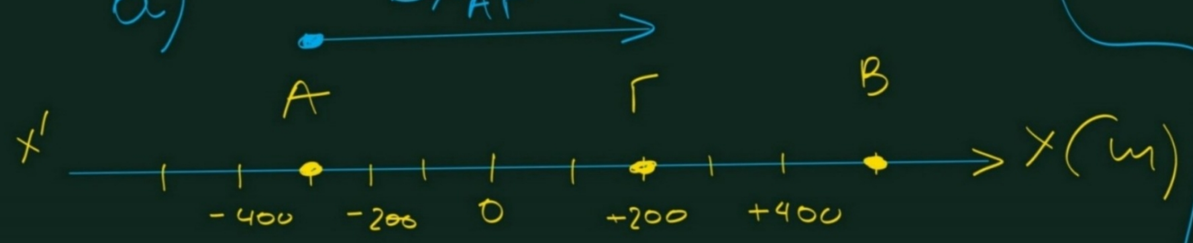
Εφ. 2.31 (Φυλλάδιο)

α) $\Delta\vec{x}_{A\Gamma}$ (διανυσματικά)



$x_A = -300\,m$

$x_B = +500\,m$

$x_\Gamma = +200\,m$

$A \rightarrow B \rightarrow \Gamma$

$\Delta x_{A\Gamma} = x_\Gamma - x_A =$

$= +200 - (-300) =$

$\Delta x_{A\Gamma} = +500\,m$ (αλγεβρική τιμή)

β) Συνολικό διάστημα:

$S_{AB\Gamma} = |\Delta x_{AB}| + |\Delta x_{B\Gamma}| =$

$= |x_B - x_A| + |x_\Gamma - x_B|$

$= |500 - (-300)| + |200 - 500|$

$= |800| + |-300| =$

$= 800 + 300 = 1100\,m$

γ) $U_{\text{μέση}} = \dfrac{\text{ολικό διάστημα}}{\text{ολικός χρόνος}}$

$U_{\text{μ}} = \dfrac{S_{AB\Gamma}}{\Delta t_{AB\Gamma}} = \dfrac{1100}{10} = 110\,m/s$

Ταχύτητες

$$\upsilon = \frac{\Delta x}{\Delta t}$$ γέση αλγεβρική

$$\vec{\upsilon} = \frac{\Delta \vec{x}}{\Delta t}$$ γέση διανυσματική

$$\upsilon_\mu = \frac{S_{ολ}}{t_{ολ}}$$ γέση

$$\upsilon = \frac{\Delta x}{\Delta t} \Rightarrow \frac{\upsilon}{1} = \frac{\Delta x}{\Delta t} \Rightarrow$$

$$\Delta x = \upsilon \cdot \Delta t$$

Αλλά: $\Delta x = x - x_0$

και $\Delta t = t - t_0$

x_0 = αρχική θέση

t_0 = αρχικός χρόνος (συνήθως μηδέν)

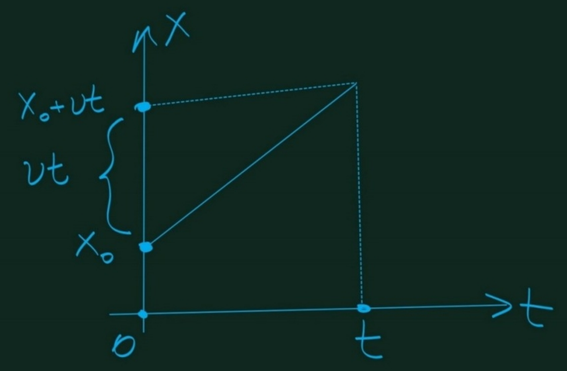
Άρα αν $t_0 = 0$ έχουμε: $x - x_0 = \upsilon \cdot t \Rightarrow$

