Vector Addition:

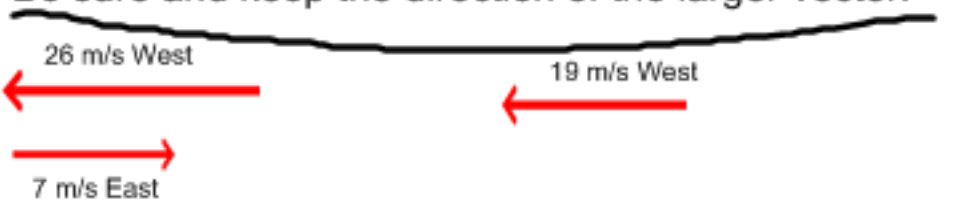
Vectors in the same direction:

Simply add the Vector quanties(keep the direction)

Vectors in Opposite Direction:

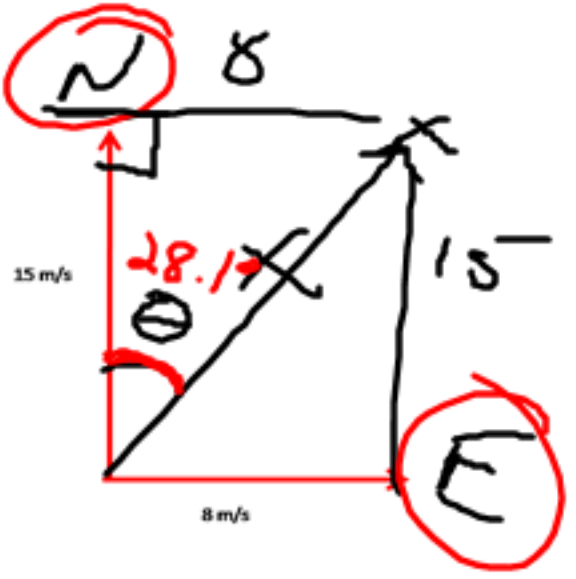
Make one of the directions a (-) and then take the algebraic sum!!(Subtract the two numbers)

Be sure and keep the direction of the larger vector!



