

Lesson 10-3

Circles

<p>Lesson Objectives</p> <p>1 Writing and graphing the equation of a circle</p> <p>2 Finding the center and radius of a circle and using it to graph the circle</p>	<p>NAEP 2005 Strand: Geometry</p> <p>Topic: Position and Direction</p> <p>Local Standards: _____</p>
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Vocabulary and Key Concepts

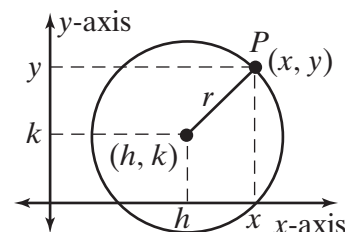
Standard Form of an Equation of a Circle

The standard form of an equation of a circle with center (h, k) and radius r is $(x - h)^2 + (y - k)^2 = r^2$.

A circle is _____

The center of a circle is _____

The radius r of a circle is _____



Examples

- 1 **Writing the Equation of a Circle** Write the equation of a circle with center $(3, -2)$ and radius 3.

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

$$(x - \square)^2 + (y - (\square))^2 = \square^2$$

$$(x - \square)^2 + (y + \square)^2 = \square$$

Use the standard form of the equation of a circle.

Substitute \square for h , \square for k , and \square for r .

Simplify.

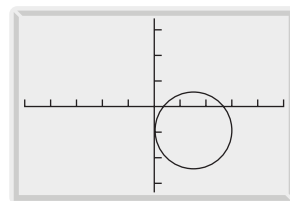
Check Solve the equation for y and enter both functions into your graphing calculator.

$$(x - \square)^2 + (y + \square)^2 = \square$$

$$(y + \square)^2 = \square - (x - \square)^2$$

$$y + \square = \pm \sqrt{\square - (x - \square)^2}$$

$$y = \square \pm \sqrt{\square - (x - \square)^2}$$



Xmin=-10 Ymin=-7
 Xmax=10 Ymax=7
 Xscl=2 Yscl=2

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2 Using Translations to Write an Equation Write an equation for the translation of $x^2 + y^2 = 16$ two units right and one unit down. Then graph the translation.

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

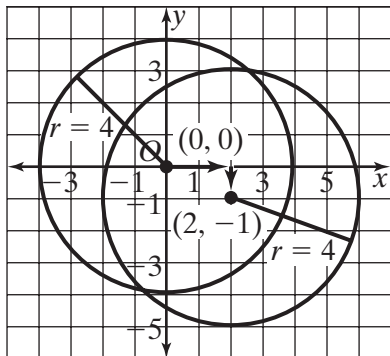
Use the standard form of the equation of a circle.

$$(x - \square)^2 + (y - (\square))^2 = \square$$

Substitute \square for h , \square for k , and \square for r^2 .

$$(x - \square)^2 + (y + \square)^2 = \square$$

Simplify.



The equation is $(x - \square)^2 + (y + \square)^2 = \square$.

Quick Check

1. Write an equation for a circle with center at $(5, -2)$ and radius 8. Check your answer.

2. Write an equation for each translation.

a. $x^2 + y^2 = 1$; left 5 and down 3

b. $x^2 + y^2 = 9$; right 2 and up 3

Examples

- 3 Finding the Center and Radius** Find the center and radius of the circle with equation $(x + 4)^2 + (y - 2)^2 = 36$.

$(x - h)^2 + (y - k)^2 = r^2$ Use the standard form.

$(x + 4)^2 + (y - 2)^2 = 36$ Write the equation.

$(x - (\square))^2 + (y - 2)^2 = \square^2$ Rewrite the equation in standard form.

$h = \square$ $k = \square$ $r = \square$ Find h , k , and r .

The center of the circle is (\square, \square) . The radius is \square .

- 4 Graphing a Circle Using Center and Radius** Graph $(x - 3)^2 + (y + 1)^2 = 4$.

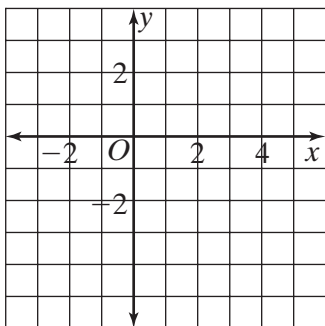
$(x - h)^2 + (y - k)^2 = r^2$ Find the center and radius of the circle.

$(x - 3)^2 + (y - (-1))^2 = 4$

$h = \square$ $k = \square$ $r^2 = \square$, or $r = \square$

Draw the center (\square, \square) and radius \square .

Draw a smooth curve.

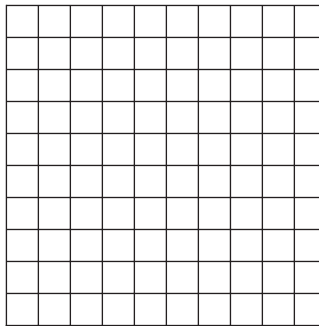


Quick Check

3. Find the center and radius of the circle with equation $(x + 8)^2 + (y + 3)^2 = 121$.



4. Graph $(x - 4)^2 + (y + 2)^2 = 49$.



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