

Exercices

1. Factoriser les expressions suivantes:

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| (a) $2x^2 - 8y^2$ | $= 2(x - 2y)(x + 2y)$ |
| (b) $3x^3 - 3xy^2$ | $= 3x(x - y)(x + y)$ |
| (c) $15x^2 - 15$ | $= 15(x - 1)(x + 1)$ |
| (d) $162 - 2x^2$ | $= 2(9 - x)(9 + x)$ |
| (e) $4a^4 - 8b^4$ | $= 4(a^4 - 2b^4)$ |
| (f) $(4x - y)^2 - (4x + 8y)^2$ | $= -9y(8x + 7y)$ |
| (g) $64a^2 - (x - 2a)^2$ | $= (6a + x)(10a - x)$ |
| (h) $75x^2 - 48$ | $= 3(5x - 4)(5x + 4)$ |
| (i) $x^8 - \frac{1}{64}$ | $= (x^4 - \frac{1}{8})(x^4 + \frac{1}{8})$ |
| (j) $\frac{3}{25} - \frac{3a^2}{16}$ | $= 3(\frac{1}{5} - \frac{a}{4})(\frac{1}{5} + \frac{a}{4})$ |
| (k) $9(x - 2y)^2 - 16(y - 3x)^2$ | $= 5(2y + 9x)(2y - 3x)$ |
| (l) $(4x - 7y)^2 - 4x^2$ | $= (2x - 7y)(6x - 7y)$ |
| (m) $a^8 - b^8$ | $= (a^4 + b^4)(a^2 + b^2)(a + b)(a - b)$ |
| (n) $3y^5 + 6ay^3 + 3y^4$ | $= 3y^3(y^2 + 2a + y)$ |
| (o) $4x^2y + 32xy^2 + 8x^2y^2$ | $= 4xy(x + 2yx + 8y)$ |
| (p) $(xy + z)(x + y) - (2y - x)(xy + z)$ | $= (xy + z)(2x - y)$ |
| (q) $3x(x^2 + y^2) - (x^2 + y^2)6y + 3(y^2 + x^2)$ | $= 3(x - 2y + 1)(x^2 + y^2)$ |

2. Résoudre les équations suivantes :

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| (a) $6(x + 5) - 5x = 25$ | $S = \{-5\}$ |
| (b) $4(4 + 2x) = 60 - 3x$ | $S = \{4\}$ |
| (c) $60x + 1 = 3(3 + 4x)$ | $S = \{\frac{1}{6}\}$ |
| (d) $3x - \frac{1}{2}(4 - x) = x - \frac{1}{3}$ | $S = \{\frac{2}{3}\}$ |
| (e) $3x - \frac{1}{2}(\frac{x}{5} + 6) = 25 + \frac{3x}{2}$ | $S = \{20\}$ |
| (f) $\frac{2x}{5} - \frac{1}{3}(\frac{5x}{4} - 4) = x + \frac{27}{5}$ | $S = \{-4\}$ |
| (g) $x^2 - 9 = 0$ | $S = \{-3, 3\}$ |
| (h) $4x^2 - 1 = 0$ | $S = \{-\frac{1}{2}, \frac{1}{2}\}$ |
| (i) $x^2 - 3x = 0$ | $S = \{0, 3\}$ |
| (j) $(x - 1)^2 + 2(x + 1)(x - 1) - 3x(x - 2) = 7$ | $S = \{2\}$ |
| (k) $(2x - 1)^2 + (2x + 3)^2 = 2x(4x - 1)$ | $S = \{-1\}$ |
| (l) $(4x + 7)^2 = (x + 3)^2$ | $S = \{-2; -\frac{4}{3}\}$ |

A) Mettre en évidence tous les facteurs communs:

1. $ab + b \dots\dots\dots = b(a + 1)$
2. $ma + ap \dots\dots\dots = a(m + p)$
3. $a^3x^2 - a^2x^3 \dots\dots\dots = a^2x^2(a - x)$
4. $4ac - 2ab \dots\dots\dots = 2a(2c - b)$
5. $6a^2b + 4ab \dots\dots\dots = 2ab(3a + 2)$
6. $24b^3c^5 - 36bc^2 \dots\dots\dots = 12bc^2(2b^2c^3 - 3)$
7. $3a^3b^4 - 12a^2b^3 \dots\dots\dots = 3a^2b^3(ab - 4)$
8. $15a^7b^2 - 10a^5b^3 \dots\dots\dots = 5a^5b^2(3a^2 - 2b)$
9. $3a^2bc^2 - abc^3 \dots\dots\dots = abc^2(3a - c)$
10. $10ac^2 + 15a^2c \dots\dots\dots = 5ac(2c + 3a)$
11. $12x^2y^2 - 18xy^3 + 24x^3y \dots\dots\dots = 6xy(2xy - 3y^2 + 4x^2)$
12. $12a^2x^3 - 30a^3x^2 + 18ax^4 \dots\dots\dots = 6ax^2(2ax - 5a^2 + 3x^2)$
13. $y(b - a) - x(b - a) \dots\dots\dots = (b - a)(y - x)$
14. $a(x^2 + y^2) - b(x^2 + y^2) \dots\dots\dots = (x^2 + y^2)(a - b)$
15. $a(x + y) + b(x + y) \dots\dots\dots = (x + y)(a + b)$
16. $(a - b) + x(a - b) \dots\dots\dots = (a - b)(1 + x)$
17. $3ab(bc)^3 - ab(bc)^2 \dots\dots\dots = ab^3c^2(3bc - 1)$
18. $2a^3b^2 + 8a^3b^3 - 6a^4b \dots\dots\dots = 2a^3b(b + 4b^2 - 3a)$
19. $3x^3y^2z - 9x^2y^3z^2 + 18x^4y^2z^2 \dots\dots\dots = 3x^2y^2z(x - 3yz + 6x^2z)$
20. $a(b - c) - b(b - c) + c(b - c) \dots\dots\dots = (b - c)(a - b + c)$

