}} \rightarrow a_{cm} = 5 \text{ m/s}^2$  ;  $\omega = 10 \text{ rad/s}^2$

Γ<sub>2</sub>.  $t_{st} = \frac{v_0}{a_{cm}} = 4 \text{ s}$

Γ<sub>3</sub>.  $\Delta\theta = \omega t - \frac{1}{2}\alpha t^2$   $\left. \begin{array}{l} t=2\text{s} \quad \theta = 60 \text{ rad} \\ t=3\text{s} \quad \theta = 75 \text{ rad} \end{array} \right\} \rightarrow \Delta\theta = 15 \text{ rad}$

$N = \frac{\Delta\theta}{\Delta t} = 15/2 \text{ επανά}$

Γ<sub>4</sub>.  $v_{top} = \omega R \equiv v_{cm} \rightarrow v_{top} = 5 \text{ m/s}$

Γ<sub>5</sub>.  $v = v_{cm}\sqrt{3} = 5\sqrt{3} \text{ m/s}$  ;  $\theta = \frac{\Delta\phi}{2} = \pi/6 \text{ rad}$

ΘΕΜΑ Δ:

Δ<sub>1</sub>. ΘΜΚΕ:  $\frac{1}{2}m_2 v_1^2 - \frac{1}{2}m_1 v_0^2 = -m_1 g d \rightarrow v_1 = 4 \text{ m/s}$

Δ<sub>2</sub>.  $v_1' = \frac{m_1 - m_2}{m_1 + m_2} v_1 = 2 \text{ m/s}$  ;  $v_2' = \frac{2m_1}{m_1 + m_2} v_1 = 2 \text{ m/s}$

Δ<sub>3</sub>. ΘΜΚΕ:  $0 - \frac{1}{2}m_1 v_1'^2 = -m_1 g d' \rightarrow d' = 1 \text{ m}$   
οπότε  $s = 1,25 \text{ m}$

Δ<sub>4</sub>. Στην ανώτερη θέση  $T=0 \rightarrow v = \sqrt{gl} = \sqrt{5} \text{ m/s}$

Στην κατώτερη θέση ΘΜΚΕ:  $v_0 = \sqrt{5gl} = \sqrt{2} \text{ m/s}$

οπότε ενεργεί ανακρούμενο!

Δ<sub>5</sub>. Στην ανώτερη θέση:  $T + mg = m \frac{v_1'^2}{l} \rightarrow T_{\min} = 90 \text{ N}$

Στην κατώτερη θέση:  $T - mg = m \frac{v_1'^2}{l} \rightarrow T_{\max} = 270 \text{ N}$