data / fecha 14 . 03 . 21

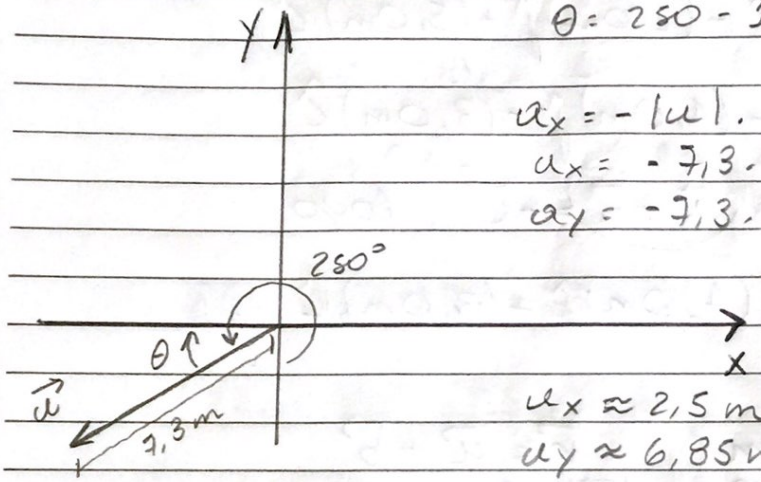
D S T Q Q S S
D L M M J V S

JORGE NAMI HAIBES

FÍSICA - 2021-1 - SISTEMAS DE INFORMAÇÃO

LISTA ~~6~~ VETORES

3- $|\vec{u}| = 7,3\ m$



$\theta = 250 - 180 = 70°$

$a_x = -|u| \cdot \cos\theta$

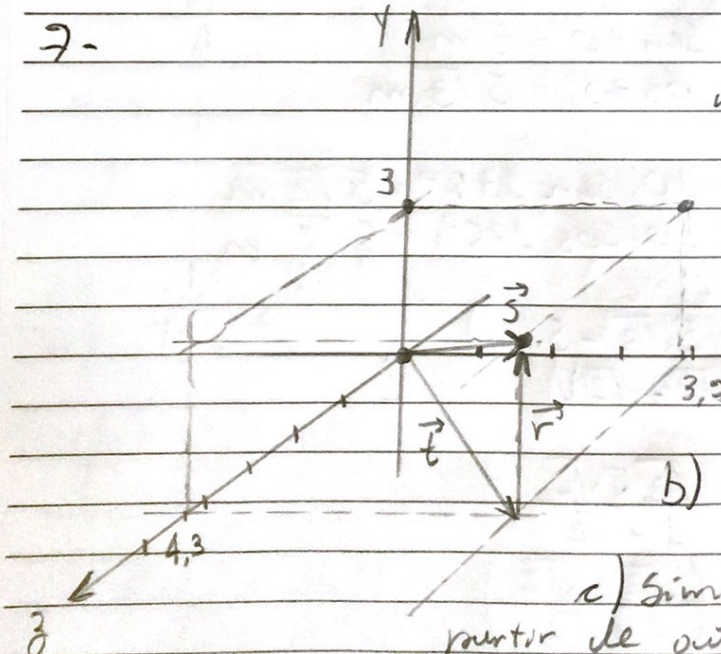
$a_x = -7,3 \cdot \cos 70°$

$a_y = -7,3 \cdot \operatorname{Sen} 70°$

$a_x \approx 2,5\ m$

$a_y \approx 6,85\ m$

7-



a) $\vec{s} = (3,7, 3, 4,3)$

$|\vec{s}| = \sqrt{(3,7)^2 + 3^2 + (4,3)^2}$

$|\vec{s}| = \sqrt{13,69 + 9 + 18,49}$

$|\vec{s}| \approx 6,4\ m$

b) Não

c) Sim d) Sim, basta partir de outra dimensão ou rumo a dimensão oposta, diferente.