$$\boxed{x = x_0 + \upsilon t}$$ εξίσωση θέσης

Αν $x_0 = 0$ έχουμε: $x = \upsilon t$

Διάγραμμα x−t

$x = x_0 + \upsilon t$

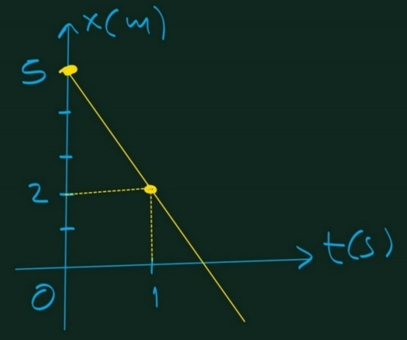


Π.χ. $x = 5 - 3t$

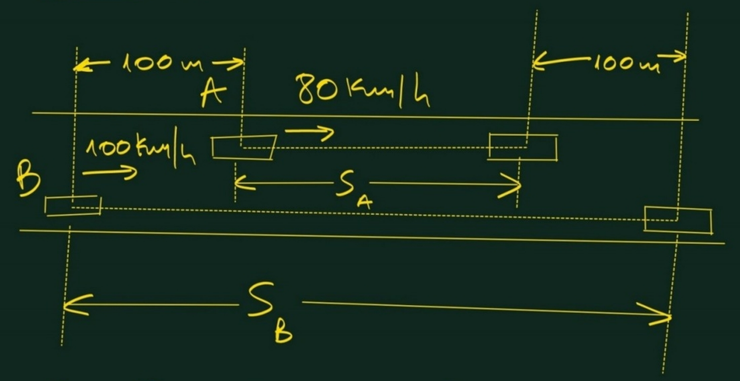
x	t
5	0
2	1

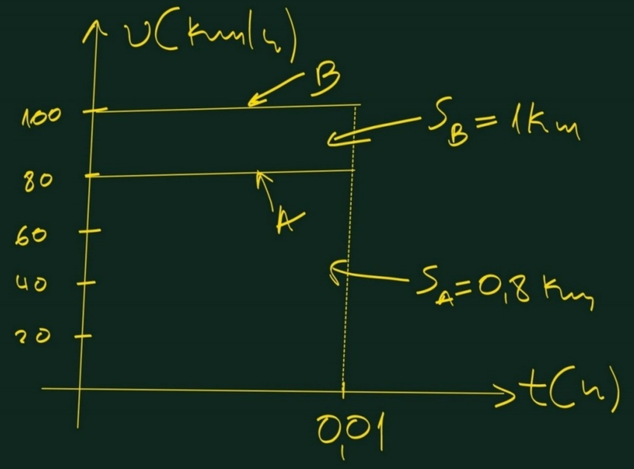
$x_0 = 5\,m$

$\upsilon = -3\,m/s$



Εφαρμογή σελ. 46.





$S_B - S_A = 200\,m \Rightarrow$

$\upsilon_B t - \upsilon_A t = 0,2\,km \Rightarrow$

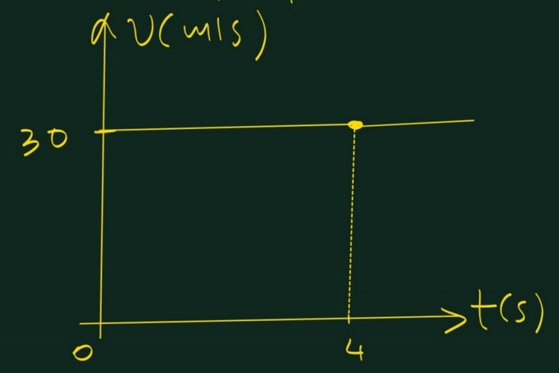
$100t - 80t = 0,2 \Rightarrow 20t = 0,2 \Rightarrow t = 0,01\,h$ ή $t = 0,01 \cdot 3600 = 36\,sec$

Ασκ. 1 σελ. 69.

