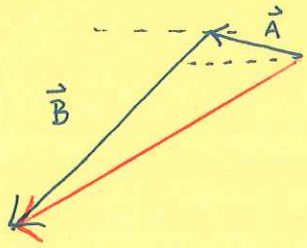
Vector Addition Practice:

(1.) $\vec{A} = 220\text{km}$ [27° above −x]; $\vec{B} = 740\text{km}$ [39° below −x]; Find $\vec{C} = \vec{A} + \vec{B}$

sketch



$\vec{A}_x = -220\text{km} \cos 27° \ \hat{x}$

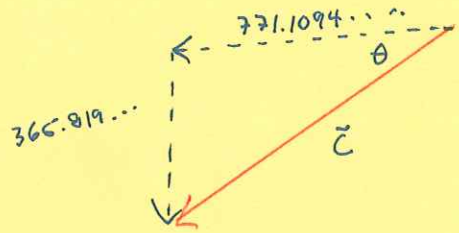
$\vec{A}_y = 220\text{km} \sin 27° \ \hat{y}$

$\vec{B}_x = -740\text{km} \cos 39° \ \hat{x}$

$\vec{B}_y = -740\text{km} \sin 39° \ \hat{y}$

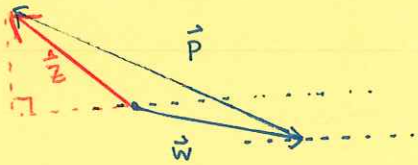
$\vec{C}_x = \vec{A}_x + \vec{B}_x = -771.1094468\text{km}$

$\vec{C}_y = \vec{A}_y + \vec{B}_y = -365.8191794\text{km}$



$\boxed{\vec{C} = 850\text{km} \ [25° \text{ below } -x]}$

(2.) $\vec{W} = 0.055T$ [29° below +x]; $\vec{P} = 0.113T$ [34° above −x]; Find $\vec{Z} = \vec{W} + \vec{P}$



$\vec{W}_x = +0.055T \cos 29°$

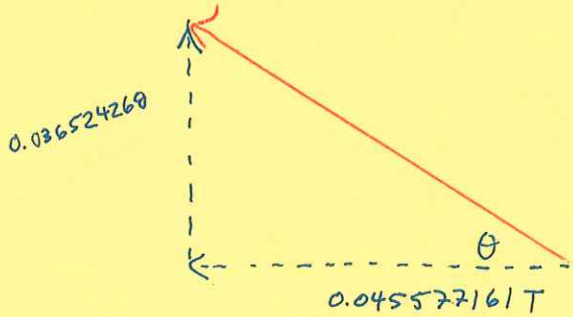
$\vec{W}_y = -0.055T \sin 29°$

$\vec{P}_x = -0.113T \cos 34°$

$\vec{P}_y = +0.113T \sin 34°$

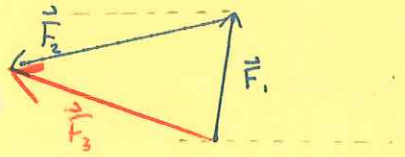
$\vec{Z}_x = \vec{W}_x + \vec{P}_x = -0.045577161T \ \hat{x}$

$\vec{Z}_y = 0.036524268T \ \hat{y}$



$\boxed{\vec{Z} = 0.058T \ [38° \text{ above } -x]}$

(3.) $\vec{F}_1 = 16N\,[81^\circ \text{ above } +x]$; $\vec{F}_2 = 27N\,[23^\circ \text{ below } -x]$; Find $\vec{F}_3 = \vec{F}_1 + \vec{F}_2$



$\vec{F}_{1x} = +16\cos 81^\circ$

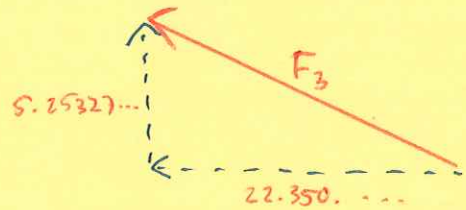
$\vec{F}_{1y} = +16\sin 81^\circ$

$\vec{F}_{2x} = -27\cos 23^\circ$

$\vec{F}_{2y} = -27\sin 23^\circ$

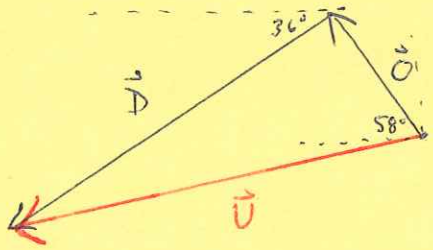
$\vec{F}_{3x} = \vec{F}_{1x} + \vec{F}_{2x} = -22.3506796N\,\hat{x}$

