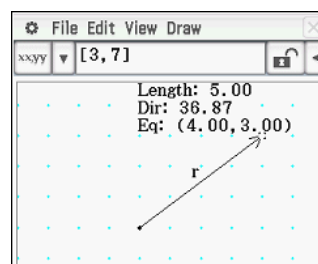
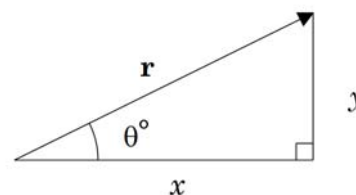


Activity 8 Component vector basics

- From Geometry,
Length = 5 units
Direction $\approx 36.87^\circ$ from the positive x -axis.



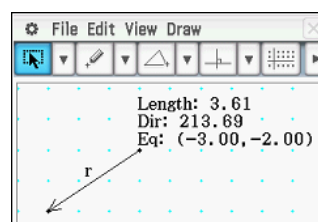
- Given $\mathbf{r} = x\mathbf{i} + y\mathbf{j}$, we can draw the right triangle below and use Pythagoras to determine the magnitude and basic trigonometry to determine the direction. (Note that care must be taken when finding direction outside the first quadrant)



$$|\mathbf{r}| = \sqrt{x^2 + y^2}$$

$$\theta = \tan^{-1}\left(\frac{y}{x}\right)$$

- Vector is $-3\mathbf{i} - 2\mathbf{j}$

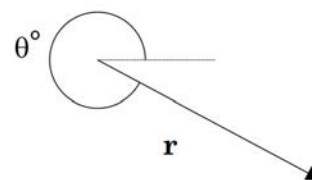
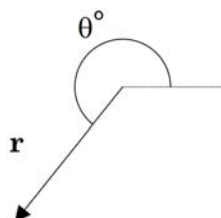
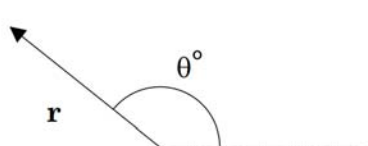


- To convert from magnitude and direction form into component form, use

$$x = |\mathbf{r}| \cos\theta$$

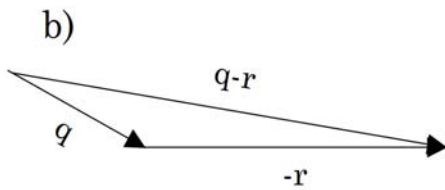
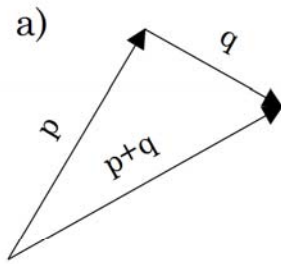
$$y = |\mathbf{r}| \sin\theta$$

Note that the angle θ is measured anticlockwise from the positive x -axis.



- $\sim 10.39\mathbf{i} + 6\mathbf{j}$
 - ~ 3.61 units on an angle of $\approx 33.69^\circ$ clockwise from the positive x -axis.

6.



```

[3 4]⇒p           [3 4]
[2, -1]⇒q         [2 -1]
[-6, 0]⇒r         [-6 0]
[8, ∠(240)]⇒s     [-4 -4√3]
p+q              [5 3]
q-r              [8 -1]
2s+r             [-14 -8√3]
norm(p)          5
angle(p, r)      126.8698976
angle(q, [1, 0]) 26.56505118
topol(q)         [2.236067977 ∠(-26.56505)]
topol(q)         [√5 ∠(-tan⁻¹(1/2))]
unitv(p)         [0.6 0.8]
  
```

