

SYSTEMES D'EQUATIONS

Collège La Providence - Montpellier

CORRIGE

EXERCICE 1

1. Multiplier chaque équation par le nombre donné :

a. $3 \times \{2x + y = 4\}$ $6x + 3y = 12$	b. $-2 \times \{x - 3y = -2\}$ $-2x + 6y = 4$
c. $4 \times \{-3x + 2y = -1\}$ $-12x + 8y = -4$	d. $-5 \times \{-x + 4y = 0\}$ $5x - 20y = 0$
e. $-6 \times \{-2x + 5y = -3\}$ $12x - 30y = 18$	f. $-3 \times \{7x - 3y = -9\}$ $-21x + 9y = 27$
g. $-3 \times \{7x - 2y = -4\}$ $-21x + 6y = 12$	h. $-7 \times \{-2x + 5y = -3\}$ $14x - 35y = 21$

2. Ajouter membre à membre et trouver x ou y :

$\begin{cases} x + y = 5 \\ x - y = 1 \end{cases}$ $2x = 6$ $x = \frac{6}{2}$ $x = 3$	$\begin{cases} 2x + 3y = -1 \\ x - 3y = 5 \end{cases}$ $3x = -1 + 5$ $3x = 4$ $x = \frac{4}{3}$	$\begin{cases} -3x + 5y = 2 \\ -x - 5y = -4 \end{cases}$ $-4x = 2 - 4$ $-4x = -2$ $x = \frac{-2}{-4}$ $x = \frac{1}{2}$
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3. Soustraire membre à membre et trouver x ou y :

a. $\begin{cases} x + y = 5 \\ x - y = 1 \end{cases}$ $y - (-y) = 5 - 1$ $2y = 4$ $y = \frac{4}{2}$ $y = 2$	b. $\begin{cases} 2x + 3y = -1 \\ x + 3y = 5 \end{cases}$ $2x - x = -1 - 5$ $x = -6$	c. $\begin{cases} 6x - 5y = 3 \\ 7x - 5y = -4 \end{cases}$ $6x - 7x = 3 - (-4)$ $-x = 3 + 4$ $-x = 7$ $-x \times (-1) = 7 \times (-1)$ $x = -7$
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EXERCICE 2 : Résoudre ces systèmes par combinaison → repérez les plus petits coefficients !

$$5 \times \begin{cases} 3x + 4y = 9 \\ 3x + 6y = 14 \end{cases} \quad 3 \times \begin{cases} 2x + 3y = -11 \\ 2x + 3y = 12 \end{cases} \quad 3 \times \begin{cases} 6x - 5y = 2 \\ -7x + 3y = 1 \end{cases} \quad 4 \times \begin{cases} 5x - 2y = -16 \\ 3x - 4y = -18 \end{cases} \quad 5 \times \begin{cases} 2x - 7y = 11 \\ -5x + 13y = -17 \end{cases}$$

REDACTION ATTENDUE EN CLASSE DE TROISIEME

$\begin{cases} 15x + 20y = 45 \\ 15x + 18y = 42 \end{cases}$	$\begin{cases} 6x + 9y = -33 \\ 6x - 10y = 24 \end{cases}$	$\begin{cases} 18x - 15y = 6 \\ -35x + 15y = 5 \end{cases}$	$\begin{cases} 20x - 8y = -64 \\ 6x - 8y = -36 \end{cases}$	$\begin{cases} 10x - 35y = 55 \\ -10x + 26y = -34 \end{cases}$
$20y - 18y = 45 - 42$	$9y + 10y = -33 - 24$	$18x - 35x = 6 + 5$	$20x - 6x = -64 + 36$	$-35y + 26y = 55 - 34$
$2y = 3$	$19y = -57$	$-17x = 11$	$14x = -28$	$-9y = 21$
$y = \frac{3}{2}$	$y = \frac{-57}{19}$	$x = -\frac{11}{17}$	$x = \frac{-28}{14}$	$y = \frac{21}{-9}$
	$y = -3$		$x = -2$	$y = -\frac{7}{3}$

