

## Lesson 29: Solving Radical Equations

### Classwork

#### Example 1

Solve the equation  $6 = x + \sqrt{x}$ .

#### Exercises 1–4

Solve.

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

2.  $3 = 4\sqrt{x} - x$

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

4.  $\sqrt{3x+7} + 2\sqrt{x-8} = 0$

**Example 2**

Solve the equation  $\sqrt{x} + \sqrt{x+3} = 3$ .

**Exercises 5–6**

Solve the following equations.

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

6.  $3 + \sqrt{x} = \sqrt{x+81}$

**Lesson Summary**

If  $a = b$  and  $n$  is an integer, then  $a^n = b^n$ . However, the converse is not necessarily true. The statement  $a^n = b^n$  does not imply that  $a = b$ . Therefore, it is necessary to check for extraneous solutions when both sides of an equation are raised to an exponent.

**Problem Set**

Solve.

1.  $\sqrt{2x - 5} - \sqrt{x + 6} = 0$

2.  $\sqrt{2x - 5} + \sqrt{x + 6} = 0$

3.  $\sqrt{x - 5} - \sqrt{x + 6} = 2$

4.  $\sqrt{2x - 5} - \sqrt{x + 6} = 2$

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

6.  $\sqrt{x + 4} = 3 + \sqrt{x}$

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

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

9.  $\sqrt{x + 12} + \sqrt{x} = 6$

10.  $2\sqrt{x} = 1 - \sqrt{4x - 1}$

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

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

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

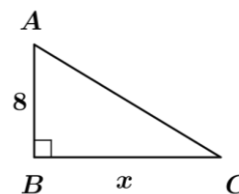
14.  $\sqrt{2x - 8} + \sqrt{3x - 12} = 0$

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

16.  $x - 2 = \sqrt{9x - 36}$

17. Consider the right triangle  $ABC$  shown to the right, with  $AB = 8$  and  $BC = x$ .

- a. Write an expression for the length of the hypotenuse in terms of  $x$ .
- b. Find the value of  $x$  for which  $AC - AB = 9$ .



18. Consider the triangle  $ABC$  shown to the right where  $AD = DC$ , and  $\overline{BD}$  is the altitude of the triangle.

- a. If the length of  $\overline{BD}$  is  $x$  cm, and the length of  $\overline{AC}$  is 18 cm, write an expression for the lengths of  $\overline{AB}$  and  $\overline{BC}$  in terms of  $x$ .
- b. Write an expression for the perimeter of  $\triangle ABC$  in terms of  $x$ .
- c. Find the value of  $x$  for which the perimeter of  $\triangle ABC$  is equal to 38 cm.

