

## ADDING & SUBTRACTING RATIONAL EXPRESSIONS

*\* MUST have same denominator \**

### Example 1

Perform the indicated operation.

$$\frac{4}{3x} + \frac{5}{3x} = \frac{9}{3x} = \boxed{\frac{3}{x}}$$

### Example 2

Perform the indicated operation.

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

**Example 3**

Perform the indicated operation.

$$\frac{3}{2x} - \frac{7}{2x} = \frac{-4}{2x} = \frac{-2}{x}$$

**Example 4**

Perform the indicated operation

$$\frac{3x}{x-4} + \frac{6}{x-4} = \frac{3x+6}{x-4} = \frac{3(x+2)}{x-4}$$

**Example 5** LCD:  $12x^2(x-3)$   $\frac{5 \cdot 2(x-3)}{6x^2 \cdot 2(x-3)} = \frac{10(x-3)}{12x^2(x-3)}$   
 Perform the indicated operation.

$$\frac{5}{6x^2} + \frac{x}{\frac{4x^2 - 12x}{4x(x-3)}}$$

$$\frac{x \cdot 3x}{4x(x-3) \cdot 3x} = \frac{3x^2}{12x^2(x-3)}$$

$$6x^2 = 2 \cdot 3 \cdot x \cdot x$$

$$4x(x-3) = 2 \cdot 2 \cdot x \cdot (x-3)$$

$$\text{LCD: } 2 \cdot x \cdot 3 \cdot 2 \cdot x \cdot (x-3)$$

$$\text{LCD: } 12x^2(x-3)$$

$$\frac{10(x-3)}{12x^2(x-3)} + \frac{3x^2}{12x^2(x-3)} = \frac{10x-30+3x^2}{12x^2(x-3)}$$

~~$\frac{5}{10} \mid \frac{3}{90}$~~   
 Can't be done

$$\boxed{\frac{3x^2 + 10x - 30}{12x^2(x-3)}}$$

**Example 6**

Perform the indicated operation.

$$\frac{4}{3x^3} + \frac{x}{\underbrace{6x^3 + 3x^2}_{3x^2(2x+1)}}$$

$$\text{LCD: } 3x^3(2x+1)$$

$$\frac{4}{3x^3} \cdot \frac{(2x+1)}{(2x+1)} = \frac{4(2x+1)}{3x^3(2x+1)}$$

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

$$3x^3 = 3 \cdot x \cdot x \cdot x$$

$$3x^2(2x+1) = 3 \cdot x \cdot x \cdot (2x+1)$$

$$\text{LCD: } 3 \cdot x \cdot x \cdot x \cdot (2x+1)$$

$$\text{LCD: } 3x^3(2x+1)$$

$$\frac{4(2x+1)}{3x^3(2x+1)} + \frac{x^2}{3x^3(2x+1)} = \frac{8x+4+x^2}{3x^3(2x+1)}$$

~~$$\begin{array}{r|l} 5 & 8 \\ \hline 1 & 4 \\ 2 & 2 \end{array}$$

Can't be done~~

$$= \frac{x^2 + 8x + 4}{3x^3(2x+1)}$$