

I/ Résoudre dans $\mathbb{R}$

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

$$\frac{1}{7}x^2 - \frac{1}{5}x + 189 = 189$$

$$\frac{x-5}{20} - \frac{3x-7}{60} = \frac{x-3}{5}$$

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

$$\frac{2}{3}x^2 - \frac{1}{5}x = 0$$

$$\left(\frac{x}{5} - 2\right)^2 = \left(x - \frac{1}{7}\right)^2$$

$$\left(5x - \frac{1}{2}\right)\left(\frac{1}{3}x + 5\right)\frac{5}{3} = 0$$

$$x \left(\frac{2}{3}x - \frac{1}{5} \right) = 0$$

$$\Leftrightarrow x = 0 \quad \text{ou} \quad \frac{2}{3}x - \frac{1}{5} = 0$$

$$\frac{2}{3}x = \frac{1}{5}$$

$$x = \frac{\frac{1}{5}}{\frac{2}{3}} = \frac{1}{5} \times \frac{3}{2}$$

$$x = \frac{3}{10}$$

$$S = \left\{ 0, \frac{3}{10} \right\}$$

$$a. \quad \frac{7}{2}x - \frac{4}{3}x^2 = 0 \quad \Leftrightarrow \quad x \left(\frac{7}{2} - \frac{4}{3}x \right) = 0 \quad \leftarrow \text{equat}^o \text{ prod. nul}$$

$$\Leftrightarrow x = 0 \quad \text{ou} \quad \frac{7}{2} - \frac{4}{3}x = 0$$

$$\frac{7}{2} = \frac{4}{3}x$$

$$\frac{7}{2} \times \frac{3}{4} = x$$

$$x = \frac{21}{8}$$

$$S = \left\{ 0; \frac{21}{8} \right\}$$

$$\frac{x-5}{20} - \frac{3x-7}{60} = \frac{x-3}{5} \quad \Leftrightarrow \quad \frac{3x-15}{60} - \frac{3x-7}{60} = \frac{12x-36}{60}$$

$$\Leftrightarrow \quad \cancel{3x} - 15 - \cancel{3x} + 7 = 12x - 36$$

$$\Leftrightarrow \quad -8 = 12x - 36$$

$$\Leftrightarrow \quad -8 + 36 = 12x$$

$$\Leftrightarrow \quad 28 = 12x$$

$$\Leftrightarrow \quad x = \frac{28}{12} = \frac{7}{3}$$

$$S = \left\{ \frac{7}{3} \right\}$$

$$\frac{1}{7}x^2 - \frac{1}{5}x + 189 = 189$$

$$\Leftrightarrow \frac{1}{7}x^2 - \frac{1}{5}x = 0$$

$$\Leftrightarrow x \left(\frac{1}{7}x - \frac{1}{5} \right) = 0$$

$$\Leftrightarrow x = 0$$

ou

$$\frac{1}{7}x - \frac{1}{5} = 0$$

$$\frac{1}{7}x = \frac{1}{5}$$

$$x = \frac{1}{5} \times \frac{7}{1} = \frac{7}{5}$$

$$S = \left\{ 0; \frac{7}{5} \right\}$$

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

$$\Leftrightarrow \underbrace{\left(x - \frac{1}{4}\right)^2}_a - \underbrace{\left(\frac{1}{3}\right)^2}_b = 0$$

$$a^2 - b^2 = (a-b)(a+b)$$

factoriser

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

simplifier

$$\Leftrightarrow \left(x - \frac{3}{12} - \frac{4}{12}\right) \left(x - \frac{3}{12} + \frac{4}{12}\right) = 0$$

$$\Leftrightarrow \left(x - \frac{7}{12}\right) \left(x + \frac{1}{12}\right) = 0$$

← équation produit nul

$$\Leftrightarrow x - \frac{7}{12} = 0 \quad \text{ou} \quad x + \frac{1}{12} = 0$$

$$\Leftrightarrow x = \frac{7}{12} \quad \text{ou} \quad x = -\frac{1}{12}$$

$$S = \left\{ -\frac{1}{12} ; \frac{7}{12} \right\}$$

$$\left(x + \frac{1}{5}\right)^2 = \frac{1}{36} \quad \Leftrightarrow \left(x + \frac{1}{5}\right)^2 - \frac{1}{36} = 0$$

$$\begin{aligned} \Leftrightarrow \underbrace{\left(x + \frac{1}{5}\right)^2}_{a^2} - \underbrace{\left(\frac{1}{6}\right)^2}_{b^2} &= 0 \\ &= (a - b)(a + b) \end{aligned}$$

$$\Leftrightarrow \left(x + \frac{1}{5} - \frac{1}{6}\right) \left(x + \frac{1}{5} + \frac{1}{6}\right) = 0$$

$$\Leftrightarrow \left(x + \frac{6}{30} - \frac{5}{30}\right) \left(x + \frac{6}{30} + \frac{5}{30}\right) = 0$$

