

8.6 Notes – Days 1 and 2

Solve for the variable in the equation. Remember to check for extraneous solutions!

* cross-multiply

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

$$2x = x - 1$$

$$\boxed{x = -1} \checkmark$$

2. $\frac{9}{3x} = \frac{-6}{2}$

$$-18x = 18$$

$$\boxed{x = -1} \checkmark$$

3. $\frac{2}{d+1} = \frac{1}{d-2}$

$$2(d-2) = d+1$$

$$2d - 4 = d + 1$$

$$\boxed{d = 5} \checkmark$$

4. $\frac{x-3}{5} = \frac{8}{x}$

$$x(x-3) = 40$$

$$x^2 - 3x = 40$$

$$x^2 - 3x - 40 = 0$$

$$(x-8)(x+5) = 0$$

$$\boxed{x = 8, -5} \checkmark$$

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

$$2(2x+3) = 3(x+1)$$

$$4x+6 = 3x+3$$

$$3 = -1x$$

$$\boxed{-3 = x} \checkmark$$

6. $\frac{x-2}{x+4} = \frac{x+1}{x+10}$

$$(x-2)(x+10) = (x+1)(x+4)$$

$$x^2 + 8x - 20 = x^2 + 5x + 4$$

$$3x = 24$$

$$\boxed{x = 8} \checkmark$$

Solve for the variable in the equation. Remember to check for extraneous solutions!

7. $\frac{5}{x} - \frac{4}{3} = \frac{7}{x}$ LCD = 3x

$$\frac{15}{3x} - \frac{4x}{3x} = \frac{21}{3x}$$

$$15 - 4x = 21$$

$$-4x = 6$$

$$x = -\frac{3}{2} \checkmark$$

8. $-\frac{12}{y} = y - 7$

$$-\frac{12}{y} = \frac{y^2}{y} - \frac{7y}{y}$$

$$-12 = y^2 - 7y$$

$$0 = y^2 - 7y + 12$$

$$0 = (y-3)(y-4)$$

$$y = 3, 4 \checkmark$$

9. $\frac{15}{x} + \frac{9x-7}{x+2} = 9$ LCD = x(x+2)

$$\frac{15x+30}{x(x+2)} + \frac{9x^2-7x}{x(x+2)} = \frac{9x(x+2)}{x(x+2)}$$

$$9x^2 + 8x + 30 = 9x^2 + 18x$$

$$30 = 10x$$

$$3 = x \checkmark$$

10. $\frac{3x-1}{x} + \frac{3}{x-3} = \frac{9}{x^2-3x}$

$$\frac{(x-3)(3x-1)}{x(x-3)} + \frac{3x}{x(x-3)} = \frac{9}{x(x-3)}$$

$$3x^2 - 10x + 3 + 3x = 9$$

$$3x^2 - 7x - 6 = 0$$

$$(3x+2)(x-3) = 0$$

$$x = -\frac{2}{3}, 3 \checkmark$$

11. $8 - \frac{4}{x} = \frac{8x-8}{x+2}$ LCD = x(x+2)

$$\frac{8x(x+2)}{x(x+2)} - \frac{4(x+2)}{x(x+2)} = \frac{x(8x-8)}{x(x+2)}$$

$$8x^2 + 16x - 4x - 8 = 8x^2 - 8x$$

$$-8 = -20x$$

$$\frac{2}{5} = x \checkmark$$

12. $1 + \frac{x}{x-3} = \frac{5}{x-3}$

$$\frac{x-3}{x-3} + \frac{x}{x-3} = \frac{5}{x-3}$$

$$2x - 3 = 5$$

$$2x = 8$$

$$x = 4 \checkmark$$

DAY TWO!

