

Algebra 2: Adding and Subtracting Rational Expressions

How to-

1. Factor denominators ONLY
2. Make common denominators if necessary by multiplying Num & Den by missing terms
3. Add/subt numerators straight across (No!)!
4. Factor numerator if possible
5. Restrictions
6. Simplify/cancel

Example 1: $\frac{x^2+3x-2}{x^2+3x-10} + \frac{4x+12}{x^2+3x-10}$

$$\frac{(x^2+7x+10)}{(x^2+3x-10)} + \frac{(x+5)(x+2)}{(x+5)(x-2)}$$

$x \neq -5, 2$

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

Example 2: $\frac{x^2-2x+3}{x^2+7x+12} - \frac{x^2-4x-5}{x^2+7x+12}$

$$\frac{2x+8}{x^2+7x+12} - \frac{2(x+4)}{(x+3)(x+4)}$$

$x \neq -3, -4$

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

Example 3: $\frac{x}{4x^2} + \frac{3}{6x}$

$$\frac{3x}{12x^2} + \frac{6x}{12x^2}$$

$$\frac{9x}{12x^2} \quad x \neq 0$$

$$\frac{3}{4x}$$

Example 4: $\frac{6}{(x+3)(x-7)} - \frac{4x+32}{(x-7)(x+3)}$

$$\frac{6x+18}{(x-7)(x+3)} - \frac{4x+32}{(x-7)(x+3)}$$

$$\frac{2x-14}{(x-7)(x+3)} = \frac{2(x-7)}{(x-7)(x+3)}$$

$x \neq 7, -3$

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

Example #5: $\frac{3}{2x+2} - \frac{2x-8}{x^2-3x-4}$

$(x-4)$ 2

$2(x+1)$ $(x-4)(x+1)$

$$\frac{3x-12}{2(x+1)(x-4)} - \frac{4x-16}{2(x-4)(x+1)}$$

$x \neq -1, 4$

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

~~$$\frac{(4-x)}{2(x+1)(x-4)}$$~~

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

Example #6: $\frac{3x+4}{x-8} - \frac{2}{8-x}$

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

$x \neq 8$

$$\frac{3x+6}{(x-8)}$$

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

Example #7: $\frac{2x^2+12}{x^2-1} - \frac{x-6}{x+1}$

$(x-1)$

$(x+1)(x-1)$

$$\frac{2x^2+12}{(x+1)(x-1)} - \frac{x^2-7x+6}{(x+1)(x-1)}$$

$x \neq -1, 1$

$$\frac{x^2+7x+6}{(x+1)(x-1)}$$

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

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