EXAMPLE 2 Solve an equation with one real solution

Solve $25x^2 - 18x = 12x - 9$.

ANOTHER WAY
You can also use factoring to solve this equation because the left side factors as $(5x - 3)^2$.

$$25x^2 - 18x = 12x - 9 \qquad \text{Write original equation.}$$

$$25x^2 - 30x + 9 = 0 \qquad \text{Write in standard form.}$$

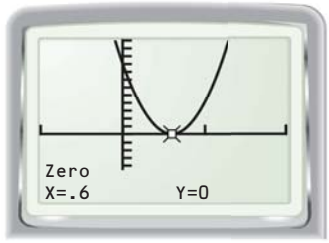
$$x = \frac{30 \pm \sqrt{(-30)^2 - 4(25)(9)}}{2(25)} \qquad a = 25,\ b = -30,\ c = 9$$

$$x = \frac{30 \pm \sqrt{0}}{50} \qquad \text{Simplify.}$$

$$x = \frac{3}{5} \qquad \text{Simplify.}$$

▶ The solution is $\frac{3}{5}$.

CHECK Graph $y = 25x^2 - 30x + 9$ and note that the only x-intercept is $0.6 = \frac{3}{5}$. ✓



EXAMPLE 3 Solve an equation with imaginary solutions

Solve $-x^2 + 4x = 5$.

$$-x^2 + 4x = 5 \qquad \text{Write original equation.}$$

$$-x^2 + 4x - 5 = 0 \qquad \text{Write in standard form.}$$

$$x = \frac{-4 \pm \sqrt{4^2 - 4(-1)(-5)}}{2(-1)} \qquad a = -1,\ b = 4,\ c = -5$$

$$x = \frac{-4 \pm \sqrt{-4}}{-2} \qquad \text{Simplify.}$$

$$x = \frac{-4 \pm 2i}{-2} \qquad \text{Rewrite using the imaginary unit } i.$$

$$x = 2 \pm i \qquad \text{Simplify.}$$

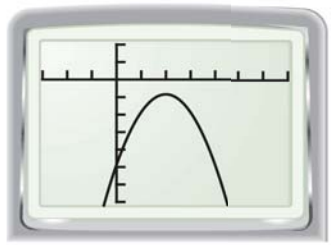
▶ The solutions are $2 + i$ and $2 - i$.

CHECK Graph $y = -x^2 + 4x - 5$. There are no x-intercepts. So, the original equation has no real solutions. The algebraic check for the imaginary solution $2 + i$ is shown.

$$-(\mathbf{2 + i})^2 + 4(\mathbf{2 + i}) \stackrel{?}{=} 5$$

$$-3 - 4i + 8 + 4i \stackrel{?}{=} 5$$

$$5 = 5 \checkmark$$



GUIDED PRACTICE for Examples 1, 2, and 3

Use the quadratic formula to solve the equation.

1. $x^2 = 6x - 4$ **2.** $4x^2 - 10x = 2x - 9$ **3.** $7x - 5x^2 - 4 = 2x + 3$