ΛΥΣΕΙΣ ΔΙΑΓΩΝΙΣΜΑΤΟΣ Β' ΛΥΚΕΙΟΥ

ΘΕΜΑ Α

Α1 α **Α2** β **Α3** γ **Α4** δ

Α5 α) Σ β) Σ γ) Σ δ) Λ ε) Σ

ΘΕΜΑ Β

Β1 **Α** $x = u_0 t \Rightarrow t = \frac{x}{u_0}$

$y = \frac{1}{2} g t^2 \Rightarrow y = \frac{1}{2} g \left(\frac{x}{u_0}\right)^2 \Rightarrow y = \frac{1}{2} g \frac{x^2}{u_0^2} \Rightarrow \boxed{y = \frac{g}{2u_0^2} x^2}$

Β $y = \frac{1}{80} x^2$ και $y = \frac{g}{2u_0^2} x^2$ ⟹ ΤΑΥΤΟΠΟΙΗΣΗ $\frac{1}{80} = \frac{10}{2u_0^2} \Rightarrow 2u_0^2 = 800$

$\Rightarrow u_0 = \sqrt{400} \Rightarrow u_0 = 20 m/s$

- $x_{max} = u_0 t_{\Sigma} \Rightarrow 40 = 20 \cdot t_{\Sigma} \Rightarrow t_{\Sigma} = 2s$
- $u_x = u_0 = 20 m/s$, $u_y = g \cdot t_{\Sigma} = 20 m/s$ $\Rightarrow u = \sqrt{u_x^2 + u_y^2} = \sqrt{20^2 + 20^2} = \sqrt{2 \cdot 20^2}$

$\Rightarrow \boxed{u = 20\sqrt{2} m/s} \rightarrow (\beta)$

Β2 **Α** Ίδια φορά κίνησης:

$S_1 - S_2 = 2\pi R \Rightarrow u_1 t_1 - u_2 t_1 = 2\pi R \Rightarrow 5u_2 t_1 - u_2 t_1 = 2\pi R$

$\Rightarrow 4u_2 t_1 = 2\pi R \Rightarrow t_1 = \frac{2\pi R}{4u_2}$ (1)

Αντίθετη φορά κίνησης.

$S_1 + S_2 = 2\pi R \Rightarrow u_1 t_1' + u_2 t_1' = 2\pi R \Rightarrow 5u_2 t_1' + u_2 t_1' = 2\pi R$

$\Rightarrow 6 \cdot U_2 \cdot t_1' = 2\pi R \Rightarrow t_1' = \frac{2\pi R}{6U_2}$ (2)

$\frac{(2)}{(1)} \Rightarrow \frac{t_1'}{t_1} = \frac{\frac{2\pi R}{6U_2}}{\frac{2\pi R}{4U_2}} = \frac{4U_2}{6U_2} \Rightarrow \frac{t_1'}{t_1} = \frac{2}{3} \Rightarrow \boxed{t_1' = \frac{2}{3} \cdot t_1}$ → (γ)

Β $\frac{S_1}{S_2} = \frac{N_2 \cdot 2\pi R}{N_2 \cdot 2\pi R} \Rightarrow \frac{U_1 \cancel{t}}{U_2 \cancel{t}} = \frac{N_1}{N_2} \Rightarrow \frac{N_1}{N_2} = \frac{5 \cdot U_2}{U_2} = \frac{5}{1}$

→ 1η γραμμή στο Γ: $N_1 = 5$ περ. και $N_2 = 1$ περ.

→ 2η γραμμή στο Γ: $N_1 = 10$ περ. και $N_2 = 2$ περ.