e) $\vec{s} = 3,7\hat{i} + 3\hat{j} + 4,3\hat{k}$

f) Seguir o vetor $\vec{t}$ e depois o vetor $\vec{r}$

data
fecha

13 - $\vec{a} = (4{,}0\,m)\hat{i} - (3{,}0\,m)\hat{j} + (1{,}0\,m)\hat{k}$

$\vec{b} = (-1{,}0\,m)\hat{i} + (1{,}0\,m)\hat{j} + (4{,}0\,m)\hat{k}$

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

b) $\vec{a} - \vec{b} = (5{,}0\,m)\hat{i} - (4{,}0\,m)\hat{j} - (3{,}0\,m)\hat{k}$

c) $\vec{a} - \vec{b} + \vec{c} = 0 \Rightarrow \vec{a} - \vec{b} = -\vec{c}$, logo

$\vec{c} = -(5{,}0\,m)\hat{i} + (4{,}0\,m)\hat{j} + (3{,}0\,m)\hat{k}$

17 - $|\vec{a}| = |\vec{b}| = 10\,m \qquad \vec{r} = \vec{a} + \vec{b}$

$r_x = ? \qquad r_y = ? \qquad |\vec{r}| = ?$

$a_x = a \cdot \operatorname{sen}\theta_1 = 10 \cdot \operatorname{sen} 30° = 5\,m$

$a_y = a \cdot \cos\theta_1 = 10 \cdot \cos 30° = 5\sqrt{3}\,m$

$b_x = b \cdot \operatorname{sen}(\theta_1 + \theta_2) = 10 \cdot \operatorname{sen} 135° = 5\sqrt{2}\,m$

$b_y = b \cdot \cos(\theta_1 + \theta_2) = 10 \cdot \cos 135° = -5\sqrt{2}\,m$

$\vec{r} = \vec{a} + \vec{b} = (5 + 5\sqrt{2},\ 5\sqrt{3} - 5\sqrt{2})$

$\vec{r} = (5(1 + \sqrt{2}),\ 5(\sqrt{3} - \sqrt{2}))$

$\operatorname{tg}\theta_r = \dfrac{5(\sqrt{3} - \sqrt{2})}{5(1 + \sqrt{2})} = \dfrac{\sqrt{3} - \sqrt{2}}{1 + \sqrt{2}} \Rightarrow$

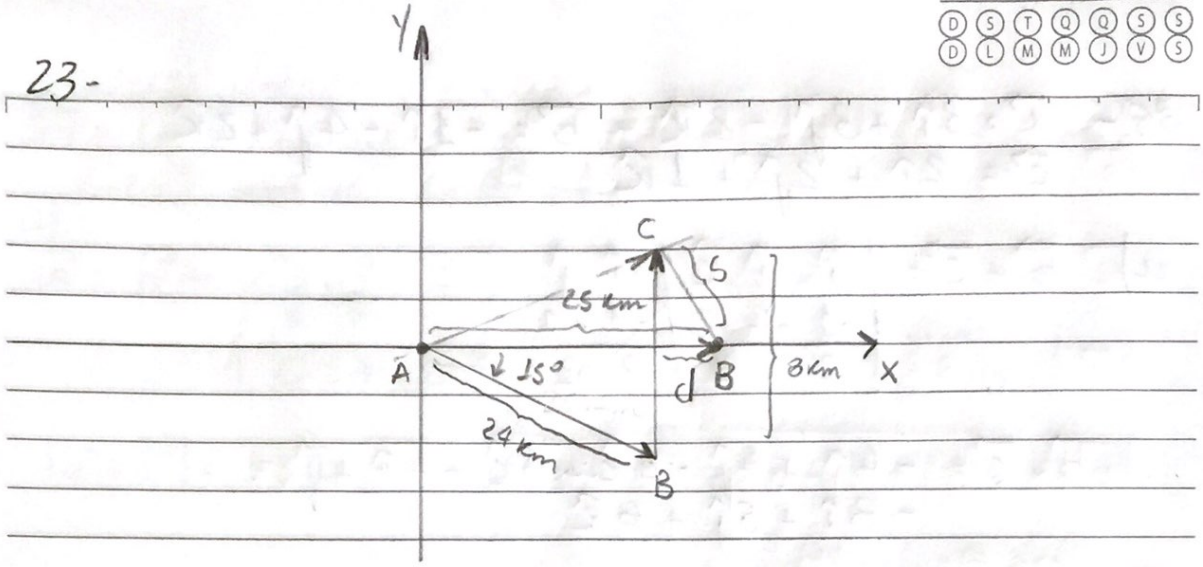
$\theta = \operatorname{arctg}\left(\dfrac{\sqrt{3} - \sqrt{2}}{1 + \sqrt{2}}\right)$

