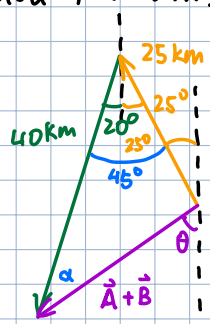
Method 1 (math): $\vec{A} = 25\text{km}\ [N25°W]$ $\vec{B} = 40\text{km}\ [S20°W]$



$|\vec{A}+\vec{B}| = \sqrt{40^2+25^2-2(40)(25)\cos 45}$

$= 28.5\text{km}\ [S71.6°W]$

$[S58.4°W]$

$\frac{\sin\beta}{40} = \frac{\sin 45}{28.5}$

$\beta = 83.4°$

$\theta = 180-83.4-25$

$= 71.6°$

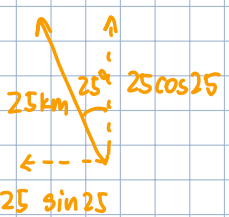
$\beta' = 180-83.4$

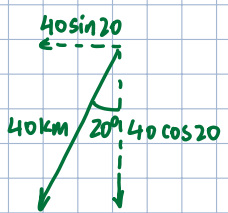
$= 96.6°$

$\theta = 180-96.6-25$

$= 58.4°$

Method 2 (component): $\vec{A} = 25\text{km}\ [N25°W]$ $\vec{B} = 40\text{km}\ [S20°W]$





$\vec{d}_x = 25\sin 25\,[W] + 40\sin 20\,[W]$

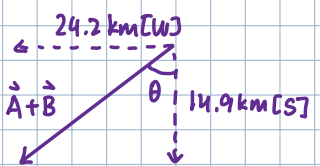
$= 24.2\text{km}\ [W]$

$\vec{d}_y = -25\cos 25\,[S] + 40\cos 20\,[S]$

$= 14.9\text{km}\ [S]$

$|\vec{A}+\vec{B}| = \sqrt{14.9^2+24.2}$

$= 28.47\text{km}$



$\tan\theta = \frac{24.2}{14.9}$

$\theta = 58.37°$

$\therefore \vec{A}+\vec{B} = 28.47\text{km}\ [S58.37W]$

Method 3 (Scale Diagram): $\vec{A} = 25\text{ km } [N25°W]$ $\vec{B} = 40\text{ km } [S20°W]$

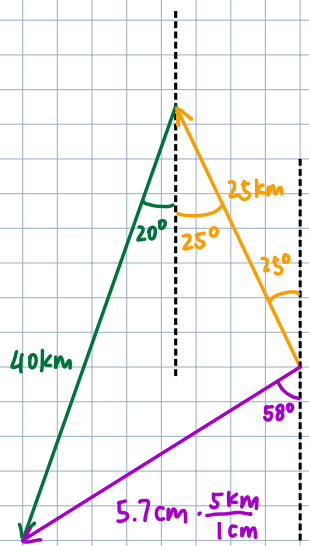
5 km = 1 cm

$25\text{ km} \cdot \frac{1\text{ cm}}{5\text{ km}} = 5\text{ cm}$ $40\text{ km} \cdot \frac{1\text{ cm}}{5\text{ km}} = 8\text{ cm}$

1) Scale
2) Arrows for Vectors
3) Label length with units
4) Label all known units

