



Série Corrigée 2

Calcul littéral et Identités remarquables

3 APIC

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I– Énoncés des exercices



Exercice 1

Développer et réduire les expressions suivantes :

- | | | | |
|------------------|-----------------|------------------|-------------------|
| a) $3(x - 2)$ | b) $-5(x + 3)$ | c) $2(3x - 5)$ | d) $3a(4 - 2a)$ |
| e) $-2x(6 - 5x)$ | f) $11(6x - 7)$ | g) $(4 - 9x)17x$ | h) $-21y(5y - 8)$ |



Exercice 2

Développer et réduire les expressions suivantes :

- | | | |
|---|---|--|
| a) $(2x + 3)(5x + 2)$ | b) $(4x - 3)(7x + 5)$ | c) $(5x - 7)(3x - 2)$ |
| d) $(4 - 3x)(2x - 3)$ | e) $(\frac{1}{2}x - \frac{2}{3})(\frac{1}{3}x + \frac{1}{2})$ | f) $(\frac{2}{3}x + \frac{1}{2})(x - 5)$ |
| g) $(3x + \frac{1}{2})(2x + \frac{1}{3})$ | h) $(2 - 3x)(5 - 4x)$ | |



Exercice 3

Développer et réduire les expressions suivantes :

- | | |
|--|--|
| a) $5(x - 2) + 2(3 - x)$ | b) $-3(x + 3) + 2(3x + 7)$ |
| c) $3x(x - 4) + (x - 4)(2x + 3)$ | d) $(2x + 5)(x - 3) + (x + 1)(2 - 3x)$ |
| e) $(3x - 2)(5x - 3) - (x + 4)(x - 3)$ | f) $11x(6x - 7) - 7x(2 - 5x)$ |



Exercice 4

Développer et réduire les expressions suivantes :

- | | | |
|-----------------|-----------------|-----------------------|
| a) $(3x + 2)^2$ | b) $(5x - 4)^2$ | c) $(2x + 5)(2x - 5)$ |
|-----------------|-----------------|-----------------------|



d) $\left(\frac{1}{2}x + \frac{2}{3}\right)^2$

e) $\left(\frac{1}{3}x - 2\right)^2$

f) $\left(\frac{3}{2}x - \frac{2}{3}\right)^2$

g) $\left(\frac{2}{5} - x\right)\left(\frac{2}{5} + x\right)$

h) $\left(4x - \frac{1}{2}\right)^2$

Exercice 5

Développer et réduire les expressions suivantes :

a) $(x + 3)^2 + (2x - 1)^2$

b) $(3 - 4x)^2 - (3x - 2)^2$

c) $(4x + 1)(2x - 5) - (3x + 4)^2$

d) $(5x - 2)^2 - (x + 4)(3 - 2x)$

e) $(4x - 3)(4x + 3) - (5x - 3)^2$

f) $(5 - 2x)(2x + 5) - (x + 1)(x - 1)$

Exercice 6

Développer et réduire les expressions suivantes :

a) $9(2x + 4) - 9(2 - x)$

b) $x(5x + 1) + (5x + 1)(6 - 2x)$

c) $2x(x + 3) - 7x$

d) $3x^2 - 5x(x + 2)$

e) $(4x - 3)(4x + 3) - (4x - 3)^2$

f) $(2x + 1)(2x + 5) - (2x + 1)(x - 1)$

Exercice 7

Factoriser les expressions suivantes :

a) $x^2 - 25$

b) $(3 - 4x)^2 - 16$

c) $(4x + 1)^2 - x^2$

d) $(3x + 5)^2 - 4x^2$

e) $9x^2 - 64$

f) $(5 - 2x)^2 - (5 - 2x)(x - 3)$

g) $x(3x + 1) + (7x + 5)(3x + 1)$

h) $x^2 - 4 + (x - 2)^2$

Exercice 8

a) $A = x^2 + 6x + 9$

b) $B = x^2 - 4x + 4$

c) $C = 4x^2 + 12x + 9$

d) $D = 16x^2 - 40x + 25$

e) $E = 25x^2 + 20x + 4$

f) $F = 64x^2 - 80x + 25$

g) $G = a^2 + \frac{5}{2}a + \frac{25}{16}$

h) $H = \frac{1}{4}x^2 - 5x + 25$

Exercice 9

On pose $T = (x - 2)^2 - (x - 2)(x + 3) - 5(x^2 - 4)$.

1) Développer et réduire l'expression T .

2) Factoriser l'expression T .

3) Calculer T pour $x = 1$ puis pour $x = 3$.