$|\vec{r}| = \sqrt{(5 + 5\sqrt{2})^2 + (5\sqrt{3} - 5\sqrt{2})^2} = \sqrt{145{,}71 + 2{,}52}$

$|\vec{r}| \approx 12{,}2\,m$

data
fecha

23-



$\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC} = (|\vec{u}| \cdot \cos 15°, -|\vec{u}| \cdot \operatorname{Sen} 15°) + (0, 8) =$

$\overrightarrow{AC} = (24 \cos 15°, -24 \operatorname{Sen} 15°) + (0, 8)$

$\overrightarrow{AC} = (24 \cos 15°, 8 - 24 \operatorname{Sen} 15°)$

$\overrightarrow{AB} = (25, 0)$

$d_{CB} = \sqrt{(25 - 24\cos 15°)^2 + (8 - 24 \operatorname{Sen} 15°)^2}$

$d_{CB} = \sqrt{3,304 + 3,148} \approx 2,54 \text{ km}$

29 - $\vec{d_1} + \vec{d_2} = 5\vec{d_3}$, $\vec{d_1} - \vec{d_2} = 3\vec{d_3}$, $\vec{d_3} = 2\hat{i} + 4\hat{j}$

a) $\vec{d_1} = ?$ b) $\vec{d_2} = ?$

$\vec{d_1} + \vec{d_2} = 10\hat{i} + 20\hat{j}$

$\vec{d_1} - \vec{d_2} = 6\hat{i} + 12\hat{j}$ +

$\Rightarrow \vec{d_2} = 10\hat{i} + 20\hat{j} - \vec{d_1}$

$\vec{d_2} = 2\hat{i} - 4\hat{j}$

$2\vec{d_1} = 16\hat{i} + 32\hat{j}$

$\vec{d_1} = 8\hat{i} + 16\hat{j}$

data
fecha

35- $\vec{a} = 3\hat{i} + 3\hat{j} - 2\hat{k}$ $\vec{b} = -1\hat{i} - 4\hat{j} + 2\hat{k}$
$\vec{c} = 2\hat{i} + 2\hat{j} + 1\hat{k}$

a) $\vec{b} \times \vec{c} =$

$\hat{i}$	$\hat{j}$	$\hat{k}$	$\hat{i}$	$\hat{j}$
-1	-4	2	-1	-4
2	2	1	2	2

$\vec{b} \times \vec{c} = -4\hat{i} + 4\hat{j} - 2\hat{k} + 8\hat{k} - 4\hat{i} + \hat{j} =$
$-8\hat{i} + 5\hat{j} + 6\hat{k}$

$\vec{a} \cdot (\vec{b} \times \vec{c}) = -24 + 15 - 12 = -24 + 3 = -21$

b) $\vec{a} \cdot (\vec{b} + \vec{c})$
$\vec{b} + \vec{c} = 1\hat{i} - 2\hat{j} + 3\hat{k}$

