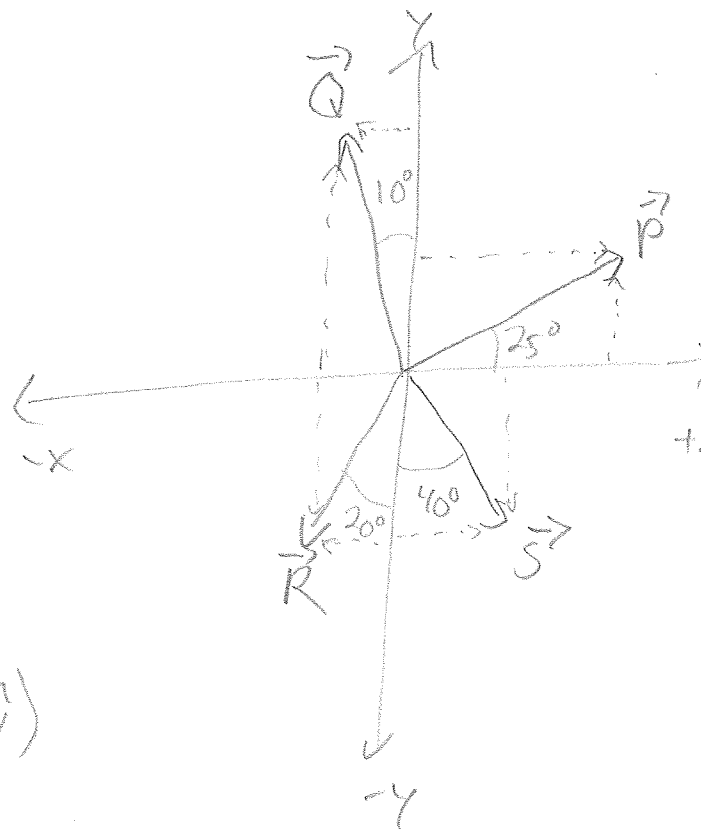
2-56 Add up:

$\vec{P}$ 10.0m @ 25.0° ccw from +x

$\vec{Q}$ 12.0m @ 10.0° ccw from +y

$\vec{R}$ 8.00m @ 20° cw from −y

$\vec{S}$ 9.00 m @ 40° ccw from −y



a) add up unit vectors:

$\vec{P} = (10.0m)(+\cos(25°)\hat{x} + \sin(25°)\hat{y})$

$= 9.06\,m\hat{x} + 4.23\,m\hat{y}$

$\vec{Q} = (12.0m)(-\sin(10°)\hat{x} + \cos(10°)\hat{y})$

$= -2.08\,m\hat{x} + 11.82\,m\hat{y}$

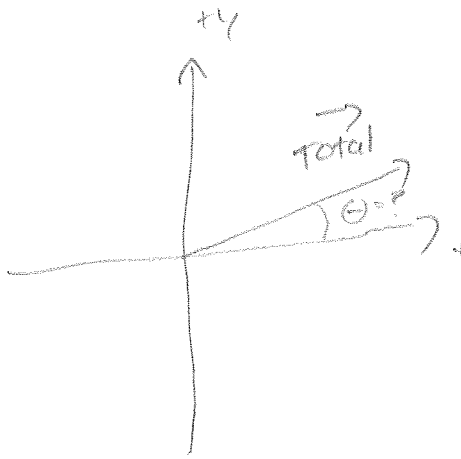
$\vec{R} = (8.00m)(-\sin(20°)\hat{x} - \cos(20°)\hat{y})$

$= -2.74\,m\hat{x} - 7.52\,m\hat{y}$

$\vec{S} = (9.00m)(+\sin(40°)\hat{x} - \cos(40°)\hat{y})$

$= 5.79\,m\hat{x} - 6.89\,m\hat{y}$

$\vec{Total} = 10.0\,m\hat{x} + 1.64\,m\hat{y}$



b) magnitude $= \sqrt{(10.0m)^2 + (1.64m)^2}$

$= 10.2\,m$

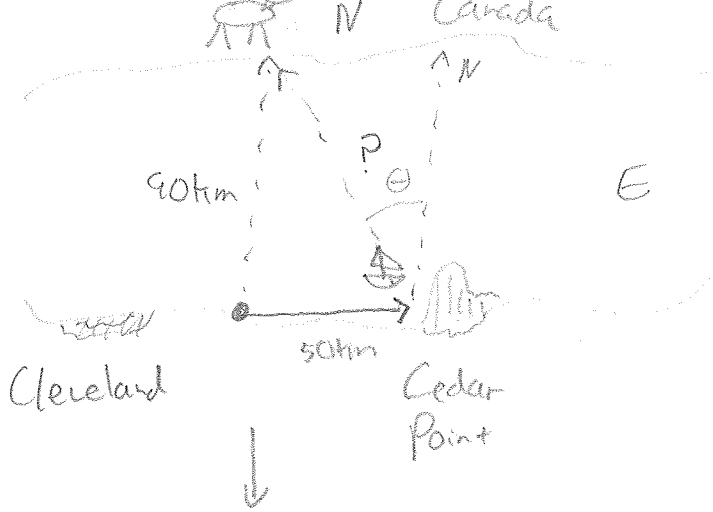
c) $\theta = \tan^{-1}\left(\frac{1.63m}{10.0m}\right) \approx 9.24°$ ccw from +x

2-49

The boat wanted to go 90km N

It ended up 50km E.

What vector takes it back to where it wanted to go?



The rest of Ohio

How far is the "?", the magnitude is the hypotenuse:

$$\text{"?"} = \sqrt{(90\text{km})^2 + (50\text{km})^2} \approx 103\text{ km}$$

direction?

$$\theta = \tan^{-1}\left(\frac{\text{opposite}}{\text{adjacent}}\right) = \tan^{-1}\left(\frac{50\text{ km}}{90\text{km}}\right) = 29^\circ$$

So 29° W of N