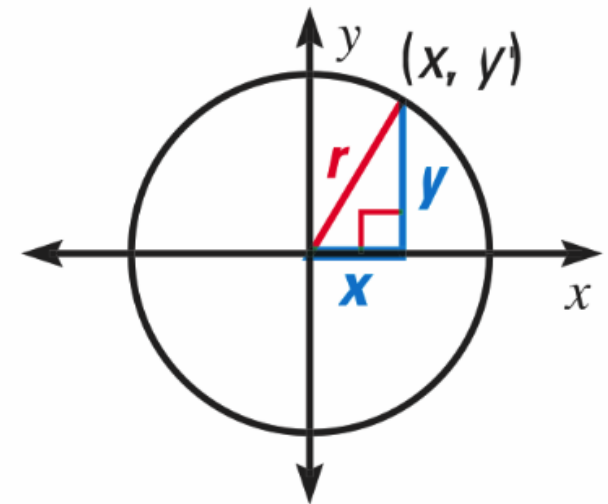


10.7 Write and Graph Equations of Circles

Let (x, y) represent any point on a circle with center at the origin and radius r . By the Pythagorean Theorem,

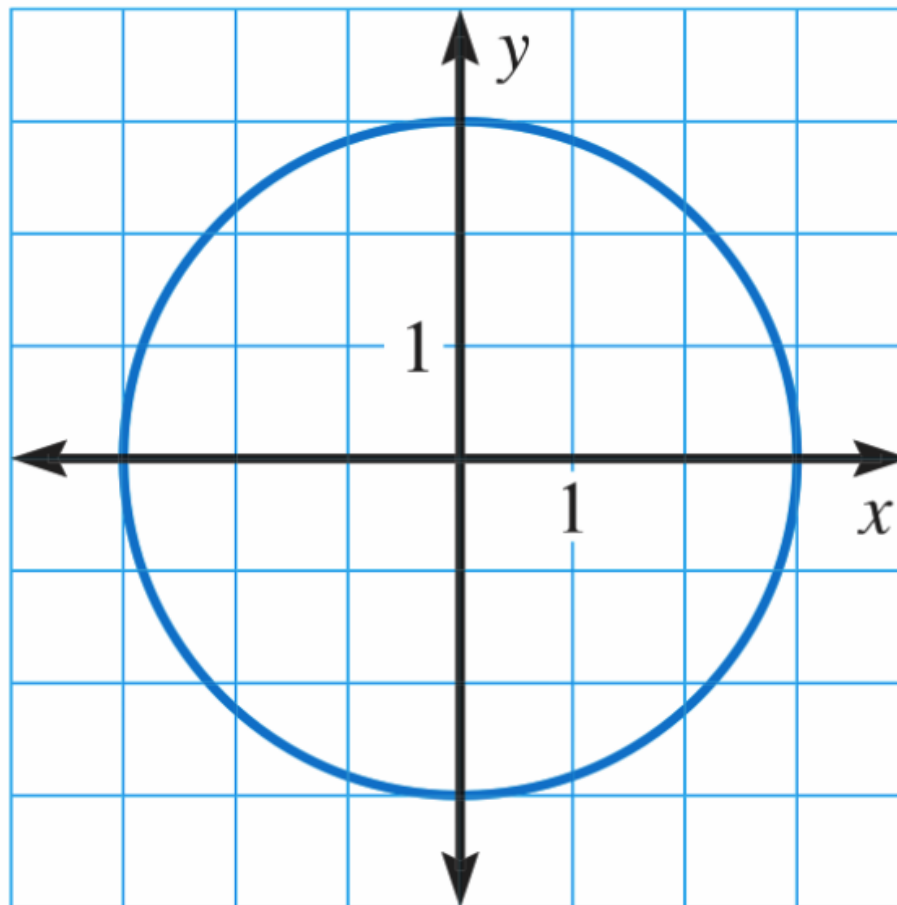
$$x^2 + y^2 = r^2.$$

This is the equation of a circle with radius r and center at the origin.



EXAMPLE 1 Write an equation of a circle

Write the equation of the circle shown.

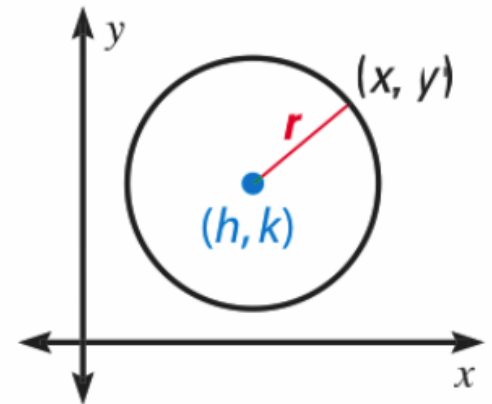


CIRCLES CENTERED AT (h, k) You can write the equation of *any* circle if you know its radius and the coordinates of its center.

