More Adding and Subtracting Rational Expressions...means more Common Denominators!

Ex 1: $\dfrac{6x}{3x-1} - \dfrac{4x}{2x+5}$

to get a LCD, we must multiply the denominators together.

$\left(\dfrac{2x+5}{2x+5}\right)\left(\dfrac{6x}{3x-1}\right) + \left(\dfrac{-4x}{2x+5}\right)\left(\dfrac{3x-1}{3x-1}\right)$

☆ remember to change that minus to plus a negative 4x so it gets distributed properly.

Don't forget domain restrictions

$= \dfrac{12x^2+30x-12x^2+4x}{(2x+5)(3x-1)} = \dfrac{34x}{(2x+5)(3x-1)}$, DR: $x \neq -\frac{5}{2}, \frac{1}{3}$

work for DR

$2x+5 \neq 0$

$2x \neq -5$

$x \neq -\frac{5}{2}$

$3x-1 \neq 0$

$3x \neq 1$

$x \neq \frac{1}{3}$

Combine, simplify and state domain restrictions:

ex2 $\dfrac{15}{x^2+3x} - \dfrac{x-2}{x+3}$

$= \dfrac{15}{x(x+3)} - \dfrac{(x-2)\cdot x}{(x+3)\cdot x}$

$= \dfrac{15-(x^2-2x)}{x(x+3)}$

$= \dfrac{15-x^2+2x}{x(x+3)}$

rearrange numerator $= \dfrac{-x^2+2x+15}{x(x+3)}$

factor -1 $= \dfrac{-1(x^2-2x-15)}{x(x+3)}$

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

$-\dfrac{x-5}{x}$, DR: $x \neq 0, -3$

or

$\dfrac{5-x}{x}$, $x \neq 0, -3$

Ex 3:

$$\frac{6}{x^2-2x}-\frac{1}{x^2-4}$$

☆Factor each denominator so we can see what the LCD is going to be.

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

$$=\frac{6x+12-x}{x(x-2)(x+2)}$$

$$=\boxed{\frac{5x+12}{x(x-2)(x+2)},\ x\neq 0,\pm 2}$$

Simplify each complex fraction.

Ex 4:

$$\frac{\frac{1}{4}}{\frac{2}{y}}=\frac{1}{4}\div\frac{2}{y}$$

$$=\frac{1}{4}\cdot\frac{y}{2}$$

$$=\boxed{\frac{y}{8},\ y\neq 0}$$

Simplify each complex fraction.

Ex 5: $\dfrac{x}{\frac{y}{y}\cdot\frac{1}{x}+\frac{1}{y}\cdot\frac{x}{x}}$ → get common denom.

$= \dfrac{x}{\frac{y+x}{yx}} = x \div \dfrac{y+x}{yx}$

$= \dfrac{x \cdot yx}{y+x}$

$= \dfrac{x^2y}{x+y}, \; x \neq 0, x \neq -y, y \neq 0, y \neq -x$

Another way...

or mult by $\frac{LCD}{LCD}$

$\dfrac{x \; (\cdot xy)}{\left(\frac{1}{x}+\frac{1}{y}\right)\cdot xy}$

$\dfrac{x^2y}{\frac{xy}{x}+\frac{xy}{y}} = \dfrac{x^2y}{y+x}$

Ex 6: $\dfrac{\frac{1}{a}+\frac{1}{a}}{\frac{a}{a}\cdot 1+\frac{1}{a}\;\frac{a}{a}1-\frac{1}{a}}$

you gotta love this one!!!

Start by getting common denominators in the denominators!

$= \dfrac{1}{\frac{a+1}{a}} + \dfrac{1}{\frac{a-1}{a}}$

$= 1 \div \frac{a+1}{a} + 1 \div \frac{a-1}{a}$

$= 1 \cdot \frac{a}{a+1} + 1 \cdot \frac{a}{a-1}$

$= \dfrac{(a-1)a}{(a-1)(a+1)} + \dfrac{a \cdot (a+1)}{(a-1)(a+1)}$

$= \dfrac{a^2-a+a^2+a}{(a+1)(a-1)} = \dfrac{2a^2}{(a+1)(a-1)}, \; a \neq 0, \pm 1$