

Pre-Calculus

HW#6.6-4

Name: Key

1. Find vector \vec{AB} in for A(2,3) and B(6,-3). Give the magnitude and direction of \vec{AB} .

$$\vec{AB} = \langle 4, -6 \rangle$$

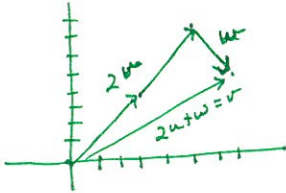
$$\text{magnitude} = \sqrt{52} = 2\sqrt{13}$$

$$\tan \theta = \frac{-6}{4}$$

$$\theta = -56.3^\circ$$

or 304°

2. Sketch and find vector v , if $v = 2u + w$ for $u = 3i + 4j$ and $w = i - 3j$. Give magnitude and direction of v .



$$v = 7i + 5j$$

$$\|v\| = \sqrt{74}$$

$$\theta = 35.5^\circ$$

3. Find u for $\|u\| = 3$ and $\theta_u = 45^\circ$ (exact form).

$$\langle 3 \cos 45^\circ, 3 \sin 45^\circ \rangle$$

$$3 \cdot \frac{\sqrt{2}}{2}, 3 \cdot \frac{\sqrt{2}}{2}$$

$$\left\langle \frac{3\sqrt{2}}{2}, \frac{3\sqrt{2}}{2} \right\rangle$$

4. Find a vector in the direction of $3i - 2j$ with a magnitude of 1.

$$\text{magnitude} = \sqrt{9+4} = \sqrt{13}$$

$$\left\langle \frac{3\sqrt{13}}{13}i, -\frac{2\sqrt{13}}{13}j \right\rangle$$

5. Find the angle between $r = 2i + 3j$, and $u = 5i + j$.

$$\cos \theta = \frac{13}{\sqrt{13} \cdot \sqrt{26}}$$

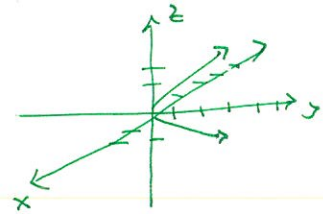
$$\theta = 45^\circ$$

6. Find the angle between $\langle 2, 3, -1 \rangle$ and $\langle -4, 5, 2 \rangle$.

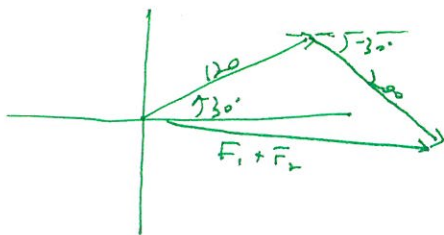
$$\cos \theta = \frac{2(-4) + 3(5) + (-1)(2)}{(\sqrt{2^2+3^2+1^2})(\sqrt{4^2+5^2+2^2})}$$

$$= \frac{5}{\sqrt{14} \cdot \sqrt{45}}$$

$$\theta = 78.5^\circ$$



7. Two forces act on the same object. One force is 120 lbs at 30° and the second force is 200 lbs at -30° . Find the magnitude and direction of the resultant force.



$$\langle 120 \cos 30^\circ, 120 \sin 30^\circ \rangle$$

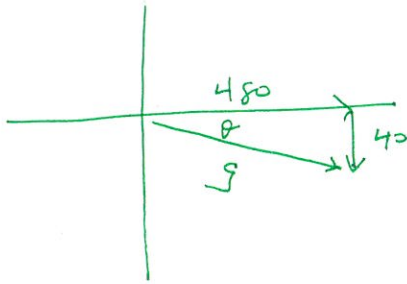
$$+ \langle 200 \cos(-30^\circ), 200 \sin(-30^\circ) \rangle$$

$$\hline \langle 277.1, -40 \rangle$$

$$\|v\| = 280 \text{ lbs}$$

$$\theta = -8^\circ$$

8. Find the ground speed and heading of an airplane with airspeed 480 km/h and heading due east if the wind velocity is 40 km/h heading due south.



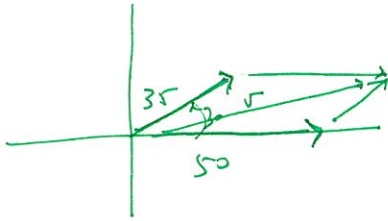
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$$\boxed{481.7 \text{ km/h}}$$

$$\theta = -5^\circ$$

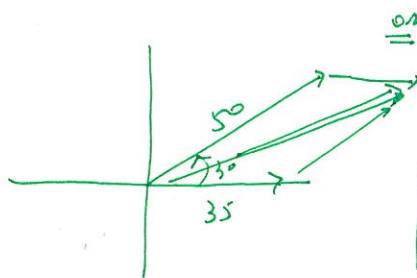
$$\text{HEADING} = \boxed{S 85^\circ E}$$

9. Forces with magnitudes of 35 lbs and 50 lbs act on a hook. The angle between the two forces is 30° . Find the direction and magnitude of the resultant of the two forces.



$$\begin{aligned} \mathbf{v} &= \langle 35 \cos 30^\circ, 35 \sin 30^\circ \rangle + \langle 50 \cos 0^\circ, 50 \sin 0^\circ \rangle \\ &= \langle 30.3, 17.5 \rangle \end{aligned}$$

$$\boxed{\|\mathbf{v}\| = 82.2 \text{ lbs} \quad \theta = 12^\circ}$$



$$\begin{aligned} \underline{\text{or}} \quad \mathbf{v} &= \langle 50 \cos 30^\circ, 50 \sin 30^\circ \rangle + \langle 35 \cos 0^\circ, 35 \sin 0^\circ \rangle \\ &= \langle 78.3, 25 \rangle \end{aligned}$$

$$\boxed{\|\mathbf{v}\| = 82.2 \text{ lbs} \quad \theta = 18^\circ}$$