

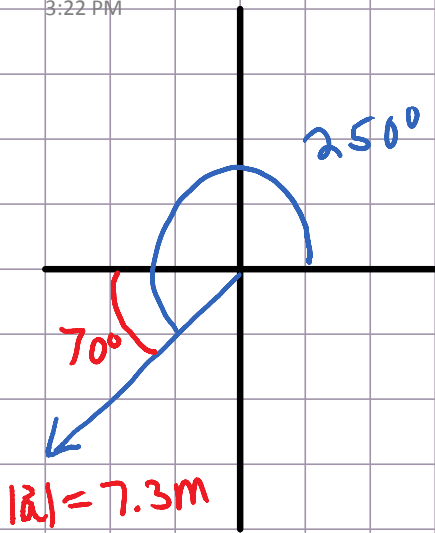
PHYS 2211 Homework 1

Chapter 3

Problems 1, 3, 9, 23, 56

Tuesday, August 09, 2011

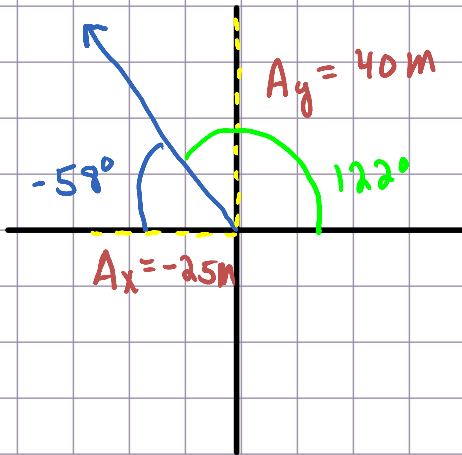
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$$\begin{aligned} \text{a) } a_x &= |\vec{a}| \cos \theta \\ a_x &= (7.3\text{m}) \cos(250^\circ) \\ a_x &= -2.5\text{m} \end{aligned}$$

$$\begin{aligned} \text{b) } a_y &= |\vec{a}| \sin \theta \\ a_y &= (7.3\text{m}) \sin(250^\circ) \\ a_y &= -6.86\text{m} \approx -6.9\text{m} \end{aligned}$$

3

Sunday, August 21, 2011
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$$a) |\vec{A}| = \sqrt{A_x^2 + A_y^2}$$

$$|\vec{A}| = \sqrt{(-25m)^2 + (40m)^2}$$

$$|\vec{A}| = 47.2m$$

$$b) \theta = \tan^{-1} \left(\frac{A_y}{A_x} \right)$$

$$\theta = \tan^{-1} \left(\frac{40m}{-25m} \right)$$

$$\theta = -58^\circ \text{ or } 180^\circ - 58^\circ = 122^\circ$$

$$\vec{a} = (4\hat{x} - 3\hat{y} + \hat{z})m$$

$$\vec{b} = (-\hat{x} + \hat{y} + 4\hat{z})m$$

$$a) \vec{r} = \vec{a} + \vec{b} = (4\hat{x} - 3\hat{y} + \hat{z})m + (-\hat{x} + \hat{y} + 4\hat{z})m$$

$$\vec{r} = [(4-1)\hat{x} + (-3+1)\hat{y} + (1+4)\hat{z}]m$$

$$\vec{r} = (3\hat{x} - 2\hat{y} + 5\hat{z})m$$

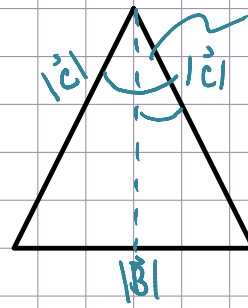
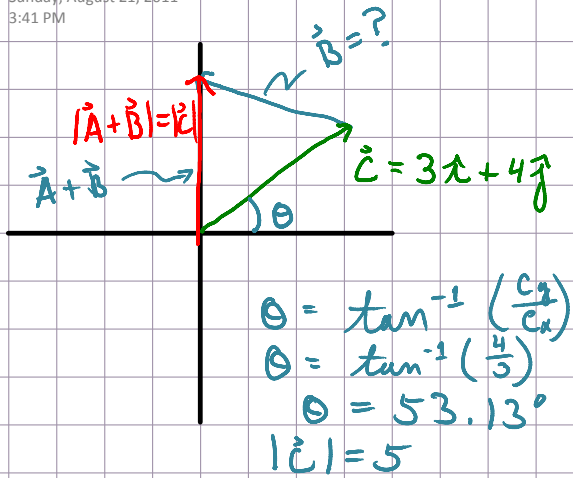
$$b) \vec{s} = \vec{a} - \vec{b} = (4\hat{x} - 3\hat{y} + \hat{z})m - (-\hat{x} + \hat{y} + 4\hat{z})m$$

