

# Chapitre 3. Equations 1<sup>er</sup> degré à une inconnue - Corrigé

## Exercice 1

$$1. \begin{array}{l|l} x+5=8 & -5 \\ \hline x=3 & \end{array}$$

$$2. \begin{array}{l|l} y-2=-7 & +2 \\ \hline y=-5 & \end{array}$$

$$3. \begin{array}{l|l} 7x-18=3 & +18 \\ 7x=21 & :7 \\ \hline x=3 & \end{array}$$

$$4. \begin{array}{l|l} z+5=15 & -5 \\ \hline z=10 & \end{array}$$

$$5. \begin{array}{l|l} 8+x=8 & -8 \\ \hline x=0 & \end{array}$$

$$6. \begin{array}{l|l} 27=4y-9 & +9 \\ 36=4y & :4 \\ \hline 9=y & \end{array}$$

$$7. \begin{array}{l|l} 16x-17x=1 & R \\ -x=1 & \cdot(-1) \\ \hline x=-1 & \end{array}$$

$$8. \begin{array}{l|l} 3x+5=2x+9 & -2x \\ x+5=9 & -5 \\ \hline x=4 & \end{array}$$

$$9. \begin{array}{l|l} 9z-9=6z-6 & -6z \\ 3z-9=-6 & +9 \\ 3z=3 & :3 \\ \hline z=1 & \end{array}$$

$$10. \begin{array}{l|l} 3-5y=2y+3 & -2y \\ 3-7y=3 & -3 \\ -7y=0 & :(-7) \\ \hline y=0 & \end{array}$$

$$11. \begin{array}{l|l} x+3=2x-7 & -x \\ 3=x-7 & +4 \\ \hline 7=x & \end{array}$$

$$12. \begin{array}{l|l} 50s-5=45s-15 & -45s \\ 5s-5=-15 & +5 \\ 5s=-10 & :5 \\ \hline s=-2 & \end{array}$$

$$13. \begin{array}{l|l} 10x-7=3+8x & -8x \\ 2x-7=3 & +7 \\ 2x=10 & :2 \\ \hline x=5 & \end{array}$$

$$14. \begin{array}{l|l} 4x+1=x+25 & -x \\ 3x+1=25 & -1 \\ 3x=24 & :3 \\ \hline x=8 & \end{array}$$

$$15. \begin{array}{l|l} z-1=2z-2 & -z \\ -1=z-2 & +2 \\ \hline 1=z & \end{array}$$

Exercia 2

$$\begin{array}{l|l}
 1. & \\
 0,5u - 6,3 = 3,7u - 9,5 & -0,5u \\
 -6,3 = 3,2u - 9,5 & +9,5 \\
 3,2 = 3,2u & :3,2 \\
 \underline{1 = u} & 
 \end{array}$$

$$\begin{array}{l|l}
 2. & \\
 4,3b - 3,9 = 2,4b + 5,6 & -2,4b \\
 1,9b - 3,9 = 5,6 & +3,9 \\
 1,9b = 9,5 & :1,9 \\
 \underline{b = 5} & 
 \end{array}$$

$$\begin{array}{l|l}
 3. & \\
 8,3 - 3x = 2,1 + 7,2x + 6,2 & R \\
 8,3 - 3x = 7,2x + 8,3 & +3x \\
 8,3 = 10,2x + 8,3 & -8,3 \\
 0 = 10,2x & :10,2 \\
 \underline{0 = x} & 
 \end{array}$$

$$\begin{array}{l|l}
 4. & \\
 10x - 2,05 = 4,9x + 1,75 - 2,5x & R \\
 10x - 2,05 = 2,4x + 1,75 & -2,4x \\
 7,6x - 2,05 = 1,75 & +2,05 \\
 7,6x = 3,8 & :7,6 \\
 \underline{x = 0,5} & 
 \end{array}$$

$$\begin{array}{l|l}
 5. & \\
 0,2y - 0,089y + 1,78 = y - 16 & R \\
 0,111y + 1,78 = y - 16 & -0,111y \\
 1,78 = 0,889y - 16 & +16 \\
 17,78 = 0,889y & :0,889 \\
 \underline{20 = y} & 
 \end{array}$$

$$\begin{array}{l|l}
 6. & \\
 2,32m - 6,84 = 1,92 - 1,66m & +1,66m \\
 4,38m - 6,84 = 1,92 & +6,84 \\
 4,38m = 8,76 & :4,28 \\
 \underline{m = 2} & 
 \end{array}$$

