Διαγώνισμα *Β Τάξης Ενιαίου Λυκείου*

Κυριακή 11 Δεκεμβρίου 2021

Φυσική Θετικού Προσανατολισμού

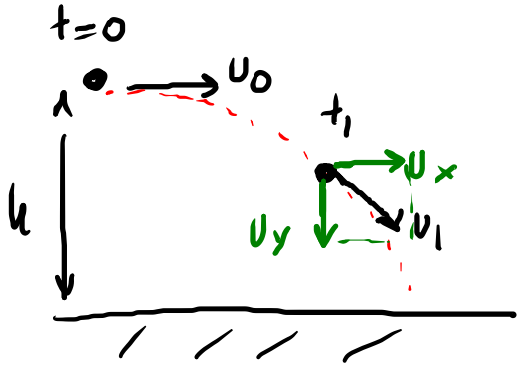
Σύνολο Σελίδων: εννέα (9) - Διάρκεια Εξέτασης: 3 ώρες

Θέμα Α

Α.1 → (δ), Α.2 → (γ), Α.3 → (γ), Α.4 → (δ)

Α.5/ Λ, Λ, Σ, Σ, Λ

Β.1



↓ (β)

$U_1 = 3U_0$

$U_1 = \sqrt{U_x^2 + U_y^2}$

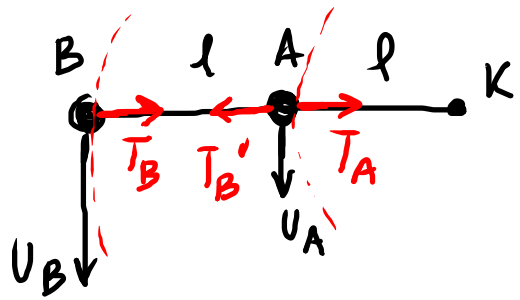
$U_x = U_0$, $U_y = gt$

$(3U_0)^2 = U_0^2 + U_y^2$

$9U_0^2 - U_0^2 = U_y^2 \Rightarrow U_y = U_0\sqrt{8}$

Αρα $g \cdot t_1 = U_0\sqrt{8} \Rightarrow \boxed{t_1 = \frac{U_0 2\sqrt{2}}{g}}$

Β.2



$\frac{U_A}{U_B} = \frac{\omega \cdot r_A}{\omega \cdot r_B} = \frac{l}{2l} \Rightarrow \boxed{\frac{U_A}{U_B} = \frac{1}{2}}$ Β.2.1 (β)

$\Sigma F_B = m a_B \Rightarrow T_B = m\omega^2 r_B$

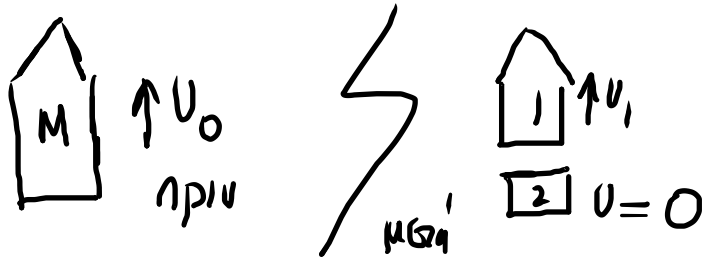
$\Sigma F_A = m a_A \Rightarrow T_A - T_B' = m\omega^2 r_A$

$T_B = T_B'$ $r_A = l$ $r_B = 2l$

$T_A - m\omega^2 2l = m\omega^2 l \Rightarrow T_A = 3m\omega^2 l$

$\frac{T_A}{T_B} = \frac{3m\omega^2 l}{m\omega^2 2l} = \frac{3}{2}$ αρα Β.2.2 (β)

Β.3



Α.Δ.Ο. $\vec{P}_{\sigma\upsilon\sigma}^{\pi\rho\iota\nu} = \vec{P}_{\sigma\upsilon\sigma}^{\mu\epsilon\tau\acute{\alpha}}$

