

Factorisation

Factorise aussi complètement que possible les expressions suivantes :

▽▽▽ EXERCICE 1

1) $2x^2 - 4x - 16$

2) $x^2 + 3x - 28$

3) $x^2 - 16$

4) $\frac{1}{4}a^6 - 49a^4$

5) $9a^2 - 49$

6) $0,01a^2 - 0,06ab^4 + 0,09b^8$

▽▽▽ EXERCICE 2

1) $x^2 - 6x - 40$

2) $x^2 - 5x - 84$

3) $x^2 - 625$

4) $3x^2 - 27$

5) $x^2 - 15x + 36$

6) $x^8 - 1$

▽▽▽ EXERCICE 3

1) $49a^5 - 28a^4b + 4a^3b^2$

2) $81a^4x - 16b^4x$

3) $9a^2 + 36a^8 + 36a^5$

4) $162x^5 - 2x$

5) $2x^3 + 10x^2 - 168x$

6) $4x^3y + 4x^2y - 80xy$

▽▽▽ EXERCICE 4

1) $4x^4 - 16y^4$

2) $16x^4 - 128x^2 + 256$

3) $-49x^3 - 9xy^2 + 42x^2y$

4) $2x^3 - 12x^2 - 54x$

5) $-48x^3 + 48x^2 - 12x$

6) $\frac{1}{4}x^3 + \frac{1}{9}xy^2 + \frac{1}{3}x^2y$

▽▽▽ EXERCICE 5

1) $60x^2y + 50x^3 + 18xy^2$

2) $3x^2y^2 - 24xy^2 + 36y^2$

3) $28x^3y + 63xy - 84x^2y$

4) $-36x^2 + 162 + 2x^4$

5) $5x^2y + 20y^3$

6) $2x^5y^5 - 8xy$

▽▽▽ EXERCICE 6

1) $2x \cdot (x - 1) - y \cdot (x - 1)$

2) $3x^2 \cdot (x^3 + 1) - (x^3 + 1) \cdot 4x$

3) $3x \cdot (2x + 1) - (2x + 1)$

4) $(2a + b) \cdot a^2 + b \cdot (b + 2a)$

5) $5a^2 \cdot (-x + y) + 5 \cdot (-x + y)$

6) $x^2 \cdot (x - 2y) - y^2 \cdot (x - 2y) - x + 2y$

▽▽▽ EXERCICE 7

1) $2x^2 \cdot (a - b) - 2y^2 \cdot (a - b)$

2) $2xy \cdot (a^2 - b^2) + y \cdot (b^2 - a^2)$

3) $(2x - y) - a^4 \cdot (2x - y)$

4) $3x^2y^3 \cdot (x^2 + 4) - (x^2 + 4) \cdot 12x^2y$

5) $y^2 \cdot (a^2 + b^2) + 16x^4 \cdot (-a^2 - b^2)$

6) $25 \cdot (x^2 - 2xy + y^2) + a^2 \cdot (2xy - x^2 - y^2)$

▽▽▽ EXERCICE 8

1) $ax + ay + bx + by$

2) $21xy - 3x - 28y + 4$

3) $ab + ac + bd + dc$

4) $7ac + 21ad - 2bc - 6bd$

5) $ad + ac - bd - bc$

6) $5ax - 5ay - bx + by$

▽▽▽ EXERCICE 9

1) $-4x^9y + 4x^4y^6 - x^8y + x^3y^6$

2) $7a^4 + 28a - 14a^3b - 56b$

3) $8x^2y - 4x - 6xy^2 + 3y$

4) $15ax + 6ay - 5bx - 2by$

5) $a^2 - 5a^2b + 10a^3b^2 - 15a^5$

6) $3a^2x - 4a^2y^2 - 3bx + 4by^2$

▽▽▽ EXERCICE 10

- 1) $4a^2 \cdot (3 - x) - 4a \cdot (3 - x) + a \cdot (3 - x)$
- 2) $2x \cdot (a + b + c) - 7xy \cdot (a + b + c) + x^2 \cdot (a + b + c)$
- 3) $a^2 \cdot (2u + 1) - 2ab \cdot (2u + 1) + b^2 \cdot (2u + 1)$
- 4) $(5a - b) \cdot x^2 - 2xy \cdot (5a - b) + y^2 \cdot (5a - b)$
- 5) $(7a - b)^2 - 4a \cdot (b - 7a) + 12b \cdot (7a - b)$
- 6) $a^2 \cdot (2x + 3) - 4a \cdot (2x + 3) - 21 \cdot (2x + 3)$

