Física 1 - Ficha S2
Movimento Unidimensional

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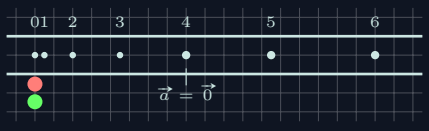
Conteúdo

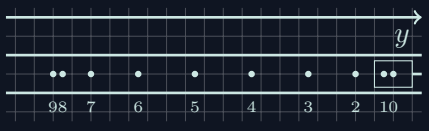
Parte I
Questões

Questão 1

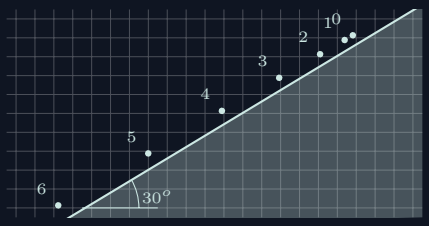
Q1 - a)



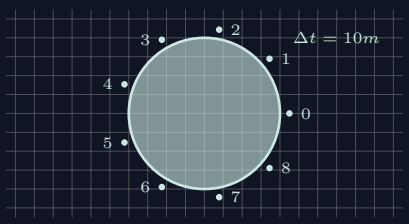
Q1 - b)



Q1 - c)



Q1 - d)



Questão 2

Q2 - a)

Movimento sobre superficie com atrito (movimento retilíneo com aceleração inversa ao movimento)

Q2 - b)

Queda livre (movimento retilíneo acelerado para baixo)

Q2 - c)

Movimento retilíneo uniforma para cima,
Movimento circular desacelerado,
movimento circular acelerado,
movimento retilíneo uniforme para esquerda.

Questão 4

Q4 - a)

t	2	4	6	10
x	10	20	20	40

Q4 - b)

$v = \Delta S/\Delta t =$
$= (20 - 0)\, m/(4 - 0)\, s = 5\, m/s$

Q4 - c)

$v = \Delta S/\Delta t =$
$= (20 - 20)\, m/(6 - 4)\, s = 0\, m/s$

Q4 - d)

$v = \Delta S/\Delta t =$
$= (40 - 20)\, m/(10 - 6)\, s = 5\, m/s$

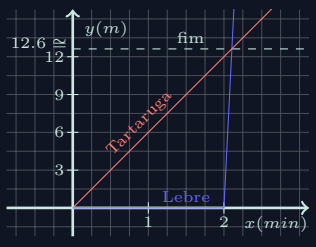
Q4 - e)

$v = \Delta S/\Delta t =$
$= (20 - 40)\, m/(12 - 10)\, s = -10\, m/s$

Parte II
Problemas

Problema 1

P1 - a)



P1 - b)

$$\Delta t * \frac{10.0\, cm}{s}\frac{60}{100} - (\Delta t - 2)20* \\ * \frac{10.0\, cm}{s}\frac{60}{100} \implies \Delta t \cong 2.1\, min$$

P1 - c)

$\Delta S = \Delta t * v_t = 2.1 * 6 \cong 12.6\, m$

Problema 2

$$\boldsymbol{x_{(t)} = 2.0 + 3.0\,t - 1.0\,t^2}$$

P2 - a)

$x_{(3)} = 2.0 + 3.0 * 3 - 1.0(3)^2 = 2.0\,m$

P2 - b)

$v_{(3)} = x'_{(3)} = 3.0 + 2 * 3 = 9\,m/s$

P2 - c)

$a_{(3)} = x''_{(3)} = -1.0\,m/s^2$

Problema 3

P3 - a)

$\Delta t_{\min}\, a_{\max} = |\Delta \vec{v}| = v_i \implies$

$\implies \Delta t_{\min} = 100/5 = 20\,s$

P3 - b)

$\iff \dfrac{a_{\max}\,(\Delta t_{\min})^2}{2} = \Delta S_{\max} <$

$< 0.80\,K\,m \implies \dfrac{5 * (20)^2}{2} = 1000\,m =$

$= 1\,K\,m \nleq 0.8\,K\,m$

Problema 4

P4 - a)

