Foundation GCSE: Solving Harder Equations

Name: _____ Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (20). Working out should be shown where appropriate.

1. Solve $3(2x - 4) - 2(x - 5) = 22$.
2. Solve $5(x + 3) - 3(2x - 1) = 8$.
3. Solve $\frac{x}{3} + \frac{x}{4} = 7$.
4. Solve $\frac{2x}{5} - \frac{x}{3} = 2$.
5. Solve $\frac{x+1}{2} + \frac{x-3}{4} = 5$.
6. Solve $\frac{3x-2}{4} - \frac{x+1}{3} = 2$.
7. Solve $2(3x - 1) + 3(2x + 3) = 31$.
8. Solve $4(2x + 1) - 2(3x - 5) = 24$.
9. Solve $\frac{5}{x} = 3$.
10. Solve $\frac{12}{x+2} = 4$.
11. Solve $\frac{15}{2x-1} = 3$.
12. Solve $\frac{x+5}{x-1} = 3$.
13. Solve $\frac{2x-3}{x+2} = \frac{3}{2}$.
14. Solve $x^2 + 5x = 0$ (by factorising).
15. Solve $x^2 - 9x = 0$.
16. Solve $2x^2 - 8x = 0$.
17. Solve $\frac{8}{x} + 3 = 7$.
18. Solve $3 - \frac{10}{x} = -2$.
19. Solve $\frac{2}{x} + \frac{3}{x} = 5$.
20. Solve $\frac{10}{x+1} + \frac{5}{x+1} = 3$.

Answers & Worked Solutions

1. $x = 6$

   Expand: $6x - 12 - 2x + 10 = 22 \implies 4x - 2 = 22 \implies 4x = 24 \implies x = 6$.

2. $x = 10$

   Expand: $5x + 15 - 6x + 3 = 8 \implies -x + 18 = 8 \implies x = 10$.

3. $x = 12$

   Multiply by 12*:* $4x + 3x = 84 \implies 7x = 84 \implies x = 12$.

4. $x = 30$

   Multiply by 15*:* $6x - 5x = 30 \implies x = 30$.

5. $x = 7$

   Multiply by 4*:* $2(x + 1) + (x - 3) = 20 \implies 3x - 1 = 20 \implies 3x = 21 \implies x = 7$.

6. $x = 8$

   Multiply by 12*:* $3(3x - 2) - 4(x + 1) = 24 \implies 5x - 10 = 24 \implies 5x = 40 \implies x = 8$.

7. $x = 2$

   Expand: $6x - 2 + 6x + 9 = 31 \implies 12x + 7 = 31 \implies 12x = 24 \implies x = 2$.

8. $x = 5$

   Expand: $8x + 4 - 6x + 10 = 24 \implies 2x + 14 = 24 \implies 2x = 10 \implies x = 5$.

9. $x = \dfrac{5}{3}$

   Multiply by x*:* $5 = 3x \implies x = \dfrac{5}{3}$.

10. $x = 1$

    Multiply by $x + 2$*:* $12 = 4(x + 2) \implies 12 = 4x + 8 \implies 4x = 4 \implies x = 1$.

11. $x = 3$

    Multiply: $15 = 3(2x - 1) \implies 5 = 2x - 1 \implies 2x = 6 \implies x = 3$.

12. $x = 4$

    Multiply: $x + 5 = 3(x - 1) \implies x + 5 = 3x - 3 \implies 8 = 2x \implies x = 4$.

13. $x = 12$

    Cross multiply: $2(2x - 3) = 3(x + 2) \implies 4x - 6 = 3x + 6 \implies x = 12$.

14. $x = 0$ or $x = -5$

    Factorise out x*:* $x(x + 5) = 0 \implies x = 0$ *or* $x = -5$.

15. $x = 0$ or $x = 9$

    Factorise out x*:* $x(x - 9) = 0 \implies x = 0$ *or* $x = 9$.

16. $x = 0$ or $x = 4$

    Factorise $2x(x - 4) = 0 \implies x = 0$ *or* $x = 4$.

17. $x = 2$

    Subtract 3*:* $\dfrac{8}{x} = 4 \implies 4x = 8 \implies x = 2$.

18. $x = 2$

    Add $\dfrac{10}{x}$*, add* 2*:* $5 = \dfrac{10}{x} \implies 5x = 10 \implies x = 2$.

19. $x = 1$

    Combine fractions: $\dfrac{5}{x} = 5 \implies x = 1$.

20. $x = 4$

    Combine: $\dfrac{15}{x + 1} = 3 \implies 15 = 3(x + 1) \implies 5 = x + 1 \implies x = 4$.