B) Factoriser en utilisant les identités remarquables:

1. $a^2 - 9 \dots\dots\dots = (a + 3)(a - 3)$
2. $a^2 - 16b^2 \dots\dots\dots = (a + 4b)(a - 4b)$
3. $a^4 - 9b^2 \dots\dots\dots = (a^2 + 3b)(a^2 - 3b)$
4. $a^2 - 25x^2 \dots\dots\dots = (a + 5x)(a - 5x)$
5. $a^2x^2 - b^2x^2 \dots\dots\dots = (ax + bx)(ax - bx)$
6. $4x^2 - 16a^2 \dots\dots\dots = (2x + 4a)(2x - 4a)$
7. $x^3y - xy^3 \dots\dots\dots = xy(x + y)(x - y)$
8. $32a^2 - 2b^4 \dots\dots\dots = 2(4a + b^2)(4a - b^2)$

9. $50x^4 - 2y^2$ = $2(5x^2 + y)(5x^2 - y)$
10. $256x^2 - 64a^4$ = $64(2x + a^2)(2x - a^2)$
11. $a^2x^2 - 81x^2$ = $x^2(a + 9)(a - 9)$
12. $16x^2y^2 - 121y^4$ = $y^2(4x + 11y)(4x - 11y)$
13. $x^4y^2 - x^2y^4$ = $x^2y^2(x + y)(x - y)$
14. $3a^3x - 3ax^3$ = $3ax(a + x)(a - x)$
15. $150a^6b^2 - 24a^2b^2$ = $6a^2b^2(5a^2 + 2)(5a^2 - 2)$
16. $x^4 - 81$ = $(x^2 + 9)(x + 3)(x - 3)$
17. $81x^4 - 625a^4$ = $(9x^2 + 25a^2)(3x + 5a)(3x - 5a)$
18. $32x^4 - 2a^4$ = $2(4x^2 + a^2)(2x + a)(2x - a)$
19. $3ax^4 - 3ay^4$ = $3a(x^2 + y^2)(x + y)(x - y)$
20. $3x^5 - 48xy^8$ = $3x(x^2 + 4y^4)(x + 2y^2)(x - 2y^2)$
21. $(a - b)^2 - c^2$ = $(a - b + c)(a - b - c)$
22. $(a + b)^2 - (x - y)^2$ = $(a + b + x - y)(a + b - x + y)$
23. $(5a + 2b)^2 - (2b - 5a)^2$ = $40ab$
24. $(x + a)^2 - (3x - 2a)^2$ = $(4x - a)(3a - 2x)$
25. $(a + b + c)^2 - (a - 2b - c)^2$ = $(2a - b)(3b + 2c)$
26. $(x + 1)^2 - (x - 1)^2$ = $4x$

C) Factoriser en utilisant les identités remarquables:

1. $a^2 + 4ab + 4b^2$ = $(a + 2b)^2$
2. $9a^2 - 12ab + 4b^2$ = $(3a - 2b)^2$
3. $4a^2 - 4a + 1$ = $(2a - 1)^2$
4. $a^2 - a + \frac{1}{4}$ = $(a - \frac{1}{2})^2$
5. $x^4 + 2x^2 + 1$ = $(x^2 + 1)^2$
6. $x^6 + 6x^3 + 9$ = $(x^3 + 3)^2$
7. $ab^2 - 2abc + ac^2$ = $a(b - c)^2$
8. $\frac{x^2}{16} - \frac{3xy}{2} + 9y^2$ = $(\frac{x}{4} - 3y)^2$
9. $4x^4 + x^2y + \frac{y^2}{16}$ = $(2x^2 + \frac{y}{4})^2$
10. $9a^4b^2 - 6a^2bc + c^2$ = $(3a^2b - c)^2$
11. $\frac{9a^2}{4} - ab + \frac{b^2}{9}$ = $(\frac{3a}{2} - \frac{b}{3})^2$