$$\Leftrightarrow \left(x + \frac{1}{30}\right) \left(x + \frac{11}{30}\right) = 0$$

$$\Leftrightarrow x + \frac{1}{30} = 0 \quad \text{ou} \quad x + \frac{11}{30} = 0$$

$$\Leftrightarrow x = -\frac{1}{30} \quad \text{ou} \quad x = -\frac{11}{30}$$

$$S = \left\{ -\frac{1}{30} ; -\frac{11}{30} \right\}$$

$$\left(\frac{x}{5} - 2\right)^2 = \left(x - \frac{1}{7}\right)^2 \Leftrightarrow \underbrace{\left(\frac{x}{5} - 2\right)^2}_{a^2} - \underbrace{\left(x - \frac{1}{7}\right)^2}_{b^2} = (a - b)(a + b)$$

$$\Leftrightarrow \left[\left(\frac{x}{5} - 2\right) - \left(x - \frac{1}{7}\right) \right] \times \left[\left(\frac{x}{5} - 2\right) + \left(x - \frac{1}{7}\right) \right] = 0$$

$$\Leftrightarrow \left(\underbrace{\frac{x}{5}}_{\text{yellow}} - \underbrace{2}_{\text{green}} - \underbrace{x}_{\text{yellow}} + \underbrace{\frac{1}{7}}_{\text{green}} \right) \left(\frac{x}{5} - 2 + x - \frac{1}{7} \right) = 0$$

$$\Leftrightarrow \left(\frac{x}{5} - \frac{5x}{5} - \frac{14}{7} + \frac{1}{7} \right) \left(\frac{x}{5} + \frac{5x}{5} - \frac{14}{7} - \frac{1}{7} \right) = 0$$

$$\Leftrightarrow \left(-\frac{4}{5}x - \frac{13}{7} \right) \left(\frac{6}{5}x - \frac{15}{7} \right) = 0$$

$$\Leftrightarrow -\frac{4}{5}x - \frac{13}{7} = 0 \quad \text{or} \quad \frac{6}{5}x - \frac{15}{7} = 0$$

$$\Leftrightarrow x = \frac{13}{7} \times \left(-\frac{5}{4}\right) \quad \left| \quad x = \frac{15}{7} \times \frac{5}{6} \right.$$

$$\Leftrightarrow x = -\frac{65}{28} \quad \left| \quad x = \frac{75}{42} \right.$$

$$S = \left\{ -\frac{65}{28} ; \frac{75}{42} \right\}$$

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

$$\Leftrightarrow \left(x - \frac{1}{2}\right)\left(9x - \frac{1}{3}\right) + \overbrace{x^2 - \left(\frac{1}{2}\right)^2}^{a^2 - b^2 = (a-b)(a+b)} = 0$$

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

$$\Leftrightarrow \left(x - \frac{1}{2}\right) \left[\left(9x - \frac{1}{3}\right) + \left(x + \frac{1}{2}\right) \right] = 0$$

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

$$\Leftrightarrow \left(x - \frac{1}{2}\right) \left(10x - \frac{2}{6} + \frac{3}{6}\right) = 0$$

$$\Leftrightarrow \left(x - \frac{1}{2}\right) \left(10x + \frac{1}{6}\right) = 0$$

$$\Leftrightarrow x - \frac{1}{2} = 0 \quad \text{ou} \quad 10x + \frac{1}{6} = 0$$

$$x = \frac{1}{2}$$

$$x = -\frac{1}{6} \times \frac{1}{10} = -\frac{1}{60}$$

$$S = \left\{ \frac{1}{2}, -\frac{1}{60} \right\}$$

$$\left(x + \frac{1}{5}\right)(3x - 1) - x^2 + \frac{1}{25} = 0 \quad \Leftrightarrow \left(x + \frac{1}{5}\right)(3x - 1) + \underbrace{\left(\frac{1}{5}\right)^2 - x^2}_{a^2 - b^2} = 0$$

$$\Leftrightarrow \boxed{\left(x + \frac{1}{5}\right)}(3x - 1) + \left(\frac{1}{5} - x\right)\boxed{\left(\frac{1}{5} + x\right)} = 0$$

$$\Leftrightarrow \left(x + \frac{1}{5}\right)\left(3x - 1 + \frac{1}{5} - x\right) = 0$$

$$\Leftrightarrow \left(x + \frac{1}{5}\right)\left(2x - \frac{4}{5}\right) = 0$$

$$\Leftrightarrow x + \frac{1}{5} = 0 \quad \text{ou} \quad 2x - \frac{4}{5} = 0$$

$$\Leftrightarrow x = -\frac{1}{5} \quad \text{ou} \quad x = \frac{\cancel{4}^2}{5} \times \frac{1}{\cancel{2}} = \frac{2}{5}$$

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