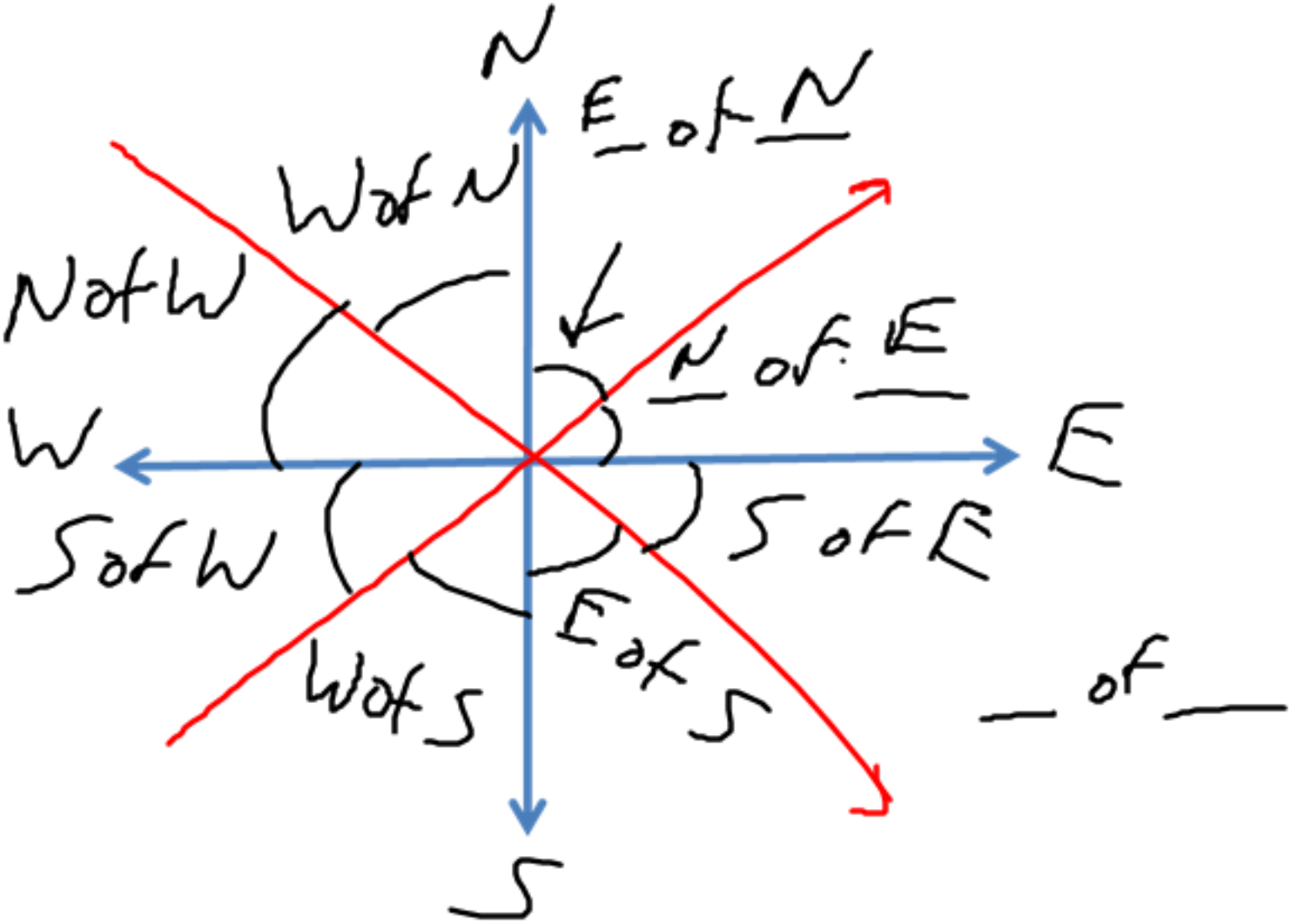
Perendicular Vectors

When 2 vectors are perpendicular to each other, place their "tails" together and use trigonometric functions to solve for unknowns!

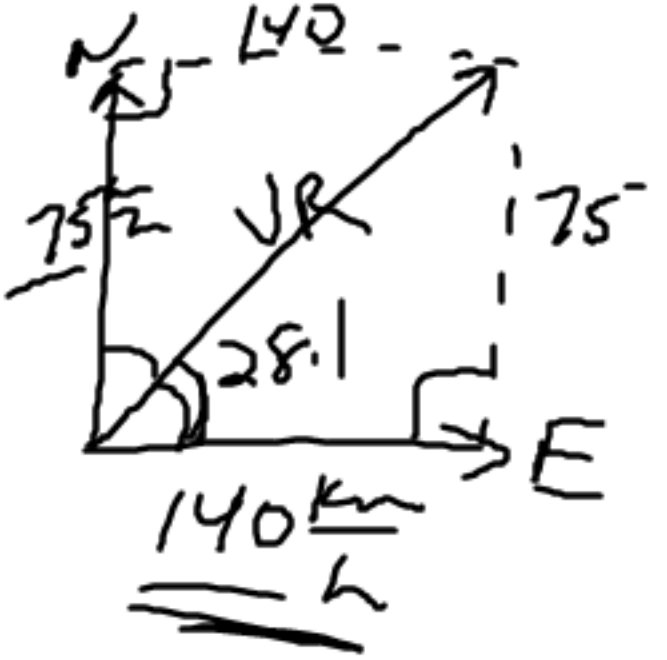


17 @ 28.1°

Determining Direction for Perpendicular Vectors:



An airplane flies at 140 km/hr due east. The wind is blowing 75 km/hr due north. Find the resultant velocity of the airplane.



