Lesson 29: Solving Radical Equations

Classwork

**Example 1**

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

Exercises 1–4

Solve.

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

1. $3=4\sqrt{x}-x$

1. $\sqrt{x+5}=x-1$
2. $\sqrt{3x+7}+2\sqrt{x-8}=0$

Example 2

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

Exercises 5–6

Solve the following equations.

1. $\sqrt{x-3}+\sqrt{x+5}=4$
2. $3+\sqrt{x}=\sqrt{x+81}$

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. $\sqrt{2x-5}-\sqrt{x+6}=0$
 | 1. $\sqrt{2x-5}+\sqrt{x+6}=0$
 |
| 1. $\sqrt{x-5}-\sqrt{x+6}=2$
 | 1. $\sqrt{2x-5}-\sqrt{x+6}=2$
 |
| 1. $\sqrt{x+4}=3-\sqrt{x}$
 | 1. $\sqrt{x+4}=3+\sqrt{x}$
 |
| 1. $\sqrt{x+3}=\sqrt{5x+6}-3$
 | 1. $\sqrt{2x+1}=x-1$
 |
| 1. $\sqrt{x+12}+\sqrt{x}=6$
 | 1. $2\sqrt{x}=1-\sqrt{4x-1}$
 |
| 1. $2x=\sqrt{4x-1}$
 | 1. $\sqrt{4x-1}=2-2x$
 |
| 1. $x+2=4\sqrt{x-2}$
 | 1. $\sqrt{2x-8}+\sqrt{3x-12}=0$
 |
| 1. $x=2\sqrt{x-4}+4$
 | 1. $x-2=\sqrt{9x-36}$
 |



1. Consider the right triangle $ABC$ shown to the right, with $AB=8$ and $BC=x$.
	1. Write an expression for the length of the hypotenuse in terms of $x$.
	2. Find the value of $x$ for which $AC-AB=9$.
2. Consider the right triangle $ABC$ shown to the right, where $AD=DC$ and $\overbar{BD}$ is the altitude of the triangle.
	1. If the length of $\overbar{BD}$ is $x cm$ and the length of $\overbar{AC}$ is $18 cm$, write an expression for the lengths of $\overbar{AB}$ and $\overbar{BC}$ in terms of $x$.
	2. Write an expression for the perimeter of $∆ABC$ in terms of $x$.
	3. Find the value of $x$ for which the perimeter of $∆ABC$ is equal to $38$ $cm$.