4. Multiplier chaque équation par le nombre indiqué, puis additionner ou soustraire pour éliminer l'une des deux inconnues, et enfin trouver x ou y :

a. $2 \times \begin{cases} 2x + 3y = 5 \\ 3x - 2y = 3 \end{cases}$ $\begin{cases} 4x + 6y = 10 \\ 15x - 6y = 9 \end{cases}$ $(+) \text{ } \begin{cases} 4x + 6y = 10 \\ 15x - 6y = 9 \end{cases}$ $19x + 0y = 19$ $\frac{19x}{19} = \frac{19}{19}$ $x = 1$	b. $5 \times \begin{cases} 2x + 3y = 4 \\ 5x - y = 7 \end{cases}$ $-2 \times \begin{cases} 2x + 3y = 4 \\ 5x - y = 7 \end{cases}$ $\begin{cases} 10x + 15y = 20 \\ -10x + 2y = -14 \end{cases}$ $(+) \text{ } \begin{cases} 10x + 15y = 20 \\ -10x + 2y = -14 \end{cases}$ $0x + 17y = 6$ $\frac{17y}{17} = \frac{6}{17}$ $y = \frac{6}{17}$
c. $5 \times \begin{cases} 2x + 3y = 5 \\ 2x - 2y = 3 \end{cases}$ $2 \times \begin{cases} 2x + 3y = 5 \\ 2x - 2y = 3 \end{cases}$ $\begin{cases} 10x + 15y = 25 \\ 10x - 4y = 6 \end{cases}$ $(-) \text{ } \begin{cases} 10x + 15y = 25 \\ 10x - 4y = 6 \end{cases}$ $0x + 15y - (-4y) = 19$ $19y = 19$ $y = \frac{19}{19} = 1$	d. $4 \times \begin{cases} 4x + 3y = 27 \\ 3x + 4y = 23 \end{cases}$ $3 \times \begin{cases} 4x + 3y = 27 \\ 3x + 4y = 23 \end{cases}$ $\begin{cases} 16x + 12y = 108 \\ 15x + 12y = 69 \end{cases}$ $(-) \text{ } \begin{cases} 16x + 12y = 108 \\ 15x + 12y = 69 \end{cases}$ $0x + 15y - (-4y) = 108 - 69$ $16x - 15x + 0y = 108 - 69$ $x = 39$

SYSTEMES D'EQUATIONS

On utilise alors la ligne de son choix dans le système, de préférence celle ayant les plus petits coefficients.

$$15x + 20 \times \frac{3}{2} = 45 \quad 6x + 9 \times (-3) = -33 \quad 18 \times \left(-\frac{11}{17}\right) - 15y = 6 \quad 6 \times (-2) - 8y = -36 \quad 10x - 35 \times \left(-\frac{7}{3}\right) = 55$$

$$15x + 30 = 45 \quad 6x - 27 = -33 \quad -\frac{11 \times 18}{17} - 15y = 6 \quad -12 - 8y = -36 \quad 10x + \frac{35 \times 7}{3} = 55$$

$$15x = 45 - 30 \quad 6x = -33 + 27 \quad -15y = \frac{6 \times 17}{17} + \frac{198}{17} \quad -8y = -36 + 12 \quad 10x = \frac{55 \times 3}{3} - \frac{245}{3}$$

$$15x = 15 \quad 6x = -6 \quad -15y = \frac{102}{17} + \frac{198}{17} \quad -8y = -24 \quad 10x = \frac{165}{3} - \frac{245}{3}$$

$$x = \frac{15}{15} = 1 \quad x = \frac{-6}{6} = -1 \quad -15y = \frac{300}{17} \quad y = \frac{-24}{-8} = 3 \quad 10x = -\frac{80}{3}$$

$$y = -\frac{300}{17 \times 15} \quad x = -\frac{80}{3 \times 10}$$

$$y = -\frac{\boxed{15} \times 20}{17 \times \boxed{15}} = -\frac{20}{17} \quad x = -\frac{8}{3}$$

Couples solutions :

$$\left(1; \frac{3}{2}\right) \quad (-1; -3) \quad \left(-\frac{11}{17}; -\frac{20}{17}\right) \quad (-2; 3) \quad \left(-\frac{8}{3}; -\frac{7}{3}\right)$$

REDACTION ATTENDUE EN CLASSE DE SECONDE

$$\begin{cases} 15x + 20y = 45 \\ 15x + 18y = 42 \end{cases} \quad \begin{cases} 6x + 9y = -33 \\ 6x - 10y = 24 \end{cases} \quad \begin{cases} 18x - 15y = 6 \\ -35x + 15y = 5 \end{cases} \quad \begin{cases} 20x - 8y = -64 \\ 6x - 8y = -36 \end{cases} \quad \begin{cases} 10x - 35y = 55 \\ -10x + 26y = -34 \end{cases}$$

$$\begin{cases} 15x + 20y = 45 \\ 20y - 18y = 45 - 42 \end{cases} \quad \begin{cases} 6x + 9y = -33 \\ 9y + 10y = -33 - 24 \end{cases} \quad \begin{cases} 18x - 15y = 6 \\ 18x - 35x = 6 + 5 \end{cases} \quad \begin{cases} 20x - 6x = -64 + 36 \\ 6x - 8y = -36 \end{cases} \quad \begin{cases} 10x - 35y = 55 \\ -35y + 26y = 55 - 34 \end{cases}$$