## Exercice 3

1.  $5t + (7-t) = -1$

$5t + 7 - t = -1$

$4t + 7 = -1$

$4t = -8$

$t = -2$

D

R

-7

:4

6.  $x - [(3-6x) - (12x-9)] = x+15$

$x - [3-6x-12x+9] = x+15$

$x - [12-18x] = x+15$

$x-12+18x = x+15$

$19x-12 = x+15$

$18x-12 = 15$

$18x = 27$

$x = 1,5$

D

R

D

R

-x

+12

:x

2.  $8x + (x-7) = 9x - (3+4x)$

$8x + x - 7 = 9x - 3 - 4x$

$9x - 7 = 5x - 3$

$4x - 7 = -3$

$4x = 4$

$x = 1$

D

R

-5x

+7

:4

7.  $3(5x-8) = 4(5x-7) - 1$

$15x - 24 = 20x - 28 - 1$

$15x - 24 = 20x - 29$

$-24 = 5x - 29$

$5 = 5x$

$x = 1$

D

R

-15x

+29

:5

3.  $8t - (9+4t) - 5 = 7t - 6$

$8t - 9 - 4t - 5 = 7t - 6$

$4t - 14 = 7t - 6$

$-14 = 3t - 6$

$-8 = 3t$

$-\frac{8}{3} = t$

D

R

-4t

+6

:3

8.  $10(x+3) - 4 = 5(3-x) - 4$

$10x + 30 - 4 = 15 - 5x - 4$

$10x + 26 = 11 - 5x$

$15x + 26 = 11$

$15x = -15$

$x = -1$

D

R

+5x

-26

:15

4.  $0 = 14 + 2x - (3x+6) - 8x$

$0 = 14 + 2x - 3x - 6 - 8x$

$0 = 8 - 9x$

$9x = 8$

$x = \frac{8}{9}$

D

R

+9x

:9

5.  $-9z = (7z-15) - (10z-8+5z)$

$-9z = 7z - 15 - 10z + 8 - 5z$

$-9z = -8z - 7$

$-z = -7$

$z = 7$

D

R

+8z

:(-1)

### Exercice 4

1.  $(7-x)(4-x) = (1-x)(8-x)$   
 $28-7x-4x+x^2 = 8-x-8x+x^2$   
 $28-11x+x^2 = 8-9x+x^2$   
 $28-11x = 8-9x$   
 $28 = 8+2x$   
 $20 = 2x$   
 $10 = x$

D  
R  
-x<sup>2</sup>  
+11x  
-8  
:2

6.  $(x-5)(x-6) = x(x-8)$   
 $x^2-6x-5x+30 = x^2-8x$   
 $x^2-11x+30 = x^2-8x$   
 $-11x+30 = -8x$   
 $30 = 3x$   
 $10 = x$

D  
R  
-x<sup>2</sup>  
+11x  
:3

2.  $5(x^2+2) = (x-1)(3x+2)$   
 $5x^2+10 = 5x^2+2x-3x-2$   
 $5x^2+10 = 5x^2-3x-2$   
 $10 = -3x-2$   
 $12 = -3x$   
 $-4 = x$

D  
R  
-5x<sup>2</sup>  
+2  
:(-3)

7.  $1-(2x-1)^2 = 4x(2-x)$   
 $1-(4x^2-4x+1) = 8x-4x^2$   
 $1-4x^2+4x-1 = 8x-4x^2$   
 $4x-4x^2 = 8x-4x^2$   
 $0 = 4x$   
 $0 = x$

Id rem + D  
D  
R  
+4x<sup>2</sup>, -4x  
:4

3.  $(a+5)^2 - (a-3)^2 = 32$   
 $a^2+10a+25 - (a^2-6a+9) = 32$   
 $a^2+10a+25 - a^2+6a-9 = 32$   
 $16a+16 = 32$   
 $16a = 16$   
 $a = 1$

