Solving Quadratic Equations
by Completing the Square

I  Move the Constant Term to the RIGHT side of the equation,
Move the \( x^2 \) and \( x \) terms to the LEFT side of the equation.

II  Get a leading coefficient of 1 (i.e. \( 1x^2 + \ldots \)). If necessary, divide both sides of the equation by the coefficient of \( x^2 \).

III  **Complete the Square** by
    Taking \( \frac{1}{2} \) of the coefficient of \( x \),
    Square this result,
    Then add the squared result to Both Sides of the equation.

IV  Factor the Perfect Square Trinomial on the left side of the equation.

V  Use the Square Root Method (take the Square Root of Both SIDES of the equation) to solve the resulting equation.
Solve the following Quadratic Equation by Completing the Square

\[2x^2 + 12x + 4 = 0\]

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\[\frac{2x^2}{2} + \frac{12x}{2} = \frac{-4}{2}\]

\[x^2 + 6x = -2\]

\[\frac{1}{2} \cdot 6 = 3, (3)^2 = 9\]

\[x^2 + 6x + 9 = -2 + 9\]

\[x^2 + 6x + 9 = 7\]

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\[(x + 3)(x + 3) = 7\]

\[(x + 3)^2 = 7\]

\[\sqrt{(x + 3)^2} = \sqrt{7}\]

\[x + 3 = \pm \sqrt{7}\]

\[x = -3 \pm \sqrt{7}\]