$MV_0 = m_1V_1 + 0 \Rightarrow MV_0 = \frac{4}{5}MV_1$

$\Rightarrow V_1 = \frac{5}{4}V_0$

$\Delta P_1 = m_1V_1 - m_1V_0 = m_1\frac{5}{4}V_0 - m_1V_0$

$m_1 = \frac{4}{5}M$

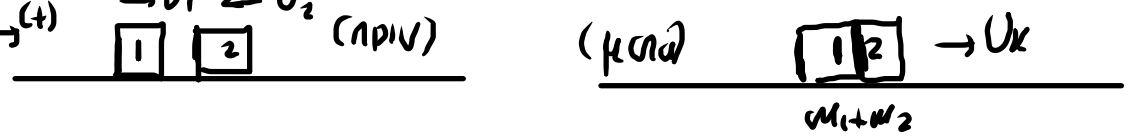
$\Delta P_1 = \frac{m_1V_0}{4} = \frac{MV_0}{5}$ (β)

β' τρόπος / αφού $\vec{P}_{\sigma\upsilon\sigma} = \sigma\tau\alpha\theta.$

$\Delta\vec{P}_1 = -\Delta\vec{P}_2 \Rightarrow \Delta P_1 = -(0 - m_2V_0)$

$\Delta P_1 = \frac{M}{5}V_0$!!!

Γ



Γ.1) Α.Δ.Ο. $m_1V_1 - m_2V_2 = (m_1+m_2)V_K \Rightarrow V_K = 8\,m/s$

Γ.2) $K_{\sigma\upsilon\sigma}^{\pi\rho\iota\nu} = \frac{1}{2}m_1V_1^2 + \frac{1}{2}m_2V_2^2 = 1400\,J$, $K_{\sigma\upsilon\sigma}^{\mu\epsilon\tau\acute{\alpha}} = \frac{1}{2}(m_1+m_2)V_K^2 = 320\,J$

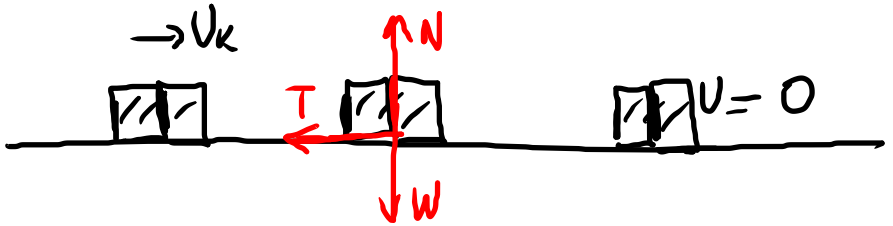
$E_{απω} = 1400 - 320$

$E_{απω} = 1080\,J$

Г3) $\Delta\vec{P}_1 = \vec{P}_1' - \vec{P}_1 \Rightarrow \Delta P_1 = m_1 v_k - m_1 v_1 \Rightarrow \Delta P_1 = 6\cdot 8 - 6\cdot 20 \Rightarrow \underline{\Delta P_1 = -72\,kg\cdot m/s}$

Г4) 

$F_{12} = \frac{\Delta P_1}{\Delta t} = \frac{-72}{0,1} = -720N$, $\underline{F = 720N}$

Г5) 

$\Sigma F_y = 0 \Rightarrow N = W$, $\underline{T = \mu N}$

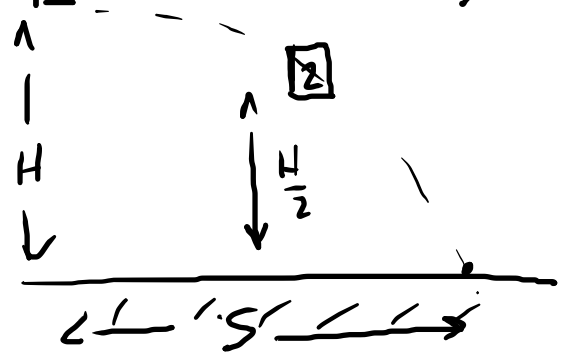
$\underline{\text{ОМЕ}}$ $\quad \Delta K = \Sigma W = W_T + W_W + W_N$ ($-T\cdot S$; $W_W = 0$, $W_N = 0$)