$\vec{F}_{3y} = \vec{F}_{1y} + \vec{F}_{2y} = 5.25327298N\,\hat{y}$



$$\boxed{\vec{F}_3 = 23N\,[13^\circ \text{ above } -x]}$$

(4.) $\vec{O} = 19\,m/s\,[58^\circ \text{ N of W}]$; $\vec{D} = 62\,m/s\,[36^\circ \text{ S of W}]$; Find $\vec{U} = \vec{O} + \vec{D}$



$\vec{O}_x = -19\cos 58^\circ$

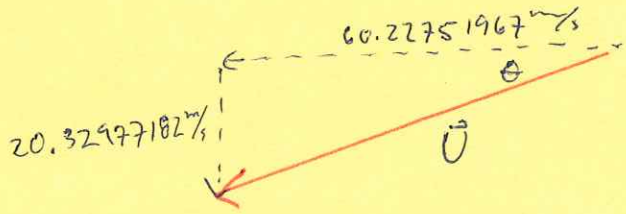
$\vec{O}_y = +19\sin 58^\circ$

$\vec{D}_x = -62\cos 36^\circ$

$\vec{D}_y = -62\sin 36^\circ$

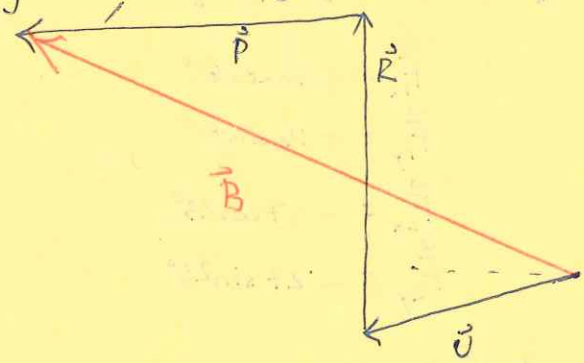
$\vec{U}_x = \vec{O}_x + \vec{D}_x = -60.2275196\,m/s\,\hat{x}$

$\vec{U}_y = -20.32977182\,m/s\,\hat{y}$



$$\boxed{\vec{U} = 64\,m/s\,[19^\circ \text{ S of W}]}$$

(5) $\vec{R} = 72\text{cm}\ \hat{y}$; $\vec{U} = 43\text{cm}\ [17^\circ \text{ below } -x]$; $\vec{P} = -57\text{cm}\ \hat{x}$; Find $\vec{B} = \vec{U} + \vec{R} + \vec{P}$



$\vec{U}_x = -43\cos 17^\circ$

$\vec{U}_y = -43\sin 17^\circ$

$\vec{R}_x = 0$

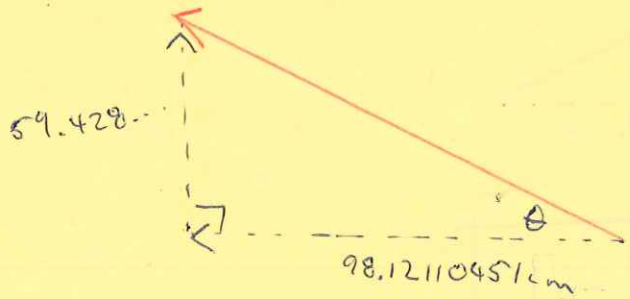
$\vec{R}_y = 72\text{cm}$

$\vec{P}_x = -57\text{cm}$

$\vec{P}_y = 0$

$\vec{B}_x = \vec{U}_x + \cancel{\vec{R}_x}^{\,0} + \vec{P}_x = -98.12110451\text{cm}\ \hat{x}$

$\vec{B}_y = \vec{U}_y + \vec{R}_y + \cancel{\vec{P}_y}^{\,0} = 59.4280167\text{cm}\ \hat{y}$



$$\boxed{\vec{B} = 110\text{cm}\ [31^\circ \text{ above } -x]}$$