In this section we will see the relationship between complex numbers in rectangular form versus polar form; seen as a vector. The objective for this section includes

- Represent a complex number in polar form

Refer to figure 16.10 on page 600 as we begin this discussion. From the right triangle shown there we remember that:

$$\cos\theta = \frac{x}{r} \text{ and therefore } x = r\cos\theta$$

$$\sin\theta = \frac{y}{r} \text{ and therefore y} = r\sin\theta$$

From the Pythagorean theorem we remember that:

$$x^2 + y^2 = r^2$$

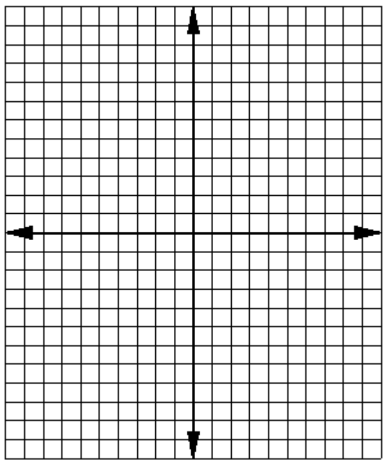
And from the definition of the trigonometric functions we remember that:

$$\tan\theta = \frac{y}{x}$$

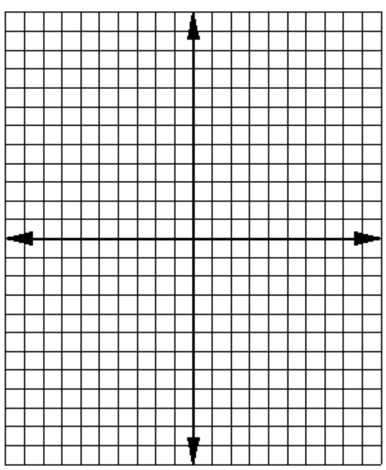
So…….. if a complex number in rectangular form is: $a + bj \ or \ x + yj$, then x and y can be replaced with the definition from up above. We'll finish the description of a complex number in polar form below:

Convert each complex number from the given rectangular form to the polar form of $r(\cos\theta + j\sin\theta)$. Graph the rectangular form first to be sure that θ corresponds to the correct quadrant when you find the value in polar form:

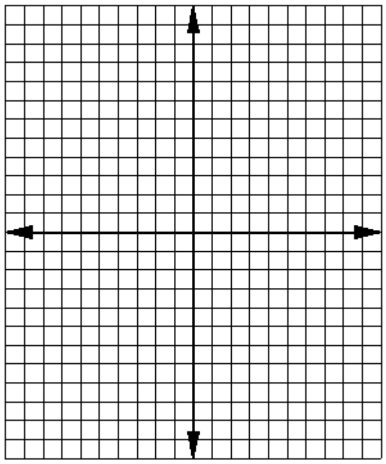
1. $6+8j$



2. $-6+8j$



3. $6-8j$



4. $-43-56j$

5. $\sqrt{3}-j$

6. 4

7. -2j

Express the complex number in the polar form $r(\cos\theta + j\sin\theta)$

8. $256\angle 185°$

Convert each complex number from the given polar form to the rectangular form $x + yj$

$32(\cos 56.1° + j\sin 56.1°)$

Continue to convert each complex number from the given polar form to the rectangular form $x + yj$

9. $5(\cos 132.5° + j \sin 132.5°)$

10. $78.3\angle 242°$

11. $18(\cos 0° + j \sin 0°)$

12. $50(\cos 270° + j \sin 270°)$