$0 - \frac{1}{2}(m_1 + m_2)v_k^2 = -\mu(m_1 + m_2)g\cdot S$

$S = \frac{v_k^2}{2\mu g} = \frac{8^2}{6,4}$

$\boxed{S = 10\,m}$

Δ

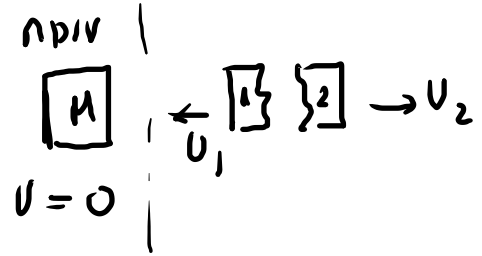


Δ.1) $t_{\pi\tau} = 2s \rightarrow H = \frac{1}{2} g t_{\pi\tau}^2 \Rightarrow \underline{H = 20m}$

$\frac{\Delta P}{\Delta t} = \Sigma F = m_2 g = \underline{80\, kg\cdot m/s^2}$

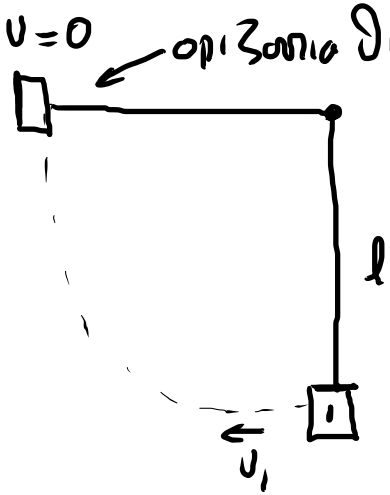
* $M = m_1 + m_2$
$M = 5m_1$
$m_1 = 2kg, m_2 = 8kg$

Δ.2)



ΑΔΟ $\quad \vec{P}_{\sigma\upsilon\sigma}^{\pi\rho\iota\nu} = \vec{P}_{\sigma\upsilon\sigma}^{\mu\epsilon\tau\alpha} \Rightarrow 0 = m_1 U_1 - m_2 U_2$

$m_1 U_1 = m_2 U_2 \Rightarrow \underline{U_1 = 4U_2}$



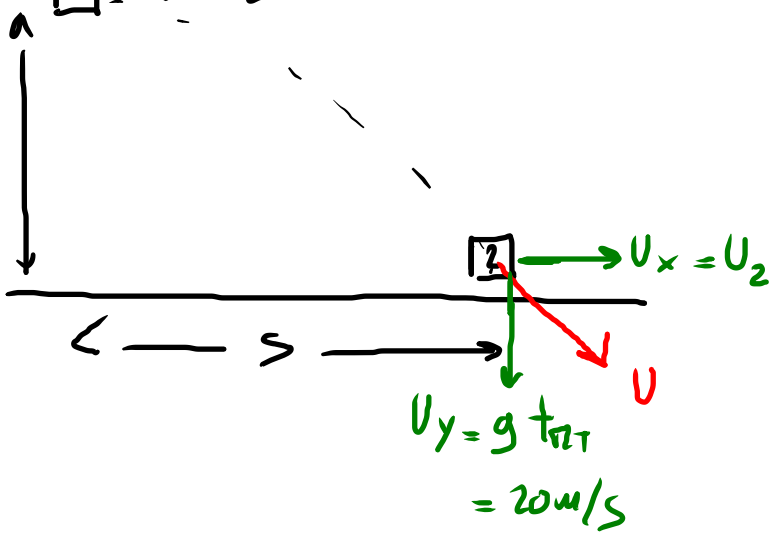
ΘΜΚΕ $\Delta K = \Sigma W \Rightarrow 0 - \frac{1}{2} m_1 U_1^2 = -m_1 g \cdot l$

$W_T = 0,$

$U_1 = \sqrt{2gl} \Rightarrow \underline{U_1 = 4m/s}$

Άρα $\underline{U_2 = 1m/s}$

Δ.3)