II– Corrigés des exercices

✓ Solution Exercise 1

a) $3(x - 2) = 3x - 6$

c) $2(3x - 5) = 6x - 10$

e) $-2x(6 - 5x) = -12x + 10x^2$

g) $(4 - 9x)17x = 68x - 153x^2$

b) $-5(x + 3) = -5x - 15$

d) $3a(4 - 2a) = 12a - 6a^2$

f) $11(6x - 7) = 66x - 77$

h) $-21y(5y - 8) = -105y^2 + 168y$

✓ Solution Exercise 2

a) $(2x + 3)(5x + 2) = 10x^2 + 4x + 15x + 6 = 10x^2 + 19x + 6$

b) $(4x - 3)(7x + 5) = 28x^2 + 20x - 21x - 15 = 28x^2 - x - 15$

c) $(5x - 7)(3x - 2) = 15x^2 - 10x - 21x + 14 = 15x^2 - 31x + 14$

d) $(4 - 3x)(2x - 3) = 8x - 12 - 6x^2 + 9x = -6x^2 + 17x - 12$

e) $\left(\frac{1}{2}x - \frac{2}{3}\right)\left(\frac{1}{3}x + \frac{1}{2}\right) = \frac{1}{6}x^2 + \frac{1}{4}x - \frac{2}{9}x - \frac{1}{3} = \frac{1}{6}x^2 + \frac{1}{36}x - \frac{1}{3}$

f) $\left(\frac{2}{3}x + \frac{1}{2}\right)(x - 5) = \frac{2}{3}x^2 - \frac{10}{3}x + \frac{1}{2}x - \frac{5}{2} = \frac{2}{3}x^2 - \frac{17}{6}x - \frac{5}{2}$

g) $\left(3x + \frac{1}{2}\right)\left(2x + \frac{1}{3}\right) = 6x^2 + x + x + \frac{1}{6} = 6x^2 + 2x + \frac{1}{6}$

h) $(2 - 3x)(5 - 4x) = 10 - 8x - 15x + 12x^2 = 12x^2 - 23x + 10$

✓ Solution Exercise 3

a) $5(x - 2) + 2(3 - x) = 5x - 10 + 6 - 2x = 3x - 4$

b) $-3(x + 3) + 2(3x + 7) = -3x - 9 + 6x + 14 = 3x + 5$

c) $3x(x - 4) + (x - 4)(2x + 3) = 3x^2 - 12x + 2x^2 - 5x - 12 = 5x^2 - 17x - 12$

d) $(2x + 5)(x - 3) + (x + 1)(2 - 3x) = 2x^2 - x - 15 + (-3x^2 - x + 2) = -x^2 - 2x - 13$

e) $(3x - 2)(5x - 3) - (x + 4)(x - 3) = 15x^2 - 19x + 6 - (x^2 + x - 12) = 14x^2 - 20x + 18$

f) $11x(6x - 7) - 7x(2 - 5x) = 66x^2 - 77x - 14x + 35x^2 = 101x^2 - 91x$

✓ Solution Exercise 4

a) $(3x + 2)^2 = (3x)^2 + 2 \times 3x \times 2 + 2^2 = 9x^2 + 12x + 4$

b) $(5x - 4)^2 = (5x)^2 - 2 \times 5x \times 4 + 4^2 = 25x^2 - 40x + 16$

c) $(2x + 5)(2x - 5) = (2x)^2 - 5^2 = 4x^2 - 25$

d) $\left(\frac{1}{2}x + \frac{2}{3}\right)^2 = \frac{1}{4}x^2 + 2 \times \frac{1}{2}x \times \frac{2}{3} + \frac{4}{9} = \frac{1}{4}x^2 + \frac{2}{3}x + \frac{4}{9}$

e) $\left(\frac{1}{3}x - 2\right)^2 = \frac{1}{9}x^2 - 2 \times \frac{1}{3}x \times 2 + 4 = \frac{1}{9}x^2 - \frac{4}{3}x + 4$



$$f) \left(\frac{3}{2}x - \frac{2}{3}\right)^2 = \frac{9}{4}x^2 - 2 \times \frac{3}{2}x \times \frac{2}{3} + \frac{4}{9} = \frac{9}{4}x^2 - 2x + \frac{4}{9}$$

$$g) \left(\frac{2}{5} - x\right)\left(\frac{2}{5} + x\right) = \left(\frac{2}{5}\right)^2 - x^2 = \frac{4}{25} - x^2$$

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

✓ Solution Exercise 5

$$a) (x+3)^2 + (2x-1)^2 = x^2 + 6x + 9 + 4x^2 - 4x + 1 = 5x^2 + 2x + 10$$

$$b) (3-4x)^2 - (3x-2)^2 = 9 - 24x + 16x^2 - (9x^2 - 12x + 4) = 9 - 24x + 16x^2 - 9x^2 + 12x - 4 = 7x^2 - 12x + 5$$

$$c) (4x+1)(2x-5) - (3x+4)^2 = 8x^2 - 18x - 5 - (9x^2 + 24x + 16) = 8x^2 - 18x - 5 - 9x^2 - 24x - 16 = -x^2 - 42x - 21$$

$$d) (5x-2)^2 - (x+4)(3-2x) = 25x^2 - 20x + 4 - (-2x^2 - 5x + 12) = 25x^2 - 20x + 4 + 2x^2 + 5x - 12 = 27x^2 - 15x - 8$$

$$e) (4x-3)(4x+3) - (5x-3)^2 = 16x^2 - 9 - (25x^2 - 30x + 9) = 16x^2 - 9 - 25x^2 + 30x - 9 = -9x^2 + 30x - 18$$

$$f) (5-2x)(2x+5) - (x+1)(x-1) = 25 - 4x^2 - (x^2 - 1) = 25 - 4x^2 - x^2 + 1 = -5x^2 + 26$$

