

Quadratic Equations

Example: $\frac{1}{x+1} + \frac{2}{x+2} = 3$

Re-arrange with all the terms on the left: $\frac{1}{x+1} + \frac{2}{x+2} - 3 = 0$

Multiply by the common denominator $(x+1)(x+2)$: $(x+2) + 2(x+1) - 3(x+1)(x+2) = 0$

Simplify: $3x^2 + 6x + 2 = 0$, *Check:* $b^2 - 4ac = 12$ (not a square number \rightarrow can't factorise)

Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ ($a = 3, b = 6, c = 2$) $x = \frac{-6 \pm \sqrt{12}}{6} = -1 \pm \frac{1}{6}\sqrt{12} = -1 \pm \frac{1}{3}\sqrt{3}$

Exercises

9 $\frac{2}{x+2} + \frac{3}{x+1} = 5$

10 $\frac{1}{x+1} - \frac{2}{x+2} = 1$

11 $\frac{x+2}{x-2} = x-3$

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

13 $\frac{1}{x-1} - \frac{1}{x+1} = \frac{2}{3}$

14 $\frac{3}{x+2} + \frac{1}{x-2} = \frac{8}{3}$

15 $\frac{3}{2x} + \frac{4}{2x+1} = 5$

16 $\frac{6}{x+2} - \frac{7}{x-3} = \frac{11}{2}$

Answers

9. $-1 \pm \frac{1}{3}\sqrt{15}$ 10. $-2 \pm \sqrt{2}$ 11. $3 \pm \sqrt{5}$ 12. $4 \pm \sqrt{30}$ 13. ± 2 14. $-1, -\frac{2}{5}$ 15. $-\frac{10}{3}, \frac{2}{1}$ 16. $1, -\frac{11}{2}$