

Lesson 8–6

Example 1 Rewrite an Equation of a Conic Section

Write the equation $x^2 + y^2 - 14y - 98 = 0$ in standard form. State whether the graph of the equation is a *parabola*, *circle*, *ellipse*, or *hyperbola*. Then graph the equation.

Complete the square to write the equation in standard form.

$$x^2 + y^2 - 14y - 98 = 0$$

$$x^2 + y^2 - 14y + \square = 98 + \square$$

$$x^2 + y^2 - 14y + 49 = 98 + 49$$

$$x^2 + (y - 7)^2 = 147$$

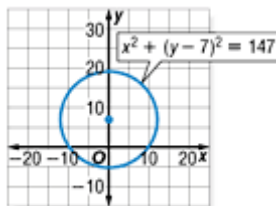
Original equation

Isolate terms.

Complete the square.

$$y^2 - 14y + 49 = (y - 7)^2$$

The graph of the equation is a circle with its center at $(0, 7)$. The radius is $7\sqrt{3}$ units.



Example 2 Analyze an Equation of a Conic Section

Without writing the equation in standard form, state whether the graph of each equation is a *parabola*, *circle*, *ellipse*, or *hyperbola*.

a. $x^2 + 2y - 3x - 1 = 0$

In this equation, $A = 1$. Since there is no y^2 term, $C = 0$. The graph is a parabola.

b. $2x^2 + 3y^2 - 5x - 6y - 10 = 0$

In this equation, $A = 2$ and $C = 3$. Since $A \neq C$ and A and C have the same sign, the graph is an ellipse.

c. $-3y^2 + 5x^2 + 3y - 2x - 4 = 0$

In this equation, $A = 5$ and $C = -3$. Since A and C have opposite signs, the graph is a hyperbola.