Reteaching 7-5

Solving Square Root and Other Radical Equations

OBJECTIVE: Solving radical equations	**MATERIALS:** None

- Equations containing radicals can be solved by isolating the radical on one side of the equation and then raising both sides to the same power that would undo the radical.

- An extraneous solution satisfies later equations in your work but does not make the original equation true.

Example

Solve $\sqrt{17 - x} - 3 = x$. Check your solution(s).

$$\sqrt{17 - x} - 3 = x$$

$$\sqrt{17 - x} = x + 3 \qquad \longleftarrow \text{ Add 3 to each side to get the radical alone on one side of the equal sign.}$$

$$\left(\sqrt{17 - x}\right)^2 = (x + 3)^2 \qquad \longleftarrow \text{ Square each side.}$$

$$17 - x = x^2 + 6x + 9$$

$$0 = x^2 + 7x - 8 \qquad \longleftarrow \text{ Rewrite in standard form.}$$

$$0 = (x - 1)(x + 8) \qquad \longleftarrow \text{ Factor.}$$

$$x - 1 = 0 \text{ or } x + 8 = 0 \qquad \longleftarrow \text{ Set each factor equal to 0 using the Zero Product Property.}$$

$$x = 1 \text{ or } \qquad x = -8$$

Check:

$$\sqrt{17 - x} - 3 \stackrel{?}{=} x \qquad\qquad \sqrt{17 - x} - 3 \stackrel{?}{=} x$$
$$\sqrt{17 - 1} - 3 \stackrel{?}{=} 1 \qquad\qquad \sqrt{17 - (-8)} - 3 \stackrel{?}{=} -8$$
$$\sqrt{16} - 3 \stackrel{?}{=} 1 \qquad\qquad \sqrt{25} - 3 \stackrel{?}{=} -8$$
$$1 = 1 \checkmark \qquad\qquad 2 \neq -8$$

The only solution is 1.

Exercises

Solve. Check for extraneous solutions.

1. $x^{\frac{1}{2}} = 13$

2. $3\sqrt{2x} = 12$

3. $\sqrt{5x + 1} = \sqrt{4x + 3}$

4. $\sqrt{x^2 + 3} = x + 1$

5. $\sqrt{3x} = \sqrt{x + 6}$

6. $x = \sqrt{x + 7} + 5$

7. $x - 3\sqrt{x} - 4 = 0$

8. $\sqrt{x + 2} = x - 4$

9. $\sqrt[3]{5y + 2} - 3 = 0$