Id rem.  
D  
R  
-16  
:16

8.  $(r-2)^2 - (r^2-36) = 12$   
 $r^2-4r+4 - r^2+36 = 12$   
 $-4r+40 = 12$   
 $-4r = -28$   
 $r = 7$

Id rem + D  
R  
-40  
:(-4)

4.  $(z+1)^2 - (z^2+30) = 59$   
 $z^2+2z+1 - z^2-30 = 59$   
 $2z-29 = 59$   
 $2z = 88$   
 $z = 44$

Id rem + D  
R  
+29  
:2

9.  $4(3p+5) = 2(6p-5)$   
 $12p+20 = 12p-10$   
 $20 = -10$  impossible  
 $\Rightarrow$  aucune solution

D  
-12p

5.  $(m+5)^2 - (m-5)^2 = 500$   
 $m^2+10m+25 - (m^2-10m+25) = 500$   
 $m^2+10m+25 - m^2+10m-25 = 500$   
 $20m = 500$   
 $m = 25$

Id rem  
D  
R  
:20

10.  $4(2q+3) = 2(4q+6)$   
 $8q+12 = 8q+12$   
 $12 = 12$  toujours vrai  
 $\Rightarrow$  infinité de solutions

D  
-8q

Exercice 5

$$\begin{array}{l|l}
 1. \quad 2\{3x-2[x-5(x-1)+3]-5\} = x & \mathcal{D} \\
 2\{3x-2[x-5x+5+3]-5\} = x & \mathcal{R} \\
 2\{3x-2[-4x+8]-5\} = x & \mathcal{D} \\
 2\{3x+8x-16-5\} = x & \mathcal{R} \\
 2\{11x-21\} = x & \mathcal{D} \\
 22x-42 = x & -21x \\
 -42 = -21x & :(-21) \\
 \underline{2 = x} & 
 \end{array}$$

$$\begin{array}{l|l}
 2. \quad 6 - \{[5x - (7-x) + 3] + x\} = 10 - 7x & \mathcal{D} \\
 6 - \{[5x - 7 + x + 3] + x\} = 10 - 7x & \mathcal{R} \\
 6 - \{[6x - 4] + x\} = 10 - 7x & [ ] \\
 6 - \{6x - 4 + x\} = 10 - 7x & \mathcal{R} \\
 6 - \{7x - 4\} = 10 - 7x & \mathcal{D} \\
 6 - 7x + 4 = 10 - 7x & \mathcal{R} \\
 10 - 7x = 10 - 7x & +7x \\
 10 = 10 \text{ toujours vrai} & \\
 \Rightarrow \underline{\text{infinité de solutions}} & 
 \end{array}$$

$$\begin{array}{l|l}
 3. \quad (x-5)(x+7) + (x-5)(x+3) - (2x-5)(x+1) = 0 & \mathcal{D} \\
 x^2 + 7x - 5x - 35 + x^2 + 3x - 5x - 15 - (2x^2 + 2x - 5x - 5) = 0 & \mathcal{R} \\
 2x^2 - 50 - (2x^2 - 3x - 5) = 0 & \mathcal{D} \\
 2x^2 - 50 - 2x^2 + 3x + 5 = 0 & \mathcal{R} \\
 3x - 45 = 0 & +45 \\
 3x = 45 & :3 \\
 \underline{x = 15} & 
 \end{array}$$

$$\begin{array}{l|l}
 4. \quad (x+1)^3 - 3(x^2-1) - (x^2-1) = 11 & \text{Idem + } \mathcal{D}: (a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3 \\
 x^3 + 3x^2 + 3x + 1 - 3x^2 + 3 - x^2 + 1 = 11 & \mathcal{R} \\
 3x + 5 = 11 & -5 \\
 3x = 6 & :3 \\
 \underline{x = 2} & 
 \end{array}$$