▽▽▽ EXERCICE 11

- 1) $a^2x \cdot (2x - 1) - a^2y \cdot (2x - 1) + 2 \cdot (2x - 1) \cdot a$
- 2) $2x^3 \cdot (2a + b) + 4x^2y \cdot (2a + b) + 6x^2 \cdot (2a + b)$
- 3) $y^2 \cdot (b - a) - 4xy \cdot (b - a) + (b - a) \cdot 4x^2$
- 4) $9x \cdot (x + y) + (x + y) \cdot 4x^3 + 12x^2 \cdot (x + y)$
- 5) $(x^2 - y^2) \cdot a^2 + 2a \cdot (x^2 - y^2) \cdot b - b^2 \cdot (y^2 - x^2)$
- 6) $x^2 \cdot (a - 2) - 4x \cdot (2 - a) - 12 \cdot (a - 2)$

▽▽▽ EXERCICE 12

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|-----------------------------|-------------------------|------------------------------|
| 1) $(x - 1)^2 - a^2$ | 3) $(3a - b)^2 - 25a^2$ | 5) $(x - 1)^2 - 16y^2$ |
| 2) $(2a - b)^2 - (a + b)^2$ | 4) $25x^4 - (a + 2b)^2$ | 6) $(2x - y)^2 - (x + 3y)^2$ |

▽▽▽ EXERCICE 13

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|--------------------------|------------------------------|------------------------------|
| 1) $(x + y)^2 - b^2$ | 3) $(a - 4b)^2 - 1$ | 5) $(2x^2 - y)^2 - 9x^4$ |
| 2) $16a^2 - (x^2 - 1)^2$ | 4) $(x + 2y)^2 - (2x - y)^2$ | 6) $(5a - b)^2 - (a - 2b)^2$ |

▽▽▽ EXERCICE 14

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|----------------------------------|---------------------------------|-------------------------------|
| 1) $(2x + y - 1)^2 - 25$ | 3) $4x^2 - (x + y - 1)^2$ | 5) $x^2 \cdot (x + 1)^2 - 16$ |
| 2) $(x + 2y - 1)^2 - (x - 2y)^2$ | 4) $(3a^2 - 2)^2 - (a^2 + 1)^2$ | 6) $(2x + y)^4 - 1$ |

▽▽▽ EXERCICE 15

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|------------------------------|--------------------------------|-------------------------------------|
| 1) $(x^2 + 2xy + y^2) - a^2$ | 3) $49x^4 - (a^2 + 2ab + b^2)$ | 5) $(a - b)^2 - (4a^2 - 4ab + b^2)$ |
| 2) $(4y^2 - 4y + 1) - 169$ | 4) $(x^2 + 6xy + 9y^2) - 9x^2$ | 6) $(25a^2 + 1 - 10a) - 9a^2$ |

▽▽▽ EXERCICE 16

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|----------------------------------------------|-----------------------------------------------------------------|
| 1) $(x + y) \cdot (x - y) - 3x - 3y$ | 4) $3a^3 \cdot (2u - v) - 2a^2 \cdot (2u - v) + 4u - 2v$ |
| 2) $3a - 2b - 4 \cdot (3a - 2b)$ | 5) $3x - 2y - 5b \cdot (2y - 3x) + 6x - 4y$ |
| 3) $(2y - 1)^2 - 5y \cdot (2y - 1) + 2y - 1$ | 6) $(x - y)^n - 4x \cdot (x - y)^{n-1} + y \cdot (x - y)^{n-2}$ |

▽▽▽ EXERCICE 17

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|----------------------------------------------------|---------------------------------------------------------------|
| 1) $x^2 - y^2 - 3a \cdot (x - y)$ | 4) $4ax \cdot (3a - b) + 2ay \cdot (3a - b) + 6a^2 - 2ab$ |
| 2) $2a - b - (4a^2 - b^2)$ | 5) $y \cdot (y - 2x) + 3x \cdot (2x - y) + (y^2 - 4x^2)$ |
| 3) $(x + 2)^2 + x^2 \cdot (x + 2) + x^2 - 3x - 10$ | 6) $x^2 \cdot (a^2 - 1) + 2x \cdot (a^2y - y) + a^2y^2 - y^2$ |

