

Exemples d'introduction:

①  $x^2 + 1 = 0 \rightarrow$  impossible

La somme de 2 nombres positifs (ou nuls) ne peut être nulle sans que tous les 2 soient nuls.

②  $x^2 - 7 = 0$  solutions?  $\left| \begin{array}{l} x = \sqrt{7} \\ x = -\sqrt{7} \end{array} \right.$

③  $(x+2)^2 + 1 = 0 \rightarrow$  impossible

④  $(x+2)^2 - 9 = 0 \Leftrightarrow (x+2)^2 = 9$   
 $\Leftrightarrow \begin{cases} x+2 = 3 \\ \text{ou} \\ x+2 = -3 \end{cases} \Leftrightarrow \begin{cases} x = 1 \\ \text{ou} \\ x = -5 \end{cases}$

⑤  $\frac{1}{2}(x+3)^2 - 7 = 0 \Leftrightarrow \frac{1}{2}(x+3)^2 = 7 \Leftrightarrow (x+3)^2 = 14$

$\Leftrightarrow x+3 = \sqrt{14} \text{ ou } x+3 = -\sqrt{14}.$

$\Leftrightarrow \begin{cases} x = -3 + \sqrt{14} \\ x = -3 - \sqrt{14} \end{cases}$

⑥  $x^2 - 6x - 5 = 0$

$\begin{array}{c} \updownarrow \quad \searrow \\ (x-3)^2 - 9 - 5 = 0 \Leftrightarrow (x-3)^2 - 14 = 0 \end{array}$

$\Leftrightarrow (x-3)^2 = 14$

$x-3 = \sqrt{14}$

ou

$x-3 = -\sqrt{14}$

 $\updownarrow$ 

$x = 3 + \sqrt{14}$

ou

$x = 3 - \sqrt{14}.$



$$\textcircled{7} \quad x^2 + 3x - 1 = 0$$

$$\Downarrow$$

$$\left(x + \frac{3}{2}\right)^2 - \frac{9}{4} - 1 = 0$$

$$\Leftrightarrow \left(x + \frac{3}{2}\right)^2 = \frac{13}{4} \Leftrightarrow x + \frac{3}{2} = \frac{\sqrt{13}}{2}$$

$$x + \frac{3}{2} = -\frac{\sqrt{13}}{2}$$

$$\Leftrightarrow \begin{cases} x = \frac{-3 + \sqrt{13}}{2} \\ \text{ou} \\ x = \frac{-3 - \sqrt{13}}{2} \end{cases}$$

$$\textcircled{8} \quad \frac{1}{2}x^2 + 5x - 8 = 0$$

$$\Downarrow$$

$$\frac{1}{2}(x^2 + 10x) - 8 = 0$$

$$\frac{1}{2}(x^2 + 10x) = 8$$

$$\frac{1}{2}(x+5)^2 - \frac{25}{2} - 8 = 0$$

$$\frac{1}{2}(x+5)^2 - \frac{41}{2} = 0$$

$$(x+5)^2 - 41 = 0$$

$$x+5 = \sqrt{41} \text{ ou } -\sqrt{41}$$

$$\begin{cases} x = \sqrt{41} - 5 \\ x = -\sqrt{41} - 5 \end{cases}$$

$$\textcircled{9} \quad \frac{1}{3}x^2 + 5x - 9 = 0$$

$$\frac{1}{3}(x^2 + 15x) = 9$$

$$\frac{1}{3}\left(x + \frac{15}{2}\right)^2 - \frac{225}{4} - 9 = 0$$

$$\frac{1}{3}\left(x + \frac{15}{2}\right)^2 - \frac{75}{4} - \frac{36}{4} = 0 \Leftrightarrow \frac{1}{3}\left(x + \frac{15}{2}\right)^2 = \frac{111}{4}$$

$$\Leftrightarrow \left(x + \frac{15}{2}\right)^2 = \frac{333}{4} \Leftrightarrow \begin{cases} x + \frac{15}{2} = \frac{\sqrt{333}}{2} \\ x + \frac{15}{2} = -\frac{\sqrt{333}}{2} \end{cases} \Leftrightarrow \begin{cases} x = \frac{-15 + \sqrt{333}}{2} \\ \text{ou} \\ x = \frac{-15 - \sqrt{333}}{2} \end{cases}$$