$\tan\theta = \frac{75}{140}$

$\theta = \tan^{-1}\left(\frac{75}{140}\right)$

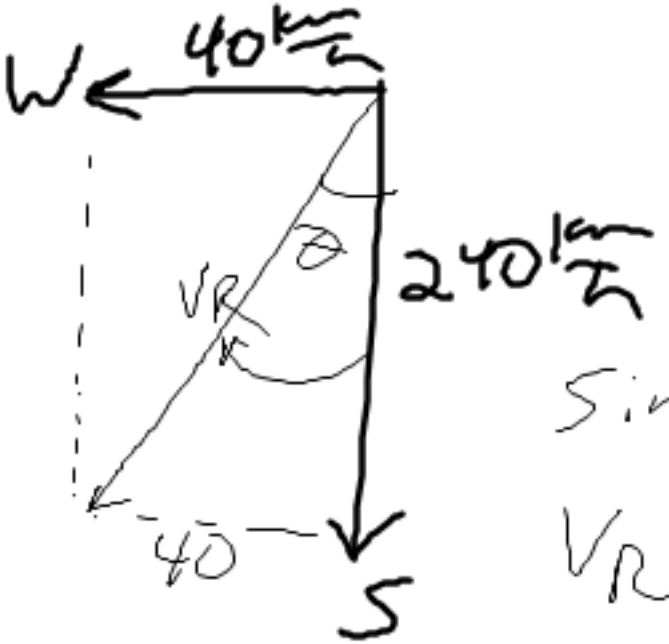
$\theta = 28.2^\circ$

$\sin 28.1^\circ = \frac{75}{V_R}$

$V_R = \frac{75}{\sin 28.1^\circ} = 159$

$V_R = 159 \frac{km}{h} @ 28.2^\circ \text{ N of E}$

An airplane is moving at 240 km/hr due south. The wind is blowing at 40 km/hr due west. Find the resultant velocity of the airplane.



$\tan\theta = \frac{40}{240}$

$\theta = \tan^{-1}\left(\frac{40}{240}\right)$

$\theta = 9.46^\circ$

$\sin 9.46^\circ = \frac{40}{V_R}$

$V_R = \frac{40}{\sin 9.46^\circ} = 243.4 \frac{km}{h}$

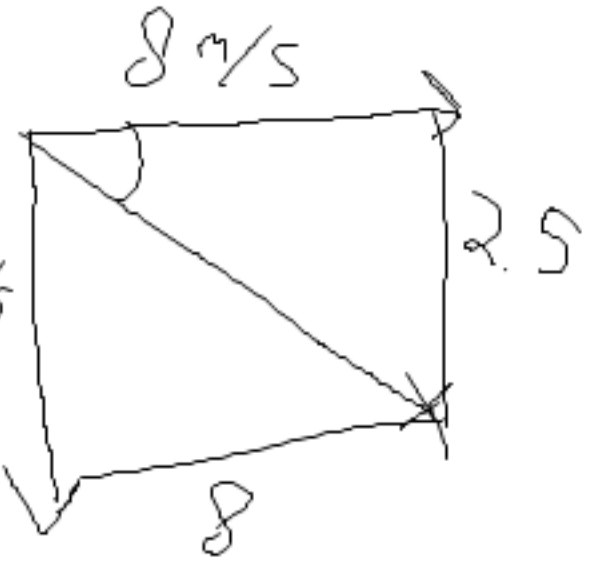
$V_R = 243.4 \frac{km}{h} @ 9.46^\circ \text{ W of S}$

A swimmer is moving straight across a river with a velocity of 8 m/s. If the downstream velocity of the river is 2.5 m/s, find the resultant velocity of the swimmer.

