

② $v = 300.000 \text{ km/s}$
 $v = 3 \cdot 10^8 \text{ m/s}$

a) $s?$ $\begin{cases} t_1 = 1 \text{ s} \\ t_2 = 1 \text{ día} \\ t_3 = 1 \text{ año} \end{cases}$

b) $t?$ $s_{\text{sol}} = 1,5 \cdot 10^8 \text{ km}$

Cambios de unidades:

$v = 3 \cdot 10^8 \text{ m/s}$; $t_2 = 86400 \text{ s}$; $t_3 = 3,15 \cdot 10^7 \text{ s}$; $s_{\text{sol}} = 1,5 \cdot 10^{11} \text{ m}$

a) $s = s_0 + vt = v \cdot t$

$s_1 = 3 \cdot 10^8 \text{ m/s} \cdot 1 \text{ s} = 3 \cdot 10^8 \text{ m}$

$s_2 = 3 \cdot 10^8 \text{ m/s} \cdot 86400 \text{ s} = 2,60 \cdot 10^{13} \text{ m}$

$s_3 = 3 \cdot 10^8 \text{ m/s} \cdot 3,15 \cdot 10^7 \text{ s} = 9,46 \cdot 10^{15} \text{ m} \rightarrow s_3 = 9.460.000.000.000 \text{ km}$

b) $t = \frac{s}{v} = \frac{1,5 \cdot 10^{11} \text{ m}}{3 \cdot 10^8 \text{ m/s}} = 500 \text{ s} \rightarrow t = 8,33 \text{ min}$

④ $v_1 = 90 \text{ km/h} = 25 \text{ m/s}$
 $\Delta t = 4 \text{ min} = 240 \text{ s}$
 $v_2 = 35 \text{ m/s}$

a) $t_2?$

b) $s?$

a) MRU $\begin{cases} s_1 = s_0 + v_1 t_1 = 25 t_1 \\ s_2 = s_0 + v_2 t_2 = 35 t_2 \end{cases}$

Condiciones $\begin{cases} s_1 = s_2 \\ t_1 = t_2 + 240 \end{cases}$

$\begin{cases} 25 t_1 = 35 t_2 \\ t_1 = t_2 + 240 \end{cases} \Rightarrow \begin{cases} t_1 = 840 \text{ s} \\ t_2 = 600 \text{ s} \end{cases}$

b) $s_2 = 35 \cdot 600 = 21.000 \text{ m}$

⑤ $d = 5 \text{ km} = 5000 \text{ m}$
 $\Delta t = 15 \text{ s}$
 $v_A = 25 \text{ m/s}$
 $v_B = 20 \text{ m/s}$

a) $t_A?$ $s_A?$ $\begin{matrix} \vec{a} \\ \vec{b} \end{matrix}$

b) $t_A?$ $s_A?$ $\begin{matrix} \vec{a} \\ \vec{b} \end{matrix}$

a) MRU $\begin{cases} s_A = s_0 + v_A t_A = 25 t_A \\ s_B = s_0 + v_B t_B = 20 t_B \end{cases}$

Condiciones $\begin{cases} s_A = s_B + d = s_B + 5000 \\ t_A = t_B - 15 \end{cases}$

$\begin{cases} 25 t_A = 20 t_B + 5000 \\ t_A = t_B - 15 \end{cases} \Rightarrow \begin{cases} t_A = 1060 \text{ s} \\ t_B = 1075 \text{ s} \end{cases}$

$s_A = 25 \cdot 1060 = 26.500 \text{ m}$ ($s_B = 20 \cdot 1075 = 21.500 \text{ m}$)

b) MRU $\begin{cases} s_A = s_0 + v_A t = 25 t \\ s_B = s_0 + v_B t = 20 t \end{cases}$

Condiciones $\begin{cases} s_A + s_B = d = 5000 \\ t_A = t_B - 15 \end{cases}$

$\begin{cases} 25 t_A + 20 t_B = 5000 \\ t_A = t_B - 15 \end{cases} \Rightarrow \begin{cases} t_A = 104,44 \text{ s} \\ t_B = 119,44 \text{ s} \end{cases}$

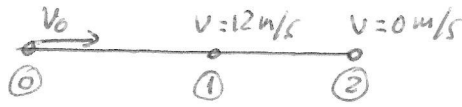
$s_A = 25 \cdot 104,44 = 2.611 \text{ m}$ ($s_B = 20 \cdot 119,44 \approx 2.389 \text{ m}$) $s_T = 5000 \text{ m}$

⑥ $v_0 = 0 \text{ m/s}$
 $v = 100 \text{ km/h} \approx 27,78 \text{ m/s}$
 $t = 10 \text{ s}$
 a) a ?
 b) t_1 ? $v_1 = 50 \text{ km/h} \approx 13,89 \text{ m/s}$
 t_2 ? $v_2 = 150 \text{ km/h} = 41,67 \text{ m/s}$

M.R.U.A.

