



Operations with Fractional Expressions

To multiply fractions:

$$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$$

To divide fractions:

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

To add/subtract fractions:

$$\frac{a}{b} \pm \frac{c}{d} = \frac{ad}{bd} \pm \frac{cb}{db} = \frac{ad \pm bc}{bd}$$

Example 1: Multiply $\frac{x+1}{x+2} \cdot \frac{x+3}{x+4}$.

$$\begin{aligned} \text{Solution:} \quad \frac{x+1}{x+2} \cdot \frac{x+3}{x+4} &= \frac{(x+1)(x+3)}{(x+2)(x+4)} \\ &= \frac{x^2 + 4x + 3}{x^2 + 6x + 8} \end{aligned}$$

Example 2: Divide $\frac{x+1}{x+2} \div \frac{x+3}{x+4}$.

$$\begin{aligned} \text{Solution:} \quad \frac{x+1}{x+2} \div \frac{x+3}{x+4} &= \frac{x+1}{x+2} \cdot \frac{x+4}{x+3} \\ &= \frac{x^2 + 5x + 4}{x^2 + 5x + 6} \end{aligned}$$

Example 3: Add $\frac{x+1}{x+2} + \frac{x+3}{x+4}$.

$$\begin{aligned} \text{Solution:} \quad \frac{x+1}{x+2} + \frac{x+3}{x+4} &= \frac{(x+1)(x+4)}{(x+2)(x+4)} + \frac{(x+3)(x+2)}{(x+4)(x+2)} \\ &= \frac{x^2 + 5x + 4}{x^2 + 6x + 8} + \frac{x^2 + 5x + 6}{x^2 + 6x + 8} \\ &= \frac{2x^2 + 10x + 10}{x^2 + 6x + 8} \end{aligned}$$

EXERCISES

A. Simplify and expand:

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

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