



**Objective:** Adding and subtracting rational expressions

**Homework RF-3** – NYA p.689 #1, 6, 7, 10, 13 – 15, 17, 20, 27, 39, 56

**Do Now: Simplify**

- $\frac{x^2 - 64}{2x - 16}$
- $\frac{x + 4}{x^3} \div \frac{x + 4}{x}$

**Exam Prep:** Which expression has no domain restriction?

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



Rational Functions look ugly but they have an inner beauty. Here there is nothing new again... just a lot of stuff together. My bowtie is quite lovely, isn't it?

### Adding and Subtracting Expressions with LIKE DENOMINATORS

Just like with numerical fractions, you add or subtract numerators and keep denominators. After adding or subtraction, check for simplification.

#### Addition

$\frac{2}{x+3} + \frac{5}{x+3} = \frac{2+5}{x+3} = \frac{7}{x+3}$	Numerators are added and simplified.	
1. $\frac{3}{x+2} + \frac{2}{x+2}$	2. $\frac{y}{y-5} + \frac{3y}{y-5}$	3. $\frac{2x+1}{4x-2} + \frac{-2}{4x-2}$

#### Subtraction

Numerators are subtracted and simplified using the distributive property.		
$\frac{3n+4}{2n^2+5n-3} - \frac{2n+1}{2n^2+5n-3} = \frac{3n+4-(2n+1)}{2n^2+5n-3} = \frac{3n+4-2n-1}{2n^2+5n-3} = \frac{n+3}{2n^2+5n-3}$		
Simplify by factoring wherever possible and eliminating common factors.	$\frac{n+3}{(2n-1)(n+3)} = \frac{1}{2n-1}$	
1. $\frac{4}{t-2} - \frac{5}{t-2}$	2. $\frac{7b-2}{3b+6} - \frac{b+7}{3b+6}$	3. $\frac{2c+1}{5m+2} - \frac{3c-4}{5m+2}$

## Adding and Subtracting Expressions with UNLIKE DENOMINATORS

Just like with numerical fractions, you need an LCD. Adjust the terms by rewriting each fraction using the LCD. Simplify if possible at the end.

### Adding or Subtracting with Monomial Denominators

$\frac{2}{3x} + \frac{1}{6} = \frac{(2) 2}{(2) 3x} + \frac{(x) 1}{(x) 6} = \frac{4}{6x} + \frac{x}{6x} = \frac{4+x}{6x}$	The LCD of <b>3x</b> and <b>6</b> is <b>6x</b> . Terms are adjusted by multiplying by a form of 1.	
1. $\frac{3}{7y^4} + \frac{2}{3y^2}$	2. $\frac{4}{25x} - \frac{49}{100}$	3. $\frac{5}{12b} + \frac{15}{36b^2}$

### Adding or Subtracting with Polynomial Denominators

$\frac{5}{c+2} + \frac{6}{c-3} = \frac{5(c-3)}{(c+2)(c-3)} + \frac{6(c+2)}{(c-3)(c+2)} =$ Continued on next line	Same concept of getting an LCD. This time the LCD is a polynomial.	
$= \frac{5c-15}{(c+2)(c-3)} + \frac{6c+12}{(c-3)(c+2)} = \frac{5c-15+6c+12}{(c+2)(c-3)} = \frac{11c-3}{(c+2)(c-3)}$		
1. $\frac{5}{t+4} + \frac{3}{t-1}$	2. $\frac{m}{2m+1} + \frac{3}{m-1}$	3. $\frac{-2}{a+2} + \frac{3a}{2a-1}$