

ΘΕΜΑ Α

A1) γ A2) γ A3) β A4) δ

A5) α) Λ β) Σ δ) Λ ε) Σ ε) Λ

ΘΕΜΑ Β

B1) $U = at \Rightarrow 1 = \alpha \cdot 4 \Rightarrow \alpha = 4 \text{ m/s}^2$

Για $t_1 = 1 \text{ s}$: $s_1 = \frac{1}{2} \alpha t^2 = \frac{1}{2} \cdot 4 \cdot 1^2 \Rightarrow s_1 = 2 \text{ m}$

Για $t_2 = 2 \text{ s}$: $s_2 = \frac{1}{2} \cdot 4 \cdot 2^2 = 8 \text{ m}$ και $U_2 = \alpha \cdot t_2 \Rightarrow U_2 = 4 \cdot 2 \Rightarrow U_2 = 8 \text{ m/s}$

$U_3 = 16 \Rightarrow \alpha t_3 = 16 \Rightarrow 4 t_3 = 16 \Rightarrow t_3 = 4 \text{ s}$ και $s_3 = \frac{1}{2} \cdot 4 \cdot 4^2 = 32 \text{ m}$

t(s)	U(m/s)	s(m)
0	0	0
1	4	2
2	8	8
4	16	32

B2) $x = 10t + t^2 \text{ (SI)}$ } $U_0 = 10 \text{ m/s}$
 $x = U_0 t + \frac{1}{2} \alpha t^2$ } $\frac{1}{2} \alpha = 1 \Rightarrow \alpha = 2 \text{ m/s}^2$

Για $t = 2 \text{ s}$: $U = U_0 + \alpha t = 10 + 2 \cdot 2 \Rightarrow U = 14 \text{ m/s}$

$x = U_0 t + \frac{1}{2} \alpha t^2 = 10 \cdot 2 + \frac{1}{2} \cdot 2 \cdot 2^2 = 24 \text{ m}$

Σ 2 Σ 20 20 (8)

B3) A) Ανάδειξη Θεωρίας

B) $d_1 = \frac{U_1^2}{2\alpha}$, $d_2 = \frac{U_2^2}{2\alpha} = \frac{(2U_1)^2}{2\alpha} = \frac{4U_1^2}{2\alpha} = 4d_1$

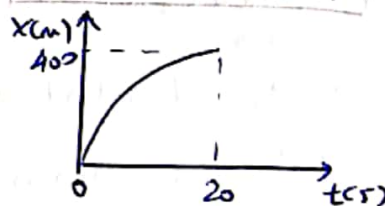
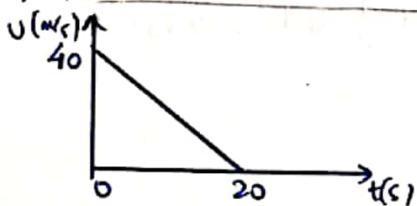
Σ 2 Σ 20 20 (8)

ΘΕΜΑ Γ

Γ1) $t_{\text{stop}} = \frac{U_0}{\alpha} = \frac{40}{2} \Rightarrow t_{\text{stop}} = 20 \text{ s}$, $S_{\text{stop}} = \frac{U_0^2}{2\alpha} = \frac{40^2}{2 \cdot 2} \Rightarrow S_{\text{stop}} = 400 \text{ m}$

Γ2) i) $U = 40 - 2t \text{ (SI)}$

ii) $x = 40t - t^2 \text{ (SI)}$



Γ3) $U_1 = \frac{U_0}{2} = 20 \text{ m/s}$

$U_1 = U_0 - \alpha t_1 \Rightarrow 20 = 40 - 2t_1 \Rightarrow t_1 = 10 \text{ s}$

$U_2 = \frac{U_0}{4} = 10 \text{ m/s}$

$U_2 = U_0 - \alpha t_2 \Rightarrow 10 = 40 - 2t_2 \Rightarrow t_2 = 15 \text{ sec}$

