Circles in the Coordinate Plane

Vocabulary

Review

Write T for *true* or F for *false*.

1. The *coordinate plane* extends without end and has no thickness.

2. Only lines can be graphed in the *coordinate plane*.

3. Any polygon can be plotted in the *coordinate plane*.

4. (0, 5) and (5, 0) are the same point in the *coordinate plane*.

5. The *coordinate plane* is three-dimensional.

6. You can find the slope of a line in the *coordinate plane*.

Vocabulary Builder

standard form (noun) STAN **durd fawrm**

Main Idea: The **standard form** of an equation gives information that can help you graph the equation in the coordinate plane.

Examples: The **standard form** of an equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$. The **standard form** of a linear equation is $Ax + By = C$. The **standard form** of a quadratic equation is $y = ax^2 + bx + c$.
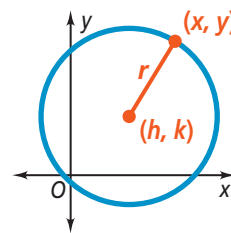
Use Your Vocabulary

Draw a line from each equation in Column A to its *standard form* in Column B.

Column A	Column B
7. $y = 2x + 3$	$x + y = 0$
8. $y = \frac{3}{4}x - 2$	$2x - y = -3$
9. $y = -x$	$3x - 4y = 8$
10. $0 = 2y - 4x + 3$	$4x - 2y = 3$

Theorem 12-16 Equation of a Circle

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

Complete each sentence with *center, circle,* or *radius.*

11. Each point on a __?__ is the same distance from the center.

12. The equation of a circle with center $(-1, 0)$ and __?__ 6 is $(x + 1)^2 + (y - 0)^2 = 6^2$.

13. Each point on a circle is r units from the __?__.

14. The Distance Formula is $d = \sqrt{(x_2 -)^2 + (y_2 -)^2}$

15. How is d in the Distance Formula related to the radius r in the standard equation of a circle?

16. How are the Distance Formula and the standard form of the equation of a circle alike?

✔ **Problem 1** **Writing the Equation of a Circle**

Got It? **What is the standard equation of the circle with center (3, 5) and radius 6?**

17. The x-coordinate of the center is ____.

18. The y-coordinate of the center is ____.

19. Is the standard equation of a circle $(x - h)^2 + (y - k)^2 = d$ Yes / No

20. Identify the values of h, k, and r.

 $h = $ ____ $k = $ ____ $r = $ ____

21. Write the standard equation of the circle with center (3, 5) and radius 6.

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

22. Simplify the equation in Exercise 21.

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

Lesson 12-5

Problem 2 Using the Center and a Point on a Circle

Got It? What is the standard equation of the circle with center $(4, 3)$ that passes through the point $(-1, 1)$?

23. Complete the reasoning model below.

Know	Need	Plan
(h, k) is ($\boxed{}$, $\boxed{}$). $(-1, 1)$ is a point on the circle.	The radius $\boxed{}$ The standard equation of the circle	Use the Distance Formula to find $\boxed{}$. Then substitute for (h, k) and for $\boxed{}$.

24. Use the Distance Formula to find *r*.

$d = \sqrt{(x_2 - \boxed{})^2 + (y_2 - \boxed{})^2}$ Write the Distance Formula.

$r = \sqrt{(4 - \boxed{})^2 + (3 - \boxed{})^2}$ Substitute.

$r = \sqrt{(\boxed{})^2 + (\boxed{})^2}$ Simplify within parentheses.

$r = \sqrt{(\boxed{}) + (\boxed{})}$ Square each number.

$r = \sqrt{\boxed{}}$ Add.

25. Now write the standard form of the circle with center $(4, 3)$ that passes through the point $(-1, 1)$.

$(x - \boxed{})^2 + (y - \boxed{})^2 = \boxed{}^2$ Use the standard form of an equation of a circle.

$(x - \boxed{})^2 + (y - \boxed{})^2 = \boxed{}^2$ Substitute.

$(x - \boxed{})^2 + (y - \boxed{})^2 = \boxed{}$ Simplify.

## Problem 3 Graphing a Circle Given Its Equation

Got It? Suppose the equation $(x - 7)^2 + (y + 2)^2 = 64$ represents the position and transmission range of a cell tower. What does the center of the circle represent? What does the radius represent?

Place a ✓ in the box if the response is correct. Place an ✗ if it is incorrect.

___ **26.** The transmission range is the same distance all around the cell tower.

___ **27.** The center of the circle represents the position of the cell tower.

___ **28.** The center of the circle represents the transmission range.

___ **29.** The radius of the circle represents the position of the cell tower.

___ **30.** The radius of the circle represents the transmission range.

Got It? What is the center and radius of the circle with equation $(x - 2)^2 + (y - 3)^2 = 100$? Graph the circle.

31. The center of the circle is (2,   ).

32. $r^2 =$

33. The radius of the circle is   .

34. Graph the circle on the coordinate plane at the right.
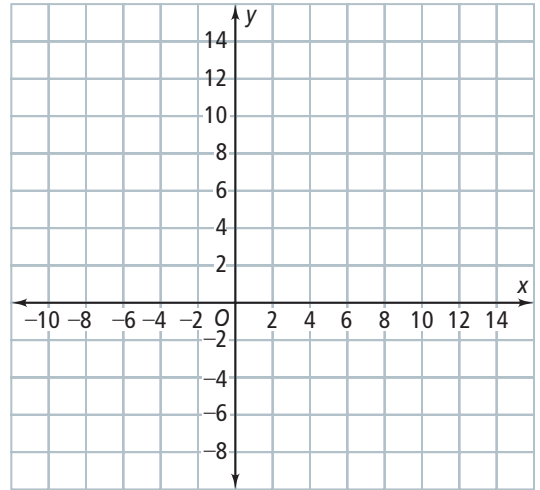
Suppose you know the center of a circle and a point on the circle. How do you determine the equation of the circle?

35. Do you know the value of h?   Yes / No

36. Do you know the value of k?   Yes / No

37. Do you know the value of r?   Yes / No

38. How can you find the missing value?

_____

_____

39. Once you know h, k, and r, how do you determine an equation of the circle?

_____

_____

✓ **Math Success**

Check off the vocabulary words that you understand.

☐ circle   ☐ Distance Formula   ☐ standard form

Rate how well you can *use the standard form of a circle.*

Need to review   0   2   4   6   8   10   Now I get it!