Name

Class



Date

**Solving Radical Equations**

You can solve some radical equations by isolating the radical, squaring (or cubing) both sides, and then solving for the variable.

**Problem**

What is the solution of the radical equation 

To find the value of *w*, you need to get it alone on one side of the equation.

You have not found the solution if *w* is in the radicand. Eliminate the radical by squaring both sides. Check the solution to the equation in the original equation.

|  |  |  |
| --- | --- | --- |
| **Solve** |  | Add 9 to both sides of the equation so the radical is alone on one side of the equation. |
|  |  | Imagine the equation is describing the side of a square. Each side measures  . Since , the area of the square is 92 or 81. |
|  |  | When you multiply the length of the sides together, you eliminate the radical. |
|  | 5*w –* 4 = 81 | Write the equation for the area of the square. |
|  | 5*w =* 85 | Add 4 to each side. |
|  | *w =* 17 | Divide both sides by 5. |
| **Check** |   0 | Substitute 17 for *w*. |
|  |   0 | Multiply. |
|  |   0 | Subtract. |
|  | 0 = 0✓ | Solution checks. |

Solution: The solution of the radical equation  is *w* = 17.

**Exercises**

Solve each radical equation. Check your solution.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **1.** |  | **2.** |  | **3.** | $$8= \sqrt[3]{c }+6$$ |
| **4.** | $$2=\sqrt[3]{-5w-2}$$ | **5.** |  | **6.** | $$\sqrt{d+7}= \sqrt{3d-1}$$ |
| **7.** |  | **8.** | $$\sqrt[3]{8-2f }= \sqrt[3]{3f+5}$$ | **9.** |  |

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**Solving Radical Equations**

**Problem**

An extraneous solution is not a solution of the original equation.

What is the extraneous solution of ?

Square both sides to remove the radical and solve for the solutions. Substitute each solution into the original equation to find the solution that does not work.

|  |  |  |
| --- | --- | --- |
| **Solve** |  | Square each side to remove the radical. |
|  |  | Think of the equation as the formula for thearea of a square, where each side measures . |
|  | *b*2 = 5 – 4*b* | Write an equation for the area of the square. |
|  | *b*2 + 4*b –* 5 = 0 | Because of the *b*2-term, the equation is a quadratic equation. Write the quadratic equation in standard form by adding 4*b* and subtracting 5 from each side. |
|  | (*b +* 5)(*b –* 1) = 0 | Factor the trinomial. |
|  | *b +* 5 = 0 or *b –* 1 = 0 | Set each factor equal to zero. |
|  | *b =* –5 *b =* 1 | Solve for *b*. |
| Check the solutions in the original equation to find the solution that does not satisfy the original equation. |
| **Check** | –5   | Check *x =* –5. |
|  | –5 ≠ 5  | Solution does not check. |
|  | 1   | Check *x =* 1. |
|  | 1 = 1  | Solution checks. |

Solution: 1 satisfies the original equation. –5 does not satisfy the original equation, so –5 is the extraneous solution.

**Exercises**

**Identify the extraneous solution for each radical equation.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **10.** |  | **11.** |  | **12.** |  |
| **13.** |  | **14.** |  | **15.** |  |