✓ Solution Exercise 6

$$a) 9(2x+4) - 9(2-x) = 18x + 36 - 18 + 9x = 27x + 18$$

$$b) x(5x+1) + (5x+1)(6-2x) = 5x^2 + x + (-10x^2 + 28x + 6) = -5x^2 + 29x + 6$$

$$c) 2x(x+3) - 7x = 2x^2 + 6x - 7x = 2x^2 - x$$

$$d) 3x^2 - 5x(x+2) = 3x^2 - 5x^2 - 10x = -2x^2 - 10x$$

$$e) (4x-3)(4x+3) - (4x-3)^2 = 16x^2 - 9 - (16x^2 - 24x + 9) = 16x^2 - 9 - 16x^2 + 24x - 9 = 24x - 18$$

$$f) (2x+1)(2x+5) - (2x+1)(x-1) = 4x^2 + 12x + 5 - (2x^2 - x - 1) = 4x^2 + 12x + 5 - 2x^2 + x + 1 = 2x^2 + 13x + 6$$

✓ Solution Exercise 7

$$a) x^2 - 25 = x^2 - 5^2 = (x-5)(x+5)$$

$$b) (3-4x)^2 - 16 = (3-4x)^2 - 4^2 = (3-4x-4)(3-4x+4) = (-4x-1)(7-4x)$$

$$c) (4x+1)^2 - x^2 = (4x+1-x)(4x+1+x) = (3x+1)(5x+1)$$

$$d) (3x+5)^2 - 4x^2 = (3x+5)^2 - (2x)^2 = (3x+5-2x)(3x+5+2x) = (x+5)(5x+5) = 5(x+5)(x+1)$$

$$e) 9x^2 - 64 = (3x)^2 - 8^2 = (3x-8)(3x+8)$$

$$f) (5-2x)^2 - (5-2x)(x-3) = (5-2x)[(5-2x) - (x-3)] = (5-2x)(5-2x-x+3) = (5-2x)(8-3x)$$

$$g) x(3x+1) + (7x+5)(3x+1) = (3x+1)[x + (7x+5)] = (3x+1)(8x+5)$$

$$h) x^2 - 4 + (x-2)^2 = (x-2)(x+2) + (x-2)^2 = (x-2)[(x+2) + (x-2)] = (x-2)(2x) = 2x(x-2)$$

Solution Exercise 8

- a) $A = x^2 + 2 \times x \times 3 + 3^2 = (x + 3)^2$
 b) $B = x^2 - 2 \times x \times 2 + 2^2 = (x - 2)^2$
 c) $C = (2x)^2 + 2 \times 2x \times 3 + 3^2 = (2x + 3)^2$
 d) $D = (4x)^2 - 2 \times 4x \times 5 + 5^2 = (4x - 5)^2$
 e) $E = (5x)^2 + 2 \times 5x \times 2 + 2^2 = (5x + 2)^2$
 f) $F = (8x)^2 - 2 \times 8x \times 5 + 5^2 = (8x - 5)^2$
 g) $G = a^2 + 2 \times a \times \frac{5}{4} + \left(\frac{5}{4}\right)^2 = \left(a + \frac{5}{4}\right)^2$
 h) $H = \left(\frac{1}{2}x\right)^2 - 2 \times \frac{1}{2}x \times 5 + 5^2 = \left(\frac{1}{2}x - 5\right)^2$

Solution Exercise 9
1) Développement :

$$\begin{aligned}
 T &= (x - 2)^2 - (x - 2)(x + 3) - 5(x^2 - 4) \\
 &= (x^2 - 4x + 4) - (x^2 + x - 6) - 5x^2 + 20 \\
 &= x^2 - 4x + 4 - x^2 - x + 6 - 5x^2 + 20 \\
 &= -5x^2 - 5x + 30
 \end{aligned}$$

2) Factorisation : on remarque que $x^2 - 4 = (x - 2)(x + 2)$, donc

$$\begin{aligned}
 T &= (x - 2)^2 - (x - 2)(x + 3) - 5(x - 2)(x + 2) \\
 &= (x - 2) [(x - 2) - (x + 3) - 5(x + 2)] \\
 &= (x - 2)(x - 2 - x - 3 - 5x - 10) \\
 &= (x - 2)(-5x - 15) \\
 &= -5(x - 2)(x + 3)
 \end{aligned}$$

3) On utilise la forme factorisée :

- pour $x = 1$: $T = -5(1 - 2)(1 + 3) = -5 \times (-1) \times 4 = \mathbf{20}$;
- pour $x = 3$: $T = -5(3 - 2)(3 + 3) = -5 \times 1 \times 6 = \mathbf{-30}$.

Vérification avec la forme développée : pour $x = 1$, $-5 - 5 + 30 = 20$; pour $x = 3$, $-45 - 15 + 30 = -30$.

