

Séquence 2 Fiche 2 : Identités Remarquables

Il faut connaître les trois **identités remarquables** suivantes :

$$(a + b)^2 = a^2 + 2 \times a \times b + b^2$$

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

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

Dans les deux premières identités, $2ab$ est appelé « le double produit ».

Exemples: Développer et réduire les expressions suivantes :

$$A = (x - 5)(x + 5);$$

$$B = (y - 9)^2;$$

$$C = (6x + 2)^2.$$

$$A = (x - 5)(x + 5) = x^2 - 5^2 = x^2 - 25;$$

$$B = (y - 9)^2 = y^2 - 2 \times 9 \times y + 9^2 = y^2 - 18y + 81;$$

$$C = (6x + 2)^2 = (6x)^2 + 2 \times 6x \times 2 + 2^2 = 36x^2 + 24x + 4$$



INFO

Attention aux parenthèses autour de $6x$!
 $(6x)^2 = 36x^2$.

$$2 \times 6x \times 2 = 2 \times 6 \times x \times 2 \\ = 2 \times 6 \times 2 \times x = 24x.$$

Exercice 1:

Développer les identités remarquables

$$A = (x + 4)^2$$

$$B = (y + 2)(y - 2)$$

$$C = (4t - 3)^2$$

$$D = (x + 5)^2$$

$$E = (y + 3)(y - 3)$$

$$F = (4t - 7)^2$$

$$G = (5x + 2)^2$$

$$H = (4x - 1)^2$$

$$I = (6x + 1)^2$$

$$J = (2y + 3)^2$$

$$K = (5n + 7)(5n - 7)$$

$$L = (3 - 4x)(3 + 4x)$$

$$M = (5 - 6x)^2$$

$$N = (9x + 4)^2$$

$$O = (3n + 8)(3n - 8)$$

$$P = (8x - 3)^2$$

$$Q = (6 + 5x)^2$$

$$R = (4x - 9)^2$$

$$S = (3n - 5)(3n + 5)$$

$$T = (6x - 4)^2$$

$$U = (10 + 2x)^2$$

$$V = (7x - 5)^2$$

$$W = (2n - 9)(2n + 9)$$

$$X = (10x - 3)^2$$

Exercice 2:

Compléter:

$$(x + \dots)^2 = \dots + \dots + 25$$

$$(y - \dots)^2 = \dots - \dots + 1$$

$$(z + \dots)^2 = \dots + 8z + \dots$$

$$(n + \dots)(n - \dots) = \dots - 49$$

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

$$(\dots - 5)^2 = 16x^2 - \dots + \dots$$

Exercice 3:

Développer et réduire chaque expression :

$$A = 15x - (x + 7)^2$$

$$B = (x + 2)(x - 2) + (x + 1)^2$$

$$C = (x + 3)^2 - (x - 2)^2$$

$$D = (x + 8)^2 - (x - 8)^2$$

$$E = (2x - 5)(2x + 5) - (x + 4)^2$$



INFO

Attention au signe moins devant une expression : il faut la développer **entre parenthèses** !

Exercice 4:

Calculer de tête en rédigeant les calculs comme dans l'exemple :

$$49^2 = (50 - 1)^2 = 50^2 - 2 \times 50 \times 1 + 1^2 \\ = 2500 - 100 + 1 = 2401$$

$$21^2 = ?$$

$$19^2 = ?$$

$$19 \times 21 = ?$$

$$201^2 = ?$$

$$199^2 = ?$$

$$199 \times 201 = ?$$

S2 F2 Identités Remarquables CORRECTION

Exercice 1:

