

Simplify:

$$\frac{\frac{8}{x-4}}{\frac{x+5}{x^2-x-12} - \frac{2x}{x+3}}$$

Factor all denominators first

$$\frac{(x-4)(x+3)}{(x-4)(x+3)} \cdot \frac{\frac{8}{x-4}}{\frac{x+5}{(x-4)(x+3)} - \frac{2x}{x+3}}$$

x-4 cancels
Both factors cancel
x+3 cancels

Multiply the numerator and denominator of the complex fraction by the LCM of all the denominators:
(x-4)(x+3)

$$= \frac{8(x+3)}{x+5 - 2x(x-4)}$$

$$= \frac{8x+24}{x+5-2x^2+8x} = \frac{8x+24}{-2x^2+9x+5}$$

Simplify:

$$\frac{\frac{4x}{x^2+8x+7}}{\frac{5x}{x^2+6x-7} + \frac{6}{x^2-1}}$$

Factor all denominators first

$$\frac{(x+7)(x+1)(x-1)}{(x+7)(x+1)(x-1)} \cdot \frac{\frac{4x}{(x+7)(x+1)}}{\frac{5x}{(x+7)(x-1)} + \frac{6}{(x+1)(x-1)}}$$

(x+7)(x+1) cancel
(x+7)(x-1) cancel
(x+1)(x-1) cancel

Multiply the numerator and denominator of the complex fraction by the LCM of all the denominators:
(x+7)(x+1)(x-1)

$$= \frac{4x(x-1)}{5x(x+1) + 6(x+7)}$$

$$= \frac{4x^2-4x}{5x^2+5x+6x+42} = \frac{4x^2-4x}{5x^2+11x+42}$$

Hwk #9:

Due Monday

Pages 518

Problems 26, 28, 44, 46 - 48

Show work to get credit

Sec 9-6: Solving Rational Equations

1. Solve.

$$\frac{2x}{9} + \frac{7}{6} = \frac{5}{3}$$

LCD = 18

$$\frac{2}{2} \cdot \frac{2x}{9} + \frac{7}{6} \cdot \frac{3}{3} = \frac{5}{3} \cdot \frac{6}{6}$$

$$\frac{4x}{18} + \frac{21}{18} = \frac{30}{18}$$

$$4x + 21 = 30$$

-21 -21

$$\frac{4x}{4} = \frac{9}{4}$$

$$x = \frac{9}{4}$$

Method 1:

1. Make **ALL** terms in the equation have the same denominator.
2. Cancel out all denominators.
3. Finish by solving the resulting equation for x.

1. Solve.

$$\frac{2x}{9} + \frac{7}{6} = \frac{5}{3}$$

LCM of the 3 denominators is 18

$$18 \left(\frac{2x}{9} + \frac{7}{6} \right) = \left(\frac{5}{3} \right) 18$$

$$4x + 21 = 30$$

$$\frac{4x}{4} = \frac{9}{4}$$

$$x = \frac{9}{4}$$

Method 2:

1. Find the LCM of **ALL** denominators in the equation
2. Eliminate **ALL** Denominators by multiplying both sides of the equation by this LCM.
3. Finish by solving the resulting equation

1. Solve.

$$\frac{2x}{9} + \frac{7}{6} = \frac{5}{3}$$

$$\frac{2}{2} \cdot \frac{2x}{9} + \frac{7}{6} \cdot \frac{3}{3} = \frac{5}{3}$$

$$\frac{4x}{18} + \frac{21}{18}$$

$$\frac{4x+21}{18} = \frac{5}{3}$$

$$\frac{3(4x+21)}{3} = \frac{90}{3}$$

Method 3:

1. Simplify each side of the equation into a single fraction, creating a proportion.
2. Cross multiply.
3. Solve the resulting equation.

$$4x + 21 = 30$$

$$\frac{4x}{4} = \frac{9}{4}$$

$$x = \frac{9}{4}$$

Solve.

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

You could use any of the three methods but since this is a proportion cross multiplying seems like a good idea.

$$28x = 3(x+1)$$

$$28x = 3x + 3$$

$$\frac{25x}{25} = \frac{3}{25}$$

$$x = \frac{3}{25}$$

Solve.

3. $\frac{2x}{5} = \frac{8}{x+1}$

You could use any of the three methods but since this is a proportion cross multiplying seems like a good idea.

$$\frac{2x}{5} = \frac{8}{x+1}$$

$$2x(x+1) = 40$$

$$2x^2 + 2x = 40$$

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

$$\begin{array}{r} -20 \\ +5 \quad -4 \\ +1 \end{array}$$

$$x^2 + x - 20 = 0$$

$$(x+5)(x-4) = 0$$

$$x = -5, 4$$

Solve

$$4. \quad \frac{6}{x} + \frac{7}{3} = \frac{9}{2x} - \frac{11}{12}$$

You can't cross-multiply because this isn't a proportion so you must use one of the other methods.

To eliminate the denominators you would multiply by the LCM of all four denominators:
12x

$$12x \cdot \left(\frac{6}{x} + \frac{7}{3} \right) = \left(\frac{9}{2x} - \frac{11}{12} \right) \cdot 12x$$

$$72 + 28x = 54 - 11x$$

$$72 + 39x = 54$$

$$39x = -18$$

$$x = \frac{-18}{39} = -\frac{6}{13}$$

Solve

$$5. \quad \frac{5x}{4} - \frac{x-3}{3x} = \frac{8x}{6}$$

LCM of the 3 denominators is 12x

$$12x \left(\frac{5x}{4} - \frac{x-3}{3x} \right) = \left(\frac{8x}{6} \right) 12x$$

$$15x^2 - 4(x-3) = 16x^2$$

$$15x^2 - 4x + 12 = 16x^2$$

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

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

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

$$x = -6, 2$$

Hwk #10

Sec 9-6

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Also Due Monday

Problems 6, 9, 14, 15, 21

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