ΦΥΣΙΚΗ ΚΑΤΕΥΘΥΝΣΗΣ Γ΄ΛΥΚΕΙΟΥ 29 / 5 / 08

ΕΝΔΕΙΚΤΙΚΕΣ ΑΠΑΝΤΗΣΕΙΣ

ΘΕΜΑ 1ο

$1 \rightarrow \delta$
$2 \rightarrow \alpha$
$3 \rightarrow \gamma$
$4 \rightarrow \delta$
5. $\alpha \rightarrow \Lambda$, $\beta \rightarrow \Lambda$, $\gamma \rightarrow \Lambda$, $\delta \rightarrow \Sigma$, $\varepsilon \rightarrow \Sigma$

ΘΕΜΑ 2ο

1.

Σωστό το (β)

$$\left.\begin{aligned} \frac{t}{T} = 12\cdot 10^{12}\, t \Rightarrow T = \frac{1}{12\cdot 10^{12}}\,\text{sec} \\ \frac{x}{\lambda} = 6\cdot 10^{4}\, x \Rightarrow \lambda = \frac{1}{6\cdot 10^{4}}\,\text{m} \end{aligned}\right\} \Rightarrow \upsilon = \frac{\lambda}{T} = 2\cdot 10^{8}\,\text{m/sec}$$

$$n = \frac{c}{\upsilon} = \frac{3\cdot \cancel{10^{8}}}{2\cdot \cancel{10^{8}}} = 1,5$$

2.

Σωστό το (α)

$$\frac{U_E}{U_B} = \frac{U_E}{E - U_E} = \frac{\cancel{\frac{1}{2}}\cdot\cancel{\frac{1}{C}}\cdot q^2}{\cancel{\frac{1}{2}}\cdot\cancel{\frac{1}{C}}\cdot Q^2 - \cancel{\frac{1}{2}}\cdot\cancel{\frac{1}{C}}\cdot q^2} = \frac{\frac{Q^2}{9}}{Q^2 - \frac{Q^2}{9}} = \frac{\frac{\cancel{Q^2}}{\cancel{9}}}{\frac{8Q^2}{\cancel{9}}} = \frac{1}{8}$$

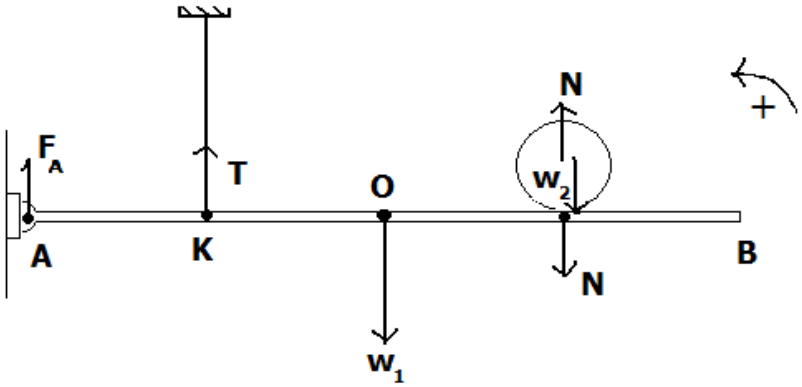
3.

Σωστό το (γ)

$$\left.\begin{aligned} \omega_1 = 998\pi \Rightarrow 2\pi f_1 = 998\pi \Rightarrow f_1 = 499\,\text{Hz} \\ \omega_2 = 1002\pi \Rightarrow 2\pi f_2 = 1002\pi \Rightarrow f_2 = 501\,\text{Hz} \end{aligned}\right\} \Rightarrow T_\delta = \frac{1}{|f_1 - f_2|} \Rightarrow T_\delta = \frac{1}{2} \Rightarrow T_\delta = 0,5\,\text{sec}$$

ΘΕΜΑ 3ο

α)



Για τη σφαίρα : $\Sigma F_y = 0 \Rightarrow N = W_2 = 25N$

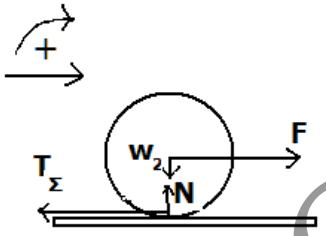
Για τη ράβδο : $\Sigma\tau_{(A)} = 0 \Rightarrow T\cdot(AK) - W_1\cdot\frac{L}{2} - N\cdot\frac{3L}{4} = 0 \Rightarrow T = 115N$

β) Σφαίρα που κυλίεται χωρίς να ολισθαίνει.

2^o Ν.Ν. $\quad \Sigma F = M\cdot\alpha_{cm} \Rightarrow F - T = M\cdot\alpha_{cm}$

ΘΝΣΚ $\quad \Sigma\tau_{cm} = I_{cm}\cdot\alpha_{γων.} \Rightarrow T_\Sigma\cdot R = \frac{2}{5}M\cdot R^2\cdot\frac{\alpha_{cm}}{R}$

$$\left.\begin{array}{l} \\ \\ \end{array}\right\} \Rightarrow F = \frac{7}{5}M\cdot\alpha_{cm} \Rightarrow \alpha_{cm} = 2\,m/sec^2$$

