



Remember:
 - Add or subtract fractions before simplifying
 - distribute the negative when subtracting

ADDING AND SUBTRACTING RATIONAL EXPRESSIONS LIKE DENOMINATORS

OLD SCHOOL:

$$\frac{2}{7} + \frac{3}{7} = \frac{5}{7}$$

ADD OR SUBTRACT NUMERATORS AND SIMPLIFY

$$\frac{7}{2x^2} - \frac{3}{2x^2} + \frac{2}{2x^2}$$

$$\frac{7-3+2}{2x^2} = \frac{6}{2x^2} = \left[\frac{3}{x^2}, x \neq 0 \right]$$

$$2x^2 = 0$$

$$\frac{4x-1}{x^2-4} - \frac{3x-3}{x^2-4}$$

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

$$\frac{x+2}{(x-2)(x+2)} = \left[\frac{1}{x-2}, x \neq \pm 2 \right]$$

ADDING AND SUBTRACTING RATIONAL EXPRESSIONS DIFFERENT DENOMINATORS

OLD SCHOOL:

LCM: 30

$$\frac{3 \cdot 3}{3 \cdot 10} + \frac{2 \cdot 2}{15 \cdot 2} = \frac{9}{30} + \frac{4}{30} = \frac{13}{30}$$

LEAST COMMON MULTIPLE (LCM) OF POLYNOMIALS

1) FACTOR EACH DENOMINATOR COMPLETELY

2) LIST DIFFERENT FACTORS. IF POLYNOMIALS

HAVE COMMON FACTORS, USE HIGHEST POWER

A) $2x^3y^4$ and $3x^5y^3$

Coefficient: LCM
 Variables: Largest Exponent

$$6x^5y^4$$

B) $x^2 + 3x - 4$ and $x^2 - 3x + 2$

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

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

$$\frac{4x}{(x+4)(x-3)} + \frac{4(x+6)}{x-3(x+6)} \quad \text{LCD: } (x-3)(x+6)$$

$$\frac{4x}{(x+4)(x-3)} + \frac{4(x+6)}{(x-3)(x+6)} = \frac{4x + 4x + 24}{(x-3)(x+6)}$$

$$\frac{8x+24}{(x+6)(x-3)} = \left[\frac{8(x+3)}{(x+6)(x-3)}, x \neq -6, 3 \right]$$

$$\text{LCD: } (x+3)(x+3)$$

$$\frac{(x+3)x}{(x+3)x+3} + \frac{2x+6}{x^2+6x+9}$$

$$\frac{(x+3)x}{(x+3)(x+3)} + \frac{2x+6}{(x+3)(x+3)}$$

$$\frac{x(x+3)}{(x+3)(x+3)} + \frac{2x+6}{(x+3)(x+3)}$$

$$\frac{x^2+3x+2x+6}{(x+3)(x+3)} = \frac{x^2+5x+6}{(x+3)(x+3)}$$

$$\frac{(x+2)(x+3)}{(x+3)(x+3)} \Rightarrow \frac{x+2}{x+3} \quad x \neq -3$$

$$\text{LCD: } (x-2)(x+2)$$

$$\frac{2x^2-16}{x^2-4} - \frac{x+4}{x+2} \cdot \frac{(x-2)}{(x-2)}$$

$$\frac{2x^2-16 - (x+4)(x-2)}{(x-2)(x+2)}$$

$$\frac{2x^2-16 - (x^2+2x-8)}{2x^2-16 - x^2 - 2x + 8}$$

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

$$\frac{(x-4)(x+2)}{(x-2)(x+2)} \Rightarrow \frac{x-4}{x-2} \quad x \neq \pm 2$$

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

$$\frac{5x - (x-5)}{2x-1}$$

$$2x-1$$

$$5x - x + 5$$

$$2x-1$$

$$\frac{4x+5}{2x-1} \quad x \neq \frac{1}{2}$$

$$\frac{x-7}{x^2+4x-5} + \frac{9-x}{x+5}$$

$$\frac{-x^2+11x-16}{(x+5)(x-1)} \quad x \neq -5, 1$$

$$\text{LCD: } (2x+5)(5x-2)$$

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

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

$$\frac{15x-6-4x-10}{(2x+5)(5x-2)}$$

$$\frac{11x-16}{(2x+5)(5x-2)} \quad x \neq \frac{-5}{2}, \frac{2}{5}$$

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

Find LCD and Build Equivalent Fractions

$$\text{LCD: } 15x^3y$$

$$\frac{20x^2y}{15x^3y} + \frac{120y}{15x^3y} - \frac{6x^2}{15x^3y}$$

$$\frac{6}{y^2-2y-35} - \frac{4}{y+5}$$

$$\frac{-4y+34}{(y-7)(y+5)} \quad x \neq 7, -5$$

$$\frac{8}{x-8} + \frac{4}{x^2-3x-40}$$

$$\frac{4(2x+11)}{(x-8)(x+5)} \quad x \neq 8, -5$$