SQUARING TWICE When an equation contains two radicals, you may need to square each side twice in order to eliminate both radicals.

EXAMPLE 6 Solve an equation with two radicals

Solve $\sqrt{x+2}+1=\sqrt{3-x}$.

Solution

METHOD 1 **Solve** using algebra.

$\sqrt{x+2}+1=\sqrt{3-x}$	**Write original equation.**
$(\sqrt{x+2}+1)^2=(\sqrt{3-x})^2$	**Square each side.**
$x+2+2\sqrt{x+2}+1=3-x$	**Expand left side and simplify right side.**
$2\sqrt{x+2}=-2x$	**Isolate radical expression.**
$\sqrt{x+2}=-x$	**Divide each side by 2.**
$(\sqrt{x+2})^2=(-x)^2$	**Square each side again.**
$x+2=x^2$	**Simplify.**
$0=x^2-x-2$	**Write in standard form.**
$0=(x-2)(x+1)$	**Factor.**
$x-2=0$ or $x+1=0$	**Zero-product property**
$x=2$ or $x=-1$	**Solve for x.**

REVIEW FOIL METHOD
For help with multiplying algebraic expressions using the FOIL method, see p. 245.

Check $x=2$ in the original equation.

$$\sqrt{x+2}+1=\sqrt{3-x}$$
$$\sqrt{2+2}+1\stackrel{?}{=}\sqrt{3-2}$$
$$\sqrt{4}+1\stackrel{?}{=}\sqrt{1}$$
$$3\neq 1$$

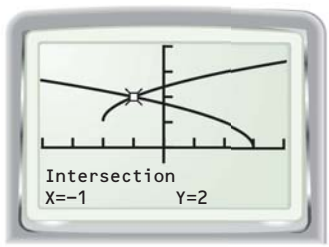
Check $x=-1$ in the original equation.

$$\sqrt{x+2}+1=\sqrt{3-x}$$
$$\sqrt{-1+2}+1\stackrel{?}{=}\sqrt{3-(-1)}$$
$$\sqrt{1}+1\stackrel{?}{=}\sqrt{4}$$
$$2=2\ \checkmark$$

▶ The only solution is -1. (The apparent solution 2 is extraneous.)

METHOD 2 **Use** a graph to solve the equation.

Use a graphing calculator to graph $y_1=\sqrt{x+2}+1$ and $y_2=\sqrt{3-x}$. Then find the intersection points of the two graphs by using the *intersect* feature. You will find that the only point of intersection is $(-1, 2)$. Therefore, -1 is the only solution of the equation $\sqrt{x+2}+1=\sqrt{3-x}$.



GUIDED PRACTICE for Examples 5 and 6

Solve the equation. Check for extraneous solutions.

11. $x-\frac{1}{2}=\sqrt{\frac{1}{4}x}$

12. $\sqrt{10x+9}=x+3$

13. $\sqrt{2x+5}=\sqrt{x+7}$

14. $\sqrt{x+6}-2=\sqrt{x-2}$