

## Unit 9 : Adding and Subtracting Algebraic Fractions

Recall:

Adding Numeric Fractions:

*Subtracting (same steps)*

Step ① Find the lowest  
(LCD)  
common denominator

$$\text{LCD} = 2 \times 2$$

Step ②: Keep the LCD

as is, and write it  
once. Over one fraction

Sign *(or subtract)*, add the numerators.

ex.

$$\frac{1}{2} + \frac{3}{4} =$$

$$\frac{2 \times 1}{2 \times 2} + \frac{3}{2 \cdot 2}$$

$$\frac{2 \times 1 + 3}{2 \times 2}$$

$$\frac{2 + 3}{4} = \frac{5}{4}$$

$$\frac{5}{6} - \frac{2}{3}$$

$$\frac{5}{3 \times 2} - \frac{2 \times 2}{3 \times 2} = \frac{5 - 2 \times 2}{3 \times 2} = \frac{5 - 4}{6} = \frac{1}{6}$$

# Adding Algebraic Fractions

## Steps

Step ①: FACTOR

Step ②: Put back in fractions and see if you can simplify.

Step ③: Get the same LCD, by "multiplying" the denominator by the missing factor (bracket). Don't forget to do the same thing to the top.

Step ④: Keep the LCD as is, write it once, and over one fraction connect the tops.

Step ⑤: Evaluate the tops following BEDMAS, factor if possible, simplify if possible.

$$\frac{1}{(a+1)} + \frac{a-1}{a^2+4a+3}$$

$$\textcircled{1} \frac{a^2+4a+3}{\begin{matrix} \text{1} \times 3 = 3 \\ -1 \quad -3 \end{matrix}}$$

$$a^2+a+3a+3$$

$$a(a+1)+3(a+1)$$

$$(a+1)(a+3)$$

$$\textcircled{2} \frac{(a+3) \times 1}{(a+3)(a+1)} + \frac{(a-1)}{(a+1)(a+3)}$$

$$\frac{(a+3) + (a-1)}{(a+3)(a+1)}$$

o

$$\frac{\underline{a+3} + \underline{a-1}}{(a+3)(a+1)}$$

$$\frac{\underline{2a} + \underline{2}}{(a+3)(a+1)} \quad \text{gcf: 2}$$

B  
D

$$\frac{2(a+1)}{(a+3)(a+1)} = \frac{2}{a+3}$$

Perform the following operations

$\begin{matrix} 3 \\ -1 & -3 \end{matrix}$

$$\textcircled{1} \frac{4}{m^2 - 4m + 3} - \frac{2}{(m-3)}$$

$$\textcircled{1} \frac{m^2 - 4m + 3}{1 \times 3 = 3} \rightarrow (m-1)(m-3)$$

$$\frac{4}{(m-1)(m-3)} - \frac{2 \times (m-1)}{(m-3)(m-1)}$$

$$\frac{4 - 2(m-1)}{(m-1)(m-3)}$$

BEDMAS

$$\frac{4 - 2m + 2}{(m-1)(m-3)}$$

$$\frac{6/2 - 2m/2}{(m-1)(m-3)} \quad \text{gcf: 2}$$

$$\frac{2(3 - m)}{(m-1)(m-3)}$$

gcf: -1  
B:  
:D:

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

$$\frac{4m}{m^3 - 16m} - \frac{m}{m^2 + 4m - 32}$$

$$\frac{3r + 6}{r^2 - 2r - 8} - \frac{2r + 4}{(r + 2)^2}$$

$$\frac{d^9}{4b^2 - d^2} - \frac{3b^3 d^2}{6b^3 d^2 + 3b^2 d^3}$$

2)

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

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

$$\frac{x-y - x - y}{(x+y)(x-y)}$$

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

Never  
unfactor  
the  
denominator

$$\textcircled{1} \frac{4m}{m^3 - 16m} \quad \textcircled{2} \frac{m}{m^2 + 4m - 32}$$

$$\frac{\cancel{4m}}{m(m-4)(m+4)} - \frac{m}{(m-4)(m+8)}$$

$$\frac{4(m+8)}{(m-4)(m+4)(m+8)} - \frac{m(m+4)}{(m-4)(m+8)(m+4)}$$

$$\frac{\overbrace{4(m+8)} - \overbrace{m(m+4)}}{(m-4)(m+4)(m+8)}$$

$$\frac{\cancel{4m} + 32 - m^2 - \cancel{4m}}{(m-4)(m+4)(m+8)}$$

$$\textcircled{1} \frac{m^3}{m} - \frac{16m}{m}$$

$$m(m^2 - 16) \quad \sqrt{m^2} = m$$

$$m(m-4)(m+4) \quad \sqrt{16} = 4$$

$$\textcircled{2} \underbrace{m^2 + 4m - 32}_{1 \times -32 = -32} \quad \begin{matrix} -32 \\ 0 \\ -4 \end{matrix}$$

$$\underbrace{m^2 - 4m + 8m - 32}_{m(m-4) + 8(m-4)}$$

$$(m-4)(m+8)$$

$$= \frac{32 - m^2}{(m-4)(m+4)(m+8)}$$

$$\begin{aligned} & \frac{y+2}{y^2-4} + \frac{y-1}{y^2-y} \\ & \textcircled{1} \frac{y+2}{(y-2)(y+2)} + \textcircled{2} \frac{y-1}{y(y-1)} \\ & \frac{1y}{(y-2)y} + \frac{1(y-2)}{y(y-2)} \\ & \frac{y + 1(y-2)}{y(y-2)} \end{aligned}$$

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

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

gcf: 2  
B  
D

$$\textcircled{1} \quad y^2 - 4 \\ (y-2)(y+2)$$

$$\textcircled{2} \quad \frac{y^2 - y}{y(y-1)} \quad \begin{matrix} \text{gcf: } y \\ B \\ D \end{matrix}$$

$$\frac{2(y-1)}{y(y-2)}$$