Correction

▽▽▽ EXERCICE 1

- 1) $2x^2 - 4x - 16 = 2(x + 2)(x - 4)$
- 2) $x^2 + 3x - 28 = (x + 7)(x - 4)$
- 3) $x^2 - 16 = (x - 4)(x + 4)$
- 4) $\frac{1}{4}a^6 - 49a^4 = \frac{1}{4}a^4(a - 14)(a + 14)$ ou $a^4\left(\frac{1}{2}a - 7\right)\left(\frac{1}{2}a + 7\right)$
- 5) $9a^2 - 49 = (3a - 7)(3a + 7)$
- 6) $0,01a^2 - 0,06ab^4 + 0,09b^8 = (0,1a - 0,3b^4)^2$ ou $\frac{1}{100}(a - 3b^4)^2$

▽▽▽ EXERCICE 2

- 1) $x^2 - 6x - 40 = (x + 4)(x - 10)$
- 2) $x^2 - 5x - 84 = (x + 7)(x - 12)$
- 3) $x^2 - 625 = (x - 25)(x + 25)$
- 4) $3x^2 - 27 = 3(x - 3)(x + 3)$
- 5) $x^2 - 15x + 36 = (x - 3)(x - 12)$
- 6) $x^8 - 1 = (x^4 + 1)(x^2 + 1)(x + 1)(x - 1)$

▽▽▽ EXERCICE 3

- 1) $49a^5 - 28a^4b + 4a^3b^2 = a^3(7a - 2b)^2$
- 2) $81a^4x - 16b^4x = (9a^2 + 4b^2)x(3a + 2b)(3a - 2b)$
- 3) $9a^2 + 36a^8 + 36a^5 = 9a^2(2a^3 + 1)^2$
- 4) $162x^5 - 2x = 2x(9x^2 + 1)(3x - 1)(3x + 1)$
- 5) $2x^3 + 10x^2 - 168x = 2x(x + 12)(x - 7)$
- 6) $4x^3y + 4x^2y - 80xy = 4xy(x + 5)(x - 4)$

▽▽▽ EXERCICE 4

- 1) $4x^4 - 16y^4 = 4(x^2 - 2y^2)(x^2 + 2y^2)$
- 2) $16x^4 - 128x^2 + 256 = 16(x - 2)^2(x + 2)^2$
- 3) $-49x^3 - 9xy^2 + 42x^2y = -x(7x - 3y)^2$
- 4) $2x^3 - 12x^2 - 54x = 2x(x + 3)(x - 9)$
- 5) $-48x^3 + 48x^2 - 12x = -12x(2x - 1)^2$
- 6) $\frac{1}{4}x^3 + \frac{1}{9}xy^2 + \frac{1}{3}x^2y = \frac{1}{36}x(3x + 2y)^2$

▽▽▽ EXERCICE 5

- 1) $60x^2y + 50x^3 + 18xy^2 = 2x(5x + 3y)^2$
- 2) $3x^2y^2 - 24xy^2 + 36y^2 = 3y^2(x - 2)(x - 6)$
- 3) $28x^3y + 63xy - 84x^2y = 7xy(2x - 3)^2$
- 4) $-36x^2 + 162 + 2x^4 = 2(x - 3)^2(x + 3)^2$
- 5) $5x^2y + 20y^3 = 5y(x^2 + 4y^2)$
- 6) $2x^5y^5 - 8xy = 2xy(x^2y^2 - 2)(x^2y^2 + 2)$

▽▽▽ EXERCICE 6

- 1) $2x \cdot (x - 1) - y \cdot (x - 1) = (x - 1)(2x - y)$
- 2) $3x^2 \cdot (x^3 + 1) - (x^3 + 1) \cdot 4x = x(3x - 4)(x + 1)(x^2 - x + 1)$

- 3) $3x \cdot (2x + 1) - (2x + 1) = (2x + 1)(3x - 1)$
- 4) $(2a + b) \cdot a^2 + b \cdot (b + 2a) = (2a + b)(a^2 + b)$
- 5) $5a^2 \cdot (-x + y) + 5 \cdot (-x + y) = 5(y - x)(a^2 + 1)$
- 6) $x^2 \cdot (x - 2y) - y^2 \cdot (x - 2y) - x + 2y = (x - 2y)(x^2 - y^2 - 1)$