$S = U_2 . t_{rt} \Rightarrow S = 2m$

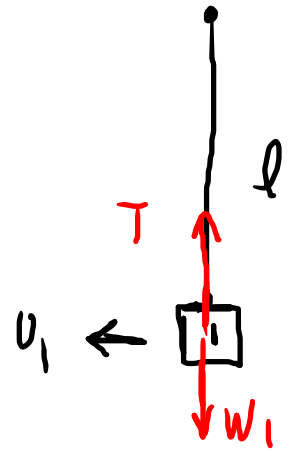
$\vec{\Delta P_2} = (\underbrace{\Delta P_{2x}}_{=0}, \Delta P_{2y}) \Rightarrow \Delta P_2 = \sqrt{\Delta P_{2x}^2 + \Delta P_{2y}^2}$

$\Delta P_2 = \Delta P_{2y} = m_2 U_{2y} - 0 \Rightarrow \Delta P_2 = 160\ kg\,m/s$

2s

$\vec{F} \quad \frac{\Delta P_2}{\Delta t} = 80 \Rightarrow \Delta P_2 = 80\,\Delta t = 160\ kg\,m/s$

Δ.4)

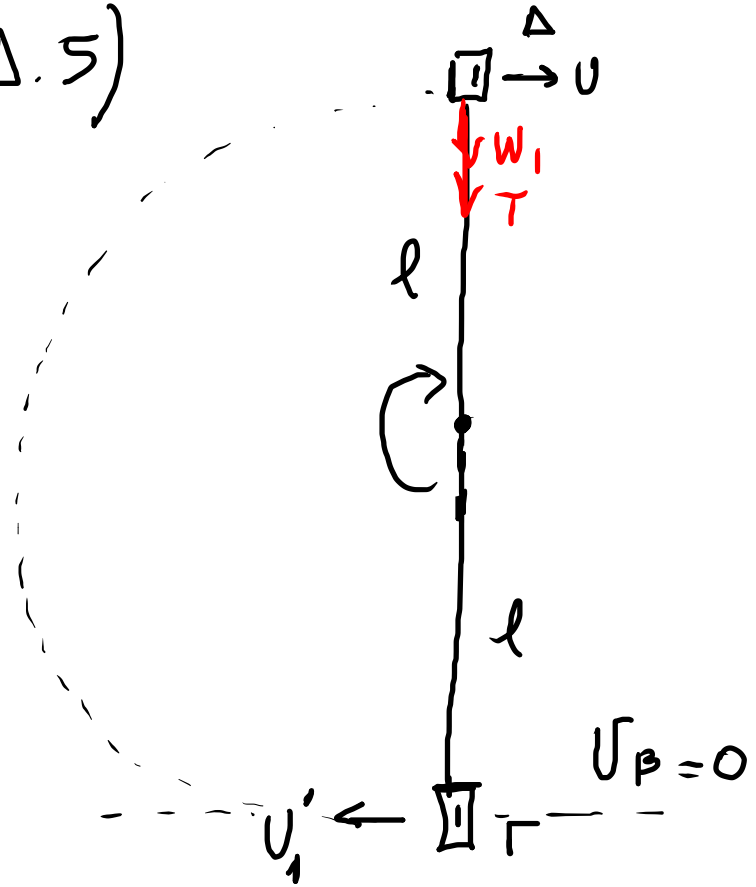


$\Sigma F = m_1 a_K$

$T - m_1 g = m_1 \frac{U_1^2}{l}$

$T = 20 + 2.\frac{16}{0,8} \Rightarrow T = 60N$

Δ.5)



οριακά κανει πλήρη κατακόρυφο κύκλο όταν

$T=0$ στο σημείο Γ

$$\cancel{T}^{0} + W_1 = m_1 \frac{U^2}{l} \Rightarrow U = \sqrt{gl} \Rightarrow \underline{U = \sqrt{8}\ m/s}$$

ΑΔΜΕ $\Gamma \to \Delta \Rightarrow E_{μηχ}^{(Γ)} = E_{μηχ}^{(Δ)}$

$$\frac{1}{2} m_1 U_1'^2 + 0 = \frac{1}{2} m_1 U^2 + m_1 g 2l$$

$$\frac{1}{2} U_1'^2 = \frac{1}{2} 8 + 10 \cdot 2 \cdot 0{,}8 \Rightarrow \underline{\underline{U_1' = \sqrt{40}\ m/s}}$$