$$\upsilon = \frac{S}{t} = \frac{120}{4} = 30\,m/s.$$

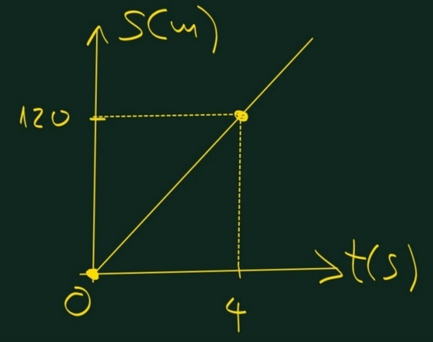
$$\left(\upsilon = \frac{\Delta x}{\Delta t} = \frac{x}{t} \quad \left| \begin{array}{l} \Delta x = x - x_0 \\ \Delta t = t - t_0 \\ \text{Αν } x_0 = 0 \\ \text{και } t_0 = 0 \end{array} \right. \Rightarrow x = \upsilon \cdot t \right)$$

Διάγραμμα υ-t



$S = \upsilon \cdot t \Rightarrow S = 30t\,(SI)$

Διάγραμμα S-t



Ασκ. 3.74 (Φυλλ.)

$x = 12 - t$ (SI)

$x = x_0 + v \cdot t$

Άρα: $x_0 = 12\,m$

και $v = -1\,m/s$.

α) Θέτουμε $x = 0$

$x = 12 - t \Rightarrow 0 = 12 - t_1 \Rightarrow$

$t_1 = 12\,sec.$

β) $x(t) = 12 - t$ (SI)

$x(0) = 12 - 0 = 12\,m$

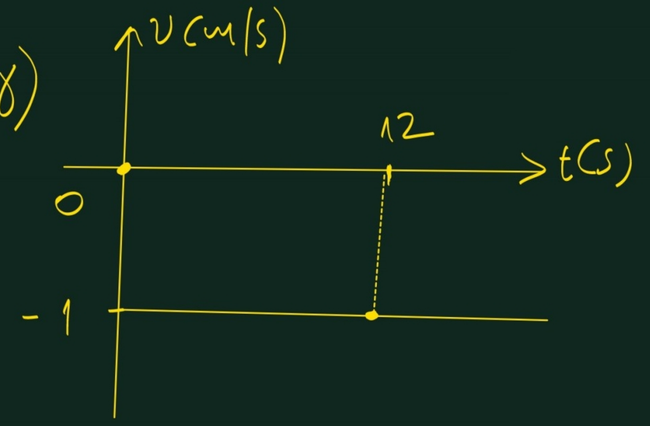
$x(5) = 12 - 5 = 7\,m$

$\Delta x = x(5) - x(0) \Rightarrow$

$\Delta x = 7 - 12 \Rightarrow$

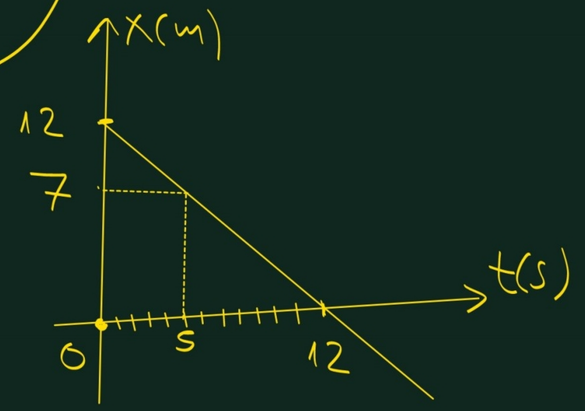
$\Delta x = -5\,m$

γ)

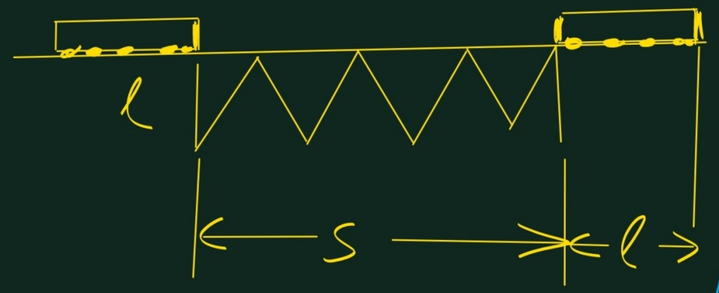


$x(0) = 12\,m$

$x(12) = 0\,m$



Ασκ. 2 σελ 69.

