Secondary Math 2 **13.3 Notes** **Adding and Subtracting Rational Expressions**

CAN YOU BELIEVE IT?? THESE ARE YOUR **LAST** NOTES EVER IN THIS CLASS!

True Statement: I need a common denominator to add/subtract fractions.

Let's work our way up: Find a common denominator for each of the following:

$\frac{5}{5}\cdot\frac{3}{4}+\frac{2}{5}\cdot\frac{4}{4}$

$\frac{15}{20}+\frac{8}{20}=\boxed{\frac{23}{20}}$

$\frac{5}{5}\cdot\frac{3}{4y}+\frac{2}{5}\cdot\frac{4y}{4y}$

$\frac{15}{20y}+\frac{8y}{20y}=\boxed{\frac{15+8y}{20y}}$

$\frac{5x}{5x}\cdot\frac{3}{4y}+\frac{2}{5x}\cdot\frac{4y}{4y}$

$\frac{15x}{20xy}+\frac{8y}{20xy}=\boxed{\frac{15x+8y}{20xy}}$

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

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

So, if the fractions already have a common denominator, we just add/subtract, like this:

$\frac{5x-2y}{6y}\left(+\right)\frac{3x-4y}{6y}=\frac{5x-2y-3x+4y}{6y}=\boxed{\frac{2x+2y}{6y}}$

$=\frac{3x+15+2x-8}{(x+5)(x-4)}$

$\boxed{\frac{5x+7}{(x+5)(x-4)}}$

If they don't have a common denominator, we need to get one and then add/subtract. Let's practice!

$\frac{2x}{2x}\cdot\frac{3x}{2y^2}+\frac{5}{2x}\cdot\frac{2y^2}{2y^2}$

$\frac{6x^2}{4xy^2}+\frac{10y^2}{4xy^2}=\boxed{\frac{6x^2+10y^2}{4xy^2}}$

$\frac{4}{4}\cdot\frac{5}{5x^3}+\frac{6x}{4}\cdot\frac{5x^3}{5x^3}$

$\frac{20}{20x^3}+\frac{30x^4}{20x^3}=\boxed{\frac{20+30x^4}{20x^3}}$

$\frac{x}{x}\cdot\frac{1}{6xy}+\frac{2}{3x^2}\cdot\frac{2y}{2y}$

$\frac{x}{6x^2y}+\frac{4y}{6x^2y}=\boxed{\frac{x+4y}{6x^2y}}$

$\frac{(x-4)}{(x-4)}\cdot\frac{4}{5x+1}-\frac{3x}{x-4}\cdot\frac{(5x+1)}{(5x+1)}$

$\frac{4(x-4)}{(x-4)(5x+1)}-\frac{3x(5x+1)}{(x-4)(5x+1)}$

$\frac{4x-16-(15x^2+3x)}{(x-4)(5x+1)}=\boxed{\frac{-15x^2+1x-16}{(x-4)(5x+1)}}$

Practice

$\frac{5ab}{5ab}\cdot\frac{3b}{2a}+\frac{6}{5ab}\cdot\frac{2a}{2a}$

$=\frac{15ab^2}{10a^2b}+\frac{12a}{10a^2b}=\frac{15ab^2+12a}{10a^2b}$

$=\frac{3a(5b^2+4)}{10a^2b}$

$=\boxed{\frac{3(5b^2+4)}{10ab}}$

$\frac{(x-1)}{(x-1)}\cdot\frac{4x}{x+3}-\frac{3}{x-1}\cdot\frac{(x+3)}{(x+3)}$

$=\frac{4x(x-1)}{(x-1)(x+3)}-\frac{3(x+3)}{(x-1)(x+3)}=\frac{4x^2-4x-(3x+9)}{(x-1)(x+3)}$

$=\boxed{\frac{4x^2-7x-9}{(x-1)(x+3)}}$