$$\vec{s} = [(4+1)\hat{x} + (-3-1)\hat{y} + (1-4)\hat{z}]m$$

$$\vec{s} = (5\hat{x} - 4\hat{y} - 3\hat{z})m$$

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

$$\vec{c} = \vec{b} - \vec{a} \quad \text{or} \quad -(\vec{a} - \vec{b}) = (-5\hat{x} + 4\hat{y} + 3\hat{z})m$$

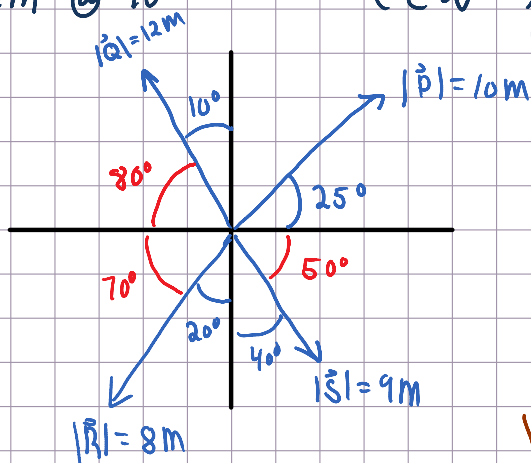


$$\sin\left(\frac{36.87^\circ}{2}\right) = \frac{\frac{|B|}{2}}{|\vec{C}|}$$

$$|\vec{B}| = 2|\vec{C}|\sin\left(\frac{36.87^\circ}{2}\right)$$

$$|\vec{B}| = 3.2 //$$

$\vec{P} = 10 \text{ m @ } 25^\circ$ Counter clockwise from (+) x
 $\vec{Q} = 12 \text{ m @ } 10^\circ$ C C W from (+) y
 $\vec{R} = 8 \text{ m @ } 20^\circ$ C W from (-) y
 $\vec{S} = 9 \text{ m @ } 40^\circ$ C C W from (-) y



$$\begin{aligned}
 P_x &= |P| \cos(25^\circ) = 9.06 \text{ m} & P_y &= |P| \sin(25^\circ) = 4.23 \text{ m} \\
 Q_x &= |Q| \cos(80^\circ) = -2.08 \text{ m} & Q_y &= |Q| \sin(80^\circ) = 11.82 \text{ m} \\
 R_x &= |R| \cos(70^\circ) = -2.74 \text{ m} & R_y &= |R| \sin(70^\circ) = -7.52 \text{ m} \\
 S_x &= |S| \cos(50^\circ) = 5.79 \text{ m} & S_y &= |S| \sin(50^\circ) = -6.9 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \vec{V} &= \vec{P} + \vec{Q} + \vec{R} + \vec{S} \\
 \vec{V} &= [(9.06\hat{i} + 4.23\hat{j}) + (-2.08\hat{i} + 11.82\hat{j}) + (-2.74\hat{i} - 7.52\hat{j}) + (5.79\hat{i} - 6.9\hat{j})] \text{ m} \\
 V &= [(9.06 - 2.08 - 2.74 + 5.79)\hat{i} + (4.23 + 11.82 - 7.52 - 6.9)\hat{j}] \text{ m}
 \end{aligned}$$

$$V = (10.03\hat{i} + 1.63\hat{j}) \text{ m}$$

$$b) |\vec{V}| = \sqrt{V_x^2 + V_y^2}$$

$$|\vec{V}| = 10.2 \text{ m}$$

$$c) \theta = \tan^{-1}\left(\frac{V_y}{V_x}\right)$$

$$\theta = 9.24^\circ \text{ above (+) x axis}$$