Name _____ Class _____ Date _____

10-4 Reteaching

Solving Radical Equations

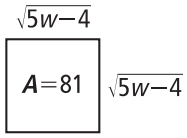
You can solve some radical equations by isolating the radical, squaring both sides, and then solving for the variable.

Problem

What is the solution of the radical equation $\sqrt{5w - 4} - 9 = 0$?

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

$\sqrt{5w - 4} = 9$	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 $\sqrt{5w - 4}$. Since $\sqrt{5w - 4} = 9$, the area of the square is 9^2 or 81.
$(\sqrt{5w - 4})(\sqrt{5w - 4}) = 5w - 4$	When you multiply the length of the sides together, you eliminate the radical.
$5w - 4 = 81$	Write the equation for the area of the square.
$5w = 85$	Add 4 to each side.
$w = 17$	Divide both sides by 5.

Check

$\sqrt{5(17) - 4} - 9 \stackrel{?}{=} 0$	Substitute 17 for w.
$\sqrt{85 - 4} - 9 \stackrel{?}{=} 0$	Multiply.
$\sqrt{81} - 9 \stackrel{?}{=} 0$	Subtract.
$0 = 0$ ✓	Solution checks.

Solution: The solution of the radical equation $\sqrt{5w - 4} - 9 = 0$ is $w = 17$.

Exercises

Solve each radical equation. Check your solution.

1. $\sqrt{5r} + 10 = 15$
   5
2. $\sqrt{x - 7} = 6$
   43
3. $8 - \sqrt{c} = 6$
   4
4. $2 = \sqrt{-5w - 2}$
   $-\frac{6}{5}$
5. $\sqrt{\frac{s}{4} - 15} + 27 = 38$
   544
6. $\sqrt{d + 7} = \sqrt{3d - 1}$
   4
7. $\sqrt{\frac{a}{3}} = \sqrt{\frac{4a + 11}{9}}$
   no solution
8. $\sqrt{8 - 2f} = \sqrt{3f + 5}$
   $\frac{3}{5}$
9. $\sqrt{h^2 + 24} = \sqrt{(h + 4)^2}$
   1

Name _____ Class _____ Date _____

10-4 Reteaching (continued)

Solving Radical Equations

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

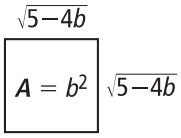
Problem

What is the extraneous solution of $b = \sqrt{5 - 4b}$?

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

$b^2 = (\sqrt{5 - 4b})^2$ — Square each side to remove the radical.



Think of the equation as the formula for the area of a square, where each side measures $\sqrt{5 - 4b}$.

$b^2 = 5 - 4b$ — Write an equation for the area of the square.

$b^2 + 4b - 5 = 0$ — Because of the b^2-term, the equation is a quadratic equation. Write the quadratic equation in standard form by adding 4b 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.

$b = -5$ $\quad b = 1$ — Solve for b.

Check the solutions in the original equation to find the solution that does not satisfy the original equation.

Check

$-5 \stackrel{?}{=} \sqrt{5 - 4(-5)}$ — Check $x = -5$.

$-5 \neq 5$ ✗ — Solution does not check.

$1 \stackrel{?}{=} \sqrt{5 - 4(1)}$ — 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. $y = \sqrt{6y + 16}$ **−2**

11. $-n = \sqrt{n + 20}$ **5**

12. $f = \sqrt{-2f + 63}$ **−9**

13. $\frac{m}{2} = \sqrt{\frac{-3m + 18}{4}}$ **−6**

14. $e = \sqrt{2e + 8}$ **−2**

15. $-g = \sqrt{-2g + 3}$ **1**