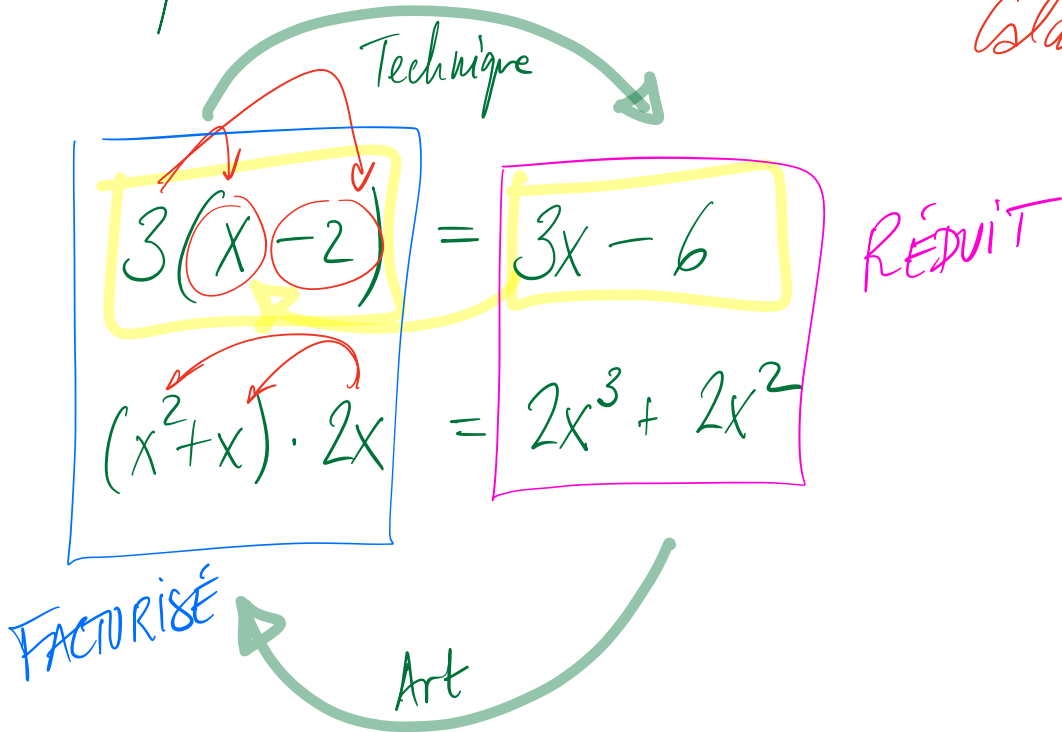


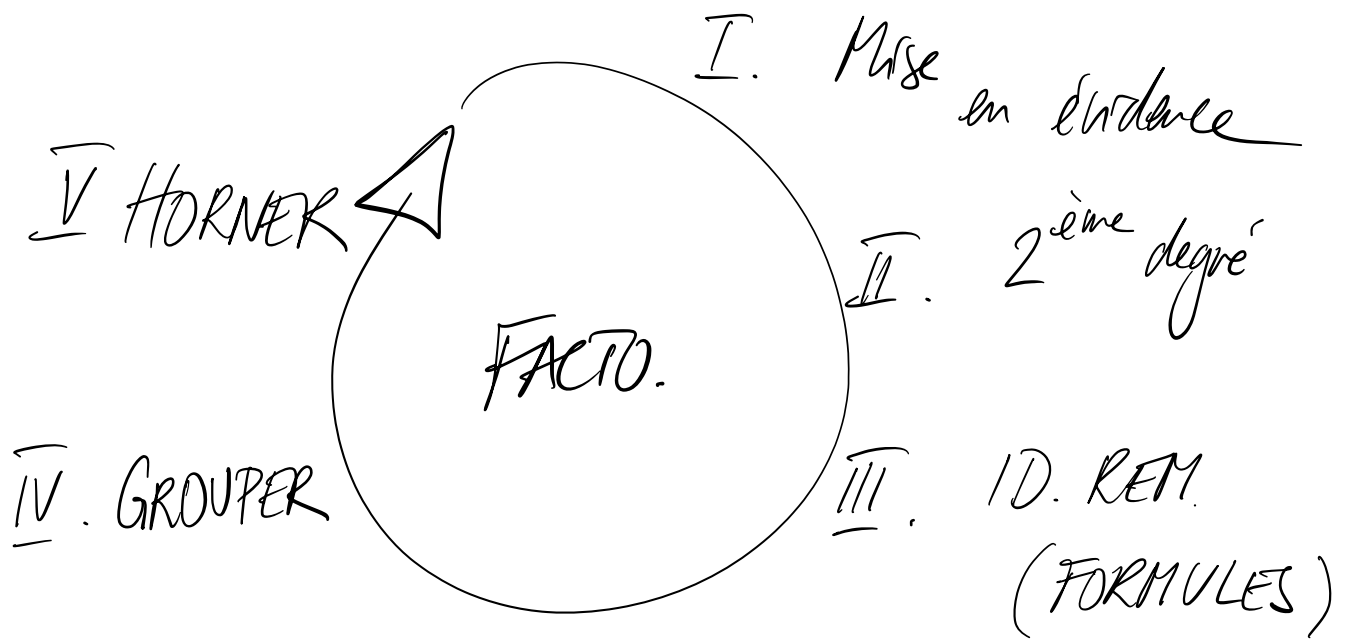
# FACTORISATION

Exemple: EFFECTUER ET RÉDUIRE

*Calcul littéral*



$$(x+3)(2x-5) = 2x^2 - 5x + 6x - 15$$
$$= 2x^2 + x - 15$$



## I. MISE EN ÉVIDENCE

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

$$3x + 3 \cdot 1 = 3(x+1)$$

FACTORISER COMPLÈTEMENT

$$15x^2 + 25x^3 = 5 \cdot 3 \cdot x \cdot x + 5 \cdot 5 \cdot x \cdot x \cdot x$$

$$= 5 \cdot x \cdot x (3 + 5x)$$

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

$$4x^2 - 2x - 8x^3 = 2 \cdot \cancel{2} \cdot x \cdot \cancel{x} - \boxed{2 \cdot x} - \cancel{2} \cdot 2 \cdot 2 \cdot x \cdot x \cdot \cancel{x}$$

