

ΛΥΣΕΙΣ Α' ΛΥΚΕΙΟΥ 22/3/2020

ΘΕΜΑ Α

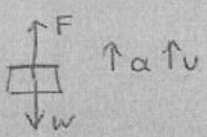
Α1) γ Α2) γ Α3) γ Α4) α Α5) α

ΘΕΜΑ Β

B1) α) $y = \frac{1}{2} g t^2 \Rightarrow Y = \frac{1}{2} \cdot 10 \cdot 3^2 \Rightarrow y = 45 \text{ m}$, $\alpha \rho \alpha \ H = h - y = 35 \text{ m}$

β) $t_{\epsilon \delta} = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \cdot 80}{10}} = \sqrt{16} \Rightarrow t_{\epsilon \delta} = 4 \text{ s}$

δ) $v_{\epsilon \delta} = g t_{\epsilon \delta} = 10 \cdot 4 \Rightarrow v_{\epsilon \delta} = 40 \text{ m/s}$

B2)  $\Sigma F = m a \Rightarrow F - W = m a \Rightarrow F - W = m 2g \Rightarrow F - W = 2W \Rightarrow F = 3W \Rightarrow W = \frac{F}{3}$ $\Sigma W_{\epsilon \delta} = T_0(B)$

B3) $F_{1x} = F_1 \cos 60^\circ = 2\sqrt{3} \cdot \frac{1}{2} \Rightarrow F_{1x} = 3 \text{ N}$

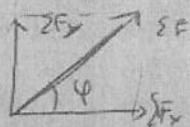
$F_{1y} = F_1 \sin 60^\circ = 2\sqrt{3} \cdot \frac{\sqrt{3}}{2} \Rightarrow F_{1y} = 3 \text{ N}$

$F_{3x} = F_3 \cos 45^\circ = 4\sqrt{2} \cdot \frac{\sqrt{2}}{2} \Rightarrow F_{3x} = 4 \text{ N}$

$F_{3y} = F_3 \sin 45^\circ \Rightarrow F_{3y} = 4 \text{ N}$

$\Sigma F_x = F_{3x} - F_{1x} = 1 \text{ N}$, προς τ' άριστερά

$\Sigma F_y = F_{1y} + F_{3y} - F_2 = 3 + 4 - 3 \Rightarrow \Sigma F_y = 4 \text{ N}$, προς τα πάνω



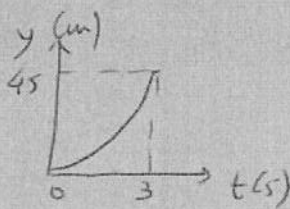
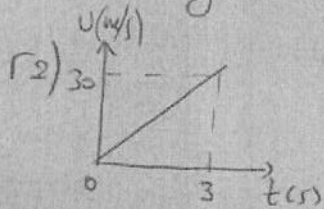
$\Sigma F = \sqrt{\Sigma F_x^2 + \Sigma F_y^2} = \sqrt{1^2 + 4^2} = \sqrt{17}$

$\epsilon \phi \varphi = \frac{\Sigma F_y}{\Sigma F_x} = \frac{4}{1} = 4$

ΘΕΜΑ Γ

Γ1) $t_{\epsilon \delta} = \sqrt{\frac{2H}{g}} = \sqrt{\frac{2 \cdot 45}{10}} \Rightarrow t_{\epsilon \delta} = 3 \text{ sec}$

$v_{\epsilon \delta} = g t_{\epsilon \delta} = 10 \cdot 3 \Rightarrow v_{\epsilon \delta} = 30 \text{ m/s}$



Γ3) $\frac{r_{10}}{r_{10}} \cdot t_1 = 1 \text{ s} \quad y_1 = \frac{1}{2} g t_1^2 = \frac{1}{2} \cdot 10 \cdot 1^2 = 5 \text{ m}$

$\frac{r_{10}}{r_{10}} \cdot t_2 = 2 \text{ s} \quad y_2 = \frac{1}{2} g t_2^2 = \frac{1}{2} \cdot 10 \cdot 2^2 = 20 \text{ m}$

$\Delta y = y_2 - y_1 = 15 \text{ m}$

$$\begin{aligned} \Gamma 4) \quad v &= gt \Rightarrow 20 = 10 \cdot t \Rightarrow t = 2s \\ y &= \frac{1}{2} gt^2 = \frac{1}{2} \cdot 10 \cdot 2^2 \Rightarrow y = 20m \\ h &= H - y = 45m - 20m \Rightarrow h = 25m \end{aligned}$$

$$\begin{aligned} \Gamma 5) \quad \Sigma F &= ma \Rightarrow w + F = ma \Rightarrow 10 + 10 = 20 \Rightarrow a = 20 \text{ m/s}^2 \\ y &= H - y = 40m, \quad y = \frac{1}{2} at^2 \Rightarrow t = \sqrt{\frac{2y}{a}} = \sqrt{\frac{2 \cdot 40}{20}} = \sqrt{4} = 2 \text{ sec} \\ v &= at = 40 \text{ m/s} \end{aligned}$$

ΘΕΜΑ Δ

$$\Delta 1) \quad t_{\text{av}} = \frac{v_0}{g} = \frac{20}{10} \Rightarrow \boxed{t_{\text{av}} = 2 \text{ sec}}$$

$$\Delta 2) \quad h_{\text{max}} = \frac{v_0^2}{2g} = \frac{20^2}{2 \cdot 10} = 20m \text{ στην οριζόντιο βολής}$$

Από εδάφος: $H = h + h_{\text{max}} \Rightarrow \boxed{H = 80m}$

$$\Delta 3) \quad t_{\text{εξο}} = t_{\text{av}} = 2 \text{ sec}, \quad t_1 = 2s + 2s \Rightarrow \boxed{t_1 = 4s}$$

$$\dot{y} = 0 \Rightarrow v_0 t - \frac{1}{2} gt^2 = 0 \Rightarrow t(v_0 - \frac{1}{2} gt) = 0 \Rightarrow t = 0 \text{ ή } t = \frac{2v_0}{g}$$

$$\Delta 4) \quad \alpha) \quad v_1 = v_0 - g t_1 = 20 - 10 \cdot 4 \Rightarrow \boxed{v_1 = -20 \text{ m/s}}$$

$$\beta) \quad \text{Από } H = 80m \text{ στο έδαφος: } t = \sqrt{\frac{2H}{g}} = \sqrt{\frac{2 \cdot 80}{10}} = 4 \text{ sec}$$

$$t_2 = t_{\text{av}} + t = 6 \text{ sec}$$

$$v_2 = v_0 - g t = 20 - 10 \cdot 6 \Rightarrow v_2 = -40 \text{ m/s}$$

