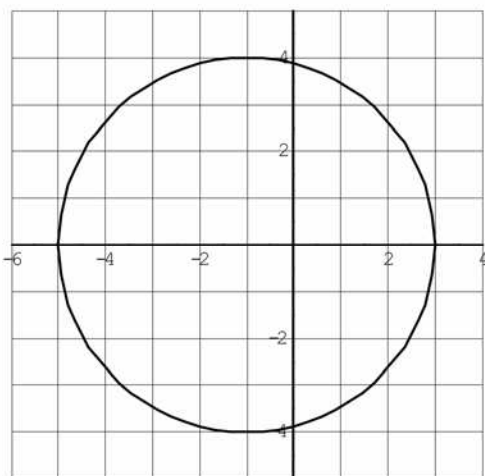


# CONICS LESSON 1

## PART II - CIRCLES

**Circles:** The standard form of a circle is given by the equation  $(x - h)^2 + (y - k)^2 = r^2$ , where  $(h, k)$  is the centre of the circle and  $r$  is the radius.

**Example 1:** Given the following graph, write the equation.



The first thing you should do when given a circle is write down the coordinates of the centre. In this case, the centre is at  $(-1, 0)$ . Next, determine the radius, which is 4 units. Finally, plug the  $h$ ,  $k$ , and  $r$  values into the standard form equation and you'll have the equation of the graph!

$$(x - h)^2 + (y - k)^2 = r^2$$

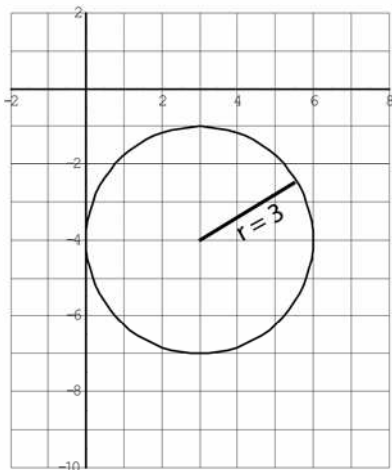
$$(x - (-1))^2 + (y - 0)^2 = 4^2$$

$$(x + 1)^2 + y^2 = 16$$

**Example 2:** Sketch the graph of  $(x - 3)^2 + (y + 4)^2 = 9$  and state the domain and range.

To draw the graph of a circle from a standard form equation, first draw a dot at the centre of the circle. The radius can be found by taking the square root of the number on the right side. (Remember, you're given  $r^2$  and you just want  $r$ .)

$$(x - 3)^2 + (y + 4)^2 = 9$$



**Quick Tip:** An easy way to read off the centres is to use values for  $x$  and  $y$  that make each bracket go to zero.

$(x - 3)$  becomes zero when  $x = 3$   
 $(y + 4)$  becomes zero when  $y = -4$   
So, the centre is at  $(3, -4)$

When writing the domain & range for an enclosed shape, we use "*in-between notation*"

**Domain:** Leftmost Value  $\leq x \leq$  Rightmost Value

**Range:** Bottom Value  $\leq y \leq$  Top Value

For the circle in this question:

**Domain:**  $0 \leq x \leq 6$  (Read as "the domain is between zero and six")

**Range:**  $-7 \leq y \leq -1$  (Read as "the range is between negative seven and negative one")