11-3 Radical Equations *(Pages 598–603)*

Equations that contain radicals with variables in the radicand are called **radical equations**. To solve a radical equation, first isolate the radical on one side of the equation. Then square each side of the equation to eliminate the radical.

Examples

a. Solve $\sqrt{x} - 4 = -2$.

$$\sqrt{x} - 4 = -2$$
$$\sqrt{x} = 2 \qquad \text{Add 4 to each side.}$$
$$(\sqrt{x})^2 = 2^2 \qquad \text{Square each side.}$$
$$x = 4 \qquad \text{Evaluate.}$$

Check the solution.
$$\sqrt{x} - 4 = -2$$
$$\sqrt{4} - 4 = -2$$
$$2 - 4 = -2$$
$$-2 = -2$$

b. Solve $\sqrt{2x - 4} = x - 2$.

$$\sqrt{2x - 4} = x - 2$$
$$(\sqrt{2x - 4})^2 = (x - 2)^2 \qquad \text{Square each side.}$$
$$2x - 4 = x^2 - 4x + 4 \qquad \text{Simplify.}$$
$$0 = x^2 - 6x + 8 \qquad \text{Subtract.}$$
$$0 = (x - 4)(x - 2) \qquad \text{Factor.}$$
$$x = 4 \text{ or } x = 2 \qquad \text{Use the Zero Product Property.}$$

Check your solutions.

$$\sqrt{2x - 4} = x - 2 \qquad\qquad \sqrt{2x - 4} = x - 2$$
$$\sqrt{2(4) - 4} = 4 - 2 \qquad\qquad \sqrt{2(2) - 4} = 2 - 2$$
$$\sqrt{4} = 2 \qquad\qquad\qquad \sqrt{0} = 0$$
$$2 = 2 \qquad\qquad\qquad 0 = 0$$

Try These Together

Solve each equation. Check your solution

1. $\sqrt{x} = \sqrt{3}$ **2.** $\sqrt{y} = \sqrt{6}$ **3.** $\sqrt{a} = 3\sqrt{5}$

HINT: Isolate the radical and then square both sides to eliminate the radical.

Practice

Solve each equation. Check your solution.

4. $\sqrt{y} - 4 = 0$ **5.** $\sqrt{c} + 4 = 0$ **6.** $\sqrt{s} + 2 = 0$

7. $\sqrt{3t + 1} = 6$ **8.** $\sqrt{2x - 2} = 4$ **9.** $16 - 5\sqrt{2y} = 1$

10. $3 + 2\sqrt{m} = 7$ **11.** $5 + 3\sqrt{4x} = 8$ **12.** $\sqrt{a - 3} = a - 5$

13. $\sqrt{x + 6} = x + 4$ **14.** $3 + \sqrt{a - 3} = 6$ **15.** $15 + \sqrt{y - 12} = 33$

16. Physics The period T of a pendulum is the time it takes to make one complete swing. At the Earth's surface, $T = 2\pi\sqrt{\dfrac{L}{32}}$, where T is measured in seconds and L is the length of the pendulum in feet. To the nearest tenth, how long is a pendulum with a period of 2 seconds?

17. **Standardized Test Practice** Solve the equation $\sqrt{x + 7} = 2\sqrt{2}$.

A 1 **B** 2 **C** 7 **D** 8

Answers: 1. 3 2. 6 3. 45 4. 16 5. no solution 6. no solution 7. $11\frac{2}{3}$ 8. 9 9. $4\frac{1}{2}$ 10. 4 11. $\frac{1}{4}$ 12. 7 13. −2 14. 12 15. 336 16. 3.2 ft 17. A