10.2 Graph $y = ax^2 + bx + c$

pp. 635–640

EXAMPLE

Graph $y = -x^2 + 2x + 1$.

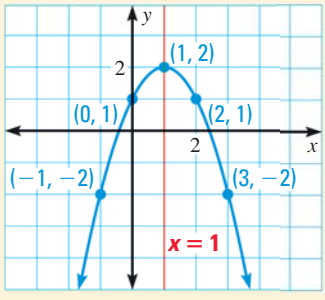
STEP 1 **Determine** whether the parabola opens up or down. Because $a < 0$, the parabola opens down.

STEP 2 **Find** and draw the axis of symmetry:

$$x = -\frac{b}{2a} = -\frac{2}{2(-1)} = 1$$

STEP 3 **Find** and plot the vertex. The x-coordinate of the vertex is $-\frac{b}{2a}$, or 1. The y-coordinate of the vertex is $y = -(1)^2 + 2(1) + 1 = 2$.

STEP 4 **Plot** four more points. Evaluating the function for $x = 0$ and $x = -1$ gives the points (0, 1) and (−1, −2). Plot these points and their reflections in the axis of symmetry.



STEP 5 **Draw** a parabola through the plotted points.

EXAMPLE 2 on p. 636 for Exs. 8–10

EXERCISES

Graph the function. Label the vertex and axis of symmetry.

8. $y = x^2 + 4x + 1$ **9.** $y = 2x^2 - 4x - 3$ **10.** $y = -2x^2 + 8x + 5$

10.3 Solve Quadratic Equations by Graphing

pp. 643–649

EXAMPLE

Solve $x^2 - 7x = -12$ by graphing.

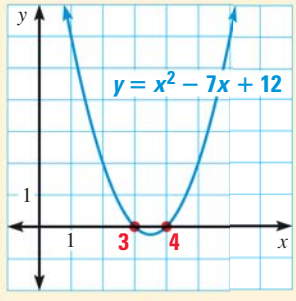
STEP 1 **Write** the equation in standard form.

$x^2 - 7x = -12$ **Write original equation.**

$x^2 - 7x + 12 = 0$ **Add 12 to each side.**

STEP 2 **Graph** the related function $y = x^2 - 7x + 12$. The x-intercepts of the graph are 3 and 4.

▶ The solutions of the equation $x^2 - 7x + 12 = 0$ are 3 and 4.



EXAMPLES 1, 2, and 3 on pp. 643–644 for Exs. 11–13

EXERCISES

Solve the equation by graphing.

11. $4x^2 + x + 3 = 0$ **12.** $x^2 + 2x = -1$ **13.** $-x^2 + 8 = 7x$