Exercices 196 à 200 : factoriser

S o l u t i o n s

Emploi des identités : $a^2 - b^2$ - décomposer en facteurs

196 2) $a^4 - 1 = (a^2 + 1)(a^2 - 1) = (a^2 + 1)(a + 1)(a - 1)$

4) $a^4 - \frac{1}{16} = \left(a^2 + \frac{1}{4}\right)\left(a^2 - \frac{1}{4}\right) = \left(a^2 + \frac{1}{4}\right)\left(a + \frac{1}{2}\right)\left(a - \frac{1}{2}\right)$

6) $25a^2 - (2a + 3b)^2 = (5a + 2a + 3b)(5a - 2a - 3b) = 3(7a + 3b)(a - b)$

8) $(3x^2 - 3x - 1)^2 - (x^2 - 3x + 1)^2 =$
$[(3x^2 - 3x - 1) + (x^2 - 3x + 1)][(3x^2 - 3x - 1) - (x^2 - 3x + 1)] =$
$(4x^2 - 6x)(2x^2 - 2) = 2x(2x - 3)2(x^2 - 1) = 4x(2x - 3)(x + 1)(x - 1)$

10) $1 - (2a - 1)^2 = [1 + (2a - 1)][1 - (2a - 1)] = 2a(2 - 2a) = 4a(1 - a)$

12) $(a + 2b)^2 - a^2 = [(a + 2b) + a][(a + 2b) - a] = (2a + 2b)2b = 4b(a + b)$

197 2) $a^2 - b^2 + ac + bc = (a + b)(a - b) + c(a + b) = (a + b)(a - b + c)$

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

6) $a^3 + 3a^2 - a - 3 = a^2(a + 3) - (a + 3) = (a + 3)(a^2 - 1) = (a + 3)(a + 1)(a - 1)$

8) $6x^3 + x^2 - 24x - 4 = x^2(6x + 1) - 4(6x + 1) = (6x + 1)(x^2 - 4) = (6x + 1)(x + 2)(x - 2)$

9) $a^2b - 2ab - b^3 + 2b^2 = b(a^2 - b^2) - 2b(a - b) = b(a + b)(a - b) - 2b(a - b) =$
$b(a - b)(a + b - 2)$

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

198 2) $9(x - y)^2 - 4y^2 = [(3x - 3y) + 2y][(3x - 3y) - 2y] = (3x - y)(3x - 5y)$

4) $12(a - b)^2 - 3(2a + b)^2 = 3[(2a - 2b) + (2a + b)][(2a - 2b) - (2a + b)]$
$= 3(4a - b)(-3b) = -9b(4a - b) = 9b(b - 4a)$

6) $9(b + x)^2 - (3a - 3x)^2 = [3(b + x) + 3(a - x)][3(b + x) - 3(a - x)] = 9(a + b)(b - a + 2x)$

8) $4(a - b)(x - 1)^2 + x^2(b - a) = 4(a - b)(x - 1)^2 - x^2(a - b) =$
$(a - b)[4(x - 1)^2 - x^2] = (a - b)[(2x - 2) + x][(2x - 2) - x] = (a - b)(3x - 2)(x - 2)$

199 1) $(a+b)^2+a(a+b)+(a^2-b^2)=(a+b)^2+a(a+b)+(a+b)(a-b)=$
$(a+b)(a+b+a+a-b)=3a(a+b)$

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

3) $(2x+1)^2-3(1+2x)+2-8x^2=(1+2x)^2-3(1+2x)+2(1+2x)(1-2x)=$
$(1+2x)(1+2x-3+2-4x)=-2x(2x+1)$

Emploi des identités : $a^2 \pm 2ab + b^2$- décomposer en facteurs

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

4) $a^2+4ab+4b^2=(a+2b)^2$

6) $1+2x^2+x^4=(1+x^2)^2$

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

10) $9x^4+16y^2+24x^2y=(3x^2+4y)^2$

12) $4x^2y^2-20xy+25=(2xy-5)^2$

14) $4x^2+\frac{1}{4}+2x=\left(2x+\frac{1}{2}\right)^2$

15) $\frac{xy}{3}+\frac{y^2}{9}+\frac{x^2}{4}=\left(\frac{x}{2}+\frac{y}{3}\right)^2$