

Solving Equations with Rational Expressions

To solve equations with rational expressions, identify the LCD, multiply both sides by the LCD, and then solve.

Example 1:

Solve for x :

$$\frac{1}{x-1} + \frac{3}{x-1} = \frac{7}{4}$$

$$\text{LCD} = 4(x-1)$$

$$4(x-1)\left(\frac{1}{x-1}\right) + 4(x-1)\left(\frac{3}{x-1}\right) = 4(x-1)\left(\frac{7}{4}\right)$$

$$4 + 4(3) = 7(x-1)$$

$$4 + 12 = 7x - 7$$

$$\begin{array}{r} 16 = 7x - 7 \\ +7 \quad \quad +7 \\ \hline \end{array}$$

$$\frac{23}{7} = \frac{7x}{7}$$

$$x = \frac{23}{7}$$

Example 2:

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

$$LCD = (x-1)(x-4)$$

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

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

$$3x - 12 + x - 1 = x^2 - 6x + 8$$

$$\begin{array}{r} 4x - 13 = x^2 - 6x + 8 \\ -4x + 13 \quad \underline{\quad -4x + 13} \end{array}$$

$$0 = x^2 - 10x + 21$$

$$a = 1$$

$$b = -10$$

$$c = 21$$

<u>$a \cdot c = 21$</u>	<u>SUM</u>
1 21	1
3 7	10
-3 -7	-10

$$\begin{array}{l} (x-3)(x-7) = 0 \\ x-3 = 0 \qquad \qquad x-7 = 0 \end{array}$$

$x = 3$	$x = 7$
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Solving Equations with Rational Expression

Practice Problems

Solve each equation

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

2.
$$\frac{x+2}{x-1} + \frac{1}{x-5} = \frac{12}{x-1}$$