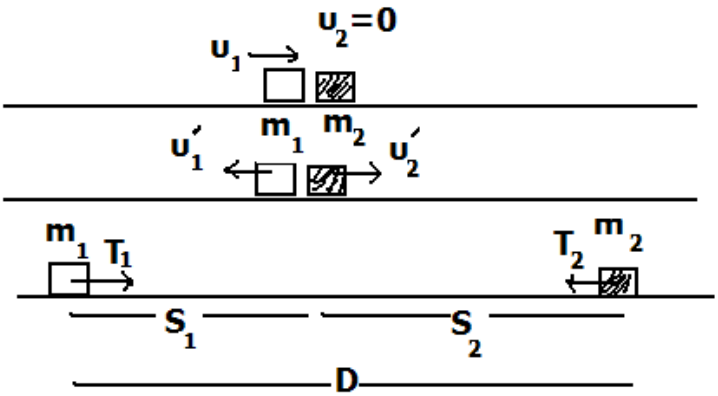


γ)

$$\left.\begin{array}{l} \upsilon_{cm} = \alpha_{cm}\cdot t \\ S = \frac{1}{2}\alpha_{cm}\cdot t^2 \Rightarrow 1 = 1\cdot t^2 \Rightarrow t = 1sec \end{array}\right\} \Rightarrow \upsilon_{cm} = 2\,m/sec$$

δ) $L = I_{cm}\cdot\omega = \frac{2}{5}M\cdot R^2\cdot\frac{\upsilon_{cm}}{R} = 0,4\ Kgr\cdot m^2/sec$

ΘΕΜΑ 4ο



α) Από ΑΔΟ + ΑΔΚΕ $-\upsilon_1' = \dfrac{m_1 - m_2}{m_1 + m_2}\cdot\upsilon_1 \Rightarrow \dfrac{m_1}{m_2} = \dfrac{1}{4}$

β)

$$\left.\begin{array}{l} \upsilon_2' = \dfrac{2m_1\upsilon_1}{m_1 + m_2} \\ \dfrac{m_1}{m_2} = \dfrac{1}{4} \Rightarrow m_2 = 4m_1 \end{array}\right\} \Rightarrow \upsilon_2' = 6\,m/sec$$

γ)

1ος τρόπος

Βρίσκω το ποσοστό % που χάνει το σώμα m_1

$$\frac{\left|K_1^{\alpha\rho\chi.} - K_1^{\tau\varepsilon\lambda.}\right|}{K_1^{\alpha\rho\chi.}}\cdot 100 = \frac{\frac{1}{2}m_1\cdot\upsilon_1^{\,2} - \frac{1}{2}m_1\cdot\upsilon_1'^{2}}{\frac{1}{2}m_1\cdot\upsilon_1^{\,2}}\cdot 100 = 64\%$$

2ος τρόπος

Βρίσκω το ποσοστό % που παίρνει το σώμα m_2

$$\frac{K_2'}{K_1}\cdot 100 = \frac{\frac{1}{2}m_2\cdot\upsilon_2'^{2}}{\frac{1}{2}m_1\cdot\upsilon_1^{\,2}}\cdot 100 = 4\cdot\frac{36}{225}\cdot 100 = 64\%$$

δ)

1ος τρόπος

$m_1 : \Sigma F_y = 0 \Rightarrow N_1 = W_1$ οπότε $T_1 = \mu \cdot N_1 = \mu \cdot m_1 g = m_1$

ΘΜΚΕ $m_1 : \cancel{K_T}^{0} - K_\alpha = \cancel{W_{N_1}}^{0} + \cancel{W_{W_1}}^{0} + W_{T_1} \Rightarrow -\frac{1}{2} m_1 \cdot \upsilon_1'^2 = -T_1 \cdot S_1 \Rightarrow S_1 = 40,5\,m$

$m_2 : \Sigma F_y = 0 \Rightarrow N_2 = W_2$ οπότε $T_2 = \mu \cdot N_2 = \mu \cdot m_2 g = m_2$

ΘΜΚΕ $m_2 : \cancel{K_T}^{0} - K_\alpha = \cancel{W_{N_2}}^{0} + \cancel{W_{W_2}}^{0} + W_{T_2} \Rightarrow -\frac{1}{2} m_2 \cdot \upsilon_2'^2 = -T_2 \cdot S_2 \Rightarrow S_2 = 18\,m$

Άρα $D = S_1 + S_2 = 58,5\,m$

2ος τρόπος : $\alpha_1 = \alpha_{\Sigma_2} = \frac{|\Sigma F_x|}{m} = \frac{T}{m} = \frac{\mu \cdot \cancel{m} g}{\cancel{m}} = 1\ m/sec^2$

$m_1 : \underset{\text{τελ.}}{\upsilon_1} = \upsilon_{1_0} - \alpha \cdot t_1 \Rightarrow 0 = 9 - t_1 \Rightarrow t_1 = 9\,sec$ ο χρόνος που σταματά

$S_1 = \upsilon_{1_0} \cdot t_1 - \frac{1}{2} \alpha \cdot t_1^2 \Rightarrow S_1 = 40,5\,m$

$m_2 : \underset{\text{τελ.}}{\upsilon_2} = \upsilon_{2_0} - \alpha \cdot t_2 \Rightarrow 0 = 6 - t_2 \Rightarrow t_2 = 6\,sec$ ο χρόνος που σταματά

$S_2 = \upsilon_{2_0} \cdot t_2 - \frac{1}{2} \alpha \cdot t_2^2 \Rightarrow S_2 = 18\,m$

Άρα $D = S_1 + S_2 = 58,5\,m$