

## 8-8 Radical Equations.....page #



Goal: Solve Radical Equations.

May 12-10:21 AM

$$\sqrt[3]{2x} \cdot \sqrt[3]{4x^2} = \sqrt[3]{8x^3}$$

$2 \cdot 2 \cdot 2 \quad x \cdot x \cdot x$

$$2x$$

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A **radical equation** contains a variable within a radical. Recall that you can solve quadratic equations by taking the square root of both sides. Similarly, radical equations can be solved by raising both sides to a power.

$$x^2 = 27 \qquad \left( \sqrt[2]{x + 5} \right)^2 = (6)^2$$

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What are the steps in solving a radical equation?

Solving Radical Equations	
Steps	Example
1. Isolate the radical.	$\sqrt[3]{x} - 2 = 0$ $\sqrt[3]{x} = 2$
2. Raise both sides of the equation to the power equal to the index of the radical.	$(\sqrt[3]{x})^3 = (2)^3$
3. Simplify and solve.	$x = 8$

1.  $5 + \sqrt{x + 1} = 16$   
 $\sqrt{x + 1} = 11$   
 $(\sqrt{x + 1})^2 = (11)^2$   
 $x + 1 = 121$   
 $x = 120$

2.  $7\sqrt[3]{5x - 7} = 84$   
 $\sqrt[3]{5x - 7} = 12$   
 $(\sqrt[3]{5x - 7})^3 = (12)^3$   
 $5x - 7 = 1728$   
 $5x = 1735$   
 $x = 347$

7 12  
 7 84  
 - 7  
 14  
 - 14

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What is the index?

$$\sqrt[3]{7x+2} = \sqrt[3]{3x-2}$$

$$7x+2 = 9(3x-2)$$

$$7x+2 = 27x-18$$

$$-7x \quad -7x$$

$$2 = 20x - 18$$

$$+18 \quad +18$$

$$20 = 20x$$

$$\frac{20}{20} = \frac{20x}{20}$$

$$1 = x$$

$$\sqrt[4]{x+6} = \sqrt[4]{2x-1}$$

$$x+6 = 8(x-1)$$

$$x+6 = 8x-8$$

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An **extraneous solution** is a solution of an equation derived from an original equation that is not a solution of the original equation. When you solve a rational equation, it is possible to get extraneous solutions. These values should be eliminated from the solution set. **Always check your solutions by substituting them into the original equation.**

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5.  $\sqrt{-9x+28} = (-x+4)^2$   $(-x+4)(-x+4)$

$-9x+28 = x^2 - 4x - 4x + 16$

$-9x+28 = x^2 - 8x + 16$

$+9x \quad -28 \quad +9x \quad -28$

$0 = x^2 + x - 12$

$0 = (x+4)(x-3)$

$x+4=0 \quad x-3=0$

$x=-4 \quad x=3$

Is the root isolated?

$\sqrt{-9(-4)+28} = -(-4)+4$

$\sqrt{36+28} = 4+4$

$\sqrt{64} = 8$

$8 = 8$

6.  $\sqrt{2x+14} = x-3$

$(\sqrt{2x+14}) = (x-3)^2 \Rightarrow (x+3)(x+3)$  FOIL

$2x+14 = x^2 + 6x + 9$

$0 = x^2 + 4x - 5$

$0 = (x+5)(x-1)$

$x+5=0 \quad x-1=0$

$x=-5 \quad x=1$

$\sqrt{2(-5)+14} = -(-5) - 3$

$\sqrt{4} = 5 - 3$

$2 = 5 - 3$

$7 \neq 3$

$x = -5$  is extraneous

$\sqrt{2(1)+14} = 1 - 3$

$\sqrt{16} = 4 - 3$

$4 = 1 - 3$

$3 = 3$

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# Assignment:

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