$$5. (2x+3)^3 - (6x-5)^2 - 2x(4x^2-3) = -238$$

$$8x^3 + 36x^2 + 54x + 27 - (36x^2 - 60x + 25) - 8x^3 + 6x = -238$$

$$36x^2 + 60x + 27 - 36x^2 + 60x - 25 = -238$$

$$120x + 2 = -238$$

$$120x = -240$$

$$\underline{x = -2}$$

Id rem + 1  
R + 1  
R  
-2  
:120

$$6. (x+2)^3 - 8 = x(x+3)^2 + 3x$$

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

$$x^3 + 6x^2 + 12x = x^3 + 6x^2 + 9x + 3x$$

$$x^3 + 6x^2 + 12x = x^3 + 6x^2 + 12x$$

0 = 0 toujours vrai  
=> infinite de solutions

Id rem  
R + 1  
R  
-x^2 - 6x^2 - 12x

$$7. (x+2)^3 + 8 = x(x+3)^2 + 3x$$

$$x^3 + 6x^2 + 12x + 8 + 8 = x(x^2 + 6x + 9) + 3x$$

$$x^3 + 6x^2 + 12x + 16 = x^3 + 6x^2 + 9x + 3x$$

$$x^3 + 6x^2 + 12x + 16 = x^3 + 6x^2 + 12x$$

16 = 0 impossible  
=> aucune solution

Id rem  
R + 1  
R  
-x^2 - 6x^2 - 12x

Exercice 6

$$1. \quad \frac{x}{2} + \frac{x}{3} = 10$$

$$\frac{3x}{6} + \frac{2x}{6} = \frac{60}{6}$$

$$3x + 2x = 60$$

$$5x = 60$$

$$\underline{x = 12}$$

D.C. (dénominateur commun)  
· 6  
R  
: 5

$$2. \quad x + \frac{x}{2} + \frac{x}{3} = 11$$

$$\frac{6x}{6} + \frac{3x}{6} + \frac{2x}{6} = \frac{66}{6}$$

$$6x + 3x + 2x = 66$$

$$11x = 66$$

$$\underline{x = 6}$$

D.C.  
· 6  
R  
: 11

$$3. \quad \frac{x}{2} - 2 - \frac{x}{4} + \frac{x}{5} = 7$$

$$\frac{10x}{20} - \frac{40}{20} - \frac{5x}{20} + \frac{4x}{20} = \frac{140}{20}$$

$$10x - 40 - 5x + 4x = 140$$

$$9x - 40 = 140$$

$$9x = 180$$

$$\underline{x = 20}$$

D.C.  
· 20  
R  
+ 40  
: 9

$$4. \quad \frac{2}{3}x - \frac{7}{4}x - 5 = \frac{5}{6}x + \frac{1}{2}x - \frac{39}{2}$$

$$\frac{40x}{60} - \frac{105x}{60} - \frac{300}{60} = \frac{50x}{60} + \frac{30x}{60} - \frac{1170}{60}$$

$$40x - 105x - 300 = 50x + 30x - 1170$$

$$-65x - 300 = 80x - 1170$$

$$-145x = -870$$

$$\underline{x = 6}$$

D.C.  
· 60  
R  
- 80x + 300  
: (-145)

$$5. \quad 3x - \frac{1}{2} \left( \frac{x}{5} + 6 \right) = 25 + \frac{3x}{2}$$

$$3x - \frac{x}{10} - 3 = 25 + \frac{3x}{2}$$

$$\frac{30x}{10} - \frac{x}{10} - \frac{30}{10} = \frac{250}{10} + \frac{15x}{10}$$

$$30x - x - 30 = 250 + 15x$$

$$29x - 30 = 250 + 15x$$

$$14x = 280$$

$$\underline{x = 20}$$

D  
D.C.  
· 10  
R  
- 15x + 30  
: 14

$$6. \frac{2x}{5} - \frac{1}{3} \left( \frac{5x}{4} - 4 \right) = x + \frac{27}{5}$$

$$\frac{2x}{5} - \frac{5x}{12} + \frac{4}{3} = x + \frac{27}{5}$$

$$\frac{24x}{60} - \frac{25x}{60} + \frac{80}{60} = \frac{60x}{60} + \frac{324}{60}$$