$\tan\theta = \frac{2.5}{8}$

$\tan^{-1}\left(\frac{2.5}{8}\right)$

$= 17.4^\circ$



$2.5\ m/s$

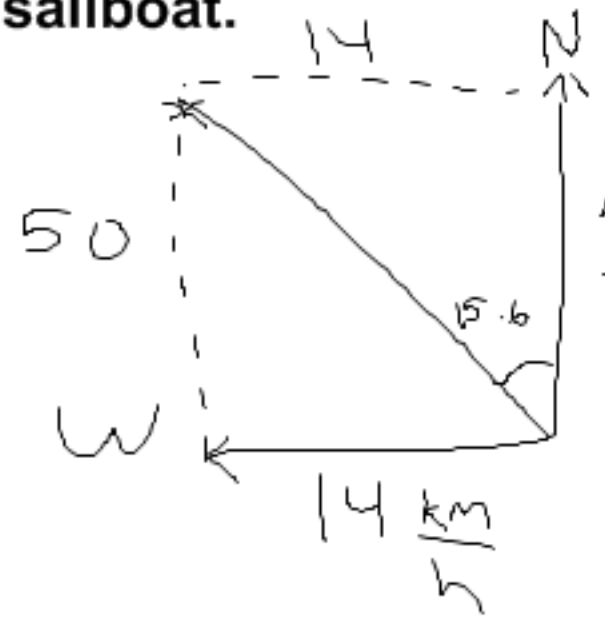
$\sin 17.4 = \frac{2.5}{x}$

$x = \frac{2.5}{\sin 17.4}$

$x = 8.3$

8.3 m/s at 17.4° downstream

A sailboat is moving across the ocean with a velocity of 50 km/hr northward. The wind is blowing at 14 km/hr westward. Find the resultant velocity of the sailboat.



$\tan\theta = \frac{14}{50}$

$= \tan^{-1}\left(\frac{14}{50}\right)$

$= 15.6$

50 km/h

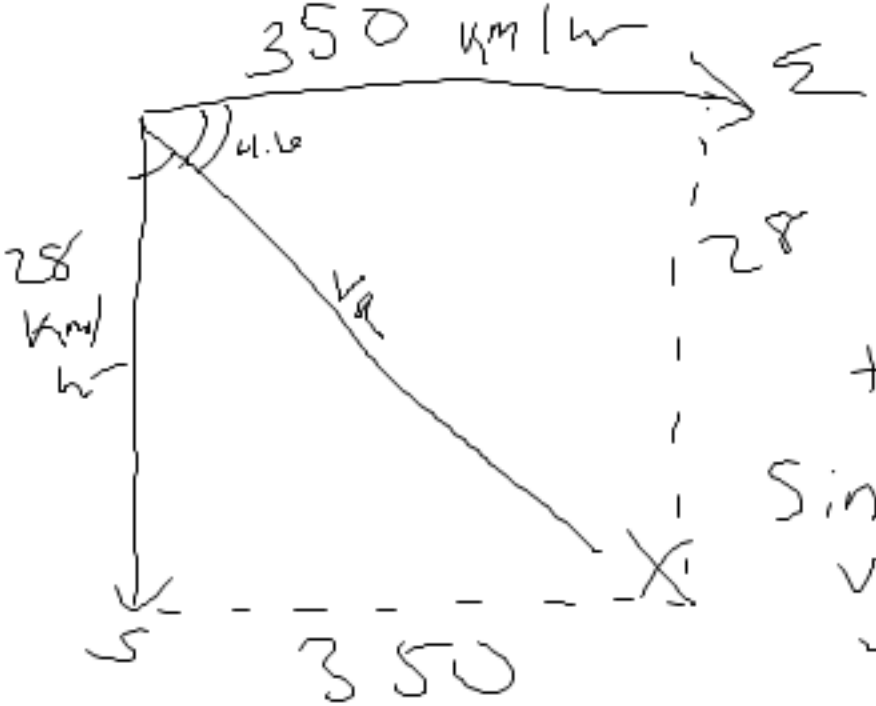
$\sin 15.6 = \frac{14}{V_R}$

$V_R = \frac{14}{\sin 15.6} = 52.1 \frac{km}{hr}$

$V_R = 52.1 \frac{km}{hr}$ @ 15.6° W of N

Wendy Smith

An F-16 Fighter is moving at 350 km/hr toward the East. The wind is blowing 28 km/hr toward the South. Find the resultant velocity of the F-16 Fighter.



