Adding & Subtracting Rational Expressions

Common Denominator

Least Common Denominator

Different Denominator

Rule for Adding & Subtracting Rational Expressions:

Let a, b, and c be polynomials where $c \neq 0$.

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

$$\frac{a}{c} - \frac{b}{c} = \frac{a-b}{c}$$

Find the sum or difference.

Add or subtract numerator
Keep denominator
Simplify if possible

1 $\frac{4}{7x} + \frac{2}{7x} = \frac{6}{7x}$

2 $\frac{5x}{x+3} + \frac{-x+1}{x+3}$

Subtraction! Distribute the minus to the num. + change to adding

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

Common Denominator

Least Common Denominator

Different Denominator

not GCF

Find the LCD of the rational expressions.

3 $\frac{2}{3x^3} \cdot \frac{x+1}{12x^2}$

3: 3, ~~6~~, ~~9~~, 12, 15, 18...

12: ~~12~~, ~~24~~, 36....

monomials

LCD: $12x^3$

4 $\frac{6x}{3x+12} \cdot \frac{x-3}{(x+4)}$

$3(x+4)$

Factor denominators to help find LCD

LCD: $3(x+4)$

5 $\frac{7}{x^2-16} \cdot \frac{x}{x^2-x-12}$

factor factor

-4×3, -1

$(x+4)(x-4)$, $(x-4)(x+3)$

already have that

LCD: $(x+4)(x-4)(x+3)$

6 $\frac{5}{(x+1)} \cdot \frac{2x}{(3x-2)}$

LCD: $(x+1)(3x-2)$

Least Common Denominator

Different Denominator

Find the sum or difference.

7 $\frac{3}{5x^2} + \frac{7}{15x^3}$ — $3x$ · $3x$

LCD: $15x^3$

$= \frac{9x}{15x^3} + \frac{7}{15x^3} = \frac{9x+7}{15x^3}$

8 $\frac{11}{28x} + \frac{-5}{7x^2}$ — x · 4

LCD: $28x^2$

$= \frac{11x}{28x^2} + \frac{-20}{28x^2} = \frac{11x-20}{28x^2}$

9 $\frac{7}{3x} + \frac{4x}{(x-5)}$ — $(x-5)$ · $3x$

LCD: $3x(x-5)$

$= \frac{7x-35}{3x(x-5)} + \frac{12x^2}{3x(x-5)} = \frac{12x^2+7x-35}{3x(x-5)}$

Factor denominators to help find LCD

10 $\frac{x}{x^2-x-6} + \frac{4}{x^2-8x+15}$

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

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

11 $\frac{2x}{x^2+6x-7} + \frac{-3}{x^2+2x-3}$ ★ change to addition 1st

$\frac{2x(x+3)}{(x+7)(x-1)(x+3)} + \frac{-3(x+7)}{(x+3)(x-1)(x+7)}$

LCD → $\frac{2x^2+6x}{(x+7)(x-1)(x+3)} + \frac{-3x-21}{(x+7)(x-1)(x+3)} = \frac{2x^2+3x-21}{(x+7)(x-1)(x+3)}$

Different Denominator