

E Michaelmas Harder Quadratic

Solve the following equations for x .

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| 1. $\frac{4}{x-2} - \frac{9}{x} = 1.$ | $x = 3 \text{ or } x = -6$ | 11. $x^2 = r^2.$ | $x = r \text{ or } x = -r$ |
| 2. $\frac{6}{x+1} - \frac{4}{x+2} = 1.$ | $x = 2 \text{ or } x = -3$ | 12. $2x^2 + z^2 = 3xz.$ | $x = z \text{ or } x = \frac{z}{2}$ |
| 3. $\frac{5}{x+6} + \frac{2}{x+3} = 2.$ | $x = -1 \text{ or } x = -\frac{9}{2}$ | 13. $x^2 + 4rx = 5r^2.$ | $x = r \text{ or } x = -5r$ |
| 4. $\frac{1}{x+2} - \frac{4}{x+3} = -1.$ | $x = -1 \text{ (repeated)}$ | 14. $x^2 + ax = 2a^2.$ | $x = a \text{ or } x = -2a$ |
| 5. $\frac{4}{x+1} + \frac{3}{x+2} = 3.$ | $x = 1 \text{ or } x = -\frac{5}{3}$ | 15. $x(3x^2 + 14x - 5) = 0.$ | $x = 0 \text{ or } x = -5 \text{ or } x = \frac{1}{3}$ |
| 6. $\frac{5}{x+1} - \frac{6}{x+2} = 2.$ | $x = 0 \text{ or } x = -\frac{7}{2}$ | 16. $x^2 + 7r^2 = 8rx.$ | $x = r \text{ or } x = 7r$ |
| 7. $\frac{10}{x+1} = 3 - \frac{4}{x}.$ | $x = 4 \text{ or } x = -\frac{1}{3}$ | 17. $x^2 = qx + 2q^2.$ | $x = -q \text{ or } x = 2q$ |
| 8. $\frac{5}{x} - \frac{4}{x+1} = 3.$ | $x = 1 \text{ or } x = -\frac{5}{3}$ | 18. $x^2 + e^3 = ex + e^2x.$ | $x = e \text{ or } x = e^2$ |
| 9. $\frac{4}{2x+1} - \frac{2}{2x+3} = \frac{3}{2}.$ | $x = -\frac{11}{6} \text{ or } x = \frac{1}{2}$ | 19. $2pq + 2px = x^2 + qx.$ | $x = -q \text{ or } x = 2p$ |
| 10. $\frac{3}{2x+5} + \frac{2}{x+5} = 1.$ | $x = 0 \text{ or } x = -4$ | 20. $2x^2 + 4xz = xy + 2yz.$ | $x = -2z \text{ or } x = \frac{y}{2}$ |
| | | 21. $(x+2)(x^2 - 2x - 15) = 0.$ | $x = -2 \text{ or } x = -3 \text{ or } x = 5$ |
| | | 22. $x^4 + 36 = 13x^2.$ | $x = \pm 3 \text{ or } x = \pm 2$ |
| | | 23. $\frac{x+6}{x+2} + \frac{x^2+1}{x+3} = x+1.$ | $x = 2 \text{ or } x = -\frac{7}{5}$ |