If **A** = 28 m [E75°N], **B** = 35 m [E24°S], **C** = 22 m [W50°N], and **D** = 40 m [W30°S] Find:

b. 4C + 3D {160 m [W2.6°N]}

$- \rightarrow +$

$R_E = 4C_E + 3D_E$ | $R_N = 4C_N + 3D_N$

$C_E = -22\cos 50$
$= -14.1\text{m}$

$C_N = +22\sin 50$
$= +16.9\text{m}$

$D_E = -40\cos 30°$
$= -34.6\text{m}$

$D_N = -40\sin 30$
$= -20\text{m}$

$R_E = 4(-14.1) + 3(-34.6)$
$= -160.2\text{m}$

$R_N = 4(16.9) + 3(-20)$
$= 7.6\text{m}$

$|R| = \sqrt{R_E^2 + R_N^2} = \sqrt{(160.2)^2 + (7.6)}$

$|R| = 160.4\text{m}$ $\theta = \tan^{-1}\left|\frac{R_y}{R_x}\right|$

$\theta = \tan^{-1}\left|\frac{7.6}{160.2}\right| = 2.7°$

$\vec{R} = 160.4\text{m}\ [W\ 2.7°\ N]$

d. 2D – C {79.2 m [W46°S]}

$D_E = -34.6\ m$ | $C_E = -14.1\ m$

$D_N = -20\ m$ | $C_N = 16.9\ m$

$R_E = 2D_E - C_E$

$= 2(-34.6) - (-14.1)$

$= -69.2 + 14.1$

$R_E = -55.1 m$

$R_N = 2D_N - C_N$

$= 2(-20) - (16.9)$

$= -40 - 16.9$

$R_N = -56.9 m$

$2D-C \rightarrow |R| = \sqrt{R_E^2 + R_N^2}$

$= \sqrt{(-55.1)^2 + (56.9)^2}$

$= 79.2\ m$

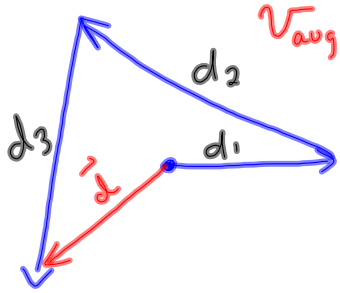
$\theta = \tan^{-1}\left|\frac{R_N}{R_E}\right| = \tan^{-1}\left|\frac{-56.9}{-55.1}\right|$

$\theta = 46°$

$R = 79.2 m\ [W\ 46°S]$

1. What is the average velocity of a car that drives 66 km [E], 52 km [W33°N], and 45 km [W73°S] in 3.1 hours?

$\vec{v}_{avg} = \frac{\vec{d}}{t}$



$d_{1E} = 66\ km$ $\quad d_{2E} = -52\cos 33 = -43.6\ km$

$d_{1N} = 0\ km$ $\quad d_{2N} = 52\sin 33 = 28.3\ km$

$d_{3E} = -45\cos 73 = -13.2\ km$

$d_{3N} = -45\sin 73 = -43\ km$

$\vec{d}_E = d_{1E} + d_{2E} + d_{3E}$ $\quad | \quad \vec{d}_N = d_{1N} + d_{2N} + d_{3N}$

$= 66 - 43.6 - 13.2$ $\quad = 0 + 28.3 - 43$

$d_E = 9.2\ km$ $\quad d_N = -14.7\ km$

$|\vec{d}| = \sqrt{d_E^2 + d_N^2} = \sqrt{(9.2)^2 + (-14.7)^2}$

$|\vec{d}| = 17.3\ km$

$\theta = \tan^{-1}\left|\frac{d_N}{d_E}\right| = \tan^{-1}\left|\frac{-14.7}{9.2}\right|$

$\theta = \tan^{-1}(1.5978) = 58°$

$\vec{d} = 17.3\ [E\,58°\,S]$

$\vec{v}_{avg} = \frac{\vec{d}}{t} = \frac{17.3\ [E\,58°\,S]}{3.1}$

2. What is the acceleration of a glider that goes from 10 m/s [N] to 10 m/s [E] in 2.5 seconds?

$$\vec{a} = \frac{\vec{v}_f - \vec{v}_0}{t}$$

$$|a| = \sqrt{a_E^2 + a_N^2} \qquad a_E = \frac{v_{fE} - v_{0E}}{t}$$

$$\theta = \tan^{-1}\left|\frac{a_N}{a_E}\right| \qquad a_N = \frac{v_{fN} - v_{0N}}{t}$$