Suppose a circle has radius r and center (h, k) . Let (x, y) be a point on the circle. The distance between (x, y) and (h, k) is r , so by the Distance Formula

$$\sqrt{(x - h)^2 + (y - k)^2} = r.$$

Square both sides to find the **standard equation of a circle**.



KEY CONCEPT*For Your Notebook***Standard Equation of a Circle**

The standard equation of a circle with center (h, k) and radius r is:

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

EXAMPLE 2 Write the standard equation of a circle

Write the standard equation of a circle with center $(0, -9)$ and radius 4.2.

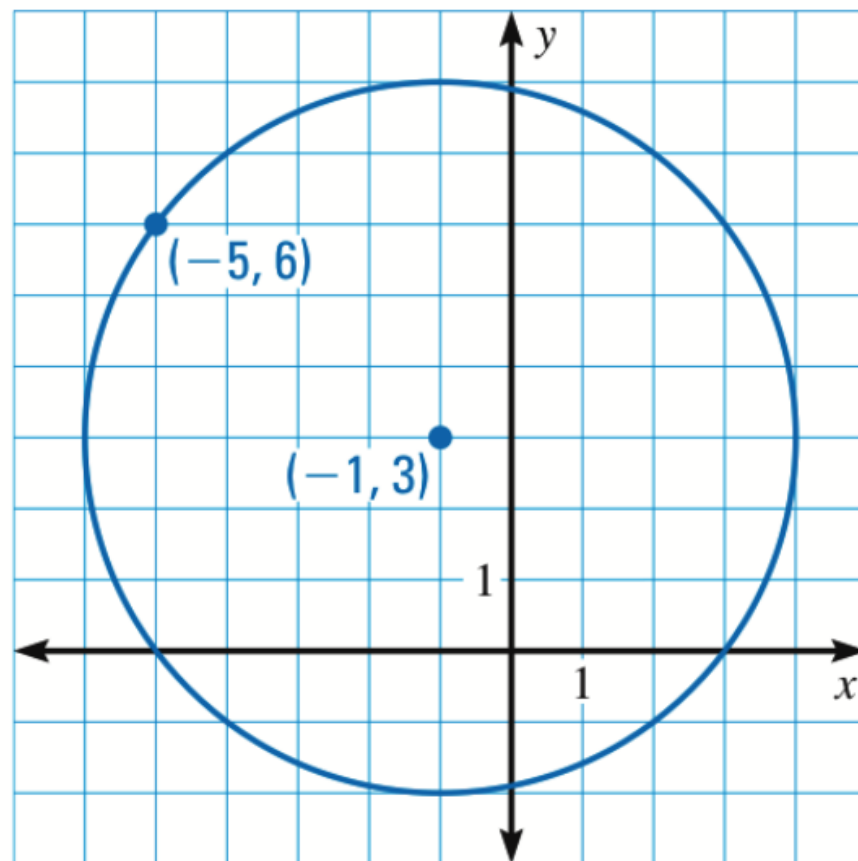
Write the standard equation of the circle with the given center and radius.

Center $(0, 0)$, radius 2.5

Center $(-2, 5)$, radius 7

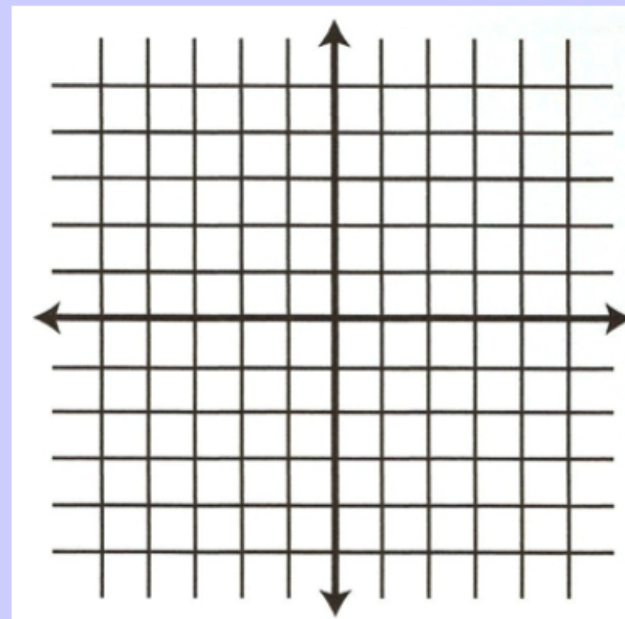
EXAMPLE 3 Write the standard equation of a circle

The point $(-5, 6)$ is on a circle with center $(-1, 3)$. Write the standard equation of the circle.



EXAMPLE 4 Graph a circle

The equation of a circle is $(x - 4)^2 + (y + 2)^2 = 36$. Graph the circle.

