9.3 Graph and Write Equations of Circles

TEKS a.5, 2A.5.B

Before You graphed and wrote equations of parabolas.

Now You will graph and write equations of circles.

Why? So you can model transmission ranges, as in Ex. 62.

Key Vocabulary
- **circle**
- **center**
- **radius**

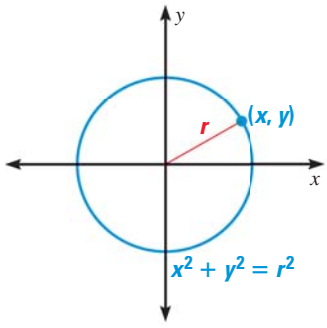
A **circle** is the set of all points (x, y) in a plane that are equidistant from a fixed point, called the **center** of the circle. The distance r between the center and any point (x, y) on the circle is the **radius**.

For a circle with center at the origin and radius r, the distance between any point (x, y) on the circle and the center $(0, 0)$ is r, so the following is true:

$$\sqrt{(x-0)^2 + (y-0)^2} = r \qquad \text{Distance formula}$$

$$(x-0)^2 + (y-0)^2 = r^2 \qquad \text{Square each side.}$$

$$x^2 + y^2 = r^2 \qquad \text{Simplify.}$$



KEY CONCEPT *For Your Notebook*

Standard Equation of a Circle with Center at the Origin

The standard form of the equation of a circle with center at $(0, 0)$ and radius r is as follows:

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

EXAMPLE 1 Graph an equation of a circle

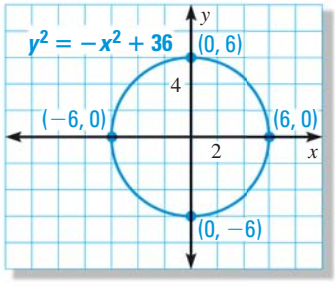
Graph $y^2 = -x^2 + 36$. Identify the radius of the circle.

Solution

STEP 1 **Rewrite** the equation $y^2 = -x^2 + 36$ in standard form as $x^2 + y^2 = 36$.

STEP 2 **Identify** the center and radius. From the equation, the graph is a circle centered at the origin with radius $r = \sqrt{36} = 6$.

STEP 3 **Draw** the circle. First plot several convenient points that are 6 units from the origin, such as $(0, 6)$, $(6, 0)$, $(0, -6)$, and $(-6, 0)$. Then draw the circle that passes through the points.



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