Example 8: Solve the Equation $\sqrt{x+4} = 2 + \sqrt{x}$

Steps

1: Isolate a radical (have a radical on each side of the equation)	$\sqrt{x+4} = 2 + \sqrt{x}$
2: Square both sides of the equation. Write out the binomial twice and multiply	$(\sqrt{x+4})^2 = (2 + \sqrt{x})^2$ $x + 4 = (2 + \sqrt{x})(2 + \sqrt{x})$ $x + 4 = 4 + 2\sqrt{x} + 2\sqrt{x} + (\sqrt{x})^2$ $x + 4 = 4 + 4\sqrt{x} + x$
3: Isolate the second remaining radical	$0 = 4\sqrt{x}$
4: Reduce the coefficients	$0 = \sqrt{x}$
5: Square both sides	$(0)^2 = (\sqrt{x})^2$
6: Solve for the variable	$0 = x$
7: Verify the answer (check)	$\sqrt{x+4} = 2 + \sqrt{x}$ $\sqrt{(0)+4} = 2 + \sqrt{0}$ $\sqrt{4} = 2 + 0$ $2 = 2$
8: Solution set	{0}

Example 9: Solve the Equation $\sqrt{2x+7} = 1 + \sqrt{x+3}$

Steps

1: Isolate a radical (have a radical on each side of the equation)	$\sqrt{2x+7} = 1 + \sqrt{x+3}$	
2: Square both sides of the equation. Write out the binomial twice and multiply	$(\sqrt{2x+7})^2 = (1 + \sqrt{x+3})^2$ $2x + 7 = (1 + \sqrt{x+3})(1 + \sqrt{x+3})$ $2x + 7 = 1 + \sqrt{x+3} + \sqrt{x+3} + (\sqrt{x+3})^2$ $2x + 7 = 1 + 2\sqrt{x+3} + x + 3$	
3: Isolate the second remaining radical	$x + 3 = 2\sqrt{x+3}$	
4: Reduce the coefficients by their GCF	**GCF = 1, therefore cannot reduce**	
5: Square both sides	$(x + 3)^2 = (2\sqrt{x+3})^2$ $x^2 + 6x + 9 = 4(x + 3)$	
6: Solve for the variable	$x^2 + 6x + 9 = 4x + 12$ $x^2 + 2x - 3 = 0$ $(x + 3)(x - 1) = 0$ $x + 3 = 0 \quad x - 1 = 0$ $x = -3 \quad x = 1$	
7: Verify the answer (check)	$\sqrt{2x+7} = 1 + \sqrt{x+3}$ $\sqrt{2(-3)+7} = 1 + \sqrt{-3+3}$ $\sqrt{1} = 1 + \sqrt{0}$ $1 = 1$	$\sqrt{2x+7} = 1 + \sqrt{x+3}$ $\sqrt{2(1)+7} = 1 + \sqrt{1+3}$ $\sqrt{9} = 1 + \sqrt{4}$ $3 = 3$
8: Solution set	{-3, 1}	

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If you wish here is another solving video: Solving double radical equations ex 2