| **FACTORISATIONS PAR UNE EXPRESSION** | **Ex 1** |

CORRIGE – NOTRE DAME DE LA MERCI – MONTPELLIER

EXERCICE 1   Factoriser :

$A = 3x + 6 = 3 \times x + 3 \times 2 = 3(x+2)$ $B = 3x^2 + x = x \times 3x + x \times 1 = x(3x+1)$

$C = x^5 + x^4 = x^4 \times x + x^4 \times 1 = x^4(x+1)$ $D = 3xy - x^2 = x \times 3y - x \times x = x(3y-x)$

$E = 3a + 3b = 3(a+b)$ $F = 2 \times a - 2 \times 2b = 2(a-2b)$

$G = a(a+b) - a = a \times (a+b) - a \times 1 = a\left[(a+b) - 1\right] = a(a+b-1)$ $H = 5a^2 - 5b^2 = 5\left(a^2 - b^2\right)$

$I = ab^3 - a^5b^4 = ab^3 \times 1 - a \times a^4 \times b^3 \times b = ab^3 \times 1 - ab^3 \times a^4 b = ab^3\left(1 - a^4 b\right)$

$J = ab^7 - a^3b^2 = a \times b^2 \times b^5 - a \times a^2 \times b^2 = ab^2 \times b^5 - ab^2 \times a^2 = ab^2\left(b^5 - a^2\right)$

$K = a^3b - ab^3 = a \times a^2 \times b - a \times b \times b^2 = ab \times a^2 - ab \times b^2 = ab\left(a^2 - b^2\right)$

$L = 4a^2 - 9b^2 = (2a)^2 - (3b)^2 = (2a + 3b)(2a - 3b)$ → vous aurez reconnu une Identité remarquable

EXERCICE 2   Factoriser :

$A = 15x^2 - 25x^4 = 5 \times 3 \times x^2 - 5 \times 5 \times x^2 \times x^2 = 5x^2 \times 3 - 5x^2 \times 5x^2 = 5x^2\left(3 - 5x^2\right)$

$B = 42y^5 - 49y^2 = 7 \times 6 \times y^2 \times y^3 - 7 \times 7 \times y^2 = 7y^2 \times 6y^3 - 7y^2 \times 7 = 7y^2\left(6y^3 - 7\right)$

$C = 12x^4y^2 - 18x^3y^5 = 6 \times 2 \times x^3 \times x \times y^2 - 6 \times 3 \times x^3 \times y^2 \times y^3 = 6x^3y^2 \times 2x - 6x^3y^2 \times 3y^3 = 6x^3y^2\left(2x - 3y^3\right)$

$D = 22x^9y^4 + 18x^4y^6 = 2 \times 11 \times x^4 \times x^5 \times y^4 + 2 \times 9 \times x^4 \times y^4 \times y^2 = 2x^4y^4 \times 11x^5 + 2x^4y^4 \times 9y^2$
$\quad = 2x^4y^4 \times \left(11x^5 + 9y^2\right)$

$E = 24a^5b^2 - 32a^4b^8 + 36a^3b^5 = 4 \times 6 \times a^3 \times a^2 \times b^2 - 4 \times 8 \times a^3 \times a \times b^2 \times b^6 + 4 \times 9 \times a^3 \times b^2 \times b^3$
$\quad = 4a^3b^2 \times 6a^2 - 4a^3b^2 \times 8ab^6 + 4a^3b^2 \times 9b^3 = 4a^3b^2\left(6a^2 - 8ab^6 + 9b^3\right)$

$F = 36x^7y^4 - 45x^{11}y^7 + 63x^9y^3 = 9 \times 4 \times x^7 \times y^3 \times y - 9 \times 5 \times x^7 \times x^4 \times y^3 \times y^4 + 9 \times 7 \times x^7 \times x^2 \times y^3$
$\quad = 9x^7y^3 \times 4y - 9x^7y^3 \times 5x^4y^4 + 9x^7y^3 \times 7x^2 = 9x^7y^3\left(4y - 5x^4y^4 + 7x^2\right)$

EXERCICE 3

$\left(b^2 - 8b + 3\right) - \left(a^2 - 8a + 3\right) = b^2 - 8b + 3 - a^2 + 8a - 3 = b^2 - a^2 - 8b + 8a = (b+a)(b-a) - 8(b-a)$
$\quad = (b-a)\left[(b+a) - 8\right] = (b-a)(b+a-8)$

$\left(b^3 - 3b\right) - \left(a^3 - 3a\right) = b^3 - 3b - a^3 + 3a$

$(b-a)\left(a^2 + ab + b^2 - 3\right) = ba^2 + ab^2 + b^3 - 3b - a^3 - a^2b - ab^2 + 3a = b^3 - a^3 - 3b + 3a$

AINSI : $\left(b^3 - 3b\right) - \left(a^3 - 3a\right) = (b-a)\left(a^2 + ab + b^2 - 3\right)$

$\left(-2b^2 + 4b + 1\right) - \left(-2a^2 + 4a + 1\right) = -2b^2 + 4b + 1 + 2a^2 - 4a - 1 = 2a^2 - 2b^2 + 4b - 4a$

$2(a-b)(a+b-2) = 2\left(a^2 + ab - 2a - ab - b^2 + 2b\right) = 2a^2 - 2b^2 + 4b - 4a$

AINSI : $\left(-2b^2 + 4b + 1\right) - \left(-2a^2 + 4a + 1\right) = 2(a-b)(a+b-2)$