Half page or larger

N/S or E/W



$5.7\text{ cm} \cdot \frac{5\text{ km}}{1\text{ cm}}$

$= 28.5\text{ km}$

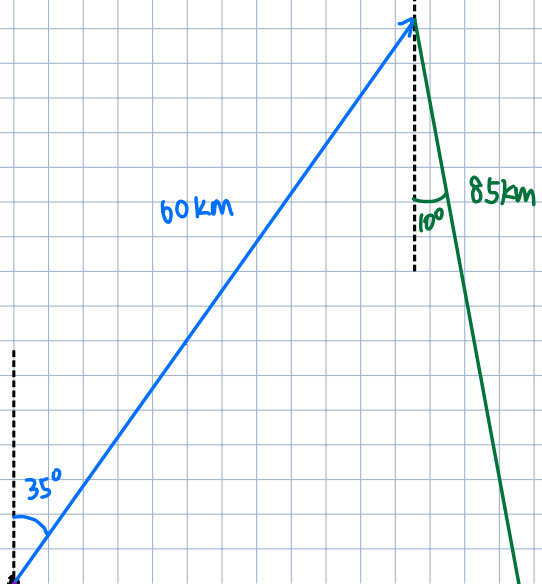
$[S58°W]$

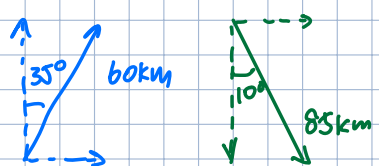
Scale diagram + one other method

12cm 17cm

$\vec{E} + \vec{F}$: $\vec{E} = 60\text{km } [N35°E]$ $\vec{F} = 85\text{ km } [S10°E]$

5km = 1cm



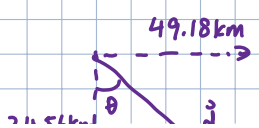


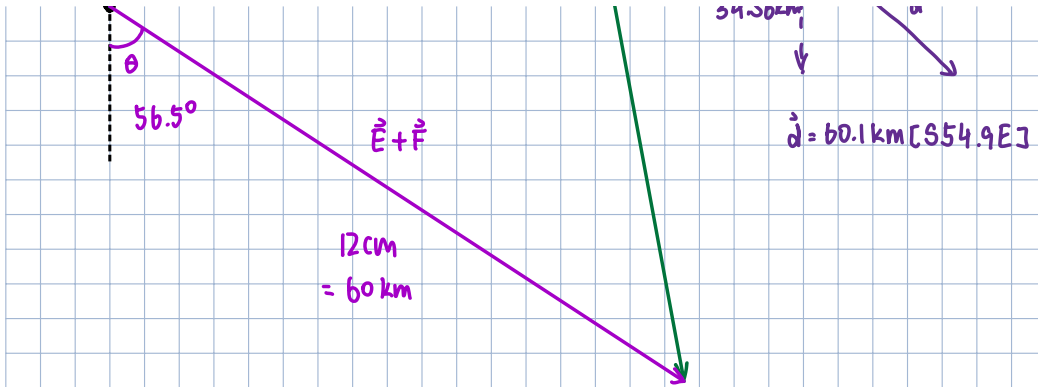
$d_y = -60\cos 35 + 85\cos 10$

$= 34.56\text{km } [S]$

$d_x = 60\sin 35 + 85\sin 10$

$= 49.18\text{km } [E]$




θ
56.5°
$\vec{E}+\vec{F}$
12 cm
= 60 km
$\vec{d}$ = 60.1 km [S54.9E]

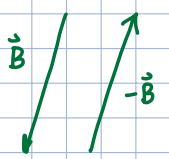
Vector Subtraction

$\vec{A} - \vec{B} = \vec{A} + (-\vec{B})$

$\vec{A}$ = 25 km [N25°W]

$\vec{B}$ = 40 km [S20°W]

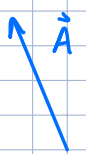
$-\vec{B}$ = same magnitude different direction to $\vec{B}$

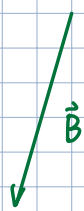


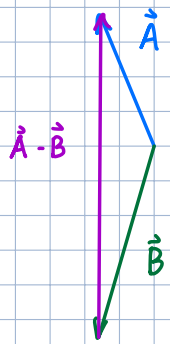
$\vec{A} - \vec{B}$:

Physics way: Draw the original Vectors tail-to-tail; the resultant points towards the first vector

$\vec{A} - \vec{B}$







$\vec{V} = \frac{\vec{d}_2 - \vec{d}_1}{t}$ $\quad \vec{a} = \frac{\vec{V}_2 - \vec{V}_1}{t}$

$\vec{V}t + \vec{d}_1 = \vec{d}_2$

Find $\vec{C}+\vec{D}$, $\vec{C}-\vec{D}$, $\vec{D}-\vec{C}$

$\vec{C}$ = 240km/h [S35°E]

8cm

$\vec{D}$ = 375 km/h [S70°W]

12.5cm

1cm = 30km

13cm

= 390km