$$24x - 25x + 80 = 60x + 324$$

$$-x + 80 = 60x + 324$$

$$-61x = 244$$

$$x = -4$$

D  
D.C.  
·60  
R  
-60x - 80  
: (-61)

$$7. \frac{2x+1}{3} + \frac{3x+1}{4} = 18 - \frac{5x-2}{7}$$

$$\frac{56x+28}{84} + \frac{63x+21}{84} = \frac{2352}{84} - \left( \frac{60x-24}{84} \right)$$

$$56x+28+63x+21 = 2352 - (60x-24)$$

$$56x+28+63x+21 = 2352 - 60x + 24$$

$$119x + 49 = 2376 - 60x$$

$$179x = 2327$$

$$x = 13$$

D.C.  
·84  
D  
R  
+60x - 49  
: 179

$$8. \frac{1}{8} = \frac{6x+7}{8} - \frac{x+1}{2} + \frac{4-3x}{5}$$

$$\frac{5}{40} = \frac{30x+35}{40} - \left( \frac{20x+10}{40} \right) + \frac{32-24x}{40}$$

$$5 = 30x+35 - (20x+10) + 32-24x$$

$$5 = 30x+35 - 20x - 10 + 32 - 24x$$

$$5 = -14x + 47$$

$$-42 = -14x$$

$$3 = x$$

D.C.  
·40  
D  
R  
-47  
: (-14)

$$9. \frac{x+3}{2} - \frac{x-2}{3} - \frac{3x-5}{12} = \frac{1}{4}$$

$$\frac{6x+18}{12} - \left( \frac{4x-8}{12} \right) - \left( \frac{3x-5}{12} \right) = \frac{3}{12}$$

$$6x+18 - (4x-8) - (3x-5) = 3$$

$$6x+18 - 4x+8 - 3x+5 = 3$$

$$-x + 31 = 3$$

$$-x = -28$$

$$x = 28$$

D.C.  
·12  
D  
R  
-31  
· (-1)



$$10. \frac{5x-11}{4} - \frac{x-1}{10} = \frac{11x-1}{12}$$

$$\frac{75x-165}{60} - \left(\frac{6x-6}{60}\right) = \frac{55x-5}{60}$$

$$75x-165 - (6x-6) = 55x-5$$

$$75x-165-6x+6 = 55x-5$$

$$69x-159 = 55x-5$$

$$14x = 154$$

$$\underline{x = 11}$$

D.C.

·60

D

R

-55x + 159

:14

$$11. \frac{5}{4} \left(\frac{x}{3} - 1\right) - \frac{3}{2} \left(\frac{x}{5} - 1\right) = 2$$

$$\frac{5x}{12} - \frac{5}{4} - \frac{3x}{10} + \frac{3}{2} = 2$$

$$\frac{25x}{60} - \frac{75}{60} - \frac{18x}{60} + \frac{90}{60} = \frac{120}{60}$$

$$25x - 75 - 18x + 90 = 120$$

$$7x + 15 = 120$$

$$7x = 105$$

$$\underline{x = 15}$$

D

D.C.

·60

R

-15

:7

$$12. \frac{2}{3} \left(\frac{x}{4} - 3\right) - \frac{1}{2} \left(\frac{x}{3} - 2\right) = \frac{1}{4} \left(2 - \frac{x}{6}\right)$$

$$\frac{2x}{12} - \frac{6}{3} - \frac{x}{6} + \frac{2}{2} = \frac{2}{4} - \frac{x}{24}$$

$$\frac{4x}{24} - \frac{48}{24} - \frac{4x}{24} + \frac{24}{24} = \frac{12}{24} - \frac{x}{24}$$

$$4x - 48 - 4x + 24 = 12 - x$$

$$-24 = 12 - x$$

$$-36 = -x$$

$$\underline{36 = x}$$

D

D.C.

·24

R

-12

·(-1)

Exercice 7

1.  $\frac{x+1}{x} - 2 = \frac{x-1}{x}$  : on doit avoir  $x \neq 0$ , sinon on divise par 0.