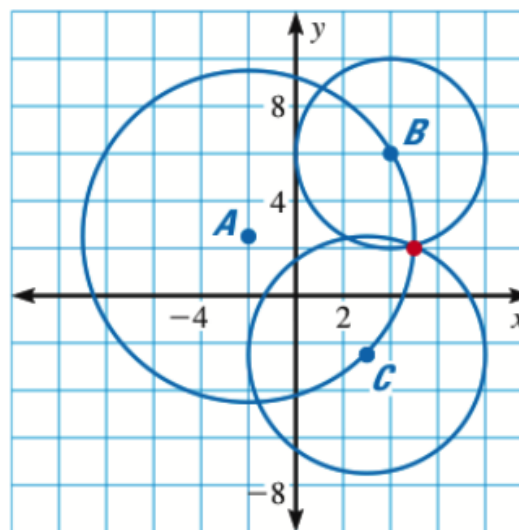


EXAMPLE 5 Use graphs of circles

EARTHQUAKES The epicenter of an earthquake is the point on Earth's surface directly above the earthquake's origin. A seismograph can be used to determine the distance to the epicenter of an earthquake. Seismographs are needed in three different places to locate an earthquake's epicenter.

Use the seismograph readings from locations A , B , and C to find the epicenter of an earthquake.

- The epicenter is 7 miles away from $A(-2, 2.5)$.
- The epicenter is 4 miles away from $B(4, 6)$.
- The epicenter is 5 miles away from $C(3, -2.5)$.



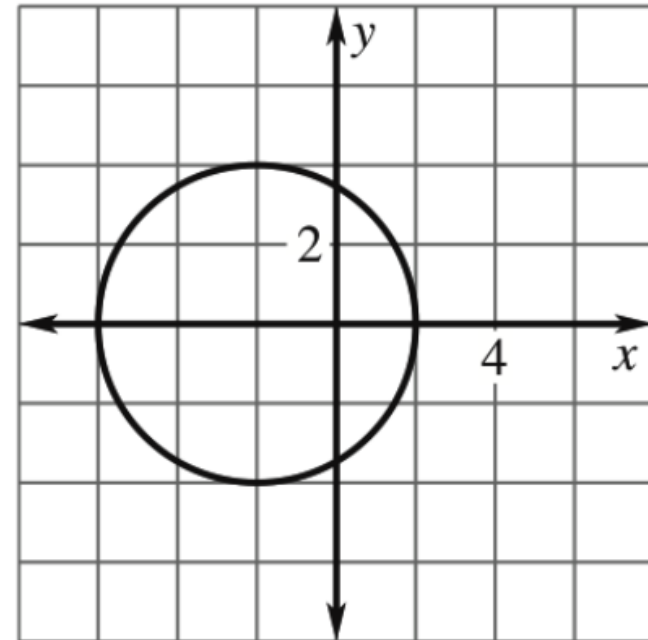
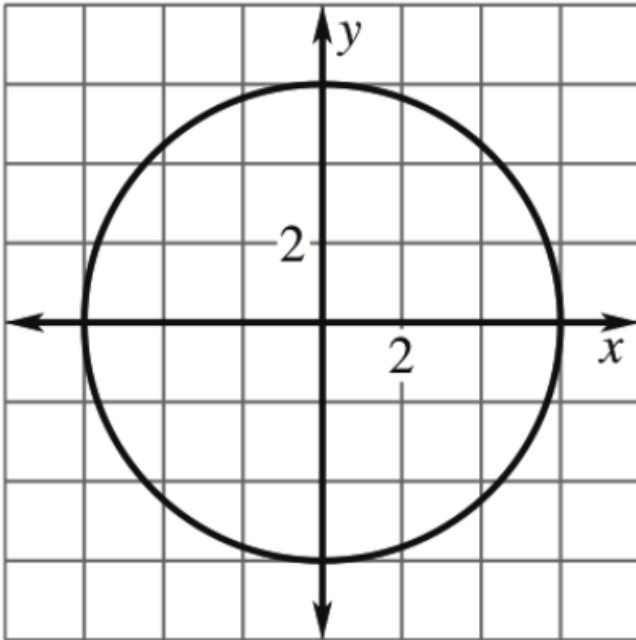
Give the center and radius of the circle.

$$x^2 + y^2 = 25$$

$$(x - 5)^2 + y^2 = 16$$

$$(x + 4)^2 + (y - 2)^2 = 25$$

Write the standard equation of the circle.



Write the standard equation of the circle with the given center and radius.

Center $(-3, 7)$, radius 6 Center $(0, 9)$, radius 7

Center $(0, 0)$, radius 2

Assignment:

p. 702 (3-14, 17 19, 20, 21, 23, 25, 49-54)