

Exercices pour s'entraîner

ex 1

a) $x(2x-7)=0$.

$\Leftrightarrow x=0$ ou $2x-7=0$.

$\Leftrightarrow x=0$ ou $2x=7$
 $x=\frac{7}{2}$

$$S = \left\{ 0, \frac{7}{2} \right\}$$

b) $4x^2 = 100$.

$\Leftrightarrow 4x^2 - 100 = 0$.

$\Leftrightarrow 4x^2 - 10^2 = 0$.

$\Leftrightarrow (2x-10)(2x+10) = 0$.

$\Leftrightarrow 2x-10=0$ ou $2x+10=0$.

$\Leftrightarrow 2x=10$ ou $2x=-10$.

$\Leftrightarrow x=\frac{10}{2}$ ou $x=-\frac{10}{2}$

$\Leftrightarrow x=5$ ou $x=-5$.

$$S = \{-5, 5\}$$

c) $(3x+2)^2 = 25$.

$\Leftrightarrow (3x+2)^2 - 25 = 0$.

$\Leftrightarrow (3x+2)^2 - 5^2 = 0$.

$\Leftrightarrow [(3x+2)-5][(3x+2)+5] = 0$.

$\Leftrightarrow (3x-3)(3x+7) = 0$.

$\Leftrightarrow 3x-3=0$ ou $3x+7=0$.

$\Leftrightarrow 3x=3$ ou $3x=-7$

$\Leftrightarrow x=1$ ou $x=-\frac{7}{3}$

$$S = \left\{ -\frac{7}{3}, 1 \right\}$$

ex 2

$$A = 8(x - 7)$$

$$B = 7x(x - 3)$$

$$C = x(39 + 26x)$$

$$D = (5x + 4)(x - 2 + 18 - 3x)$$

$$D = (5x + 4)(x - 2 + 8 - 3x)$$

$$D = (5x + 4)(-2x + 6)$$

$$E = (x + 3)^2 + (x + 3)(-2x + 9)$$

$$E = (x + 3)[(x + 3) + (-2x + 9)]$$

$$E = (x + 3)[x + 3 - 2x + 9]$$

$$E = (x + 3)(-x + 12)$$

$$F = (x - 7)^2 + (x - 7)$$

$$F = (x - 7)(x - 7) + (x - 7) \times 1$$

$$F = (x - 7)[(x - 7) + 1]$$

$$F = (x - 7)(x - 6)$$

ex 3 a) $x^2 = 36$

$$\Leftrightarrow x^2 - 36 = 0$$

$$\Leftrightarrow x^2 - 6^2 = 0$$

$$\Leftrightarrow (x - 6)(x + 6) = 0$$

$$\Leftrightarrow x - 6 = 0 \text{ ou } x + 6 = 0$$

$$\Leftrightarrow x = 6 \text{ ou } x = -6$$

$$S = \{-6; 6\}$$

b) $(x - 5)^2 - 9 = 0$

$$\Leftrightarrow (x - 5)^2 - 3^2 = 0$$

$$\Leftrightarrow [(x - 5) - 3][(x - 5) + 3] = 0$$

$$\Leftrightarrow (x - 8)(x - 2) = 0$$

$$\Leftrightarrow x - 8 = 0 \text{ ou } x - 2 = 0$$

$$\Leftrightarrow x = 8 \text{ ou } x = 2$$

$$S = \{2; 8\}$$

$$\begin{aligned}
 c) \quad & (2x-4)(4x+1) = 0 \\
 \Leftrightarrow & 2x-4=0 \text{ ou } 4x+1=0 \\
 \Leftrightarrow & 2x=4 \text{ ou } 4x=-1 \\
 \Leftrightarrow & x=2 \text{ ou } x=-\frac{1}{4} \\
 & S = \left\{ -\frac{1}{4}, 2 \right\}
 \end{aligned}$$

