

data
 fecha 22.03.21

D S T Q Q S S
 D L M M J V S

JORGE NAMI HARDES

FÍSICA - 2021-1 - SISTEMAS DE INFORMAÇÃO

LISTA MOVIMENTO EM 2D E 3D

$$1 - \Delta \vec{r} = 2\hat{i} - 3\hat{j} + 6\hat{k}$$

$$\vec{r} = 3\hat{j} - 4\hat{k} \quad \vec{r}_0 = ?$$

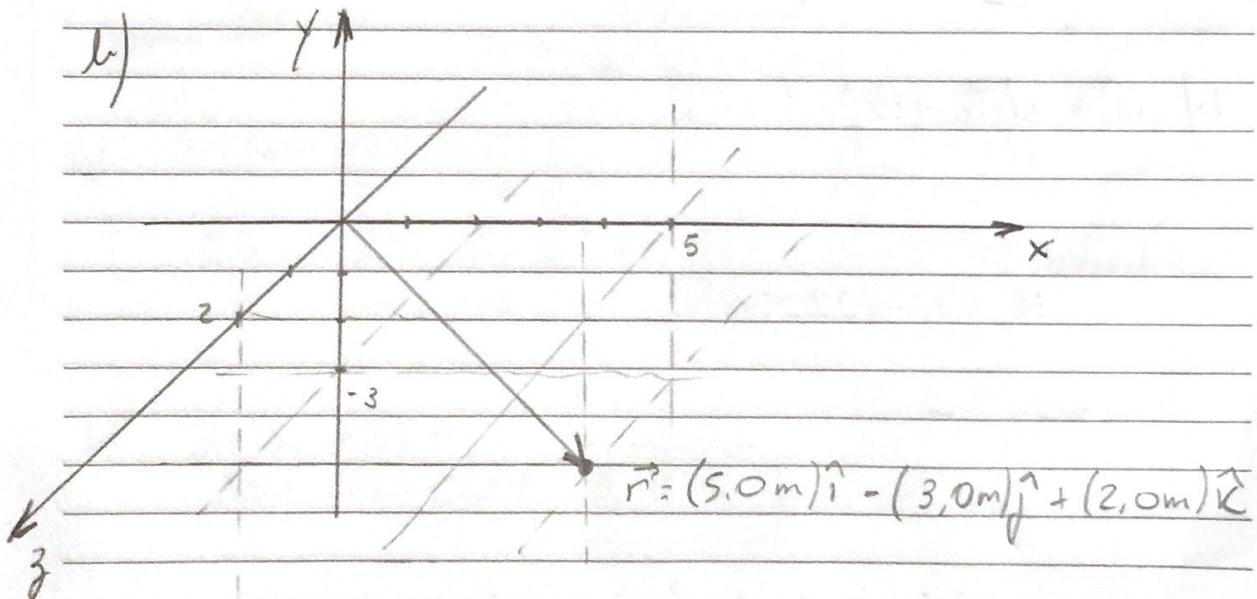
$$\Delta \vec{r} = \vec{r} - \vec{r}_0 \Rightarrow 2\hat{i} - 3\hat{j} + 6\hat{k} = 3\hat{j} - 4\hat{k} - \vec{r}_0$$

$$- \vec{r}_0 = 2\hat{i} - 6\hat{j} + 10\hat{k} \Rightarrow \boxed{\vec{r}_0 = -2\hat{i} + 6\hat{j} - 10\hat{k}}$$

$$3 - \vec{r} = (5,0\text{m})\hat{i} - (3,0\text{m})\hat{j} + (2,0\text{m})\hat{k}$$

$$a) |\vec{r}| = \sqrt{(5,0\text{m})^2 + (-3,0\text{m})^2 + (2,0\text{m})^2} =$$

$$\sqrt{25 + 9 + 4} = \sqrt{38} \text{ m} \approx \boxed{6,16 \text{ m}}$$



$$5- \vec{r}_0 = 5,0\hat{i} - 6,0\hat{j} + 2,0\hat{k} \quad \Delta t = 10s$$

$$\vec{r}_f = 2,0\hat{i} + 8,0\hat{j} - 2,0\hat{k}$$

$$\vec{v}_{med} = ?$$

$$\vec{v}_{med} = \frac{\Delta \vec{r}}{\Delta t} = \frac{(2-5)\hat{i} + (8-(-6))\hat{j} + (-2-2)\hat{k}}{10}$$

