Rational Expressions and Equations Lesson #4:
Addition and Subtraction of Rational Expressions - Part Two

Denominators with Factors in Common

In this lesson we will add/subtract rational expressions where the denominators are different but have a common monomial or binomial factor.

It is important to factor the denominators in the rational expressions (if possible) **before** beginning to add or subtract.

Perform the indicated operations. Express final answers in lowest terms, and indicate the nonpermissible values.

a) $\frac{3}{5x} - \frac{3}{10x}$ **b)** $\frac{4}{5x+5} + \frac{3}{2x+2}$ **c)** $\frac{1}{x^2} - \frac{1}{x^2+2x}$

Simplify, stating restrictions on the value of x. $\frac{5}{(x+1)(x-2)} + \frac{2}{(x+4)(x-2)}$

only one is needed in the LCD.

$$\text{LCD} = \frac{5(x+4)+2(x+1)}{(x+1)(x-2)(x+4)}$$

$$= \frac{5x+20+2x+2}{(x+1)(x-2)(x+4)}$$

$$= \frac{7x+22}{(x+1)(x-2)(x+4)}$$

$x \neq -1, 2, -4$

Simplify $\dfrac{4}{p^2-1}+\dfrac{2}{p+1}$. State the nonpermissible values for p.

Notice that in Class Example #3, the numerator of the answer had a factor in common with the denominator. This resulted in a further reduction which simplified the answer.
We must always check to see that our answers are in fully-reduced form.

Complete Assignment Questions #1 - #2

Trinomial Denominators

FRS

Simplify: **a)** $\dfrac{2}{x+1}-\dfrac{x-1}{x^2-2x-3}$ **b)** $\dfrac{1}{y^2-3y+2}+\dfrac{3}{y^2+y-2}$

$$\frac{2}{x+1}-\frac{(x-1)}{(x+1)(x-3)}$$

$$\frac{2(x-3)-x+1}{(x+1)(x-3)}$$

$$\frac{2x-6-x+1}{(x+1)(x-3)}$$

$$\frac{x-5}{(x+1)(x-3)}$$

$x \neq -1, 3$

Simplify $\dfrac{x^2-3x+2}{x^2-5x+4} - \dfrac{x^2+10x+24}{x^2+8x+12}$.

Show that $\dfrac{2a+7}{a^2+7a+12} + \dfrac{2a}{9-a^2}$ can be reduced to $\dfrac{-7}{(a+4)(a-3)}$.

$a \neq \pm 3, -4$

$$\frac{2a+7}{(a+3)(a+4)} + \frac{-2a}{(a+3)(a-3)}$$

$$= \frac{(2a+7)(a-3) + -2a(a+4)}{(a+3)(a+4)(a-3)}$$

$$= \frac{2a^2+a-21-2a^2-8a}{(a+3)(a+4)(a-3)} = \frac{-7a-21}{(a+3)(a+4)(a-3)} = \frac{-7(a+3)}{(a+3)(a+4)(a-3)}$$

$$= \frac{-7}{(a+4)(a-3)}$$

#1-7 (a, c)

Complete Assignment Questions #3 - #11

Assignment

1. Perform the indicated operations. Express final answers in lowest terms, and indicate the nonpermissible values.

a) $\dfrac{1}{a} - \dfrac{1}{6a}$ **b)** $\dfrac{2}{5x-15} + \dfrac{3}{2x-6}$ **c)** $\dfrac{3}{4x+2} - \dfrac{1}{6x+3}$