EXAMPLE 2 Solve a quadratic equation

Solve $2x^2 - 7 = x$.

$2x^2 - 7 = x$	**Write original equation.**
$2x^2 - x - 7 = 0$	**Write in standard form.**
$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	**Quadratic formula**
$= \dfrac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-7)}}{2(2)}$	**Substitute values in the quadratic formula: $a = 2$, $b = -1$, and $c = -7$.**
$= \dfrac{1 \pm \sqrt{57}}{4}$	**Simplify.**

▶ The solutions are $\dfrac{1 + \sqrt{57}}{4} \approx 2.14$ and $\dfrac{1 - \sqrt{57}}{4} \approx -1.64$.

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CHECK Write the equation in standard form, $2x^2 - x - 7 = 0$. Then graph the related function $y = 2x^2 - x - 7$. The x-intercepts are about -1.6 and 2.1. So, each solution checks.
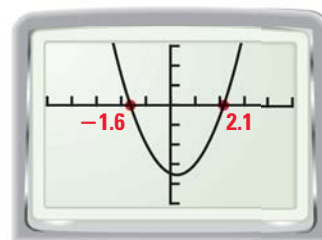
✓ **GUIDED PRACTICE** for Examples 1 and 2

Use the quadratic formula to solve the equation. Round your solutions to the nearest hundredth, if necessary.

1. $x^2 - 8x + 16 = 0$ **2.** $3n^2 - 5n = -1$ **3.** $4z^2 = 7z + 2$

EXAMPLE 3 Use the quadratic formula

FILM PRODUCTION For the period 1971–2001, the number y of films produced in the world can be modeled by the function $y = 10x^2 - 94x + 3900$ where x is the number of years since 1971. In what year were 4200 films produced?

Solution

$y = 10x^2 - 94x + 3900$	**Write function.**
$4200 = 10x^2 - 94x + 3900$	**Substitute 4200 for y.**
$0 = 10x^2 - 94x - 300$	**Write in standard form.**
$x = \dfrac{-(-94) \pm \sqrt{(-94)^2 - 4(10)(-300)}}{2(10)}$	**Substitute values in the quadratic formula: $a = 10$, $b = -94$, and $c = -300$.**
$= \dfrac{94 \pm \sqrt{20{,}836}}{20}$	**Simplify.**

INTERPRET SOLUTIONS
The solution -3 can be ignored because -3 represents the year 1968, which is not in the given time period.

The solutions of the equation are $\dfrac{94 + \sqrt{20{,}836}}{20} \approx 12$ and $\dfrac{94 - \sqrt{20{,}836}}{20} \approx -3$.

▶ There were 4200 films produced about 12 years after 1971, or in 1983.