Fill in the blanks to complete the square

1. $x^2 + 24x$ $+144$ $= (x$ $+12$ $)^2$

2. $x^2 - 30x$ $+225$ $= (x$ -15 $)^2$

3. $x^2 + 5x$ $+\frac{25}{4}$ $= (x$ $+\frac{5}{2}$ $)^2$

In general, to complete the square:

$$x^2 + bx + \left(\frac{b}{2}\right)^2 = (x + \frac{b}{2})^2$$

Find the exact solution to each by completing the square

1. $x^2 + 18x - 13 = 0$

2. $3x^2 - 24x + 15 = 0$

3. $2x^2 + 7x - 3 = 0$

1. $x^2 + 18x - 13 = 0$

$x^2 + 18x + 81 = 13 + 81$

$\sqrt{(x+9)^2} = \sqrt{94}$

$x + 9 = \pm\sqrt{94}$

$x = -9 \pm \sqrt{94}$

2. $3x^2 - 24x + 15 = 0$

$\frac{3}{3} \quad \frac{3}{3} \quad \frac{3}{3}$

$x^2 - 8x + 5 = 0$

$-5 \quad -5$

$x^2 - 8x = -5$

$\sqrt{(x-4)^2} = \sqrt{-5+16}$

$x - 4 = \pm\sqrt{11}$

$+4 \quad +4$

$x = 4 \pm \sqrt{11}$

Solve by completing the square

3. $2x^2 + 7x - 3 = 0$

$2x^2 + 7x = 3$

$x^2 + \frac{7}{2}x + \frac{49}{16} = \frac{3}{2} + \frac{49}{16} = \frac{73}{16}$

$\sqrt{(x+\frac{7}{4})^2} = \sqrt{\frac{73}{16}}$

$x + \frac{7}{4} = \pm\frac{\sqrt{73}}{4}$

$x = \frac{-7 \pm \sqrt{73}}{4}$

Solve by completing the square

$3x^2 - 16x + 2 = 0$

* Subtract 2 from both sides $\quad 3x^2 - 16x = -2$
* Divide both sides by 3 $\quad x^2 - \frac{16}{3}x = -\frac{2}{3}$
* find $b/2 \rightarrow -\frac{16}{3} \cdot \frac{1}{2} = -\frac{8}{3}$
* add $(b/2)^2$ to both sides $\quad x^2 - \frac{16}{3}x + \frac{64}{9} = -\frac{2}{3} + \frac{64}{9}$
* write left side as $(x - b/2)^2$ $\quad (x - \frac{8}{3})^2 = \frac{58}{9}$
* SQ ROOT BOTH SIDES $\quad x - \frac{8}{3} = \pm\frac{\sqrt{58}}{3}$
* add 8/3 to both sides $\quad x = \frac{8}{3} \pm \frac{\sqrt{58}}{3} = \frac{8 \pm \sqrt{58}}{3}$

$\frac{3}{3} \cdot -\frac{2}{3} + \frac{64}{9}$

$-\frac{6}{9} + \frac{64}{9}$

$\frac{58}{9}$

Find the coordinates of the vertex of each quadratic.

Vertex Form

$y = (x + 3)^2 - 7$

$(-3, -7)$

Standard Form

$y = x^2 + 6x - 11$

Find LOS: $x = \frac{-6}{2(1)} = -3$

Vertex $(-3, -20)$

$(-3)^2 + 6(-3) - 11$

If you could write Standard Form into Vertex Form you could find the vertex quickly.

Write in Vertex Form: $y = x^2 + 12x - 6$

Add 6 to both sides $y + 6 = x^2 + 12x$

Find $(b/2)^2 = (6)^2 = 36$ and add to both sides $y + 6 + 36 = x^2 + 12x + 36$

Simplify the left side and write the right side as $(x + b/2)^2$ $y + 42 = (x + 6)^2$

Subtract 42 from both sides to get Vertex Form: $y = (x + 6)^2 - 42$

Now you can see the Vertex is (-6, -42)

Completing the Square to write equation in Vertex Form.

$y = x^2 + 6x - 11$