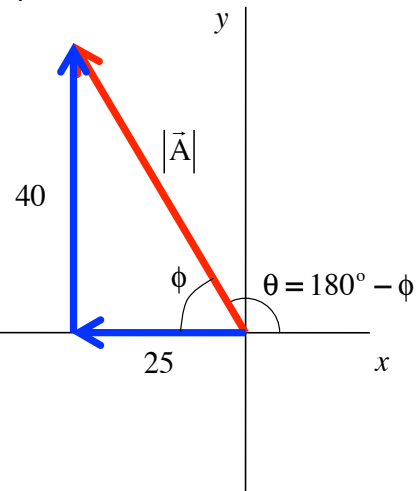


Problem 3.15

We are given the components, which could have been presented as:

$$\vec{A} = -25.0\hat{i} + 40.0\hat{j}$$

A graphical representation of this vector is shown to the right (though not to scale) with the unknown magnitude and angular position additionally shown.



To get the magnitude of the contrived right-triangle, trig yields:

$$\begin{aligned} |\vec{A}| &= (A_x^2 + A_y^2)^{1/2} \\ &= ((-25.0)^2 + (40.0)^2)^{1/2} \\ &= 47.2 \end{aligned}$$

1.)

Because I prefer to work with first-quadrant right triangles (that is, triangles with angles in them that are less than or equal to 90°), I'm going to determine ϕ , then with that information θ . That operation looks like:

$$\begin{aligned} \phi &= \tan^{-1}\left(\frac{A_y}{A_x}\right)^{1/2} \\ &= \tan^{-1}\left(\frac{40.0}{25.0}\right)^{1/2} \\ &= 58.0^\circ \end{aligned}$$

$$\begin{aligned} \text{This means: } \theta &= 180^\circ - \phi \\ &= 122^\circ \end{aligned}$$

In *polar notation*, our resultant is:

$$\vec{A} = 47.2 \angle 122^\circ$$

Note that this would put the vector about 30° to the left of the +y axis, which seems about right.

2.)