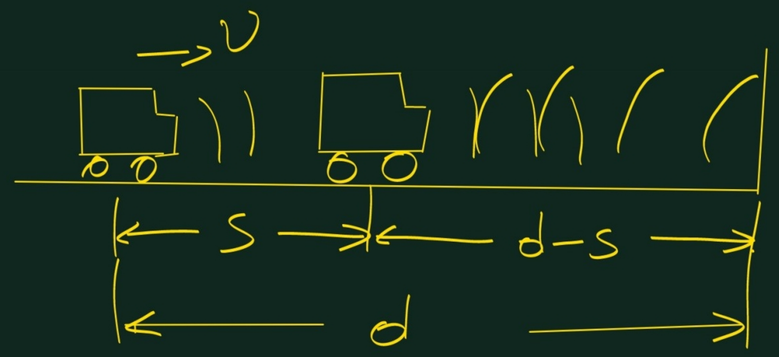


$$s + l = v \cdot t \Rightarrow$$

$$1980 + 20 = 10 \cdot t \Rightarrow$$

$$\frac{2000}{10} = \frac{\cancel{10}t}{\cancel{10}} \Rightarrow t = 200\,sec$$

Ασκ 3.56 (Αθθενοφόρο)



$$v = 72\,km/h = \frac{72.000\,m}{3.600\,sec} = 20\,m/s.$$

$$s = v \cdot \Delta t \Rightarrow s = 20 \cdot 2 \Rightarrow s = 40\,m$$

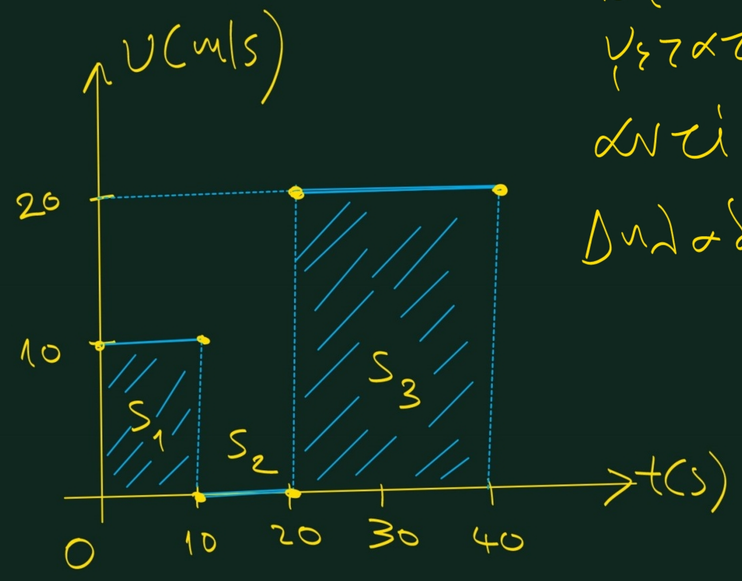
$$d + d - s = v_{nx} \cdot \Delta t \Rightarrow 2d - 40 = 340 \cdot 2 \Rightarrow$$

$$2d = 40 + 680 \Rightarrow$$

$$\frac{\cancel{2}d}{\cancel{2}} = \frac{720}{2} \Rightarrow d = 360\,m$$

$$v_{nx} = 340\,m/s$$

Ασκ. 3 σελ. 69



$\Delta x = x - x_0 = x$

αν $x_0 = 0$

και $\Delta x = S$.

α) Από τα εμβαδά βρίσκουμε τις αντίστοιχες μετατοπίσεις ή τα αντίστοιχα διαστήματα.

Δηλαδή: $S_1 = \Delta x_1 = 10 \cdot 10 = 100\,m$

$S_2 = \Delta x_2 = 10 \cdot 0 = 0\,m$

$S_3 = \Delta x_3 = 20 \cdot 20 = 400\,m$

Άρα το συνολικό διάστημα είναι:

$S_{ολ} = S_1 + S_2 + S_3 = 500\,m$

β) $\upsilon_\mu = \frac{S_{ολ}}{t_{ολ}} = \frac{500}{40} \Rightarrow$

$\upsilon_\mu = 12{,}5\,m/s$.