$$13. \frac{2}{x-1} = \frac{1}{x+1} + \frac{8}{x^2-1}$$

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

$$2x+2 = x+7$$

$$x = 5 \quad \checkmark$$

$$14. \frac{3x-2}{x+1} = 4 + \frac{x+2}{1-x}$$

$$\frac{(3x-2)(1-x)}{(x+1)(1-x)} = \frac{4(x+1)(1-x)}{(x+1)(1-x)} + \frac{(x+2)(x+1)}{(x+1)(1-x)}$$

$$-3x^2 + 5x - 2 = -4x^2 + 4 + x^2 + 3x + 2$$

$$2x = 8$$

$$x = 4 \quad \checkmark$$

$$15. \frac{x-8}{2x+2} + \frac{x}{2x+2} = \frac{2x-3}{x+1} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \frac{2(2x-3)}{2(x+1)}$$

$$x-8+x = 4x-6$$

$$-2x = 2$$

$$\cancel{x = -1}$$

no solution

$$16. \frac{12x+19}{x^2+7x+12} - \frac{3}{x+3} = \frac{5}{x+4}$$

$$\frac{12x+19}{(x+3)(x+4)} - \frac{3(x+4)}{(x+3)(x+4)} = \frac{5(x+3)}{(x+3)(x+4)}$$

$$12x+19-3x-12 = 5x+15$$

$$9x+7 = 5x+15$$

$$4x = 8$$

$$x = 2 \quad \checkmark$$

$$17. \frac{x}{x-2} + \frac{1}{x-4} = \frac{2}{x^2-6x+8}$$

$$\frac{x(x-4) + 1(x-2)}{(x-2)(x-4)} = \frac{2}{(x-2)(x-4)}$$

$$x^2 - 4x + x - 2 = 2$$

$$x^2 - 3x - 4 = 0$$

$$(x-4)(x+1) = 0$$

$$x = \cancel{-1}, 4 \quad \checkmark$$

$$18. \frac{x}{x+5} - \frac{5}{x-5} = \frac{x^2+25}{x^2-25}$$

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

$$x^2 - 5x - 5x - 25 = x^2 + 25$$

$$-10x = 50$$

$$\cancel{x = -5}$$

no solution

$$19. \frac{x}{x-2} + \frac{2}{x+3} = \frac{10}{x^2+x-6}$$

$$(x-2)(x+3)$$

$$x(x+3) + 2(x-2) = 10$$

$$x^2 + 3x + 2x - 4 = 10$$

$$x^2 + 5x - 14 = 0$$

$$(x+7)(x-2) = 0$$

$$x = -7, \cancel{2}$$

$$20. \frac{3x-1}{x+5} + \frac{32}{x^2-25} = \frac{3x+1}{x-5}$$

$$(x+5)(x-5)$$

$$(3x-1)(x-5) + 32 = (3x+1)(x+5)$$

$$\cancel{3x^2} - 16x + \cancel{5} + 32 = \cancel{3x^2} + 16x + \cancel{5}$$

$$32 = 32x$$

$$1 = x \quad \checkmark$$

$$21. \frac{2x+1}{x-2} - \frac{x}{x+2} = \frac{20}{x^2-4}$$

$$(x+2)(x-2)$$

$$(2x+1)(x+2) - x(x-2) = 20$$

$$2x^2 + 5x + 2 - x^2 + 2x = 20$$

$$x^2 + 7x - 18 = 0$$

$$(x+9)(x-2) = 0$$

$$x = -9, \cancel{2}$$

$$22. \frac{5}{x+1} - \frac{x}{2-x} = \frac{8x-7}{x^2-x-2}$$

$$(x-2)(x+1)$$

$$-1(2-x)(x+1)$$

$$5(-1(2-x)) - x(-1(x+1)) = 8x-7$$

$$-10 + 5x + x^2 + x = 8x-7$$

$$x^2 - 2x - 3 = 0$$

$$(x-3)(x+1) = 0$$

$$x = 3, \cancel{-1}$$

$$23. \frac{5}{x-3} + \frac{x}{x+4} = \frac{41-2x}{x^2+x-12}$$

$$(x-3)(x+4)$$

$$5(x+4) + x(x-3) = 41 - 2x$$

$$5x + 20 + x^2 - 3x = 41 - 2x$$

$$x^2 + 4x - 21 = 0$$

$$(x+7)(x-3) = 0$$

$$x = -7, \cancel{3}$$

$$24. \frac{x+2}{x-3} + \frac{x-2}{x-6} = 2$$

$$(x+2)(x-6) + (x-2)(x-3) = 2(x-3)(x-6)$$

$$x^2 - 4x - 12 + x^2 - 5x + 6 = 2(x^2 - 9x + 18)$$

$$\cancel{2x^2} - 9x - 6 = \cancel{2x^2} - 18x + 36$$

$$9x = 42$$

$$x = \frac{14}{3} \quad \checkmark$$