$U_1 = 2\pi R \cdot f_1 \Rightarrow f_1 = \frac{U_1}{2\pi R}$

$f_1 = \frac{N_1}{t} \Rightarrow t = \frac{N_1}{f_1} = \frac{10}{\frac{U_1}{2\pi R}} \Rightarrow \boxed{t = \frac{20\pi R}{U_1}}$ → (β)

Β3 $\varepsilon\varphi\varphi = \frac{U_y}{U_0} = 2 \Rightarrow U_y = 2U_0 \Rightarrow g \cdot t_{\text{εσ.}} = 2U_0 \Rightarrow t_{\text{εσ.}} = \frac{2U_0}{g}$

- $H = \frac{1}{2} g \cdot t_{\text{εσ}}^2 = \frac{1}{2} \cdot g \cdot \frac{4U_0^2}{g^{\cancel{2}}} \Rightarrow H = \frac{2U_0^2}{g}$
- $x_{max} = U_0 \cdot t_{\text{εσ.}} = U_0 \cdot \frac{2U_0}{g} = \frac{2U_0^2}{g}$

$\Rightarrow \boxed{\frac{H}{x_{max}} = 1}$ → (α)

ΘΕΜΑ Γ

Γ1 $\omega = \frac{2\pi}{T} = \frac{2\pi}{4\pi} \Rightarrow \boxed{\omega = 0{,}5 \text{ rad/s}}$

Γ2 $a_{κB} = \omega^2 \cdot R_2 \Rightarrow 1 = 0{,}5^2 \cdot R_2 \Rightarrow R_2 = \frac{1}{0{,}25} \Rightarrow \boxed{R_2 = 4 \text{ m}}$

Γ3 $\boxed{U_{γA} = \omega \cdot R_1 = 1 \text{ m/s}}$ και $\boxed{U_{γB} = \omega \cdot R_2 = 2 \text{ m/s}}$

Γ4 $\omega = \frac{\theta}{t} \Rightarrow t = \frac{\theta}{\omega} = \frac{\pi/2}{0{,}5} \Rightarrow \boxed{t = \pi \text{ s}}$

Γ5 $U_{\mu A} = \frac{S_A}{t} \Rightarrow 1 = \frac{4}{t} \Rightarrow t = 4s$

$U_{\mu B} = \frac{S_B}{t} \Rightarrow S_B = U_{\mu B} \cdot t \Rightarrow S_B = 2 \cdot 4 \Rightarrow \boxed{S_B = 8m}$

ΘΕΜΑ Δ

Δ1 $t_{\varepsilon\delta_1} = \sqrt{\frac{2h_1}{g}} = \sqrt{\frac{2 \cdot 45}{10}} = \sqrt{9} \Rightarrow \boxed{t_{\varepsilon\delta_1} = 3s}$

$t_{\varepsilon\delta_2} = \sqrt{\frac{2h_2}{g}} = \sqrt{\frac{2 \cdot 125}{10}} = \sqrt{25} \Rightarrow \boxed{t_{\varepsilon\delta_2} = 5s}$

Δ2 $x_{max_1} = U_{o_2} \cdot t_{\varepsilon\delta_1} \Rightarrow \boxed{x_{max_1} = 30m}$

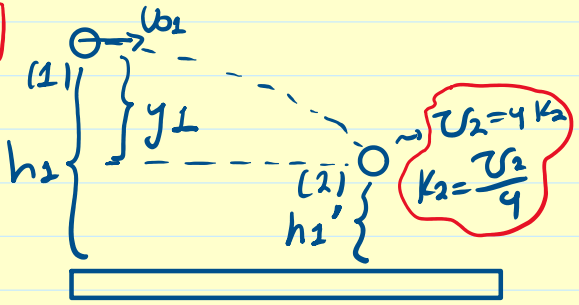
$x_{max_2} = U_{o_2} \cdot t_{\varepsilon\delta_2} \Rightarrow \boxed{x_{max_2} = 100m}$

Δ3 $y = \frac{x}{2} \Rightarrow \frac{1}{2} g t^2 = \frac{1}{2} \cdot U_{o_2} \cdot t \Rightarrow 5 \cdot t = 10 \Rightarrow t = 2s$

$y = \frac{1}{2} g \cdot t^2 \Rightarrow y = \frac{1}{2} \cdot 10 \cdot 2^2 \Rightarrow y = 20m$

Από το σχήμα: $h = h_2 - y \Rightarrow \boxed{h = 105m}$

Δ4



Α.Δ.Μ.Ε. (1 → 2)

