

Les identités remarquables

$$\begin{aligned}(a + b)^2 &= (a + b)(a + b) \\ &= a \times a + a \times b + b \times a + b \times b \\ &= a^2 + 2ab + b^2\end{aligned}$$

Conclusion :

$$(a + b)^2 = a^2 + 2ab + b^2$$

Exemple :

$$\begin{aligned}(x + 2)^2 &= (x)^2 + 2(x)(2) + (2)^2 \\ &= x^2 + 4x + 4\end{aligned}$$

$$\begin{aligned}(2x + 5)^2 &= (2x)^2 + 2(2x)(5) + (5)^2 \\ &= 4x^2 + 20x + 25\end{aligned}$$

$$\begin{aligned}
 (a - b)^2 &= (a - b)(a - b) \\
 &= a \times a - a \times b - b \times a + b \times b \\
 &= a^2 - \underbrace{2ab} + b^2
 \end{aligned}$$

Conclusion :

$$(a - b)^2 = a^2 - 2ab + b^2$$

Examples:

$$\begin{aligned}
 (x - 3)^2 &= (x)^2 - 2(x)(3) + (3)^2 \\
 &= x^2 - 6x + 9
 \end{aligned}$$

$$\begin{aligned}
 (2x - 5)^2 &= (2x)^2 - 2(2x)(5) + (5)^2 \\
 &= 4x^2 - 20x + 25
 \end{aligned}$$

$$(a - b)(a + b) = a \times a + \cancel{a \times b} - \cancel{b \times a} - b \times b \\ = a^2 - b^2$$

Conclusion

$$(a - b)(a + b) = a^2 - b^2$$

Exemples : $(x - 2)(x + 2) = (x)^2 - (2)^2$
 $= x^2 - 4$

$$(2x - 5)(2x + 5) = (2x)^2 - (5)^2 \\ = 4x^2 - 25$$

Résumé

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

$$(a + b)(a - b) = a^2 - b^2$$

Exercice d'application

Développer en utilisant les identités remarquables

$$(\mathbf{5x} + \mathbf{1})^2 = (\quad)^2 + \mathbf{2}(\quad)(\quad) + (\quad)^2$$

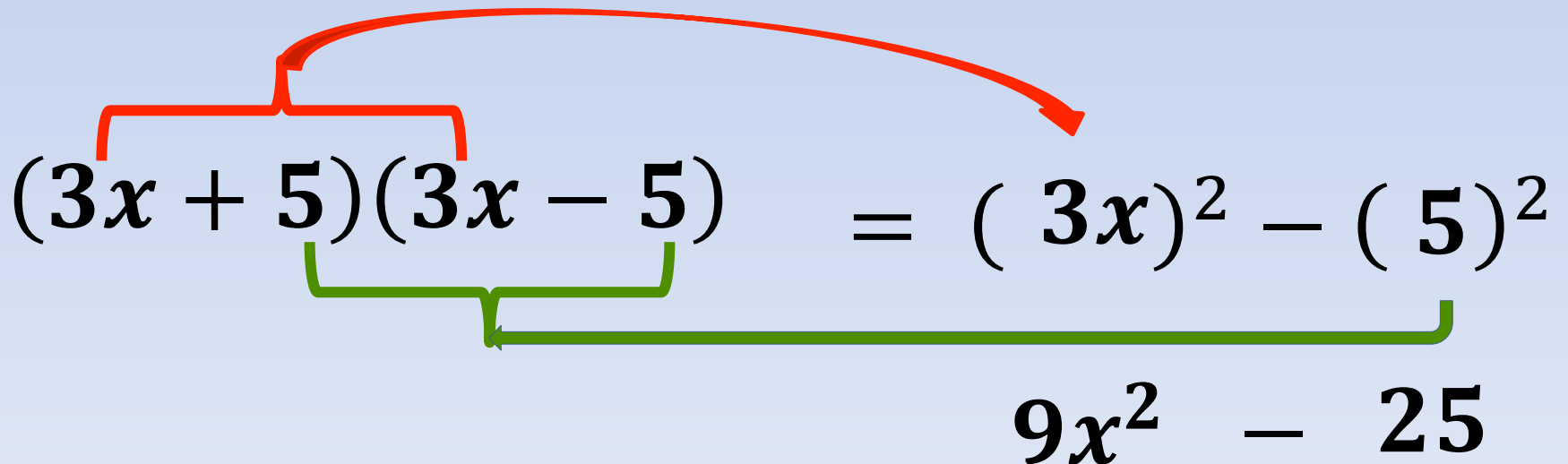
$$(\mathbf{2x} - \mathbf{3})^2 = (\quad)^2 - \mathbf{2}(\quad)(\quad) + (\quad)^2$$

$$(\mathbf{3x} + \mathbf{5})(\mathbf{3x} - \mathbf{5}) = (\quad)^2 - (\quad)^2$$

Corrigé

$$\begin{aligned}(5x + 1)^2 &= (\mathbf{5x})^2 + 2(\mathbf{5x})(\mathbf{1}) + (\mathbf{1})^2 \\ &= \mathbf{25x^2} + \mathbf{10x} + \mathbf{1}\end{aligned}$$

$$\begin{aligned}(2x - 3)^2 &= (\mathbf{2x})^2 - 2(\mathbf{2x})(\mathbf{3}) + (\mathbf{3})^2 \\ &= \mathbf{4x^2} - \mathbf{12x} + \mathbf{9}\end{aligned}$$


$$\begin{aligned}(3x + 5)(3x - 5) &= (\mathbf{3x})^2 - (\mathbf{5})^2 \\ &= \mathbf{9x^2} - \mathbf{25}\end{aligned}$$

Exercices d'applications

Completer

$$(x - \dots)^2 = x^2 - \dots + 25 \quad ; \quad (\dots + 3)^2 = x^2 + \dots + 9$$

$$(3x + \dots)^2 = \dots + 24x + 16 \quad ; \quad (x + \dots)(x - \dots) = x^2 - 36$$

$$(\dots + 7)(2x - \dots) = 4x^2 - 49 \quad ; \quad (5x - \dots)^2 = 25x^2 - \dots + 9$$

Correction

Compléter :

$$(x - \dots 5 \dots)^2 = x^2 - \dots 10x \dots + 25$$

$$(\dots x \dots + 3)^2 = x^2 + \dots 6x \dots + 9$$

$$(3x + \dots 4 \dots)^2 = \dots 9x^2 \dots + 24x + 16$$

$$(x + \dots 6 \dots)(x - \dots 6 \dots) = x^2 - 36$$

$$(\dots 2x \dots + 7)(2x - \dots 7 \dots) = 4x^2 - 49$$

$$(5x - \dots 3 \dots)^2 = 25x^2 - \dots 30x \dots + 9$$