Trig 8.1

Find equal, opposite and parallel vectors
Add and subtract vectors geometrically
Find horizontal and vertical components of vectors

vector

magnitude

standard position

direction

zero vector

equal vectors

resultant

opposite vectors

scalar quantity (scalar)

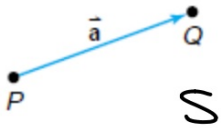
parallel vectors

components

tip-to tail (triangle) method

parallelogram method...BOO

One picture is worth 1000 words.

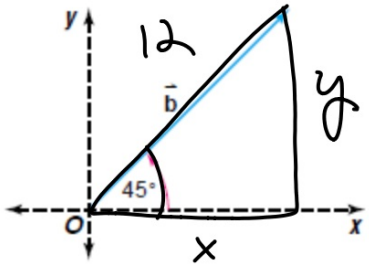


SohCah

magnitude $|m|$

standard position

direction θ



$\sin 45 = \frac{y}{12}$

$y = 12 \sin 45$

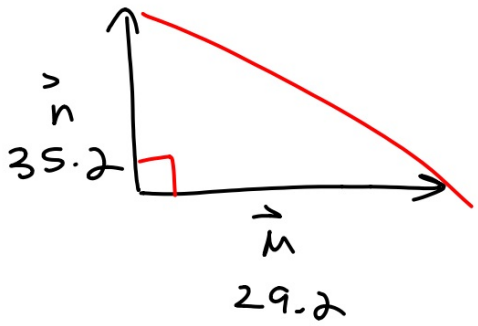
$= 12 \cdot \frac{\sqrt{2}}{2} = 6\sqrt{2}$

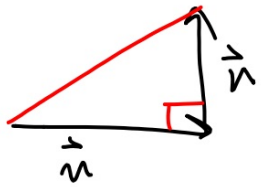
$\cos 45 = \frac{x}{12}$

$x = 12 \cos 45$

$= 12 \cdot \frac{\sqrt{2}}{2} = 6\sqrt{2}$

35. The magnitude of $\vec{m}$ is 29.2 meters, and the magnitude of $\vec{n}$ is 35.2 meters. If $\vec{m}$ and $\vec{n}$ are perpendicular, what is the magnitude of their sum?





$29.2^2 + 35.2^2 = h^2$

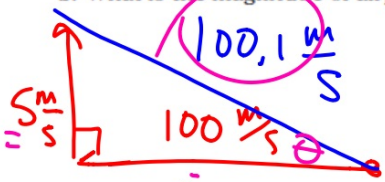
$2091.7 \sim h^2$

$45.7 \sim h$

13. Aviation An airplane is flying due west at a velocity of 100 m/s. The wind is blowing out of the south at 5 m/s.

a. Draw a labeled diagram of the situation.

b. What is the magnitude of airplane's resultant velocity?



$5^2 + 100^2 = h^2$

$10025 = h^2$

$100.1 = h$

$\tan\theta = \frac{5}{100}$

$\theta \approx 3^\circ$

177° from horiz.

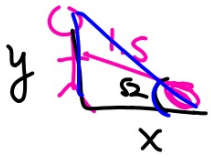
3° N of W

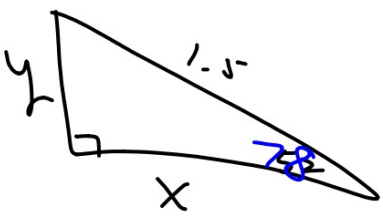
Force diagram
Component form
Standard position

40. Toys Belkis is pulling a toy by exerting a force of 1.5 newtons on a string attached to the toy.

a. The string makes an angle of 52° with the floor. Find the vertical and horizontal components of the force.

b. If Belkis raises the string so that it makes a 78° angle with the floor, what are the magnitudes of the horizontal and vertical components of the force?





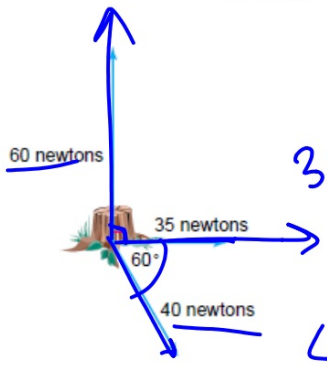
$\cos 52 = \frac{x}{1.5}$

$\sin 52 = \frac{y}{1.5}$

$\cos 78 = \frac{x}{1.5}$ $\sin 78 = \frac{y}{1.5}$

38. Physics Three workers are pulling on ropes attached to a tree stump as shown in the diagram. Find the magnitude and direction of the resultant force on the tree. *A newton (N) is a unit of force used in physics. A force of one newton will accelerate a one-kilogram mass at a rate of one meter per second squared.*

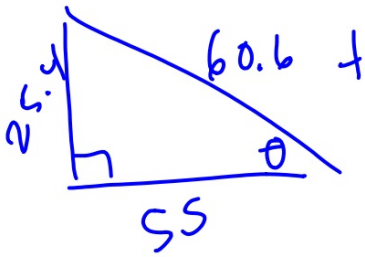
"force diagram"
component form
angle in std position



60N = $x = 60\cos 90$ $y = 60\sin 90$ $\langle 0, 60 \rangle$

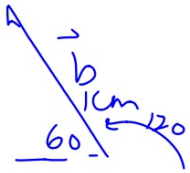
35N = $x = 35\cos 0$ $y = 35\sin 0$ $\langle 35, 0 \rangle$

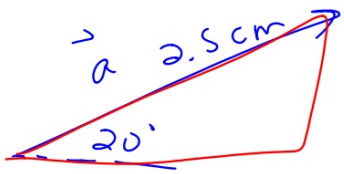
40N $x = 40\cos 60$ $y = 40\sin 60$ $\langle 55, 25.4 \rangle$



$\tan\theta = \frac{25.4}{55}$

$\theta = 25°$





$\vec{a} + \vec{b}$

$\langle 2.35, 0.86 \rangle$

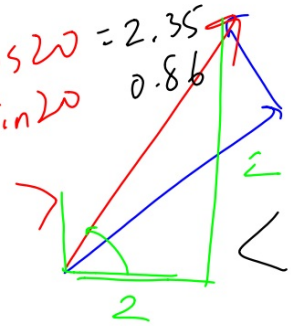
$\langle -0.5 \quad 0.86 \rangle$

$X = 1\cos 60$

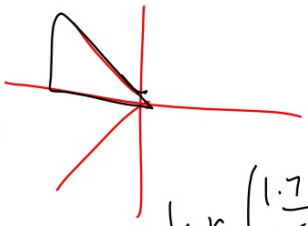
$y = 1\sin 60$

$X = 2.5\cos 20 = 2.35$

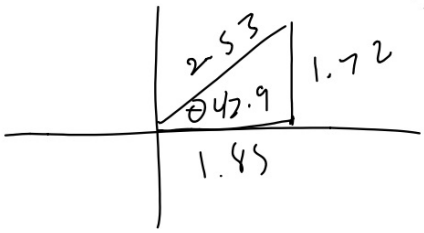
$y = 2.5\sin 20 \quad 0.86$



$\langle 1.85, 1.72 \rangle$



$\tan\left(\frac{1.72}{1.85}\right)$



2.53 $\quad 42.9^\circ$