

DOUBLE DISTRIBUTIVITE – IDENTITES REMARQUABLES

I – Double distributivité

Propriété double distributivité

$$(a + b)(c + d) = ac + ad + bc + bd$$

Démonstration

$$(a + b)(c + d) = (a + b) \times c + (a + b) \times d = ac + ad + bc + bd$$

	c	d
a	ac	ad
b	bc	bd

Exemples

$$(x + 3)(x + 7) = x^2 + 7x + 3x + 21 = x^2 + 10x + 21$$

$$(x + 2)(x + 3) = x^2 + 3x + 2x + 6 = x^2 + 5x + 6$$

$$(x + 5)(x - 4) = x^2 - 4x + 5x - 20 = x^2 + x - 20$$

$$(x - 8)(x + 3) = x^2 + 3x - 8x - 24 = x^2 - 5x - 24$$

$$(x - 4)(x - 6) = x^2 - 6x - 4x + 24 = x^2 - 10x + 24$$

$$(2x + 3)(3x + 7) = 6x^2 + 14x + 9x + 21 = 6x^2 + 23x + 21$$

Exemples complexes

$$(x + 5)(x + 4) + (x + 2)(x + 9) = x^2 + 4x + 5x + 20 + x^2 + 9x + 2x + 18 = 2x^2 + 20x + 38$$

$$(x + 5)(x - 4) + (x - 2)(x - 9) = x^2 - 4x + 5x - 20 + x^2 - 9x - 2x + 18 = 2x^2 - 10x - 2$$

$$(x + 3)(x - 2) + 5(x - 6)(x + 7) = x^2 - 2x + 3x - 6 + 5(x^2 + 7x - 6x - 42) = x^2 + x - 6 + 5x^2 + 35x - 42x - 210 = 6x^2 - 6x - 216$$

$$(x - 2)(x - 3) - (x - 5)(x + 4) = x^2 - 3x - 2x + 6 - (x^2 + 4x - 5x - 20) = x^2 - 3x - 2x + 6 - x^2 - 4x + 5x + 20 = -4x + 26$$

$$(2x + 7)(3x - 4) - 8(x + 2)(x - 5) = 6x^2 - 8x + 21x - 28 - 8(x^2 - 5x + 2x - 10) = 6x^2 - 8x + 21x - 28 - 8x^2 + 40x - 16x + 80 = -2x^2 + 37x + 52$$

II – Identités remarquables

Propriété 1^{ère} identité remarquable

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

Démonstration

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

Exemples

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

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

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

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

$$(3x + 7)^2 = (3x)^2 + 2 \times 3x \times 7 + 7^2 = 9x^2 + 42x + 49$$

⚠ Attention

Dans la réponse, il y a la somme des deux carrés mais il ne faut pas oublier le double

Propriété 2^{ème} identité remarquable

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

Démonstration

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

Exemples

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

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

$$(x - 8)^2 = x^2 - 2 \times x \times 8 + 8^2 = x^2 - 16x + 64$$

$$(5x - 4)^2 = (5x)^2 - 2 \times 5x \times 4 + 4^2 = 25x^2 - 40x + 16$$

	a	b
a	a ²	ab
b	ab	b ²

Propriété 3^{ème} identité remarquable

♥ $(a + b)(a - b) = a^2 - b^2$

Démonstration

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

Exemples

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

♥ $(a + b)(a - b) = a^2 - b^2$

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

$$(5x + 4)(5x - 4) = (5x)^2 - 4^2 = 25x^2 - 16$$

$$(t - 7)(t + 7) = t^2 - 7^2 = t^2 - 49$$