$K_1 + U_1 = K_2 + U_2$

$\Rightarrow \frac{1}{2} m \cdot U_{o_1}^2 + mg \cdot h_1 = \frac{U_2}{4} + U_2$

$\Rightarrow \frac{1}{2} \cancel{m} \cdot U_{o_1}^2 + \cancel{mg} \cdot h_1 = \frac{5}{4} \cdot \cancel{mg} \cdot h_1'$

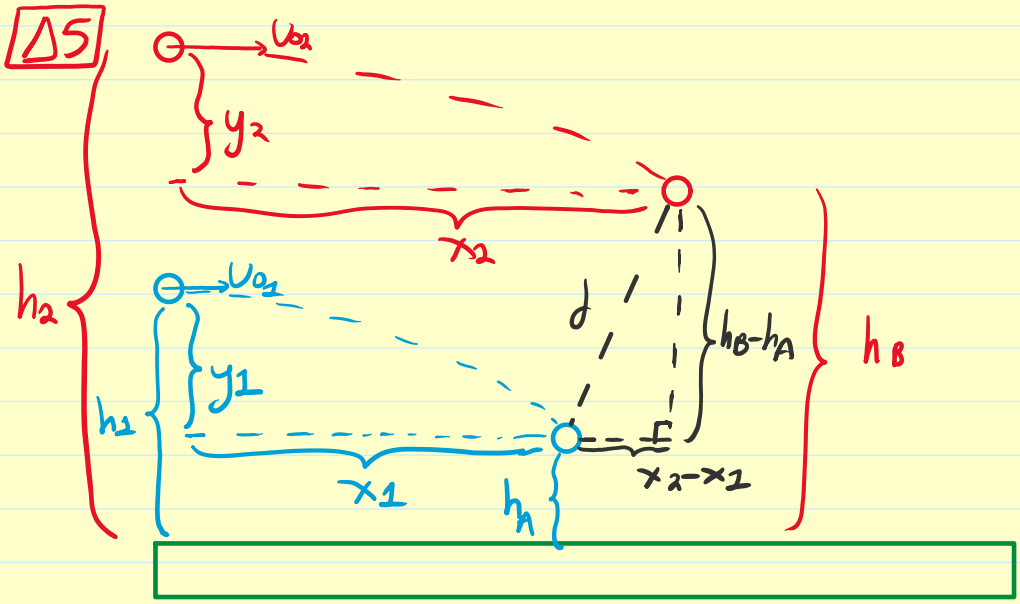
$\Rightarrow \frac{100}{2} + 450 = \frac{5}{4} \cdot 10 \cdot h_1'$

$\Rightarrow \frac{500 \cdot 4}{50} = h_1' \Rightarrow h_1' = 40m$

$y_1 = h_1 - h_1' = 5m$

$y_1 = \frac{1}{2} g \cdot t^2 \Rightarrow 5 = 5 \cdot t^2 \Rightarrow$ $\boxed{t = 1s}$

Δ5



$$\left.\begin{array}{l} x_1 = U_{01} \cdot t = 20m \\ x_2 = U_{02} \cdot t = 40m \end{array}\right\} \Rightarrow x_2 - x_1 = 20m$$

$y_1 = \frac{1}{2} g \cdot t^2 = \frac{1}{2} \cdot 10 \cdot 2^2 = 20m \rightarrow h_A = h_2 - y_1 = 25m$

$y_2 = \frac{1}{2} g \cdot t^2 = \frac{1}{2} \cdot 10 \cdot 2^2 = 20m \rightarrow h_B = h_2 - y_2 = 105m$

$h_B - h_A = 80m$

$d = \sqrt{(x_2 - x_1)^2 + (h_B - h_A)^2} = \sqrt{20^2 + 80^2} = \sqrt{400 + 6400}$

$\Rightarrow d = \sqrt{6800} \Rightarrow d = \sqrt{4 \cdot 17 \cdot 100} \Rightarrow$ $\boxed{d = 20\sqrt{17}m}$