

Vocabulary:

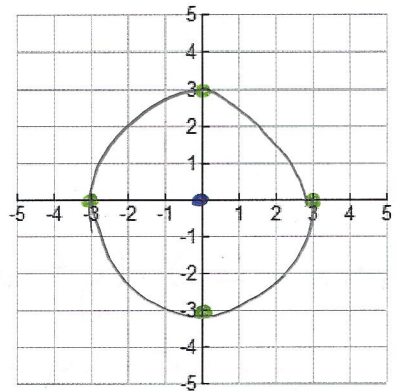
A **circle** is the set of all points in a plane that are a constant distance, called the radius, from a fixed point, called the **center**.

Standard Equation of a Circle:

An equation for the circle with its center at (0,0) and a radius of r is: $x^2 + y^2 = r^2$

Example 1: Write the standard equation of the circle whose center is at the origin and whose radius is 3. Sketch the graph.

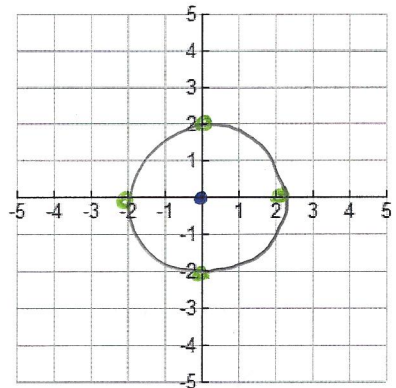
$$x^2 + y^2 = 9$$



Example 2:

Write the standard equation of the circle whose center is at the origin and whose radius is 2. Sketch the graph.

$$x^2 + y^2 = 4$$



Standard Equation of a Translated Circle:

The standard equation for a circle with its center at (h, k) and a radius of r is: $(x - h)^2 + (y - k)^2 = r^2$

When you take out OR put in "h" and "k" you do the opposite

Example 3: Write the standard equation for the translated circle with a center of (-30, -20). The circle has a radius of 40.

$$(x + 30)^2 + (y + 20)^2 = 1600$$

Example 4: Write the equation of a circle that passes through (-2, 6) and has center B(-6, 3).

$$(x + 6)^2 + (y - 3)^2 = r^2$$

$$(x + 6)^2 + (y - 3)^2 = 25$$

$$r = \sqrt{(-6 - (-2))^2 + (6 - 3)^2}$$

$$r = \sqrt{16 + 9} = \sqrt{25}$$

Example 5:

Tell whether $A(2,1)$ is inside, outside, or on the circle whose center is at $(-2,3)$ and whose radius is 4.

$$(x+2)^2 + (y-3)^2 = 16$$

$$(2+2)^2 + (1-3)^2 = 16$$

$$20 = 16$$

$20 > 16$, so point is

OUTSIDE!

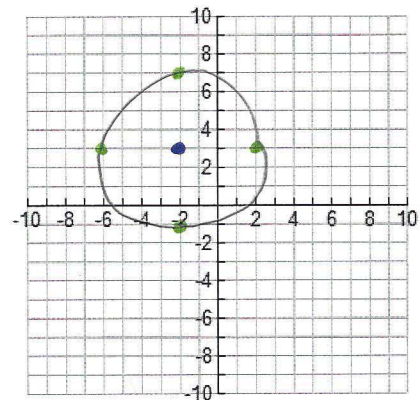
Example 6:

Write the standard equation for the circle $x^2 + y^2 + 4x - 6y - 3 = 0$. State the coordinates of its center and give its radius. Then sketch the graph.

$$(x^2 + 4x + \underline{4}) + (y^2 - 6y + \underline{9}) = 3 + \underline{4} + \underline{9}$$

$$(x+2)^2 + (y-3)^2 = 16$$

center $(-2, 3)$ $r=4$

**Example 7:**

Write the standard equation for the circle $x^2 + y^2 - 2x + 2y - 7 = 0$. State the coordinates of its center and give its radius. Then sketch the graph.

$$(x^2 - 2x + \underline{1}) + (y^2 + 2y + \underline{1}) = 7 + \underline{1} + \underline{1}$$

$$(x-1)^2 + (y+1)^2 = 9$$

center $(1, -1)$ $r=3$