ex 4

$$\begin{aligned}
 d) \quad & (3x-6)(7x+9) = 0 \\
 \Leftrightarrow & 3x-6=0 \text{ ou } 7x+9=0 \\
 \Leftrightarrow & 3x=6 \text{ ou } 7x=-9 \\
 \Leftrightarrow & x=2 \text{ ou } x=-\frac{9}{7} \\
 & S = \left\{ -\frac{9}{7}, 2 \right\}
 \end{aligned}$$

$$\begin{aligned}
 b) \quad & (2x+2)(5x-3) - (8x-5)(2x+2) = 0 \\
 \Leftrightarrow & (2x+2)[(5x-3) - (8x-5)] = 0 \\
 \Leftrightarrow & (2x+2)(5x-3-8x+5) = 0 \\
 \Leftrightarrow & (2x+2)(-3x+2) = 0 \\
 \Leftrightarrow & (2x+2)=0 \text{ ou } -3x+2=0 \\
 \Leftrightarrow & 2x=-2 \text{ ou } -3x=-2 \\
 \Leftrightarrow & x=-1 \text{ ou } x=\frac{-2}{-3} \\
 & x = \frac{2}{3} \\
 & S = \left\{ -1, \frac{2}{3} \right\}
 \end{aligned}$$

$$\begin{aligned}
 e) \quad & (2x^2-4)^2 + (2x-4)(7x+12) = 0 \\
 \Leftrightarrow & (2x-4)(2x-4) + (2x-4)(7x+12) = 0 \\
 \Leftrightarrow & (2x-4)[(2x-4) + (7x+12)] = 0 \\
 \Leftrightarrow & (2x-4)(2x-4+7x+12) = 0 \\
 \Leftrightarrow & (2x-4)(9x+8) = 0
 \end{aligned}$$

$$\Leftrightarrow 2x - 4 = 0 \quad \text{ou} \quad 9x + 8 = 0$$

$$\Leftrightarrow 2x = 4 \quad \text{ou} \quad 9x = -8$$

$$\Leftrightarrow x = 2 \quad \text{ou} \quad x = -\frac{8}{9}$$

$$S = \left\{ -\frac{8}{9}; 2 \right\}$$

ex 5

1. $E = 9x^2 - 30x + 25 - 24x^2 + 40x - 3x + 5$
 $E = -15x^2 + 7x + 30$

2. $E = (3x - 5) [(3x - 5) - (8x + 1)]$
 $E = (3x - 5) (3x - 5 - 8x - 1)$
 $E = (3x - 5) (-5x - 6)$

3. $x = -3$
 $E = -15 \times (-3)^2 + 7 \times (-3) + 30$
 $E = -15 \times 9 + (-21) + 30$
 $E = -135 + 7$
 $E = -128$

4. $E = 0$
 $\Leftrightarrow (3x - 5)(-5x - 6) = 0$
 $\Leftrightarrow 3x - 5 = 0 \quad \text{ou} \quad -5x - 6 = 0$
 $\Leftrightarrow 3x = 5 \quad \text{ou} \quad -5x = 6$
 $\Leftrightarrow x = \frac{5}{3} \quad \text{ou} \quad x = \frac{6}{-5}$
 $\Leftrightarrow x = \frac{5}{3} \quad \text{ou} \quad x = -1,2$

$$S = \left\{ -1,2; \frac{5}{3} \right\}$$

exc 6.

