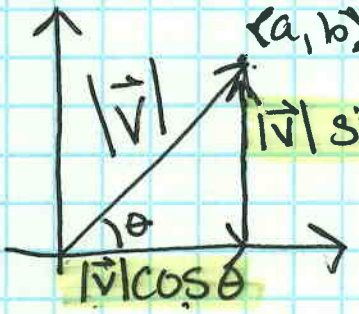
8-2-3 Find Component Form



Component Form of $\vec{v}$

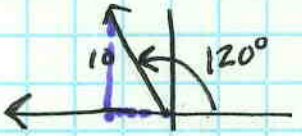
find: $\vec{v} = \langle a, b \rangle$ given $|\vec{v}|, \theta$

$$\vec{v} = \langle |\vec{v}|\cos\theta, |\vec{v}|\sin\theta \rangle = \langle a, b \rangle$$

Linear Combination of $\vec{v}$ =

$$= |\vec{v}|(\cos\theta)\hat{i} + |\vec{v}|(\sin\theta)\hat{j}$$

Ex 6. Find the Component Form of $\vec{v}$ with magnitude 10 and direction angle 120° from the horizontal.



$$\vec{v} = \langle |\vec{v}|\cos\theta, |\vec{v}|\sin\theta \rangle$$

$$= \langle 10\cos 120°, 10\sin 120° \rangle = \langle 10\left(\tfrac{-1}{2}\right), 10\left(\tfrac{\sqrt{3}}{2}\right) \rangle$$

$$= \langle -5, 5\sqrt{3} \rangle$$

You try:

a) $|\vec{v}| = 8$, $\theta = 45°$

$$\vec{v} = \langle 8\cos 45°, 8\sin 45° \rangle$$

$$= \left\langle \frac{8\sqrt{2}}{2}, \frac{8\sqrt{2}}{2} \right\rangle$$

$$= \langle 4\sqrt{2}, 4\sqrt{2} \rangle$$

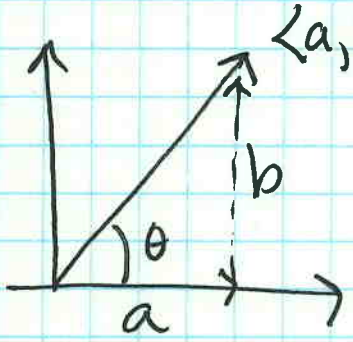
b) $|\vec{v}| = 24$, $\theta = 210°$

$$\vec{v} = \langle 24\cos 210°, 24\sin 210° \rangle$$

$$= \left\langle 24\left(\frac{-\sqrt{3}}{2}\right), 24\left(\frac{-1}{2}\right) \right\rangle$$

$$= \langle -12\sqrt{3}, -12 \rangle$$

Finding the direction angle



$\tan\theta = \frac{b}{a}$

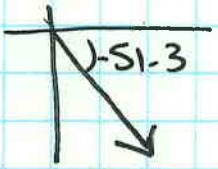
$\tan^{-1}\left(\frac{b}{a}\right) = \theta$

pay attn to the Quadrant

Ex 7 Find the direction

a) of $\vec{p} = 3\hat{i} + 7\hat{j}$ $\quad \theta = \tan^{-1}\frac{7}{3} = 66.8°$

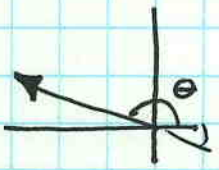
b) of $\vec{r}$ $\langle 4, -5\rangle$ $\quad \theta = \tan^{-1}\left(\frac{-5}{4}\right) = -51.3°$



$\theta = 308.7°$

you try:

$-6\hat{i} + 2\hat{j}$

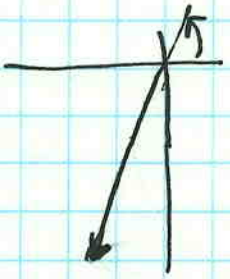


$\tan^{-1}\left(\frac{+2}{-6}\right)$

$\theta = -18.43$

$\theta = 161.56°$

$\langle -3, -8\rangle$



$\tan^{-1}\left(\frac{-8}{-3}\right)$

$\theta = 69.44$

$\theta = 249.44°$

B 497: 39-42, 46-49, 60-61, 67, 69