

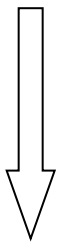
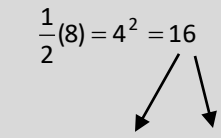
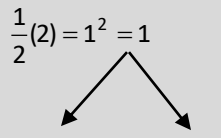
Name:

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Solving a Quadratic Equation by Completing the Square

An equation in which one side is a **perfect square trinomial** can be easily solved by taking the square root of each side.

	<u>Leading Coefficient = 1</u>	<u>Leading Coefficient ≠ 1</u>
1. Isolate the x^2 and x terms ... so, move the constant to the other side of the equal sign.	$x^2 + 8x - 4 = 0$ $x^2 + 8x = 4$	$4x^2 + 8x - 12 = 0$ $4x^2 + 8x = 12$
1a. The leading coefficient must be 1 for completing the square ...	Leading coefficient of x^2 is 1 	Factor out leading coefficient of 4. Be careful!! When we have a coefficient $\neq 1$, add a double parenthesis to side without the variables. Both sides must be multiplied by 4. Also, Factor the 4 out of BOTH terms on the left.
2. Add + _____ to BOTH sides of the equal sign to KEEP THE EQUATION BALANCED . Fill in the + _____ with the # that completes the square (half of the coefficient of the x -term squared).	$x^2 + 8x + \underline{\quad} = 4 + \underline{\quad}$ Half the middle term squared: $\frac{1}{2}(8) = 4^2 = 16$  $x^2 + 8x + \underline{16} = 4 + \underline{16}$	$\underline{4}(x^2 + 2x + \underline{\quad}) = 12 + \underline{(4)(\quad)}$ Half the middle term squared: $\frac{1}{2}(2) = 1^2 = 1$  $\underline{4}(x^2 + 2x + \underline{1}) = 12 + \underline{(4)(1)}$
3. Factor the perfect square trinomial and simplify other side.	$(x + 4)^2 = 20$	$4(x + 1)^2 = 16$ ***Divide BOTH sides by 4 to ISOLATE the radical BEFORE taking the square root. $(x + 1)^2 = 4$
4. Take the square root of each side and Solve for x . Note 1: A SQUARE and a SQUARE ROOT cancel each other out Note 2: Remember to consider both plus and minus results. *** Don't forget that you must ISOLATE the radical before taking the square root of both sides!!	$x + 4 = \pm\sqrt{20}$ $\underline{-4} \quad \underline{-4}$ $x = -4 \pm\sqrt{20}$ Simplify: $\sqrt{20} \implies \sqrt{4}\sqrt{5} \implies \pm 2\sqrt{5}$ $x = -4 + 2\sqrt{5} \quad \quad x = -4 - 2\sqrt{5}$	$x + 1 = \pm\sqrt{4}$ $\underline{-1} \quad \underline{-1}$ $x = -1 \pm\sqrt{4}$ $x = -1 + 2 \quad \quad x = -1 - 2$ $x = 1 \quad \quad x = -3$

Let's Try these on the back:

1. $x^2 + 6x + 1 = 0$

3. $x^2 + 20x + 40 = 0$

5. $-x^2 - 2x + 24 = 0$

2. $x^2 - 4x - 18 = 0$

4. $x^2 - 2x - 1 = 0$

6. $3p^2 - 21 = 6p$