Pour factoriser, on utilise les formules suivantes.

$$a \times c + a \times d = a \times (c + d) \qquad \text{(facteur commun)}$$

$$a \times c - a \times d = a \times (c - d) \qquad \text{(facteur commun)}$$

$$a^2 - b^2 = (a - b)(a + b) \qquad \text{(identité remarquable)}$$

1. Factoriser.

a)

$$\begin{aligned} x^2 + 3x &= x \times x + 3 \times x \\ &= (x + 3) \times x \end{aligned}$$

b)

$$\begin{aligned} -7x^2 + 8x &= -7x \times x + 8 \times x \\ &= (-7x + 8) \times x \end{aligned}$$

c)

$$\begin{aligned} x^2 - x &= x \times x - 1 \times x \\ &= (x - 1) \times x \end{aligned}$$

d)

$$\begin{aligned} (2x + 1)(x - 7) + (2x + 1)(7x + 2) &= (2x + 1) \times [(x - 7) + (7x + 2)] \\ &= (2x + 1) \times (8x - 5) \end{aligned}$$

e)

$$\begin{aligned}(-5x+2)(3x+4)-(3x+4)(6x+6) &= (3x+4)(-5x+2)-(3x+4)(6x+6)\\ &= (3x+4)\times[(-5x+2)-(6x+6)]\\ &= (3x+4)\times(-5x+2-6x-6)\\ &= (3x+4)\times(-11x-4)\end{aligned}$$

f)

$$\begin{aligned}3(5x+9)(-5x+7)-6(5x+9)(-x-1) &= (5x+9)\times[3(-5x+7)-6(-x-1)]\\ &= (5x+9)\times(-15x+21+6x+6)\\ &= (5x+9)\times(-9x+27)\end{aligned}$$

g)

$$\begin{aligned}x(4x-1)-x^2(3x+2) &= x\times(4x-1)-x\times x(3x+2)\\ &= x\times[(4x-1)-x(3x+2)]\\ &= x\times\left(4x-1-3x^2-2x\right)\\ &= x\times\left(-3x^2+2x-1\right)\end{aligned}$$

h)

$$\begin{aligned}2x\left(x^2+1\right)-(5x-5)\left(x^2+1\right) &= [2x-(5x-5)]\times\left(x^2+1\right)\\ &= (2x-5x+5))\times\left(x^2+1\right)\\ &= (-3x+5))\times\left(x^2+1\right)\end{aligned}$$

2. Factoriser.

a)

$$\begin{aligned} x^2 - 4 &= x^2 - 2^2 \\ &= (x-2) \times (x+2) \end{aligned}$$

b)

$$\begin{aligned} -x^2 + 9 &= 9 - x^2 \\ &= 3^2 - x^2 \\ &= (3-x) \times (3+x) \end{aligned}$$

c)

$$\begin{aligned} 16x^2 - 1 &= 4^2 x^2 - 1^1 \\ &= (4x)^2 - 1^2 \\ &= (4x-1) \times (4x+1) \end{aligned}$$

d)

$$\begin{aligned} 36 - (x+1)^2 &= 6^2 - (x+1)^2 \\ &= [6-(x+1)] \times [6+(x+1)] \\ &= (6-x-1) \times (6+x+1) \\ &= (-x+5) \times (x+7) \end{aligned}$$

e)

$$\begin{aligned} (x-1)^2 - (x+1)^2 &= [(x-1)-(x+1)] \times [(x-1)+(x+1)] \\ &= (x-1-x-1) \times (x-1+x+1) \\ &= -2 \times 2x \end{aligned}$$

$$= -4x$$

f)

$$\begin{aligned}(5x+4)^2-(-7x+2)^2 &= [(5x+4)-(-7x+2)]\times[(5x+4)+(-7x+2)]\\ &= (5x+4+7x-2)\times(5x+4-7x+2)\\ &= (12x+2)\times(-2x+6)\end{aligned}$$

g)

$$\begin{aligned}(-2x+7)^2-(6-8x)^2 &= [(-2x+7)-(6-8x)]\times[(-2x+7)+(6-8x)]\\ &= (-2x+7-6+8x)\times(-2x+7+6-8x)\\ &= (6x+1)\times(-10x+13)\end{aligned}$$

h)

$$\begin{aligned}(-2x-4)^2-(8x+9)^2 &= [(-2x-4)-(8x+9)]\times[(-2x-4)+(8x+9)]\\ &= (-2x-4-8x-9)\times(-2x-4+8x+9)\\ &= (-10x-13)\times(6x+5)\end{aligned}$$

i)

$$\begin{aligned}(8x+2)^2-(7+8x)^2 &= [(8x+2)-(7+8x)]\times[(8x+2)+(7+8x)]\\ &= (8x+2-7-8x)\times(8x+2+7+8x)\\ &= -5\times(16x+9)\end{aligned}$$

j)

$$\begin{aligned}4(-3x+6)^2-9(-4x+1)^2 &= 2^2(-3x+6)^2-3^2(-4x+1)^2\\ &= [2(-3x+6)]^2-[3(-4x+1)]^2\end{aligned}$$

$$= (-6x+12)^2 - (-12x+3)^2$$

$$= [(-6x+12) - (-12x+3)] \times [(-6x+12) + (-12x+3)]$$

$$= (-6x+12+12x-3) \times (-6x+12-12x+3)$$

$$= (6x+9) \times (-18x+15)$$

k)

$$16(1-2x)^2 - 25(3+9x)^2 = 4^2(1-2x)^2 - 5^2(3+9x)^2$$

$$= [4(1-2x)]^2 - [5(3+9x)]^2$$

$$= (4-8x)^2 - (15+45x)^2$$

$$= [(4-8x) - (15+45x)] \times [(4-8x) + (15+45x)]$$

$$= (4-8x-15-45x) \times (4-8x+15+45x)$$

$$= (-53x-11) \times (37x+19)$$