Γ4) $S_1 = U_0 t_1 - \frac{1}{2} \alpha t_1^2 = 40 \cdot 10 - \frac{1}{2} \cdot 2 \cdot 10^2 \Rightarrow S_1 = 300 \text{ m}$

$S_2 = U_0 t_2 - \frac{1}{2} \alpha t_2^2 = 40 \cdot 15 - \frac{1}{2} \cdot 2 \cdot 15^2 = 600 - 225 \text{ m} = 375 \text{ m}$

Αρα $S = S_2 - S_1 = 75 \text{ m}$

Γ5) Το τελευταίο δευτερόλεπτο είναι το 20^{ος} sec

$$\text{Για } t=19\text{s} : s_{19} = 40 \cdot 19 - \frac{1}{2} \cdot 2 \cdot 19^2 \Rightarrow s_{19} = 399\text{m}$$

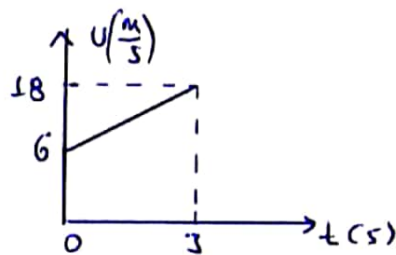
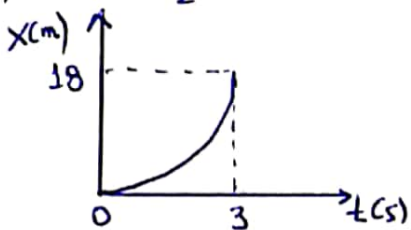
$$\text{Για } t=20\text{s} : s_{20} = 40 \cdot 20 - \frac{1}{2} \cdot 2 \cdot 20^2 \Rightarrow s_{20} = 400\text{m}$$

$$\text{Άρα στην διάρκεια των } 20\text{ων sec} : s = s_{20} - s_{19} = 1\text{m.}$$

ΘΕΜΑ Δ

$$\Delta 1) v_1 = v_0 + a t_1 \Rightarrow 18 = 6 + 4 t_1 \Rightarrow 12 = 4 t_1 \Rightarrow t_1 = 3\text{s}$$

$$\Delta 2) x_1 = \frac{1}{2} a t_1^2 = 18\text{m}$$



$$\Delta 3) s_2 = \frac{v_2^2 - v_0^2}{2a} \Rightarrow 20 = \frac{v_2^2 - 6^2}{2 \cdot 4} \Rightarrow 20 = \frac{v_2^2 - 36}{8}$$

(με αριθμεί=4)

$$\Rightarrow v_2^2 = 196 \Rightarrow v_2 = \sqrt{196} \Rightarrow v_2 = 14\text{m/s}$$

$$\Delta 4) s = v_0 t + \frac{1}{2} a' t^2$$

$$\text{Για } t_1 = 1\text{s} : s_1 = v_0 \cdot 1 + \frac{1}{2} a' \cdot 1^2 \quad (1)$$

$$\text{Για } t_2 = 2\text{s} : s_2 = v_0 \cdot 2 + \frac{1}{2} a' \cdot 2^2 \Rightarrow s_2 = 2v_0 + 2a' \quad (2)$$

$$\text{Για } t_3 = 3\text{s} : s_3 = v_0 \cdot 3 + \frac{1}{2} a' \cdot 3^2 \Rightarrow s_3 = 3v_0 + 4,5a' \quad (3)$$

$$\text{Στην διάρκεια των } 2\text{ων sec} : \Delta s_2 = s_2 - s_1 \xrightarrow{(1)} \Delta s_2 = v_0 + 1,5a' \quad (4)$$

$$\text{Στην διάρκεια των } 3\text{ων sec} : \Delta s_3 = s_3 - s_2 \xrightarrow{(2)} \Delta s_3 = v_0 + 2,5a' \quad (5)$$

$$\Delta s_3 - \Delta s_2 = 6 \xrightarrow{(4)} \xrightarrow{(5)} v_0 + 2,5a' - (v_0 + 1,5a') = 6 \Rightarrow a' = 6\text{m/s}^2$$