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

Exercice: Factoriser complètement.

a)  $5 - 25x + 125x^2 = 5(1 - 5x + 25x^2)$

b)  $x^3 - x^2 + x = x(x^2 - x + 1)$

c)  $20x^3 - 14x^2 + 32x^4 = 2x^2(10x - 7 + 16x^2)$

d)  $10x^3 - 5x^2 = 5x^2(2x - 1)$

II. 2<sup>ème</sup> degré

a)  $2x^2 - 4x + 1 = 2(x - x_1)(x - x_2) = 2 \cdot (x - 1,7)(x - 0,3)$

$a=2$     $b=-4$     $c=1$

$2x^2 + bx + c$

$\Delta = (-4)^2 - 4 \cdot 2 \cdot 1$   
 $= 16 - 8 = 8$

$x_1 = \frac{-b + \sqrt{\Delta}}{2a}$

$x_2 = \frac{-b - \sqrt{\Delta}}{2a}$

$x_1 = \frac{4 + \sqrt{8}}{2 \cdot 2} = \frac{4 + \sqrt{8}}{4} = 1,7$

$x_2 = \frac{4 - \sqrt{8}}{4} = 0,3$

6)

$$1 \cdot x^2 + 7x + 12 = a(x-x_1)(x-x_2) = 1 \cdot (x - (-3)) \cdot (x - (-4))$$

$$a=1 \quad b=7 \quad c=12$$

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

$$\Delta = 49 - 4 \cdot 12 = 49 - 48 = 1$$

$$x_1 = \frac{-7 + \sqrt{1}}{2} = -3$$

$$x_2 = \frac{-7 - \sqrt{1}}{2} = -4$$

### III ID. REM. (FORMULES)

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

$$A^2 - B^2 = (A+B)(A-B)$$

$$27 = 3 \cdot 3 \cdot 3$$

$$A^3 + B^3 = (A+B)(A^2 - AB + B^2)$$

$$27 + x^3$$

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

FORMULE

$$= (3+x)(x^2 - 3x + 9) \quad \checkmark$$

2<sup>ème</sup> deg.

$$\Delta = (-3)^2 - 4 \cdot 1 \cdot 9 = 9 - 36 = -27$$

$\Rightarrow x^2 - 3x + 9$  IRREDUCTIBLE

**EXERCICE** Factoriser complètement

a)  $16 - x^2 = (4+x)(4-x)$  en utilisant une FORMULE

b)  $x^4 - 16 = (x^2 - 4)(x^2 + 4) = (x-2)(x+2)(x^2 + 4)$   
(et aussi les autres techniques)

c)  $16 + 2x^3 = 2(8 + x^3) = 2(2+x)(4 - 2x + x^2)$

d)  $3x^2 + 6x + 3 = 3(x^2 + 2x + 1) = 3(x+1)^2$

a)  $-(x+4)(x-4) = -(x^2 - 4x + 4x - 16)$

$= -(x^2 - 16) = -x^2 + 16 = 16 - x^2$

3.4 1<sup>ère</sup> ligne / 3.5 / 3.6 fj / 3.7 af / 3.8 aejlq

$$9x^2 + 6x + 1 = (3x)^2 + 2 \cdot 3x \cdot 1 + 1^2 = (3x+1)^2$$

$$A^2 + 2AB + B^2 = (A+B)^2$$

$$\Delta = 36 - 4 \cdot 9 = 0$$

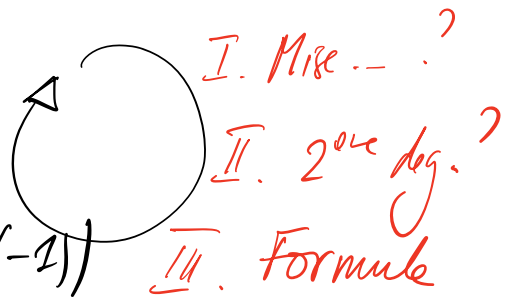
$$x_1 = x_2 = \frac{-6}{18} = -\frac{1}{3}$$

$$2(x - x_1)(x - x_2)$$

$$9x^2 + 6x + 1 = \overset{3 \cdot 3}{9} (x + 0, \bar{3}) (x + 0, \bar{3})$$

$$= (3x+1)(3x+1) = 3(x + 0, \bar{3}) \cdot 3 \cdot (x + 0, \bar{3})$$

# IV GROUPEUR



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

$$x = \frac{-2 \pm \sqrt{4-4}}{2} = \frac{-2}{2} = -1$$

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

$$x^2 + 2 \cdot x \cdot 1 + 1^2 \\ \uparrow \\ A^2 + 2 \cdot A \cdot B + B^2$$

$$A^2 + 2AB + B^2 = (A+B)^2$$

Groupeur

$$x^2 + x + x + 1 = x^2 + 2x + 1$$

$$x(x+1) + (x+1) =$$

$$x(x+1) + 1(x+1) = (x+1) \cdot (x+1)$$

$$x^3 - x^2 + 4x - 4 =$$

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

$$(x^2 + 4)(x-1)$$

PAS FACTORISABLE