$\tan \frac{28}{350}$

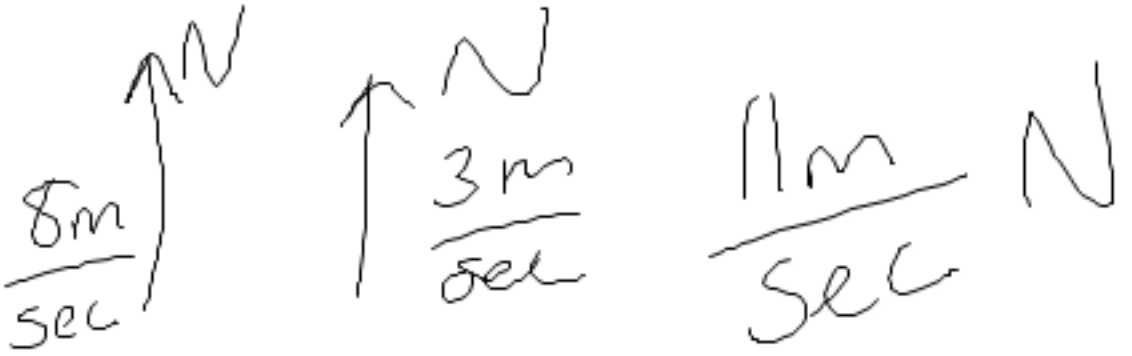
$\sin 4.6 = \frac{28}{VR}$

$VR = \frac{28}{\sin 4.6}$

$VR = 351$

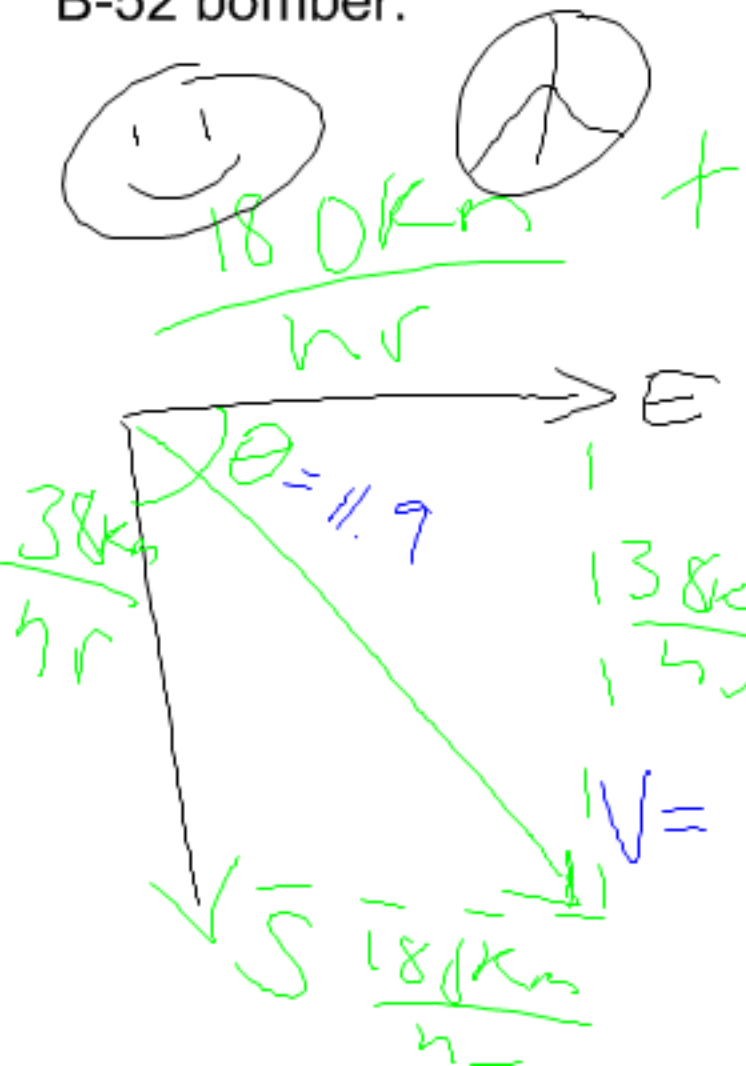
351 km/hr @ 4.6° S of E

A child throws a Frisbee at 8 m/s toward the North. The wind is blowing at 3 m/s toward the North. Find the resultant velocity of the Frisbee.



Chelsea Zilch

A B-52 bomber is moving at 180 km/hr due east. The wind is blowing 38 km/hr due south. Find the resultant velocity of the B-52 bomber.



$\tan\theta = \frac{38}{180}$

$\theta = \tan^{-1}\left(\frac{38}{180}\right) = 11.9$

$\sin(11.9) = \frac{38}{VR}$ Answer Check

$VR = 184.3$

$V = 184.3 \text{ km/hr}$ at 11.9 South of East