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10-8 Lesson Reading Guide

Equations of Circles

Get Ready for the Lesson

Read the introduction to Lesson 10-8 in your textbook.

In a series of concentric circles, what is the same about all the circles, and what is different?

Skip

Read the Lesson

1. Identify the center and radius of each circle.

a. $(x - 2)^2 + (y - 3)^2 = 16$ $(2,3)$ $r=4$

b. $(x + 1)^2 + (y + 5)^2 = 9$ $(-1,-5)$ $r=3$

c. $x^2 + y^2 = 49$ $(0,0)$ $r=7$

d. $(x - 8)^2 + (y + 1)^2 = 36$ $(8,-1)$ $r=6$

e. $x^2 + (y - 10)^2 = 144$ $(0,10)$ $r=12$

f. $(x + 3)^2 + y^2 = 5$ $(-3,0)$ $r=\sqrt{5}$

2. Write an equation for each circle.

a. center at origin, $r = 8$ $x^2+y^2=64$

b. center at (3, 9), $r = 1$ $(x-3)^2+(y-9)^2=1$

c. center at (−5, −6), $r = 10$ $(x+5)^2+(y+6)^2=100$

d. center at (0, −7), $r = 7$ $x^2+(y+7)^2=49$

e. center at (12, 0), $d = 12$ $(x-12)^2+y^2=36$

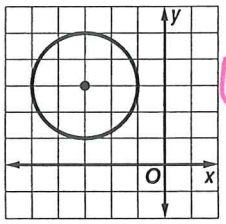
f. center at (−4, 8), $d = 22$ $(x+4)^2+(y-8)^2=121$

g. center at (4.5, −3.5), $r = 1.5$ $(x-4.5)^2+(y+3.5)^2=2.25$

h. center at (0, 0), $r = \sqrt{13}$ $x^2+y^2=13$

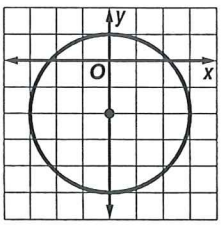
3. Write an equation for each circle.

a.



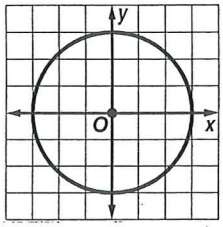
$(x+3)^2+(y-3)^2=4$

b.



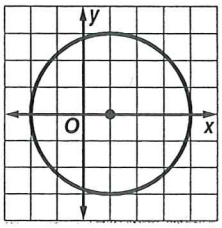
$x^2+(y+2)^2=9$

c.



$x^2+y^2=9$

d.



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

Remember What You Learned

4. A good way to remember a new mathematical formula or equation is to relate it to one you already know. How can you use the Distance Formula to help you remember the standard equation of a circle?

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10-8 Study Guide and Intervention *(continued)*

Equations of Circles

Graph Circles If you are given an equation of a circle, you can find information to help you graph the circle.

Example **Graph $(x + 3)^2 + (y - 1)^2 = 9$.**

Use the parts of the equation to find (h, k) and r.

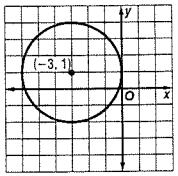
$(x - h)^2 + (y - k)^2 = r^2$

$(x - h)^2 = (x + 3)^2$ $\quad (y - k)^2 = (y - 1)^2$ $\quad r^2 = 9$

$x - h = x + 3$ $\quad y - k = y - 1$ $\quad r = 3$

$-h = 3$ $\quad -k = -1$

$h = -3$ $\quad k = 1$

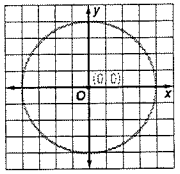


The center is at $(-3, 1)$ and the radius is 3. Graph the center. Use a compass set at a radius of 3 grid squares to draw the circle.

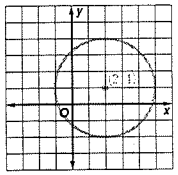
Exercises

Graph each equation.

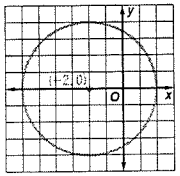
1. $x^2 + y^2 = 16$



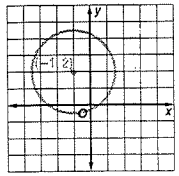
2. $(x - 2)^2 + (y - 1)^2 = 9$



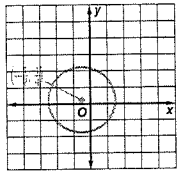
3. $(x + 2)^2 + y^2 = 16$



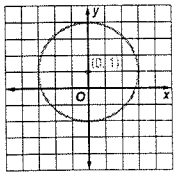
4. $(x + 1)^2 + (y - 2)^2 = 6.25$



5. $\left(x + \frac{1}{2}\right)^2 + \left(y - \frac{1}{4}\right)^2 = 4$



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



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10-8 Skills Practice

Equations of Circles

Write an equation for each circle.

1. center at origin, $r = 6$
   $x^2 + y^2 = 36$

2. center at $(0, 0)$, $r = 2$
   $x^2 + y^2 = 4$

3. center at $(4, 3)$, $r = 9$
   $(x - 4)^2 + (y - 3)^2 = 81$

4. center at $(7, 1)$, $d = 24$
   $(x - 7)^2 + (y - 1)^2 = 144$

5. center at $(-5, 2)$, $r = 4$
   $(x + 5)^2 + (y - 2)^2 = 16$

6. center at $(6, -8)$, $d = 10$
   $(x - 6)^2 + (y + 8)^2 = 25$

7. a circle with center at $(8, 4)$ and a radius with endpoint $(0, 4)$
   $(x - 8)^2 + (y - 4)^2 = 64$

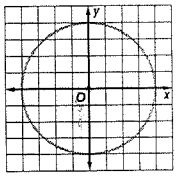
8. a circle with center at $(-2, -7)$ and a radius with endpoint $(0, 7)$
   $(x + 2)^2 + (y + 7)^2 = 200$

9. a circle with center at $(-3, 9)$ and a radius with endpoint $(1, 9)$
   $(x + 3)^2 + (y - 9)^2 = 16$

10. a circle whose diameter has endpoints $(-3, 0)$ and $(3, 0)$
    $x^2 + y^2 = 9$

Graph each equation.

11. $x^2 + y^2 = 16$



12. $(x - 1)^2 + (y - 4)^2 = 9$