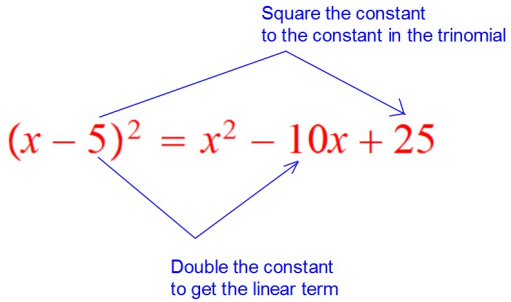


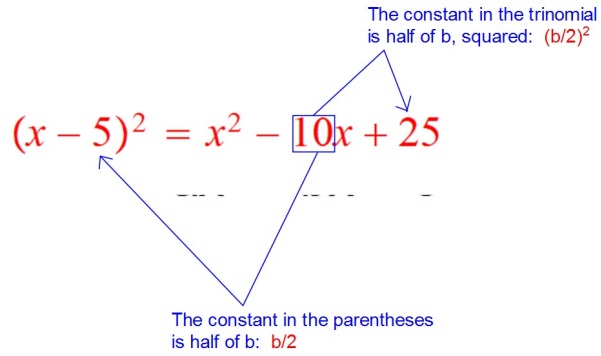

Sec 5-7: Completing the Square

Fill in the blanks.

1. $x^2 + 20x +$ 100 $= (x +$ 10 $)^2$

2. $x^2 - 4x +$ 4 $= (x -$ 2 $)^2$

This is called "completing the square"




In general, to complete the square:

$$x^2 + 16x + 64 = (x + 8)^2$$

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

Complete the square for each.

1. $x^2 - 12x = (x \quad)^2$ → 1. $x^2 - 12x + 36 = (x - 6)^2$

2. $x^2 + 20x = (x \quad)^2$ → 2. $x^2 + 20x + 100 = (x + 10)^2$

3. $x^2 - 2x = (x \quad)^2$ → 3. $x^2 - 2x + 1 = (x - 1)^2$

Solve by completing the square.

$x^2 + 22x = 5$

$x^2 + 22x + 121 = 5 + 121$

$(x + 11)^2 = 126$

$x + 11 = \pm\sqrt{126} = \pm\sqrt{9 \cdot 14}$

$x + 11 = \pm 3\sqrt{14}$

$x = -11 \pm 3\sqrt{14}$

$x^2 - 14x + 11 = 0$

Rewrite into: $ax^2 + bx = c$ Form

$x^2 - 14x = -11$

$x^2 - 14x + 49 = -11 + 49$

$(x - 7)^2 = 38$

$x - 7 = \pm\sqrt{38}$

$x = 7 \pm \sqrt{38}$

Solve $x^2 + 6x - 19 = 0$

$x^2 + 6x = 19$

add $(b/2)^2$ to both sides

$x^2 + 6x + 9 = 19 + 9$

$(x + 3)^2 = 28$

$x + 3 = \pm 2\sqrt{7}$

$x = -3 \pm 2\sqrt{7}$

Solve by completing the square:

$x^2 - 10x + 36 = 0$

$x^2 - 10x + 25 = -36 + 25$

$(x - 5)^2 = -11$

No Real Sol

Why can't you solve this equation by completing the square, the way it's written.

$5x^2 - 8x + 3 = 0$

$\frac{5}{5} \quad \frac{5}{5} \quad \frac{5}{5} \quad \frac{5}{5}$

$x^2 - \frac{8}{5}x + \frac{3}{5} = 0$

$ax^2 + bx + c$

a must be 1

Therefore, you would have to factor out the 5 or, if it's an equation, divide both sides by 5.

Solve by completing the square.

$5x^2 - 8x + 3 = 0$

subtract 3 from both sides: $5x^2 - 8x = -3$

Divide both sides by 5: $x^2 - \frac{8}{5}x = -\frac{3}{5}$

Add $(b/2)^2$ to both sides and simplify: $x^2 - \frac{8}{5}x + \frac{16}{25} = -\frac{3}{5}\cdot\frac{5}{5} + \frac{16}{25}$

$x^2 - \frac{8}{5}x + \frac{16}{25} = \frac{1}{25}$

Rewrite left side as $(\ )^2$: $\left(x - \frac{4}{5}\right)^2 = \frac{1}{25}$

Square root both sides. $\sqrt{\left(x - \frac{4}{5}\right)^2} = \sqrt{\frac{1}{25}}$

$x - \frac{4}{5} = \pm\frac{1}{5}$

Add 4/5 to both sides and simplify: $x = \frac{5}{5}, \frac{3}{5}$