

# Solving Rational Equations



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Solve:

$$\text{C.D.: } 12 \cdot \frac{4 \cdot 2}{4 \cdot 3} x + \frac{3 \cdot 3}{3 \cdot 4} = \frac{5 \cdot 12}{1 \cdot 12}$$

$$12 \cdot \left( \frac{8}{12} x + \frac{9}{12} \right) = \left( \frac{60}{12} \right) \cdot 12$$

$$8x + 9 = 60$$

$$x = \frac{51}{8} \text{ or } 6.375$$



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Solve:

$$\frac{x}{x-6} \quad \swarrow \quad \searrow \quad \frac{1}{x-4}$$

extraneous  
solution

$$x(x-4) = x-6$$

$$x=2$$

$$x=3$$

$$x^2 - 4x = x - 6$$

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

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

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## Steps to Solve a Rational Equation:



- Find LCD
- State the domain restrictions
- Multiply every term by the LCD
- (This cancels the denominators)
- Solve
- State solutions

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Solve:

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

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

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

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

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

$$x = 3 \quad x = -1$$

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Solve:

$$C.D.: (x-3)(x+3)$$

$$\frac{x}{x-3} + \frac{2x}{x+3} = \frac{18}{x^2-9}$$

$$\frac{x(x+3)}{\cancel{(x-3)(x+3)}} + \frac{2x(x-3)}{\cancel{(x+3)(x-3)}} = \frac{18}{\cancel{(x-3)(x+3)}}$$

$$x(x+3) + 2x(x-3) = 18$$

$$x^2 + 3x + 2x^2 - 6x = 18$$

$$3x^2 - 3x = 18$$

$$3x^2 - 3x - 18 = 0$$

$$3(x^2 - x - 6) = 0$$

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

$$x = 3$$

$$x = -2$$

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Solve:

C. D.:  $(x+2)(x-2)$

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


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

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

$$x^2 - 4x - 12 = 0$$

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

$x = 6$   
 $x = -2$



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Solve:

$$\frac{x}{x-2} + \frac{x}{x-3} = \frac{3}{x^2-5x+6}$$

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

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

$$2x^2 - 5x - 3 = 0$$


$$(2x^2 - 6x + x - 3) = 0$$

$$2x(x-3) + 1(x-3) = 0$$

$$(2x+1)(x-3) = 0$$

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

|              |      |
|--------------|------|
| $-6$         | $-5$ |
| $-6 \cdot 1$ | $-5$ |



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**Solve:**

$$\frac{x+2}{2x-3} - \frac{x-2}{2x+3} = \frac{21}{4x^2-9}$$



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**Homework**



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