$60°$ $2X$

X

$30°$

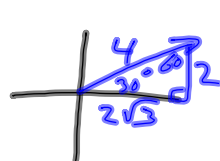$X\sqrt{3}$

$145°$ $X\sqrt{2}$

X

$45°$

X

6-3 day 2

I. Find the component form of v given its magnitude and the angle it makes with the positive x-axis. Sketch v.
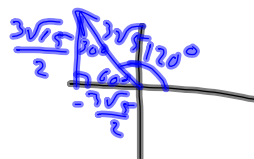
Ex 1) ||v|| = 4

$\theta = 30°$

$\frac{4}{2} = 2$

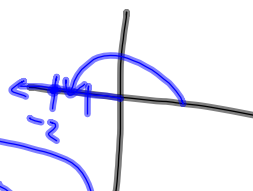$\langle 2\sqrt{3}, 2 \rangle$

Ex 2) ||v|| = $3\sqrt{5}$

$\theta = 120°$

$\frac{3\sqrt{5}}{2} \cdot \sqrt{3}$

$\left\langle -\frac{3\sqrt{5}}{2}, \frac{3\sqrt{15}}{2} \right\rangle$
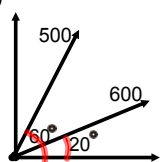

Ex 3) ||v|| = 2

$\theta = 180°$

$\langle -2, 0 \rangle$

II. Graph the vectors and the resultant of the vectors. Find the magnitude and direction of the resultant.
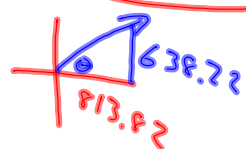
$$sum$$

Note: Trig Form of a Vector: $v = <\|v\|\cos \theta, \|v\|\sin\theta>$ θ must be an angle in standard position

Ex 4)

$$< 600 \cos 20°, 600 \sin 20° >$$
$$+ < 500 \cos 60°, 500 \sin 60° >$$
$$< 813.82, 638.22 >$$

$$\|\tilde{v}\| = \sqrt{(813.82)^2 + (638.22)^2}$$
$$= 1034.23$$

$$\tan \theta = \frac{638.22}{813.82}$$
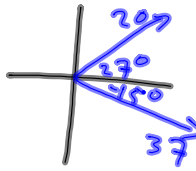$$\theta \approx 38.1°$$

III. **Applications**: Force = Speed = Magnitude

Ex 5) Find the component form of the vector that represents the velocity of an airplane descending at a speed of 100 mph at angle of 30 degrees below the horizontal (as shown).
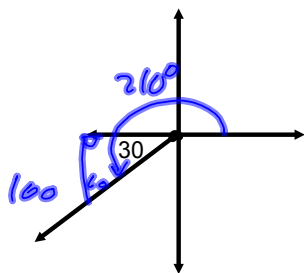
$$< 100 \cos 210°, 100 \sin 210° >$$
$$< 100 \left(-\frac{\sqrt{3}}{2}\right), 100 \left(-\frac{1}{2}\right) >$$
$$< -50\sqrt{3}, -50 >$$

Ex 6) My two kids wanted to take our 100 lb black lab Baily for a walk. They devise a scheme to use 2 leashes on Baily so both could attempt to walk her. Baily rebels and starts pulling on the kids. Dani is pulling with a force of 20 lbs at an angle of 27 degrees while Drew is pulling with a force of 37 lbs at an angle of -15 degrees. How hard is Baily pulling if she holds Dani and Drew at a standstill?

$$Dani \langle 20\cos 27°, 20\sin 27° \rangle$$

$$Drew \langle 37\cos -15°, 37\sin -15° \rangle$$

$$+$$

$$\vec{U} = \langle 53.56, -0.4967 \rangle$$

$$||\vec{U}|| = \sqrt{(53.56)^2 + (-0.4967)^2}$$

$$= 53.56 \text{ lbs}$$

$$\tan \theta = \frac{-0.4967}{53.56}$$

$$\theta = -0.53°$$