a) $v = v_0 + a \cdot t$; $a = \frac{v - v_0}{t} = \frac{27,78 \text{ m/s} - 0 \text{ m/s}}{10 \text{ s}} = \underline{2,78 \text{ m/s}^2}$
 b) $v_1 = v_0 + a \cdot t_1$; $t_1 = \frac{v_1 - v_0}{a} = \frac{13,89 \text{ m/s} - 0 \text{ m/s}}{2,78 \text{ m/s}^2} \approx \underline{5 \text{ s}}$
 $v_2 = v_0 + a \cdot t_2$; $t_2 = \frac{v_2 - v_0}{a} = \frac{41,67 \text{ m/s} - 0 \text{ m/s}}{2,78 \text{ m/s}^2} \approx \underline{15 \text{ s}}$

⑧ $v_0 = 90 \text{ km/h} = 25 \text{ m/s}$
 $a = -1,5 \text{ m/s}^2$
 a) t ? $v = 12 \text{ m/s}$
 b) s ? "
 c) s ? $v = 0 \text{ m/s}$



a) $v_1 = v_0 + a \cdot t_1$; $t_1 = \frac{v_1 - v_0}{a} = \frac{12 \text{ m/s} - 25 \text{ m/s}}{-1,5 \text{ m/s}^2} = \underline{8,67 \text{ s}}$
 b) $v_1^2 - v_0^2 = 2 a s_1$; $s_1 = \frac{v_1^2 - v_0^2}{2 a} = \frac{(12 \text{ m/s})^2 - (25 \text{ m/s})^2}{2 (-1,5 \text{ m/s}^2)} = \underline{160,33 \text{ m}}$
 c) $v_2^2 - v_0^2 = 2 a s_2$; $s_2 = \frac{v_2^2 - v_0^2}{2 a} = \frac{(0 \text{ m/s})^2 - (25 \text{ m/s})^2}{2 (-1,5 \text{ m/s}^2)} = \underline{208,33 \text{ m}}$

⑩ $v_0 = 0 \text{ m/s}$
 $a_1 = 1 \text{ m/s}^2$
 $t_1 = 20 \text{ s}$
 $t_2 = 10 \text{ s}$
 $a_2 = 3 \text{ m/s}^2$
 $t_3 = 15 \text{ s}$? $v_3 = \text{cte}$
 $a_4 = -2 \text{ m/s}^2$
 $v_4 = 0$

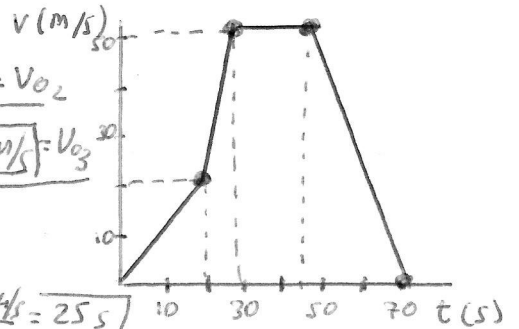
a) Necesitamos v_1, v_2, v_3, v_4 en cada tramo

$v_1 = v_0 + a_1 \cdot t_1 = 1 \text{ m/s}^2 \cdot 20 \text{ s} = \underline{20 \text{ m/s}} = v_2$

$v_2 = v_2 + a_2 \cdot t_2 = 20 \text{ m/s} + 3 \text{ m/s}^2 \cdot 10 \text{ s} = \underline{50 \text{ m/s}} = v_3$

v_3 (MRU) $v_3 = v_3 = \underline{50 \text{ m/s}} = v_4$

$v_4 = v_4 + a_4 \cdot t_4$; $t_4 = \frac{v_4 - v_4}{a_4} = \frac{0 \text{ m/s} - 50 \text{ m/s}}{-2 \text{ m/s}^2} = \underline{25 \text{ s}}$



b) $v^2 - v_0^2 = 2 a s$; $s = \frac{v^2 - v_0^2}{2 a}$ (MRUA \rightarrow Tramos 1, 2 y 4)

$s_1 = \frac{(20 \text{ m/s})^2 - (0 \text{ m/s})^2}{2 \cdot 1 \text{ m/s}^2} = \underline{200 \text{ m}}$; $s_2 = \frac{(50 \text{ m/s})^2 - (20 \text{ m/s})^2}{2 \cdot 3 \text{ m/s}^2} = \underline{350 \text{ m}}$

s_3 (MRU) $\rightarrow s_3 = v_3 \cdot t = 50 \text{ m/s} \cdot 15 \text{ s} = \underline{750 \text{ m}}$

$s_4 = \frac{(0 \text{ m/s})^2 - (50 \text{ m/s})^2}{2 (-2 \text{ m/s}^2)} = \underline{625 \text{ m}}$

c) $v_m = \frac{s_T}{t_T} = \frac{200 \text{ m} + 350 \text{ m} + 750 \text{ m} + 625 \text{ m}}{20 \text{ s} + 10 \text{ s} + 15 \text{ s} + 25 \text{ s}} = \underline{27,5 \text{ m/s}}$

- a) Gráfica $v-t$
 b) s_i
 c) v_m ?