Definition of a circle:

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_____

When a circle has its center on the origin, then its equation is always of the form:

_____

When a circle has its center someplace other than the origin, then its equation is of the form:

_____

Where (h, k) represent the coordinates of the center point.

For example, a circle which has center at (5, -3) and with a radius of 10, has the equation:

_____

Write an equation for each indicated circle:

1.   center (1, 5), radius 12   2.   center (-4, 0), radius 5

3.   center (-7, -1), radius $\sqrt{3}$ 4.   center (-2, 6), radius $\sqrt{7}$

For each circle whose equation is given below, state the coordinates of the center point and state the radius:

5. $(x - 5)^2 + (y - 7)^2 = 81$ 6. $(x + 4)^2 + (y + 9)^2 = 64$

7. $(x + 3)^2 + y^2 = 16$ 8. $(x - 6)^2 + (y + 5)^2 = 12$

Now suppose I have a circle with center point (5, -4). I don't know the radius but do know the circle goes through the point (2, -8). I want to find the equation of the circle:

Step 1:   Use the Distance Formula to find the radius:

           Distance Formula_____

Step 2:   Write the equation of the circle in the usual way:

Find the equation of the circle that passes through the given point and has the given center:

9.   center (5, -1) passes through the point (0, 11)

10.   center (2, -3) passes through the point (6, -1)

When writing an equation in standard form, remember that a circle looks something like this:

$$(x-4)^2 + (y+6)^2 = 100 \qquad \text{center:}_____ \qquad \text{radius:}_____$$

Consider the equation, $x^2 + 8x + y^2 - 6y = 11$. We can write the equation in standard form for a circle by completing the square, like so:

Write: $x^2 + 8x + \_\_\_\_ + y^2 - 6y + \_\_\_\_ = 11 + \_\_\_\_ + \_\_\_\_$

Complete the square for the x – terms and for the y – terms. Balance your equations by adding the same numbers on the left and right side of the equal sign.

Now you have:_____

Write this expression in standard from:_____

Where is the center?_____ What is the radius?_____

Use completing the square to express each of the following as the equation of a circle in standard form. Then give the coordinates of the center point and the value of the radius.

11. $x^2 - 12x + y^2 - 2y = -12$

12. $x^2 + y^2 + 10y = 75$

13. $x^2 + 4x + y^2 + 6y = 36$