



## Thème N° 16 : CALCUL LITTÉRAL (2) FACTORISATION (2) - Identités remarquables (2)

### ACTIVITE 1 : Factoriser en utilisant les identités remarquables.

1.  
 $4x^2 = (2x)^2$  ;  $9x^2 = (3x)^2$  ;  $16x^2 = (4x)^2$  ;  $25x^2 = (5x)^2$   
 $36x^2 = (6x)^2$  ;  $49x^2 = (7x)^2$  ;  $64x^2 = (8x)^2$  ;  $81x^2 = (9x)^2$   
 $121x^2 = (11x)^2$  ;  $144x^2 = (12x)^2$  ;  $169x^2 = (13x)^2$   
 $24x = 2 \times 4x \times 3$  ;  $30x = 2 \times 3x \times 5$  ;  $160x = 2 \times 8x \times 10$

2.

	De la forme:			Valeur de $a$ et $b$
	$a^2 + 2ab + b^2$ ?	$a^2 - 2ab + b^2$ ?	$a^2 - b^2$ ?	
$4x^2 + 4x + 1$	$a^2 + 2ab + b^2$			$a = 2x$ et $b = 1$
$16x^2 - 25$	$a^2 - b^2$			$a = 4x$ et $b = 5$
$9x^2 - 6x + 1$	$a^2 - 2ab + b^2$			$a = 3x$ et $b = 1$
$64x^2 - 169$	$a^2 - b^2$			$a = 8x$ et $b = 13$
$36x^2 - 84x + 49$	$a^2 - 2ab + b^2$			$a = 6x$ et $b = 7$
$25x^2 + 30x + 9$	$a^2 + 2ab + b^2$			$a = 5x$ et $b = 3$

3. D'après le tableau de la question 2. et en te servant de la question 1. Factorise les expressions suivantes:

$4x^2 + 20x + 25 = (2x + 5)^2$  ;  $x^2 - 20x + 100 = (x - 10)^2$  ;  $x^2 + 14x + 49 = (x + 7)^2$

$x^2 - 16 = (x + 4)(x - 4)$  ;  $9x^2 - 12x + 4 = (3x - 2)^2$  ;  $x^2 - 49 = (x + 7)(x - 7)$

### Exercice n°1 :

$A = 4x^2 + 4x + 1 = (2x)^2 + 2 \times 2x \times 1 + 1^2 = (2x + 1)^2$  ;  $B = 16x^2 - 25 = (4x)^2 - 5^2 = (4x - 5)(4x + 5)$

$C = 9x^2 - 6x + 1 = (3x)^2 - 2 \times 3x \times 1 + 1^2 = (3x - 1)^2$  ;  $D = 64x^2 - 169 = (8x)^2 - 13^2 = (8x - 13)(8x + 13)$

$E = 36x^2 - 84x + 49 = (6x)^2 - 2 \times 6x \times 7 + 7^2 = (6x - 7)^2$  ;  $F = (11x)^2 - 3^2 = (11x - 3)(11x + 3)$

$G = 64x^2 + 80x + 25 = (8x)^2 + 2 \times 8x \times 5 + 5^2 = (8x + 5)^2$  ;  $H = 4x^2 - 36x + 81 = (2x)^2 - 2 \times 2x \times 9 + 9^2 = (2x - 9)^2$

$I = 9x^2 + 12x + 4 = (3x)^2 + 2 \times 3x \times 2 + 2^2 = (3x + 2)^2$  ;  $J = 9 - 16x^2 = 3^2 - (4x)^2 = (3 - 4x)(3 + 4x)$

$K = 25x^2 - 30x + 9 = (5x)^2 - 2 \times 5x \times 3 + 3^2 = (5x - 3)^2$  ;  $L = 25x^2 + 30x + 9 = (5x)^2 + 2 \times 5x \times 3 + 3^2 = (5x + 3)^2$

