

Solve.

$$1. \left(x + \frac{x}{x-2} = \frac{2}{x-2} \right) (x-2)$$

D: $x \neq 2$

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

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

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

$$(x-2)(x+1) = 0$$

$$x = 2, -1$$

$$x = -1$$

2 is extraneous

$$2. \left(\frac{x}{x+2} + \frac{7}{x-5} = \frac{14}{x^2 - 3x - 10} \right) (x-5)(x+2)$$

D: $x \neq -2, 5$

$$x(x-5) + 7(x+2) = 14$$

$$x^2 - 5x + 7x + 14 = 14$$

$$x^2 + 2x = 0$$

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

$$x = 0, -2$$

$$x = 0$$

-2 is extraneous

$$3. \left(\frac{3}{x-3} + \frac{4}{x-4} = \frac{25}{x^2 - 7x + 12} \right) (x-4)(x-3)$$

D: $x \neq 3, 4$

$$3(x-4) + 4(x-3) = 25$$

$$3x - 12 + 4x - 12 = 25$$

$$7x - 24 = 25$$

$$7x = 49$$

$$x = 7$$

$$4. \left(\frac{3x+2}{x-1} + \frac{2x-4}{x+2} = 5 \right) (x-1)(x+2)$$

D: $x \neq 1, -2$

$$(3x+2)(x+2) + (2x-4)(x-1) = 5(x-1)(x+2)$$

$$3x^2 + 8x + 4 + 2x^2 - 6x + 4 = 5(x^2 + x - 2)$$

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

$$18 = 3x$$

$$6 = x$$

5. $\left(3 - \frac{22}{x+5} = \frac{6x-1}{2x+7}\right) (x+5)(2x+7)$
 $D: x \neq -5, -\frac{7}{2}$

$$3(x+5)(2x+7) - 22(2x+7) = (6x-1)(x+5)$$

$$3(2x^2+17x+35) - 44x - 154 = 6x^2+29x-5$$

$$6x^2+51x+105-44x-154 = 6x^2+29x-5$$

$$6x^2+7x-49 = 6x^2+29x-5$$

$$-44 = 22x$$

$$-2 = x$$

6. $\left(\frac{3x}{x-2} + \frac{2x}{x+3} = \frac{30}{x^2+x-6}\right) (x-2)(x+3)$
 $D: x \neq 2, -3$

$$3x(x+3) + 2x(x-2) = 30$$

$$3x^2+9x+2x^2-4x = 30$$

$$5x^2+5x-30 = 0$$

$$5(x^2+x-6) = 0$$

$$5(x+3)(x-2) = 0$$

$$x = -3, 2$$

no solution
 -3 and 2 are extr.

7. $\left(\frac{x}{x^2-2x+1} = \frac{2}{x+1} + \frac{4}{x^2-1}\right) (x+1)(x-1)(x-1)$
 $D: x \neq \pm 1$

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

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

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

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

$$0 = (x-2)(x+1)$$

$$x = 2, -1$$

$$x = 2$$

-1 is extraneous

8. $\left(\frac{4x}{x-1} - \frac{5x}{x-2} = \frac{2}{x^2-3x+2}\right) (x-2)(x-1)$
 $D: x \neq 1, 2$

$$4x(x-2) - 5x(x-1) = 2$$

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

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

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

$$-(x+2)(x+1) = 0$$

$$x = -2, -1$$