▽▽▽ EXERCICE 7

- 1) $2x^2 \cdot (a - b) - 2y^2 \cdot (a - b) = 2(a - b)(x - y)(x + y)$
- 2) $2xy \cdot (a^2 - b^2) + y \cdot (b^2 - a^2) = y(a - b)(a + b)(2x - 1)$
- 3) $(2x - y) - a^4 \cdot (2x - y) = (2x - y)(1 + a^2)(1 + a)(1 - a)$
- 4) $3x^2y^3 \cdot (x^2 + 4) - (x^2 + 4) \cdot 12x^2y = 3x^2y(x^2 + 4)(y - 2)(y + 2)$
- 5) $y^2 \cdot (a^2 + b^2) + 16x^4 \cdot (-a^2 - b^2) = (a^2 + b^2)(y - 4x^2)(y + 4x^2)$
- 6) $25 \cdot (x^2 - 2xy + y^2) + a^2 \cdot (2xy - x^2 - y^2) = (x - y)^2(5 + a)(5 - a)$

▽▽▽ EXERCICE 8

- 1) $ax + ay + bx + by = (x + y)(a + b)$
- 2) $21xy - 3x - 28y + 4 = (3x - 4)(7y - 1)$
- 3) $ab + ac + bd + dc = (b + c)(a + d)$
- 4) $7ac + 21ad - 2bc - 6bd = (c + 3d)(7a - 2b)$
- 5) $ad + ac - bd - bc = (c + d)(a - b)$
- 6) $5ax - 5ay - bx + by = (x - y)(5a - b)$

▽▽▽ EXERCICE 9

- 1) $-4x^9y + 4x^4y^6 - x^8y + x^3y^6 = x^3y(4x + 1)(y^5 - x^5) = \dots$ (on pourrait continuer)
- 2) $7a^4 + 28a - 14a^3b - 56b = 7(a^3 + 4)(a - 2b)$
- 3) $8x^2y - 4x - 6xy^2 + 3y = (4x - 3y)(2xy - 1)$
- 4) $15ax + 6ay - 5bx - 2by = (5x + 2y)(3a - b)$
- 5) $a^2 - 5a^2b + 10a^3b^2 - 15a^5 = a^2(10ab^2 - 15a^3 - 5b + 1)$
- 6) $3a^2x - 4a^2y^2 - 3bx + 4by^2 = (a^2 - b)(3x - 4y^2)$

▽▽▽ EXERCICE 10

- 1) $4a^2 \cdot (3 - x) - 4a \cdot (3 - x) + a \cdot (3 - x) = a(4a - 3)(3 - x)$
- 2) $2x \cdot (a + b + c) - 7xy \cdot (a + b + c) + x^2 \cdot (a + b + c) = x(a + b + c)(x - 7y + 2)$
- 3) $a^2 \cdot (2u + 1) - 2ab \cdot (2u + 1) + b^2 \cdot (2u + 1) = (a - b)^2(2u + 1)$
- 4) $(5a - b) \cdot x^2 - 2xy \cdot (5a - b) + y^2 \cdot (5a - b) = (x - y)^2(5a - b)$
- 5) $(7a - b)^2 - 4a \cdot (b - 7a) + 12b \cdot (7a - b) = 11(7a - b)(a + b)$
- 6) $a^2 \cdot (2x + 3) - 4a \cdot (2x + 3) - 21 \cdot (2x + 3) = (2x + 3)(a + 3)(a - 7)$

▽▽▽ EXERCICE 11

- 1) $a^2x \cdot (2x - 1) - a^2y \cdot (2x - 1) + 2 \cdot (2x - 1) \cdot a = a(2x - 1)(ax - ay + 2)$
- 2) $2x^3 \cdot (2a + b) + 4x^2y \cdot (2a + b) + 6x^2 \cdot (2a + b) = 2x^2(2a + b)(x + 2y + 3)$
- 3) $y^2 \cdot (b - a) - 4xy \cdot (b - a) + (b - a) \cdot 4x^2 = (y - 2x)^2(b - a)$
- 4) $9x \cdot (x + y) + (x + y) \cdot 4x^3 + 12x^2 \cdot (x + y) = x(2x + 3)^2(x + y)$
- 5) $(x^2 - y^2) \cdot a^2 + 2a \cdot (x^2 - y^2) \cdot b - b^2 \cdot (y^2 - x^2) = (a + b)^2(x - y)(x + y)$
- 6) $x^2 \cdot (a - 2) - 4x \cdot (2 - a) - 12 \cdot (a - 2) = (x + 6)(x - 2)(a - 2)$