## **ACTIVITE 2 : Reconnaître une factorisation de deux carrés $a^2 - b^2$**

$$A = 36 - (x + 5)^2$$

$$A = 6^2 - (x + 5)^2$$

$$A = [6 - (x + 5)][6 + (x + 5)]$$

$$A = [6 - x - 5][6 + x + 5]$$

$$A = (-x + 1)(x + 11)$$

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

$$B = [(2x - 1) - (x + 2)][(2x - 1) + (x + 2)]$$

$$B = [2x - 1 - x - 2][2x - 1 + x + 2]$$

$$B = (x - 3)(3x + 1)$$

$$C = 9(x + 7)^2 - (4x - 3)^2$$

$$C = [3(x + 7)]^2 - (4x - 3)^2$$

$$C = (3x + 21)^2 - (4x - 3)^2$$

$$C = [(3x + 21) - (4x - 3)][(3x + 21) + (4x - 3)]$$

$$C = [3x + 21 - 4x + 3][3x + 4x + 21 - 3]$$

$$C = (-x + 24)(7x + 18)$$

### **Exercice n°2 :**

$$A = (x + 3)^2 - 25$$

$$A = (x + 3)^2 - 5^2$$

$$A = [(x + 3) - 5][(x + 3) + 5]$$

$$A = [x + 3 - 5][x + 3 + 5]$$

$$A = (x - 2)(x + 8)$$

$$B = (x + 8)^2 - (3x - 1)^2$$

$$B = [(x + 8) - (3x - 1)][(x + 8) + (3x - 1)]$$

$$B = [x + 8 - 3x + 1][x + 8 + 3x - 1]$$

$$B = (-2x + 9)(4x + 7)$$

$$C = 49 - 25(x - 6)^2$$

$$C = 7^2 - [5(x - 6)]^2$$

$$C = 7^2 - (5x - 30)^2$$

$$C = [7 - (5x - 30)][7 + (5x - 30)]$$

$$C = [7 - 5x + 30][7 + 5x - 30]$$

$$C = (-5x + 37)(5x - 23)$$

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

$$D = [(3 - 4x) - (x + 1)][(3 - 4x) + (x + 1)]$$

$$D = [3 - 4x - x - 1][3 - 4x + x + 1]$$

$$D = (-5x + 2)(-3x + 4)$$

## **ACTIVITE 3 : Factorisations utilisant mise en facteur commun et identités remarquables successivement**

$$A = (x^2 + 2x + 1) - (5x + 3)^2$$

$$A = (x + 1)^2 - (5x + 3)^2$$

$$A = [(x + 1) - (5x + 3)][(x + 1) + (5x + 3)]$$

$$A = [x + 1 - 5x - 3][x + 1 + 5x + 3]$$

$$A = (-4x - 2)(6x + 4)$$

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

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

$$B = (x + 2)(x + 2) - (x + 2)(2x + 5)$$

$$B = (x + 2)[(x + 2) - (2x + 5)]$$

$$B = (x + 2)[x + 2 - 2x - 5]$$

$$B = (x + 2)(-x - 3)$$

### Exercice n°3 :

$$A = (x+1)(x+2) - 5(x^2 + 4x + 4)$$

$$A = (x+1)(x+2) - 5(x+2)^2$$

$$A = (x+1)(x+2) - 5(x+2)(x+2)$$

$$A = (x+2)[(x+1) - 5(x+2)]$$

$$A = (x+2)[x+1-5x-10]$$

$$A = (x+2)(-4x-9)$$

$$D = 9x^2 - 4 - (3x-2)(9x-4)$$

$$D = (3x-2)(3x+2) - (3x-2)(9x-4)$$

$$D = (3x-2)[(3x+2) - (9x-4)]$$

$$D = (3x-2)[3x+2-9x+4]$$

$$D = (3x-2)(-6x+6)$$

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

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

$$B = (2x+1)[3(2x+1) + (2x-1)]$$

$$B = (2x+1)[6x+3+2x+1]$$

$$B = (2x+1)(8x+4)$$

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

$$E = (x-1)^2 - (x-2)^2$$

$$E = [(x-1) - (x-2)][(x-1) + (x-2)]$$

$$E = [x-1-x+2][x-1+x-2]$$

$$E = 1 \times (2x-3)$$

$$C = x^2 - 9 + (x+3)(x-9)$$

$$C = (x-3)(x+3) + (x+3)(x-9)$$

$$C = (x+3)[(x-3) + (x-9)]$$

$$C = (x+3)(x-3+x-9)$$

$$C = (x+3)(2x-12)$$

$$F = (2x+1)^3 - 9(2x+1)$$

$$F = (2x+1)(2x+1)^2 - 9(2x+1)$$

$$F = (2x+1)[(2x+1)^2 - 9]$$

$$F = (2x+1)[(2x+1)-3][(2x+1)+3]$$

$$F = (2x+1)(2x+1-3)(2x+1+3)$$

$$F = (2x+1)(2x-2)(2x+3)$$

### Exercice n°4 :

1.  $4x^2 - 9 = (2x-3)(2x+3)$ .

$$E = 4x^2 - 9 + (2x+3)(x-1) = (2x-3)(2x+3) + (2x+3)(x-1) = (2x+3)(2x-3+x-1) = (2x+3)(3x-4)$$

1.  $E = 4x^2 - 9 + (2x+3)(x-1) = 4x^2 - 9 + 2x^2 - 2x + 3x - 3 = 6x^2 + x - 12$

2. Si  $(2x+3)(3x-4) = 0$ , alors  $2x+3 = 0$  ou  $3x-4 = 0$

$$2x = -3 \quad \text{ou} \quad 3x = 4$$

$$x = -3/2 \quad \text{ou} \quad x = 4/3$$

Conclusion : l'équation  $(2x+3)(3x-4) = 0$  admet deux solutions :  $-3/2$  et  $4/3$

### Exercice n°5 :

1.  $A = (7x-3)^2 - 9 = 49x^2 - 42x + 9 - 9 = 49x^2 - 42x$

1.  $A = (7x-3)^2 - 9 = (7x-3+3)(7x-3-3) = 7x(7x-6)$

2. Si  $7x(7x-6) = 0$ , alors  $7x = 0$  ou  $7x-6 = 0$

$$x = 0 \quad \text{ou} \quad 7x = 6$$

$$x = 6/7$$

Conclusion : L'équation  $7x(7x-6) = 0$  admet deux solutions :  $0$  et  $6/7$