

Adding and Subtracting Rational Expressions

In order to add or subtract fractions, we must first find the least common denominator, or LCD. (Want denominators to match!)

Multiply the top & bottom!

$$a) \left(\frac{1}{3}\right) + \left(\frac{1}{4}\right)^3 = \frac{4}{12} + \frac{9}{12} = \boxed{\frac{13}{12}}$$

$$b) \left(\frac{5}{2}\right) - \frac{3}{4} = \frac{10}{4} - \frac{3}{4} = \boxed{\frac{7}{4}}$$

Monomial Denominators-FIND A COMMON DENOMINATOR!

- determine what each denominator has that the other denominator is missing
- multiply top and bottom by whatever is missing-to give you the common denominator

$$\text{Example 1: } \frac{1}{2x} + \frac{1}{2x} = \frac{2}{2x} = \boxed{\frac{1}{x}}$$

$$x \neq 0$$

$$\text{Example 2: } \frac{2}{x} - \frac{1}{x} = \boxed{\frac{-3}{x}}$$

$$x \neq 0$$

$$\text{Example 3: } \frac{2}{6x} + \frac{8}{3x} - \frac{9}{4x}$$

$$\frac{2}{12x} + \frac{8}{12x} - \frac{9}{12x} = \boxed{\frac{1}{12x}}$$

$$x \neq 0$$

$$\text{Example 4: } \frac{4(5y+2)}{xy^2} + \frac{(2x-4)y}{4xy}$$

$$\frac{20y+8}{4xy^2} + \frac{2xy-4y}{4xy^2} =$$

$$\frac{16y+8+2xy}{4xy^2} = \frac{8y+4+xy}{2xy^2}$$

$$\text{Example 5: } \frac{3}{7x^2y} + \frac{4}{21xy^2}$$

$$\text{Example 6: } \frac{3}{8x^3y^3} - \frac{1}{4xy}$$

Factor Denominators!!

Monomial Denominators - FACTOR & FIND A COMMON DENOMINATOR!

- Always start by factoring polynomial denominators
- Multiply top and bottom by whatever is missing and then combine the numerators

Example 7: $\frac{x+12}{4x-16} - \frac{x+4}{2x-8}$

Example 8: $\frac{y}{2y+4} - \frac{3}{y+2}$

$$\frac{y}{2(y+2)} - \frac{3}{y+2} = \frac{y}{2(y+2)} - \frac{6}{2(y+2)}$$

$$= \frac{y-6}{2(y+2)} \quad y \neq -2$$

Example 9: $\frac{-3x}{x^2-9} + \frac{4}{2x-6}$

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

Example 11: $\frac{5x}{x^2-x-6} - \frac{4}{x^2+4x+4}$

Example 12: $\frac{x}{x-1} + \frac{2x-1}{x^2-3x+2} = \frac{x}{x-1} + \frac{2x-1}{(x-2)(x-1)}$

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

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

$$= \frac{(x+1)(x-1)}{(x-2)(x-1)} = \frac{x+1}{x-2} \quad x \neq 2, 1$$