Développer les identités remarquables

$$A = (x + 4)^2 = x^2 + 8x + 16$$

$$B = (y + 2)(y - 2) = y^2 - 4$$

$$C = (4t - 3)^2 = 16t^2 - 24t + 9$$

$$D = (x + 5)^2 = x^2 + 10x + 25$$

$$E = (y + 3)(y - 3) = y^2 - 9$$

$$F = (4t - 7)^2 = 16t^2 - 56t + 49$$

$$G = (5x + 2)^2 = 25x^2 + 20x + 4$$

$$H = (4x - 1)^2 = 16x^2 - 8x + 1$$

$$I = (6x + 1)^2 = 36x^2 + 12x + 1$$

$$J = (2y + 3)^2 = 4y^2 + 12y + 9$$

$$K = (5n + 7)(5n - 7) = 25n^2 - 49$$

$$L = (3 - 4x)(3 + 4x) = 9 - 16x^2$$

$$M = (5 - 6x)^2 = 25 - 60x + 36x^2$$

$$N = (9x + 4)^2 = 81x^2 + 72x + 16$$

$$O = (3n + 8)(3n - 8) = 9n^2 - 64$$

$$P = (8x - 3)^2 = 64x^2 - 48x + 9$$

$$Q = (6 + 5x)^2 = 36 + 60x + 25x^2$$

$$R = (4x - 9)^2 = 16x^2 - 72x + 81$$

$$S = (3n - 5)(3n + 5) = 9n^2 - 25$$

$$T = (6x - 4)^2 = 36x^2 - 48x + 16$$

$$U = (10 + 2x)^2 = 100 + 40x + 4x^2$$

$$V = (7x - 5)^2 = 49x^2 - 70x + 25$$

$$W = (2n - 9)(2n + 9) = 4n^2 - 81$$

$$X = (10x - 3)^2 = 100x^2 - 60x + 9$$

Exercice 2:

Compléter:

$$(x + 5)^2 = x^2 + \mathbf{10x} + 25$$

$$(y - 1)^2 = \mathbf{y^2 - 2y} + 1$$

$$(z + 4)^2 = \mathbf{z^2 + 8z + 16}$$

$$(n + 7)(n - 7) = \mathbf{n^2 - 49}$$

$$(3x + 4)^2 = 9x^2 + \mathbf{24x + 16}$$

$$(4x - 5)^2 = 16x^2 - \mathbf{40x + 25}$$

Exercice 3:

Développer et réduire chaque expression :

$$A = 15x - (x + 7)^2 = 15x - (x^2 + 14x + 49) = 15x - x^2 - 14x - 49 = -x^2 + x - 49$$

$$B = (x + 2)(x - 2) + (x + 1)^2 = x^2 - 4 + x^2 + 2x + 1 = 2x^2 + 2x - 3$$

$$C = (x + 3)^2 - (x - 2)^2 = x^2 + 6x + 9 - (x^2 - 4x + 4) = x^2 + 6x + 9 - x^2 + 4x - 4 = 10x + 5$$

$$D = (x + 8)^2 - (x - 8)^2 = x^2 + 16x + 64 - (x^2 - 16x + 64) = x^2 + 16x + 64 - x^2 + 16x - 64 = 32x$$

$$E = (2x - 5)(2x + 5) - (x + 4)^2 = 4x^2 - 25 - (x^2 + 8x + 16) = 4x^2 - 25 - x^2 - 8x - 16 = 3x^2 - 8x - 41$$

Exercice 4:

Calculer de tête en rédigeant les calculs comme dans l'exemple :

$$\begin{aligned} 49^2 &= (50 - 1)^2 = 50^2 - 2 \times 50 \times 1 + 1^2 \\ &= 2\,500 - 100 + 1 = 2\,401 \end{aligned}$$

$$21^2 = (20 + 1)^2 = 400 + 40 + 1 = 441$$

$$19^2 = (20 - 1)^2 = 400 - 40 + 1 = 361$$

$$19 \times 21 = (20 - 1)(20 + 1) = 400 - 1 = 399$$

$$201^2 = (200 + 1)^2 = 40\,000 + 400 + 1 = 40\,401$$

$$199^2 = (200 - 1)^2 = 40\,000 - 400 + 1 = 39\,601$$

$$199 \times 201 = (200 - 1)(200 + 1) = 40\,000 - 1 = 39\,999$$