

NAME _____ DATE _____ PERIOD _____

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?
Sample answer: They all have the same center, but different radii.

Read the Lesson

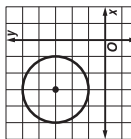
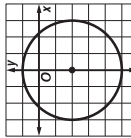
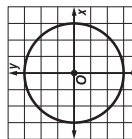
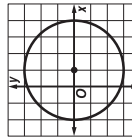
1. Identify the center and radius of each circle.

- a. $(x - 2)^2 + (y - 3)^2 = 16$ **(2, 3); 4**
- b. $(x + 1)^2 + (y + 5)^2 = 9$ **(-1, -5); 3**
- c. $x^2 + y^2 = 49$ **(0, 0); 7**
- d. $(x - 8)^2 + (y + 1)^2 = 36$ **(8, -1); 6**
- e. $x^2 + (y - 10)^2 = 144$ **(0, 10); 12**
- f. $(x + 3)^2 + y^2 = 5$ **(-3, 0); $\sqrt{5}$**

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

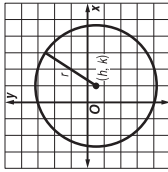
4. A good way to remember a new mathematical formula or equation is to relate it to one you already know. How can you use the Distance Formula to help you remember the standard equation of a circle? **Sample answer:** Use the Distance Formula to find the distance between the center (h, k) and a general point (x, y) on the circle. Square each side to obtain the standard equation of a circle.

NAME _____ DATE _____ PERIOD _____

10-8 Study Guide and Intervention

Equations of Circles

Equation of a Circle A circle is the locus of points in a plane equidistant from a given point. You can use this definition to write an equation of a circle.



Standard Equation of a Circle An equation for a circle with center at (h, k) and a radius of r units is $(x - h)^2 + (y - k)^2 = r^2$.

Example Write an equation for a circle with center (-1, 3) and radius 6. Use the formula $(x - h)^2 + (y - k)^2 = r^2$ with $h = -1$, $k = 3$, and $r = 6$.

$$\begin{aligned} (x - h)^2 + (y - k)^2 &= r^2 && \text{Equation of a circle} \\ (x - (-1))^2 + (y - 3)^2 &= 6^2 && \text{Substitution} \\ (x + 1)^2 + (y - 3)^2 &= 36 && \text{Simplify.} \end{aligned}$$

Exercises

Write an equation for each circle.

- 1. center at (0, 0), $r = 8$ **$x^2 + y^2 = 64$**
- 2. center at (-2, 3), $r = 5$ **$(x + 2)^2 + (y - 3)^2 = 25$**
- 3. center at (2, -4), $r = 1$ **$(x - 2)^2 + (y + 4)^2 = 1$**
- 4. center at (-1, -4), $r = 2$ **$(x + 1)^2 + (y + 4)^2 = 4$**
- 5. center at (-2, -6), diameter = 8 **$(x + 2)^2 + (y + 6)^2 = 16$**
- 6. center at $(-\frac{1}{2}, \frac{1}{4})$, $r = \sqrt{3}$ **$(x + \frac{1}{2})^2 + (y - \frac{1}{4})^2 = 3$**
- 7. center at the origin, diameter = 4 **$x^2 + y^2 = 4$**
- 8. center at $(1, -\frac{5}{8})$, $r = \sqrt{5}$ **$(x - 1)^2 + (y + \frac{5}{8})^2 = 5$**
- 9. Find the center and radius of a circle with equation $x^2 + y^2 = 20$.
center (0, 0); radius $2\sqrt{5}$
- 10. Find the center and radius of a circle with equation $(x + 4)^2 + (y + 3)^2 = 16$.
center (-4, -3); radius 4