

# 7.2 Adding & Subtracting Rationals

## Old Adding & Subtracting Fractions

$$\textcircled{1} \frac{4}{5} + \frac{3}{5} = \frac{7}{5}$$

$$\textcircled{2} \frac{-2}{11} + \frac{7}{11} = \frac{5}{11}$$

What if fractions do not have the same denominator? Find the least common multiple (LCM).

$$\textcircled{1} \frac{1}{2} + \frac{3}{5} \quad \begin{array}{l} 2 \quad 5 \\ 4 \quad \textcircled{10} \\ 6 \quad 15 \\ 8 \quad 20 \end{array}$$

$$= \frac{1 \cdot 5}{2 \cdot 5} + \frac{3 \cdot 2}{5 \cdot 2} \quad \begin{array}{l} \textcircled{10} \\ 12 \end{array}$$

$$= \frac{5}{10} + \frac{6}{10} = \frac{5+6}{10}$$

$$= \frac{11}{10}$$

$$\textcircled{2} \frac{2}{3} - \frac{1}{6} \quad \begin{array}{l} 3 \quad \textcircled{6} \\ \textcircled{6} \quad 12 \\ 9 \quad 24 \end{array}$$

$$= \frac{2 \cdot 2}{3 \cdot 2} - \frac{1 \cdot 1}{6 \cdot 1} \quad \begin{array}{l} 12 \\ 15 \end{array}$$

$$= \frac{4}{6} - \frac{1}{6} = \frac{4-1}{6}$$

$$= \frac{3}{6} = \frac{1}{2}$$

## New Adding & Subtracting Rational Expressions

**Basic Idea** You may add & subtract rational expressions if they have the same denominator.

$$\textcircled{1} \frac{3x-4}{x+3} + \frac{2x+5}{x+3} = \frac{(3x-4)+(2x+5)}{x+3} = \frac{3x-4+2x+5}{x+3} = \frac{5x+1}{x+3}$$

$$\textcircled{2} \frac{2x-1}{x^2+2} - \frac{4x+4}{x^2+2} = \frac{(2x-1)-(4x+4)}{x^2+2} = \frac{2x-1-4x-4}{x^2+2} = \frac{-2x-5}{x^2+2}$$

$$\textcircled{3} \quad \frac{x-1}{x} + \frac{x+2}{x^2} = \frac{x-1(x)}{x(x)} + \frac{x+2}{x^2} = \frac{x^2-x}{x^2} + \frac{x+2}{x^2} = \frac{x^2-x+x+2}{x^2}$$

$$= \frac{x^2+2}{x^2}$$

$$\textcircled{4} \quad \frac{x-1}{x^2+3x+2} + \frac{x}{x+1} = \frac{x-1}{(x+2)(x+1)} + \frac{x}{x+1} = \frac{x-1}{(x+2)(x+1)} + \frac{x(x+2)}{(x+1)(x+2)}$$

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

$$\textcircled{5} \quad \frac{x+4}{5} + \frac{x}{x+5} = \frac{x+4(x+5)}{5(x+5)} + \frac{x(5)}{(x+5)(5)} = \frac{(x+4)(x+5)+5x}{5(x+5)}$$

$$= \frac{x^2+9x+20+5x}{5(x+5)} = \frac{x^2+14x+20}{5(x+5)}$$