objective: To solve completing the square method for quadratic equations

Goal: We are trying to create a perfect square trinomial in order to solve by the square root method.

useful: when quadratics in standard form ($y=ax^2+bx+c$) are not factorable.

* use quadratic formula if fractions appear.

Example of a perfect square trinomial:

$$x^2+8x+16 \rightarrow (x+4)(x+4) \rightarrow \boxed{(x+4)^2}$$

$$\begin{matrix} x & & 4 \\ x & & 4 \end{matrix}$$

Steps:

1.) Divide by leading coefficient, if other than 1.

2.) Remove the constant (number w/o variable) to the other side of the equation. (Leave a space)

3.) Complete the square: Take half of middle coefficient (b), square it, and add to both sides of equation.

4.) Factor the perfect square trinomial $(\quad)^2$

5.) Solve by the square root method and simplify (don't forget to use $\pm$)

Space

1.) $x^2 + 6x \cancel{+3} = 0$

$\cancel{-3} \quad -3$

$x^2 + 6x + \left(\frac{6}{2}\right)^2 = -3 + \left(\frac{6}{2}\right)^2$

$x^2 + 6x + (3)^2 = -3 + 9$

$\sqrt{(x+3)^2} = \sqrt{6}$

$x \cancel{+3} = \pm\sqrt{6}$

$\cancel{-3} \quad -3$

$x = -3 \pm \sqrt{6}$

$\boxed{x = -3 + \sqrt{6}}$ $\boxed{x = -3 - \sqrt{6}}$

side note

$x^2 + 6x + 9$

$x \quad 3$

$x \quad 3$

$(x+3)(x+3)$

$(x+3)^2$

2.) $2x^2 - 12x + 2 = 0$

$\frac{2x^2}{2} - \frac{12x}{2} + \frac{2}{2} = \frac{0}{2}$

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

$-1 \quad -1$

$x^2 - 6x + \left(-\frac{6}{2}\right)^2 = -1 + (-3)^2$

$x^2 - 6x + (-3)^2 = 8$

$(x-3)^2 = 8$