$\vec{a} \cdot (\vec{b} + \vec{c}) = 3 - 6 - 6 = -9$

c) $\vec{a} \times (\vec{b} + \vec{c}) =$

$\hat{i}$	$\hat{j}$	$\hat{k}$	$\hat{i}$	$\hat{j}$
3	3	-2	3	3
1	-2	3	1	-2

$= 9\hat{i} - 2\hat{j} - 6\hat{k} - 3\hat{k} - 4\hat{i} - 9\hat{j} =$
$5\hat{i} - 11\hat{j} - 9\hat{k}$

data
fecha

37 - $|\vec{a}| = 4$ $|\vec{b}| = 3$ $|\vec{c}| = 5$

$\vec{a} = (4,0,0)$ $\vec{b} = (0,3,0)$ $\vec{c} = (4,3,0)$

a)

$\vec{a} \times \vec{b} =$

$\hat{i}$	$\hat{j}$	$\hat{k}$	$\hat{i}$	$\hat{j}$
4	0	0	4	0
0	3	0	0	3

$= 12\hat{k}$

b)

$|\vec{a} \times \vec{b}| = 12$ u.c. orientação positiva coincidente com o eixo z.

b) $\vec{a} \times \vec{c} =$

$\hat{i}$	$\hat{j}$	$\hat{k}$	$\hat{i}$	$\hat{j}$
4	0	0	4	0
4	3	0	4	3

$= 12\hat{k}$

$|\vec{a} \times \vec{c}| = 12$ u.c.

d) Orientação positiva coincidente com o eixo z

e) $\vec{b} \times \vec{c} =$

$\hat{i}$	$\hat{j}$	$\hat{k}$	$\hat{i}$	$\hat{j}$
0	3	0	0	3
4	3	0	4	3

$= -12\hat{k}$

$|\vec{b} \times \vec{c}| = 12$ u.c.

f) Orientação negativa coincidente com o eixo z

data
fecha

39 - $\vec{a} \cdot \vec{b} = |\vec{a}| \cdot |\vec{b}| \cdot \cos\theta$

$\vec{a} = (3, 3, 3)$ $\vec{b} = (2, 1, 3)$

$\vec{a} \cdot \vec{b} = 6 + 3 + 9 = 18$

$|\vec{a}| = \sqrt{3^2 + 3^2 + 3^2} = \sqrt{27} = 3\sqrt{3}$ u.c.

$|\vec{b}| = \sqrt{2^2 + 1^2 + 3^2} = \sqrt{4 + 1 + 9} = \sqrt{14}$ u.c.

$\cos\theta = \frac{18^{6}}{3\sqrt{3} \cdot \sqrt{14}} = \frac{6}{\sqrt{42}}$

$\theta = \text{arc}\cos\left(\frac{6}{\sqrt{42}}\right) \approx \boxed{22,20°}$

43 - $|\vec{a}| = 3\,m$ $|\vec{b}| = 4\,m$ $|\vec{c}| = 10\,m$ $\theta = 30°$

a) $a_x = \boxed{3\,m}$ b) $a_y = \boxed{0\,m}$

c) $b_x = 4 \cdot \cos 30° = \boxed{2\sqrt{3}\,m}$

d) $b_y = 4 \cdot \text{sen}\, 30° = \boxed{2\,m}$

e) $c_x = 10 \cdot \cos 120° = \boxed{-5\,m}$

f) $c_y = 10 \cdot \text{sen}\, 120° = \boxed{5\sqrt{3}\,m}$

g) $\vec{c} = p\vec{a} + q\vec{b}$ $p = ?$ $q = ?$

$(-5, 5\sqrt{3}) = p(3, 0) + q(2\sqrt{3}, 2)$

$5\sqrt{3} = 2q$

$\boxed{q = \frac{5\sqrt{3}}{2}}$

$-5 = 3p + 2\sqrt{3}\,q$

$-5 = 3p + 2\sqrt{3} \cdot \frac{5\sqrt{3}}{2} \Rightarrow -5 = 3p + 15$

$3p = -20$

$\boxed{p = -\frac{20}{3}}$