$\frac{x+1}{x} - 2 = \frac{x-1}{x}$	· x
$x+1 - 2x = x-1$	R
$-x+1 = x-1$	+x+1
$2 = 2x$	: 2
<u><math>1 = x</math></u>	OK car $1 \neq 0$

2.  $\frac{1}{x} + 3 = \frac{x-1}{x}$  : on doit avoir  $x \neq 0$ , sinon on divise par 0.

$\frac{1}{x} + 3 = \frac{x-1}{x}$	· x
$1+3x = x-1$	-x-1
$2x = -2$	: 2
<u><math>x = -1</math></u>	OK car $-1 \neq 0$

3.  $\frac{3}{2} + \frac{1}{x-3} = \frac{1}{2}$  : on doit avoir  $x \neq 3$ , sinon on divise par 0.

$\frac{3}{2} + \frac{1}{x-3} = \frac{1}{2}$	D.C
$\frac{3(x-3)}{2(x-3)} + \frac{2}{2(x-3)} = \frac{x-3}{2(x-3)}$	· 2(x-3)
$3(x-3) + 2 = x-3$	D
$3x-9+2 = x-3$	R
$3x-7 = x-3$	-x+7
$2x = 4$	: 2
<u><math>x = 2</math></u>	OK car $2 \neq 3$

4.  $\frac{3}{4} - \frac{2}{x+1} = \frac{1}{2}$  : on doit avoir  $x \neq -1$ , sinon on divise par 0.

$\frac{3}{4} - \frac{2}{x+1} = \frac{1}{2}$	D.C.
$\frac{3(x+1)}{4(x+1)} - \frac{8}{4(x+1)} = \frac{2(x+1)}{4(x+1)}$	· 4(x+1)
$3(x+1) - 8 = 2(x+1)$	D
$3x+3-8 = 2x+2$	R
$3x-5 = 2x+2$	-2x+5
<u><math>x = 7</math></u>	OK car $7 \neq -1$

5.  $3 - \frac{1}{x-2} = \frac{-3x-1}{x-2}$  : on doit avoir  $x \neq 2$ , sinon on divise par 0.

$$\begin{array}{l|l} 3 - \frac{1}{x-2} = \frac{-3x-1}{x-2} & \cdot (x-2) \\ \hline 3(x-2) - 1 = -3x-1 & \text{D} \\ 3x-6-1 = -3x-1 & \text{R} \\ 3x-7 = -3x-1 & +3x+7 \\ 6x = 6 & :6 \end{array}$$

$x=1$  OK car  $1 \neq 2$ .

6.  $\frac{x-1}{x+1} - 3 = \frac{x}{x+1} - 2$  : on doit avoir  $x \neq -1$ , sinon on divise par 0.

$$\begin{array}{l|l} \frac{x-1}{x+1} - 3 = \frac{x}{x+1} - 2 & \cdot (x+1) \\ \hline x-1-3(x+1) = x-2(x+1) & \text{D} \\ x-1-3x-3 = x-2x-2 & \text{R} \\ -2x-4 = -x-2 & +x+4 \\ -x = 2 & \cdot (-1) \end{array}$$

$x=-2$  OK car  $-2 \neq -1$

7.  $\frac{x-4}{x-6} = 2$  : on doit avoir  $x \neq 6$ , sinon on divise par 0.

$$\begin{array}{l|l} \frac{x-4}{x-6} = 2 & \cdot (x-6) \\ \hline x-4 = 2(x-6) & \text{D} \\ x-4 = 2x-12 & -x+12 \end{array}$$

$8=x$  OK car  $8 \neq 6$ .

8.  $\frac{x-4}{x-6} = 1$  : on doit avoir  $x \neq 6$ , sinon on divise par 0

$$\begin{array}{l|l} \frac{x-4}{x-6} = 1 & \cdot (x-6) \\ \hline x-4 = x-6 & -x \end{array}$$

$-4 = -6$  impossible  $\Rightarrow$  aucune solution

9.  $\frac{x-4}{x-6} = 0$  : on doit avoir  $x \neq 6$ , sinon on divise par 0

$$\begin{array}{l|l} \frac{x-4}{x-6} = 0 & \cdot (x-6) \\ \hline x-4 = 0 & +4 \end{array}$$

$x=4$  OK car  $4 \neq 6$