

In order to add or subtract fractions, we must first find the least common denominator, or **LCD**.

$$a) \frac{1}{3} + \frac{3}{4} = \frac{4}{12} + \frac{9}{12} = \frac{13}{12}$$

$4 \cdot 3 = 12$   
 $3 \cdot 4 = 12$   
 ~~$3, 6, 9, 12, 15$~~   
 ~~$4, 8, 12, 16, 20$~~

$$b) \frac{5}{2} - \frac{3}{4} = \frac{10}{4} - \frac{3}{4} = \frac{7}{4}$$

$2 \cdot 2 = 4$   
 $2 \cdot 2 = 4$

**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

Example 1:  $\frac{1}{2x} + \frac{1}{2x}$

$$\frac{1}{2x} = \frac{1}{x}$$

Example 2:  $\frac{-2}{x} - \frac{1}{x}$

$$\frac{-3}{x}$$

Example 3:  $\frac{1}{6x} + \frac{2}{3x} - \frac{3}{4x}$  LCD:  $12x$

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

Example 4:  $\frac{4(5y+2)}{1xy^2} + \frac{(2x-4)y}{4xy}$  LCD:  $4xy^2$

$$\frac{4xy^2}{1xy^2} = 4$$

$$\frac{4xy^2}{4xy} = y$$

$$\frac{20y + 8 + 2xy - 4y}{4xy^2} \rightarrow \frac{2(8y + 4 + xy)}{4xy^2}$$

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

Bonus Points

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

$$\frac{21x^2y^2}{7x^2y} = 3y$$

$$\frac{21x^2y^2}{21xy^2} = x$$

$$\frac{9y + 4x}{21x^2y^2}$$

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

$$\frac{8x^3y^3}{4xy} = 2x^2y^2$$

$$\frac{3 - 2x^2y^2}{8x^3y^3}$$

## 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:**  $\frac{w+12}{4w-16} - \frac{w+4}{2w-8}$

*factor completely*

$$\frac{w+12}{4(w-4)} - \frac{(w+4)^2}{2(w-4)^2} \quad \text{LCD: } 4(w-4)$$

$$\frac{w+12 - (2w+8)}{4(w-4)}$$

$$\frac{w+12-2w-8}{4(w-4)} = \frac{-w+4}{4(w-4)} \rightarrow \frac{-(w-4)}{4(w-4)} \rightarrow \frac{-1}{4}$$

*Bonus Points*

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

$$\frac{y}{2(y+2)} - \frac{3 \cdot 2}{(y+2)} \quad \text{LCD: } 2(y+2)$$

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

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

*(DOS)*

$$\frac{-3x \cdot 2}{(x+3)(x-3)} + \frac{4(x+3)}{2(x-3)} \quad \text{LCD: } 2(x-3)(x+3)$$

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

$$\frac{-2x + 12}{2(x-3)(x+3)} \rightarrow \frac{-2(x-6)}{2(x-3)(x+3)}$$

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

*Bonus Points*

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

$$\frac{2x(x-1)}{(x-2)(x+1)} - \frac{4x(x+1)}{(x-2)(x-1)} \quad \text{LCD: } (x-2)(x-1)(x+1)$$

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

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

$$\frac{-2x^2 - 6x}{(x-2)(x-1)(x+1)} \rightarrow \frac{-2x(x+3)}{(x-2)(x-1)(x+1)}$$

*Bonus Points*

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

*HW 11/7/17*

$$\frac{5x(x+2)}{(x-3)(x+2)} - \frac{4(x-3)}{(x+2)(x+2)} \quad \text{LCD: } (x-3)(x+2)(x+2)$$

$$\frac{5x^2 + 10x - (4x - 12)}{(x-3)(x+2)(x+2)}$$

$$\frac{5x^2 + 10x - 4x + 12}{(x-3)(x+2)(x+2)}$$

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

**Example 12:**  $\frac{x}{x-1} + \frac{2x-1}{x^2-3x+2}$

$$\frac{x(x-2)}{(x-1)} + \frac{2x-1}{(x-2)(x-1)} \quad \text{LCD: } (x-1)(x-2)$$

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

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

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

*Bonus Points*