$$\vec{v}_{med} = \frac{-3\hat{i} + 14\hat{j} - 4\hat{k}}{10}$$

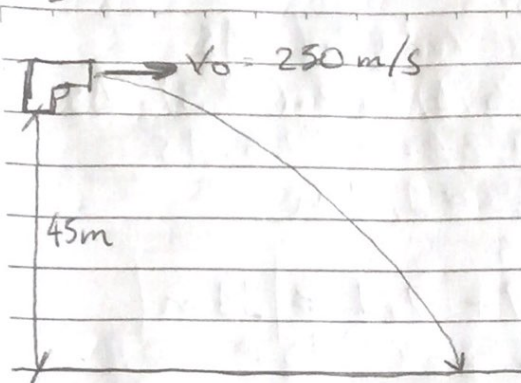
$$\vec{v}_{med} = -0,3\text{ m/s } \hat{i} + 1,4\text{ m/s } \hat{j} - 0,4\text{ m/s } \hat{k}$$

$$11- \vec{r} = \hat{i} + 4t^2\hat{j} + t\hat{k}$$

$$a) \vec{v} = \frac{d\vec{r}}{dt} = 8t\hat{j} + \hat{k}$$

$$b) \vec{a} = \frac{d\vec{v}}{dt} = 8\hat{j}$$

21-



$$u) S = S_0 + V_0 t + \frac{at^2}{2}$$

$$-45 = \frac{-9,8 \cdot t^2}{2}$$

$$90 = 9,8 \cdot t^2$$

$$t^2 = \frac{90}{9,8} \Rightarrow t \approx 3,03 \text{ s}$$

$$b) S = S_0 + V_0 t$$

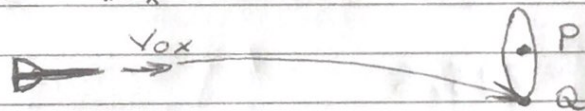
$$\Delta S = 250 \cdot 3,03 \Rightarrow \Delta S = 757,5 \text{ m}$$

$$c) v^2 = v_0^2 + 2u \cdot \Delta S$$

$$v^2 = -9,8 \cdot 2 \cdot -45$$

$$v^2 = 882 \Rightarrow v \approx 29,7 \text{ m/s}$$

25- $v_{0x} = 10 \text{ m/s}$ $\Delta t = 0,19 \text{ s}$



$$u) S = S_0 + V_0 t + \frac{at^2}{2}$$

$$\Delta S = \frac{-9,8 \cdot (0,19)^2}{2} \Rightarrow \Delta S = -0,17649 \text{ m}$$

$$PQ = 0,17649 \text{ m}$$

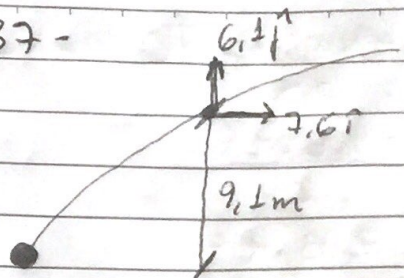
$$b) S = S_0 + V_0 t$$

$$\Delta S = 10 \cdot 0,19 = 1,9 \text{ m}$$

data
fecha

D S T Q Q S S
D L M M J V S

37-



$$a) \quad v^2 = v_0^2 + 2u \cdot \Delta s$$

$$0 = (6,1)^2 + 2 \cdot (-9,8) \cdot \Delta s$$

$$-37,21 = -19,6 \cdot \Delta s$$

$$\Delta s \approx 1,9 \text{ m}$$

$$h = 1,9 + 9,1 \approx \boxed{11 \text{ m}}$$

$$b) \quad s = s_0 + v_0 t + \frac{at^2}{2}$$

$$-11 = -9,8 t^2 \Rightarrow -22 = -9,8 t^2 \Rightarrow$$

$$t = \sqrt{\frac{22}{9,8}} \approx 1,5 \text{ s (upper desired)}, \text{ total } t_{\text{total}} = 2 \cdot 1,5 = 3 \text{ s}$$

$$s = s_0 + v_0 t \rightarrow \Delta s = 7,6 \cdot 3 \approx \boxed{22,8 \text{ m}}$$

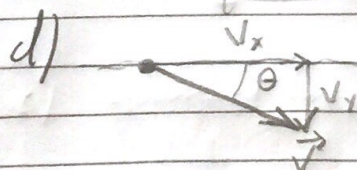
$$c) \quad v_x^2 = v_0^2 + 2u \cdot \Delta s$$

$$v^2 = 2(-9,8) \cdot (-11) = 215,6$$

$$v \approx 14,7 \text{ m/s}$$

$$|\vec{v}| = \sqrt{(14,7)^2 + (7,6)^2} = \sqrt{215,6 + 57,76}$$

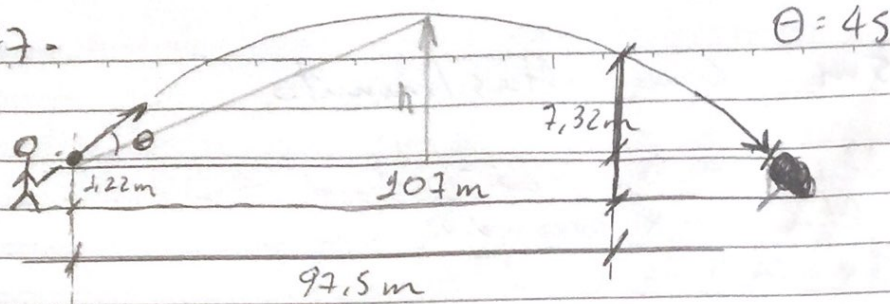
$$|\vec{v}| \approx \boxed{16,53 \text{ m/s}}$$



