

Study Guide

Equations with Radicals

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Radicals: Equations

Radical equations are equations in which there are numbers and or letters inside the radical sign. The numbers and/or letters are called the radicand. The following is an example of how to solve a radical equation.

Example 1: Find the solution set of the radical equation.

$$\begin{array}{l} 4 + \sqrt{4x - 3} = 7 \\ \text{(1)} \quad 4 + \sqrt{4x - 3} = 7 \quad \text{(2)} \quad (\sqrt{4x - 3})^2 = 3^2 \quad \text{(3)} \quad 4x - 3 = 9 \\ \quad \quad \quad -4 \quad \quad \quad -4 \\ \quad \quad \quad \hline \quad \quad \quad \sqrt{4x - 3} = 3 \\ \text{(4)} \quad 4x - 3 = 9 \quad \text{(5)} \quad \frac{4x}{4} = \frac{12}{4} \\ \quad \quad \quad +3 \quad +3 \quad \quad \quad \frac{4x}{4} = \frac{12}{4} \\ \quad \quad \quad \hline \quad \quad \quad 4x = 12 \quad \quad \quad x = 3 \end{array}$$

Step 1: Combine the whole numbers by subtracting 4 from both sides.

Step 2: Square both sides.

Step 3: Simplify each side of the equation.

Step 4: Add 3 to both sides of the equation.

Step 5: Divide both sides of the equation by 4.

The answer is: $x = 3$.

Substitute the result into the original equation to verify that it is correct.

Example 2: The square root of the quantity of 3 times a number increased by 4, equals 11. Find the number.

$$\begin{array}{l} \text{(1)} \quad \sqrt{3x + 4} = 11 \\ \text{(2)} \quad (\sqrt{3x + 4})^2 = (11)^2 \\ \text{(3)} \quad 3x + 4 = 121 \\ \text{(4)} \quad 3x + 4 = 121 \\ \quad \quad \quad -4 \quad -4 \\ \quad \quad \quad \hline \quad \quad \quad 3x = 117 \\ \text{(5)} \quad \frac{3x}{3} = \frac{117}{3} \\ \quad \quad \quad x = 39 \end{array}$$

Step 1: Write the equation.

Step 2: Square both sides of the equation to get rid of the square root.

Step 3: Simplify both sides of the equation.

Step 4: Subtract 4 from both sides of the equation.

Step 5: Divide both sides of the equation by 3.

The answer is: $x = 39$.