γ) Μπορούμε να κάνουμε το διάγραμμα θέσης - χρόνου θεωρώντας ότι: $x(0) = 0$

Από $0 \to 10\,sec$:

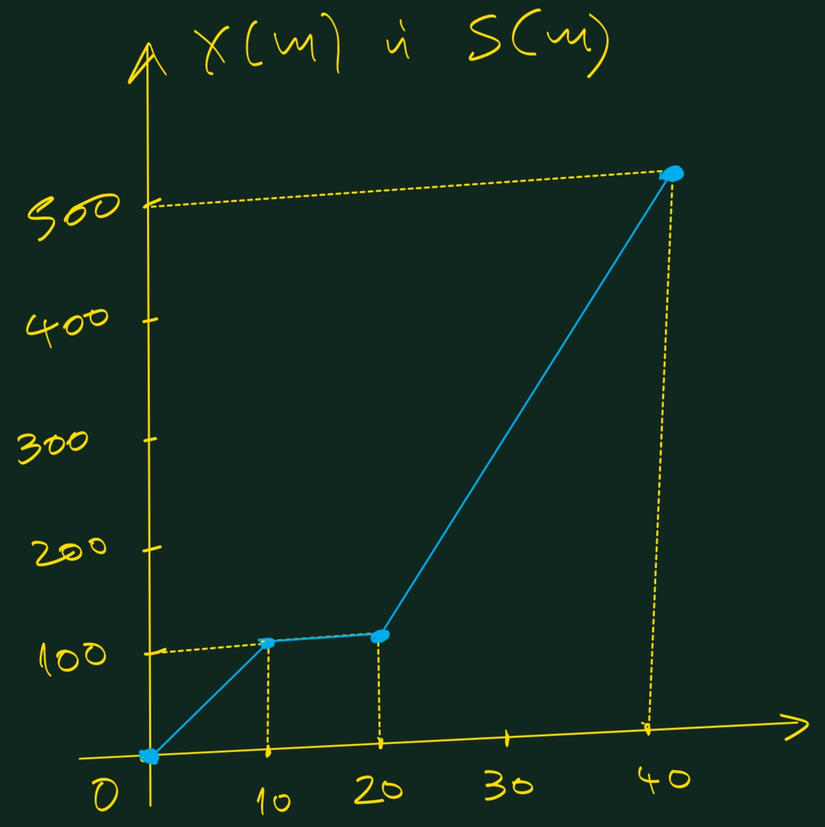
$\Delta x_1 = x(10) - x(0) \Rightarrow$

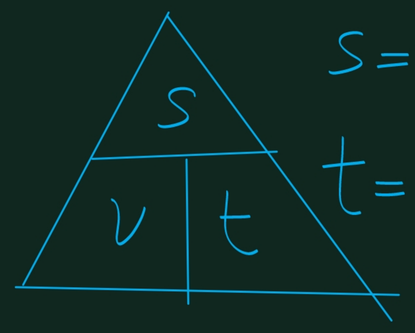
$100 = x(10) - 0 \Rightarrow$

$x(10) = 100\,m$

Από $10 \to 20\,sec$: $\Delta x_2 = x(20) - x(10) \Rightarrow 0 = x(20) - 100 \Rightarrow x(20) = 100\,m$

Από $20 \to 40\,sec$: $\Delta x_3 = x(40) - x(20) \Rightarrow 400 = x(40) - 100 \Rightarrow x(40) = 500\,m$





$$S = \upsilon \cdot t$$

$$t = \frac{S}{\upsilon}$$

$$\upsilon = \frac{S}{t}$$

Ασκ. 4 σελ. 69

$$\upsilon_1 = 36\ \text{Km/h} = \frac{36.000\ \text{m}}{3.600\ \text{sec}} = 10\ \text{m/s}.$$

$$\upsilon_2 = 54\ \text{Km/h} = \frac{54.000\ \text{m}}{3.600\ \text{sec}} = 15\ \text{m/s}.$$