$$\tan \theta = \frac{v_y}{v_x} = \frac{14,7}{7,6} \approx 1,93$$

$$\theta = \arctan 1,93 \approx \boxed{62,66^\circ}$$

47.



$$V^2 = V_0^2 + 2u \cdot \Delta S$$

$$0 = V \cdot \sin 45^\circ + 2(-9.8) \cdot \Delta S$$

$$-V \cdot \sin 45^\circ = -19.6 \cdot \Delta S$$

$$\Delta S = \frac{V \cdot \sin 45^\circ}{19.6}$$

$$19.6 t$$

$$V = V_0 + at$$

$$0 = V \cdot \sin 45^\circ - 9.8t$$

$$9.8t = V \cdot \sin 45^\circ$$

$$t = \frac{V \cdot \sin 45^\circ}{9.8}$$

$$9.8$$

$$S = S_0 + V_0 t$$

$$53.5 = V \cdot \cos 45^\circ \cdot t$$

$$t = \frac{53.5}{V \cdot \cos 45^\circ}$$

$$V \cdot \cos 45^\circ$$

$$\frac{53.5}{V \cdot \cos 45^\circ} = \frac{2V \cdot \sin 45^\circ}{9.8}$$

$$9.8$$

$$2V^2 \cdot \cos 45^\circ \cdot \sin 45^\circ = 524.30$$

$$2V^2 = 524.30 \cdot 2$$

$$V \approx 22.89 \text{ m/s}$$

$$97.5 = V \cdot \cos 45^\circ \cdot t$$

$$t = \frac{97.5 \cdot 2}{22.89 \cdot \sqrt{2}} \approx 6.02 \text{ s}$$

$$22.89 \cdot \sqrt{2}$$

$$S = S_0 + V_0 t + \frac{at^2}{2}$$

$$107 = 22.89 \cdot \frac{\sqrt{2}}{2} \cdot t$$

$$t = 6.61 \text{ s}$$

$$\Delta S = V_0 \sin 45^\circ \cdot 2.22 - \frac{9.8(2.22)^2}{2}$$

$$\Delta S = 22.89 \cdot \frac{\sqrt{2}}{2} \cdot 2.22 - \frac{9.8(2.22)^2}{2}$$

$$t = 3.30 \text{ s}$$

$$\Delta S = 16.12 - 36.25$$

$$\Delta S = -20.13 \text{ m}$$

$$h/\Delta S = -20.13 \text{ m ou}$$

$$\text{seja altura} = 37.24 - 20.13 =$$

$$17.11 \text{ m}$$

$$\Delta S = V_0 \cdot \sin 45^\circ \cdot 2.22 - \frac{9.8(2.22)^2}{2}$$

$$h_A = 7.32 - 1.22 = 6.10 \text{ m}$$

$$\Delta h = 17.11 - 6.1 = 11.01 \text{ m}$$

$$\Delta S = -37.24 \text{ m}$$

$$\Delta S = 17.11 \text{ m}$$

57 - $R = 15 \text{ m}$ cinco voltas / minuto

a) 5 voltas = 60 segundos
1 volta = x segundos
 $5x = 60 \Rightarrow x = 12 \text{ s}$

b) $T = \frac{2\pi R}{V} \Rightarrow \frac{60}{5} = \frac{2 \cdot \pi \cdot 15}{V} \Rightarrow V = \frac{15\pi}{6} = \frac{5\pi}{2}$

$a = \frac{V^2}{R} = \frac{25\pi^2}{4} = \frac{5\pi^2}{4 \cdot 3} = \frac{5\pi^2}{12} \approx 1,3 \text{ m/s}^2$

c) Para baixo

d) $a \approx 1,3 \text{ m/s}^2$

e) Para cima

59 -

a) $T = \frac{2\pi R}{V} \Rightarrow V = \frac{2\pi R}{T} = \frac{2\pi \cdot 20.000}{1}$

$V = 40000\pi = 125600 \text{ m/s}$ ou $1,256 \cdot 10^5 \text{ m/s}$

b) $|\vec{a}| = \frac{V^2}{R} = \frac{125600^2}{20000} = 788768 \text{ m/s}^2$ ou $7,88768 \cdot 10^5 \text{ m/s}^2$

c) Aumentam, pois seu período diminui