▽▽▽ EXERCICE 12

- 1) $(x-1)^2 - a^2 = (x-1+a)(x-1-a)$
- 2) $(2a-b)^2 - (a+b)^2 = 3a(a-2b)$
- 3) $(3a-b)^2 - 25a^2 = (8a-b)(-2a-b) = (b-8a)(2a+b)$
- 4) $25x^4 - (a+2b)^2 = (5x^2+a+2b)(5x^2-a-2b)$
- 5) $(x-1)^2 - 16y^2 = (x-1+4y)(x-1-4y)$
- 6) $(2x-y)^2 - (x+3y)^2 = (x-4y)(3x+2y)$

▽▽▽ EXERCICE 13

- 1) $(x+y)^2 - b^2 = (x+y-b)(x+y+b)$
- 2) $16a^2 - (x^2-1)^2 = (4a+x^2-1)(4a-x^2+1)$
- 3) $(a-4b)^2 - 1 = (a-4b+1)(a-4b-1)$
- 4) $(x+2y)^2 - (2x-y)^2 = (3y-x)(3x+y)$
- 5) $(2x^2-y)^2 - 9x^4 = -(x^2+y)(5x^2-y)$
- 6) $(5a-b)^2 - (a-2b)^2 = 3(2a-b)(4a+b)$

▽▽▽ EXERCICE 14

- 1) $(2x+y-1)^2 - 25 = (2x+y-6)(2x+y+4)$
- 2) $(x+2y-1)^2 - (x-2y)^2 = (2x-1)(4y-1)$
- 3) $4x^2 - (x+y-1)^2 = (x-y+1)(3x+y-1)$
- 4) $(3a^2-2)^2 - (a^2+1)^2 = (2a+1)(2a-1)(2a^2-3)$
- 5) $x^2 \cdot (x+1)^2 - 16 = (x^2+x-4)(x^2+x+4)$
- 6) $(2x+y)^4 - 1 = (2x+y+1)(2x+y-1)(4x^2+4xy+y^2+1)$

▽▽▽ EXERCICE 15

- 1) $(x^2+2xy+y^2) - a^2 = (x+y-a)(x+y+a)$
- 2) $(4y^2-4y+1) - 169 = 4(y+6)(y-7)$
- 3) $49x^4 - (a^2+2ab+b^2) = (7x^2+a+b)(7x^2-b-a)$
- 4) $(x^2+6xy+9y^2) - 9x^2 = (3y-2x)(4x+3y)$
- 5) $(a-b)^2 - (4a^2-4ab+b^2) = a(2b-3a)$
- 6) $(25a^2+1-10a) - 9a^2 = (8a-1)(2a-1)$

▽▽▽ EXERCICE 16

- 1) $(x+y) \cdot (x-y) - 3x - 3y = (x-y-3)(x+y)$
- 2) $3a-2b-4 \cdot (3a-2b) = 3(2b-3a)$
- 3) $(2y-1)^2 - 5y \cdot (2y-1) + 2y-1 = -3y(2y-1)$
- 4) $3a^3 \cdot (2u-v) - 2a^2 \cdot (2u-v) + 4u-2v = (3a^3-2a^2+2)(2u-v)$
- 5) $3x-2y-5b \cdot (2y-3x) + 6x-4y = (3x-2y)(5b+3)$
- 6) $(x-y)^n - 4x \cdot (x-y)^{n-1} + y \cdot (x-y)^{n-2} = (x-y)^{n-2}(-3x^2+2xy+2y)$

▽▽▽ EXERCICE 17

- 1) $x^2 - y^2 - 3a \cdot (x-y) = (x-y)(x+y-3a)$
- 2) $2a-b - (4a^2-b^2) = (2a-b)(1-2a-b)$
- 3) $(x+2)^2 + x^2 \cdot (x+2) + x^2 - 3x - 10 = (x-1)(x+3)(x+2)$
- 4) $4ax \cdot (3a-b) + 2ay \cdot (3a-b) + 6a^2 - 2ab = 2a(3a-b)(2x+y+1)$
- 5) $y \cdot (y-2x) + 3x \cdot (2x-y) + (y^2-4x^2) = (y-2x)(2y-x)$
- 6) $x^2 \cdot (a^2-1) + 2x \cdot (a^2y-y) + a^2y^2 - y^2 = (x+y)^2(a-1)(a+1)$