

Unit 4: Adding and Subtracting Algebraic Fractions

ex Perform the following operation

$$\frac{x^2}{5x^3} + \frac{5x^2 - 20}{x^2 + 4x + 4}$$

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

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

$$\frac{(x+2) \cdot 1}{(x+2) \cdot 5x} + \frac{5(x-2) \cdot 5x}{(x+2) \cdot 5x}$$

$$\frac{(x+2) + 5(x-2) \cdot 5x}{5x(x+2)}$$

$$\frac{(x+2) + 25x(x-2)}{5x(x+2)}$$

$$= \frac{x+2 + 25x^2 - 50x}{5x(x+2)}$$

$$\frac{5(x-2) \cdot 5x}{(5x-10) \cdot 5x} = \frac{25x^2 - 50x}{25x^2 - 50x}$$

$$= \frac{25x^2 - 49x + 2}{5x(x+2)}$$

Done ↗

① FACTOR

② Simplify

③ Do operation

(During which, never simplify/rotate!!!)

i. get same LCD by multiplying each denominator by missing factor.

ii. write denominator once and add tops.

iii. evaluate tops and collect like terms

④ FACTOR if possible.

⑤ Simplify

$$\begin{array}{r} 50 \\ 50 \quad 1 \\ -50 \quad -1 \end{array}$$

Note the Difference

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

okay  
↳  $\frac{1}{\cancel{x}} \times \frac{\cancel{x}(x-2)}{(x+2)}$

$$\frac{\cancel{x}(x-2)}{\cancel{x}(x+2)} = \frac{(x-2)}{x(x+2)}$$

p 4.20 Evaluate

$$\#2 \quad \frac{st}{25s^2 - t^2} + \frac{2s^2t}{10s^2t + 2st^2}$$

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

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

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

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

factor out -1

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

evaluate negative with the signs

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

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

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

**BEDMAS**

Note: For Adding and Subtracting, not multiplying, you do it all at once.

**Adding Fractions**

i Get LCD by x missing factors, - or - employ negative one strategy to make factors the same.

$$\frac{2x}{x^2 - 3x + 2} + \frac{2}{2-x}$$

don't forget about 1

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

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

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

$$\textcircled{1} \frac{3x+3}{3x-9}$$

$$\textcircled{2} 3x-9$$

$$\textcircled{3} \frac{x^2-4y^2}{3x^2+4xy-4y^2}$$

$$\textcircled{4} 3x^2+4xy-4y^2$$

$$\frac{\cancel{3}(x+1)}{\cancel{3}(x-3)} - \frac{(x-2y)\cancel{(x+2y)}}{(3x-2y)\cancel{(x+2y)}}$$

$$\frac{\cancel{(3x-2y)}(x+1)}{\cancel{(3x-2y)}(x-3)} - \frac{(x-2y)\cancel{(x-3)}}{\cancel{(3x-2y)}(x-3)}$$

$$\frac{\cancel{(3x-2y)}(x+1) - \cancel{1}(x-2y)\cancel{(x-3)}}{(3x-2y)(x-3)}$$

$$\frac{3x^2+3x-2xy-2y - [x^2-3x-2yx+6y]}{(3x-2y)(x-3)}$$

$$\frac{\underline{3x^2} + \underline{3x} - \underline{2xy} - \underline{2y} - \underline{x^2} + \underline{3x} + \underline{2xy} - \underline{6y}}{(3x-2y)(x-3)} = \frac{2x^2 + 6x - 8y}{(3x-2y)(x-3)}$$

$$\frac{4x-12}{x^2-9} - \frac{x^2+4x+4}{x^2-4}$$

$$\textcircled{1} 3x+3$$

$$3(x+1)$$

$$\textcircled{2} 3(x-3)$$

$$\textcircled{3} (x-2y)(x+2y)$$

$$\textcircled{4} 3x^2+4xy-4y^2$$

$$3x^2 - 2xy + 6xy - 4y^2$$

$$x(3x-2y) + 2y(3x-2y)$$

$$(3x-2y)(x+2y)$$

-12  
2 6

important to not forget about negative

Evaluate:

$$\frac{-2}{(5q-2p)} - \frac{p}{p^2-pq-2q^2} + \frac{4q}{2p^2-9pq+10q^2}$$

$$\frac{-2}{(5q-2p)} - \frac{p}{(p-2q)(p+q)} + \frac{4q}{(p-2q)(2p-5q)}$$

(a)  $2p^2 - 9pq + 10q^2$   
 $2p^2 - 4pq - 5pq + 10q^2$   
 $2p(p-2q) - 5q(p-2q)$   
 $(p-2q)(2p-5q)$

$$-\frac{2(p-2q)(p+q)}{(2p-5q)(p-2q)(p+q)} + \frac{4q(p+q)}{(p-2q)(2p-5q)(p+q)}$$

$$\frac{2(p-2q)(p+q) - p(2p-5q) + 4q(p+q)}{(2p-5q)(p-2q)(p+q)}$$

$$\frac{2(p^2 + pq - 2qp - 2q^2) - 2p^2 + 5qp + 4pq + 4q^2}{(2p-5q)(p-2q)(p+q)}$$

$$\frac{\cancel{2p^2} + \underline{2pq} - \underline{4qp} - \cancel{4q^2} - \cancel{2p^2} + \underline{5qp} + \underline{4pq} + \underline{4q^2}}{(2p-5q)(p-2q)(p+q)}$$

$$\frac{-3pq}{(5q-2p)(p-2q)(p+q)} = \frac{7pq}{(2p-5q)(p-2q)(p+q)}$$

$p=2$   
 $q=3$

$$\frac{-3(2)(3)}{(5(3)-2(2))(2-2(3))(2+3)}$$

?

$$\frac{7(2)(3)}{(2(2)-5(3))(2-2(3))(2+3)}$$

0.1709