$\Delta S = a_0(t_0)^2/2 + v_1\,t_1 + a_1(t_1)^2/2;\ t_{Total} = t_0 + t_1;$

$v_1 = t_0\,a_0 \implies \Delta S = \dfrac{v_1}{t_{Total} - t_1}\dfrac{(t_{Total} - t_1)^2}{2} + v_1\,t_1 + a_1(t_1)^2/2 =$

$= \dfrac{10.0}{160 - 20}\dfrac{(160 - 20)^2}{2} + 10.0 * 20.0 - 5.00 * 10^{-2}(20.0)^2/2 \cong 890\,m$

P4 - b)

Maria ganha $\iff t_M < t_J;\ t_M = t_0 + t_1;\ a_0\,(t_0)^2/2 = l_1 \implies$

$\implies \sqrt{2\,l_1/a_0} + t_1 = \sqrt{2 * 200/0.100} + 128 \cong 191\,s \not< 160\,s$

$\therefore$ João ganha

Problema 5

P5 - a)

$\vec{a} = \Delta\vec{v}/\Delta t;\ \Delta\vec{S} = \vec{v}_i\,\Delta t + \vec{a}\,(\Delta t)^2/2 \implies \vec{v}_i\,(\Delta v/a) + \vec{a}\,(\Delta v/a)^2/2 = \Delta\vec{S} \implies$

$\implies \dfrac{\vec{a}}{a^2}\,\dfrac{(\Delta v)^2}{2} = \Delta\vec{S} - \vec{v}_i\,\Delta v/a \implies a^2\,\hat{\imath} - a\,v_i\,\hat{\imath}\,\Delta v/\Delta S + a\hat{\imath}\,\dfrac{(\Delta v)^2}{2\,\Delta S} = \vec{0} \implies$

$\implies a\,\hat{\imath}\left(a + \dfrac{v_i\,\Delta v}{\Delta S} - \dfrac{(\Delta v)^2}{2\,\Delta S}\right) = \vec{0} \implies \vec{a} = \dfrac{(\Delta v)(\Delta v - 2\,v_i)}{2\,\Delta S}\,\hat{\imath} =$

$= \dfrac{(420 - 280)(420 - 280 - 2 * 420)}{2 * 0.10} = -490\,\hat{\imath}\,K\,m/s^2$

P5 - b)

$\Delta t = \Delta v/a = \dfrac{420 - 280}{490\,K} \cong 286 * 10^{-6} s$

P5 - c)

$\Delta\vec{S} = \vec{v}_i\,\Delta t + \vec{a}\,(\Delta t)^2/2;\ \vec{a} = \Delta\vec{v}/\Delta t;\ \Delta\vec{v} = -\vec{v}_i \implies$

$\implies \Delta S\,\hat{\imath} = \dfrac{v_i^2}{a}\,\hat{\imath} - \dfrac{v_i^2}{2\,a}\,\hat{\imath} = \dfrac{v_i^2}{2\,a}\,\hat{\imath} = \left(\dfrac{420^2}{2 * 490\,K}\right)\hat{\imath} \cong 18\,\hat{\imath}\,c\,m$

Problema 6

P6 - a)

$\Delta t_{Total} = \Delta t_1 + \Delta t_2;\ a_1\,\Delta t_1 = a_2\,\Delta t_2;\ \Delta S = a_1\,(\Delta t_1)^2/2 + v_2\,\Delta t_2 - a_2\,(\Delta t_2)^2/2;$

$v_2 = a_1\,\Delta t_1 \implies \Delta t_{Total} = \sqrt{\dfrac{2\,a_2\,\Delta S}{a_2\,a_1 + a_1^2}} + \dfrac{a_1}{a_2}\sqrt{\dfrac{2\,a_2\,\Delta S}{a_2\,a_1 + a_1^2}} =$

$= \left(1 + \dfrac{0.100}{0.500}\right)\sqrt{\dfrac{2 * 0.500 * 1.00\,K}{0.500 * 0.100 + 0.100^2}} \cong 155\,s;$

$\Delta t_1 = \sqrt{\dfrac{2\,a_2\,\Delta S}{a_2\,a_1 + a_1^2}} = \sqrt{\dfrac{2 * 0.500 * 1.00\,K}{0.500 * 0.100 + 0.100^2}} \cong 129\,s$