$$\begin{cases} 15x + 20y = 45 \\ 2y = 3 \end{cases} \quad \begin{cases} 6x + 9y = -33 \\ 19y = -57 \end{cases} \quad \begin{cases} 18x - 15y = 6 \\ -17x = 11 \end{cases} \quad \begin{cases} 14x = -28 \\ 6x - 8y = -36 \end{cases} \quad \begin{cases} 10x - 35y = 55 \\ -9y = 21 \end{cases}$$

$$\begin{cases} 15x + 20y = 45 \\ y = \frac{3}{2} \end{cases} \quad \begin{cases} 6x + 9y = -33 \\ y = \frac{-57}{19} = -3 \end{cases} \quad \begin{cases} 18x - 15y = 6 \\ x = -\frac{11}{17} \end{cases} \quad \begin{cases} x = \frac{-28}{14} = -2 \\ 6x - 8y = -36 \end{cases} \quad \begin{cases} 10x - 35y = 55 \\ y = \frac{21}{-9} = -\frac{7}{3} \end{cases}$$

$$\begin{cases} 15x + 20 \times \frac{3}{2} = 45 \\ y = \frac{3}{2} \end{cases} \quad \begin{cases} 6x + 9 \times (-3) = -33 \\ y = -3 \end{cases} \quad \begin{cases} 18 \times \left(-\frac{11}{17}\right) - 15y = 6 \\ x = -\frac{11}{17} \end{cases} \quad \begin{cases} x = -2 \\ 6 \times (-2) - 8y = -36 \end{cases} \quad \begin{cases} 10x - 35 \times \left(-\frac{7}{3}\right) = 55 \\ y = -\frac{7}{3} \end{cases}$$

$$\begin{cases} 15x + 30 = 45 \\ y = \frac{3}{2} \end{cases} \quad \begin{cases} 6x - 27 = -33 \\ y = -3 \end{cases} \quad \begin{cases} -\frac{11 \times 18}{17} - 15y = 6 \\ x = -\frac{11}{17} \end{cases} \quad \begin{cases} x = -2 \\ -12 - 8y = -36 \end{cases} \quad \begin{cases} 10x + \frac{35 \times 7}{3} = 55 \\ y = -\frac{7}{3} \end{cases}$$

$$\begin{cases} 15x = 45 - 30 \\ y = \frac{3}{2} \end{cases} \quad \begin{cases} 6x = -33 + 27 \\ y = -3 \end{cases} \quad \begin{cases} -15y = \frac{6 \times 17}{17} + \frac{198}{17} \\ x = -\frac{11}{17} \end{cases} \quad \begin{cases} x = -2 \\ -8y = -36 + 12 \end{cases} \quad \begin{cases} 10x = \frac{55 \times 3}{3} - \frac{245}{3} \\ y = -\frac{7}{3} \end{cases}$$

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$$\begin{cases} 15x = 15 \\ y = \frac{3}{2} \end{cases}$$

$$\begin{cases} 6x = -6 \\ y = -3 \end{cases}$$

$$\begin{cases} -15y = \frac{102}{17} + \frac{198}{17} \\ x = -\frac{11}{17} \end{cases}$$

$$\begin{cases} x = -2 \\ -8y = -24 \end{cases}$$

$$\begin{cases} 10x = \frac{165}{3} - \frac{245}{3} \\ y = -\frac{7}{3} \end{cases}$$

$$\begin{cases} x = \frac{15}{15} = 1 \\ y = \frac{3}{2} \end{cases}$$

$$\begin{cases} x = \frac{-6}{6} = -1 \\ y = -3 \end{cases}$$

$$\begin{cases} -15y = \frac{300}{17} \\ x = -\frac{11}{17} \end{cases}$$

$$\begin{cases} x = -2 \\ y = \frac{-24}{-8} = 3 \end{cases}$$

$$\begin{cases} 10x = -\frac{80}{3} \\ y = -\frac{7}{3} \end{cases}$$

$$\begin{cases} y = -\frac{300}{17 \times 15} \\ x = -\frac{11}{17} \end{cases}$$

$$\begin{cases} x = -\frac{80}{3 \times 10} \\ y = -\frac{7}{3} \end{cases}$$

$$\begin{cases} y = -\frac{\boxed{15} \times 20}{17 \times \boxed{15}} = -\frac{20}{17} \\ x = -\frac{11}{17} \end{cases}$$

$$\begin{cases} x = -\frac{8}{3} \\ y = -\frac{7}{3} \end{cases}$$