

Solve each equation.

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

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

3. $\frac{5}{x-2} = 7 - \frac{10}{x+2}$

4. One person can paint the house in 6 hours. Another person can paint the same house in 8 hours. How many hours will it take for them to finish painting the house if they work together?

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

$$3(x-2) - 4(x-3) = x-2$$

$$3x-6-4x+12 = x-2$$

$$-x+6 = x-2$$

$$8 = 2x$$

$$x = 4$$

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

$$\frac{(x+5) \cdot 3}{(x+5) \cdot \cancel{x-5}} - \frac{20}{\cancel{(x+5)}(x-5)} = \frac{2(x-5)}{\cancel{x+5}(x-5)}$$

$$3(x+5) - 20 = 2(x-5)$$

$$3x+15-20 = 2x-10$$

$$3x-5 = 2x-10$$

$$x = -5 \text{ extraneous}$$

No solution

3. $\frac{5}{x-2} = 7 - \frac{10}{x+2}$

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

$$5(x+2) = \underbrace{7(x+2)(x-2)}_{7(x^2-4)} - 10(x-2)$$

$$5x+10 = 7x^2-28-10x+20$$

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

$$0 = 7x^2-15x-18$$

$$0 = (7x+6)(x-3)$$

	x	-3
7x	7x ²	-21x
6	+6x	-18

$$x = -\frac{6}{7}, 3$$

4. One person can paint the house in 6 hours. Another person can paint the same house in 8 hours. How many hours will it take for them to finish painting the house if they work together?

1st person's Rate: $\frac{1}{6} \frac{\text{House}}{\text{hr}}$ 2nd person's Rate: $\frac{1}{8} \frac{\text{House}}{\text{hr}}$ They work together for t hours

$$\frac{1}{6} \frac{\text{House}}{\text{hr}} \cdot t \text{ hrs} + \frac{1}{8} \frac{\text{House}}{\text{hr}} \cdot t \text{ hrs} = 1 \text{ house}$$

$$\frac{1}{6}t + \frac{1}{8}t = 1$$

$$24\left(\frac{t}{6} + \frac{t}{8}\right) = (1)24$$

$$4t + 3t = 24$$

$$7t = 24$$

$$t = \frac{24}{7} \text{ hrs}$$