$$A = (x-7)(x+7)$$

$$B = [2 - (7x-5)][2 + (7x-5)]$$

$$B = (2 - 7x + 5)(2 + 7x - 5)$$

$$B = (7 - 7x)(7x - 3)$$

$$C = (3x - 5)^2$$

$$D = [(3x-5) - 2x][(3x-5) + 2x]$$

$$D = (3x - 5 - 2x)(3x - 5 + 2x)$$

$$D = (x - 5)(5x - 5)$$

$$E = (2x + 3)^2$$

$$F = [(8x-3) - (8x-1)][(8x-3) + (8x-1)]$$

$$F = (8x-3-8x+1)(8x-3+8x-1)$$

$$F = -2(16x-2)$$

exc 7

$$A = (x+1)^2 - 81$$

$$A = (x+1)^2 - 9^2$$

$$A = (x+1-9)(x+1+9)$$

$$A = (x-8)(x+10)$$

$$B = 1 - (3x-1)^2$$

$$B = 1^2 - (3x-1)^2$$

$$B = (1 - (3x-1))(1 + (3x-1))$$

$$B = (1-3x+1)(1+3x-1) = (2-3x)(2+3x)$$

$$C = 121x^2 - (10x-3)^2$$

$$C = (11x)^2 - (10x-3)^2$$

$$C = (11x - (10x-3))(11x + 10x-3)$$

$$C = (x+3)(21x-3)$$

exc 8

$$a) \quad 36 - x^2 = \overset{a}{\underbrace{6^2}} - \overset{b}{\underbrace{x^2}} \\ = (6 - x)(6 + x)$$

$$b) \quad 36x^2 - 81 = \overset{a}{\underbrace{(6x)^2}} - \overset{b}{\underbrace{9^2}} \\ = (6x - 9)(6x + 9)$$

$$c) \quad 25x^2 - 36 = \overset{a}{\underbrace{(5x)^2}} - \overset{b}{\underbrace{6^2}} \\ = (5x - 6)(5x + 6)$$

$$d) \quad (2x - 7)^2 - 49 = \overset{a}{\underbrace{(2x - 7)^2}} - \overset{b}{\underbrace{7^2}} \\ = [(2x - 7) - 7][(2x - 7) + 7] \\ = (2x - 14)(2x) \\ = 2x(2x - 14)$$

exc 9

1. a)

$$A_1 = 8x - 6$$

$$A_1 = 2(4x - 3)$$

b)

$$A_2 = 8x - 6 - (4x - 3)(2x + 5)$$

$$A_2 = \underline{2(4x - 3)} - \underline{(4x - 3)(2x + 5)}$$

$$A_2 = (4x - 3) \left(2 - (2x + 5) \right)$$

$$A_2 = (4x - 3) \left(2 - 2x - 5 \right)$$

$$A_2 = (4x - 3) \left(-3 - 2x \right)$$

2. a)

$$B_1 = 4x^2 - 1$$

$$B_1 = (2x)^2 - 1^2$$

$$B_1 = (2x - 1)(2x + 1)$$

$$\begin{aligned}
 b) \quad B_2 &= (x-8)(2x+1) + 4x^2 - 1 \\
 B_2 &= (x-8)(2x+1) + (2x-1)(2x+1) \\
 B_2 &= (2x-1)[(x-8) + (2x+1)] \\
 B_2 &= (2x-1)(x-8+2x+1) \\
 B_2 &= (2x-1)(3x-7)
 \end{aligned}$$

$$\begin{aligned}
 3. \quad a) \quad C_1 &= 25 - 60x + 36x^2 \\
 C_1 &= 5^2 - 2 \times 5 \times 6x + (6x)^2 \\
 C_1 &= (5 - 6x)^2
 \end{aligned}$$

ex 10

$$\begin{aligned}
 1) \quad & (3x+5) \left[(2x-4) - (7x-9) \right] \\
 &= (3x+5) (2x-4 - 7x+9) \\
 &= (3x+5) (-5x+5) \\
 &= (3x+5) (-x+1) \times 5 \\
 &= 5 (3x+5) (-x+1)
 \end{aligned}$$

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

$$\begin{aligned}
 3) \quad & (3x+1)^2 - (2x-7)(3x+1) \\
 &= (3x+1) \left[(3x+1) - (2x-7) \right] \\
 &= (3x+1) (3x+1 - 2x+7) \\
 &= (3x+1) (x+8)
 \end{aligned}$$

$$\begin{aligned}
 4) \quad & 25x^2 + 90x + 81 \\
 &= (5x)^2 + 2 \times 9 \times 5x + 9^2 \\
 &= (5x+9)^2
 \end{aligned}$$

$$\begin{aligned}
 5) \quad & (-3x+1)(2x+9) - 5(2x+9) \\
 &= (2x+9) [(-3x+1) - 5] \\
 &= (2x+9) (-3x-4)
 \end{aligned}$$