

1. Combine into a fraction in simplest form. Expand everything.

a. $\frac{4}{x-2} + \frac{3}{2x+3} - \frac{1}{x+2}$

$$4(2x+3)(x+2) + 3(x^2-4) - 1(x-2)(2x+3)$$

$$4(2x^2+7x+6) + 3x^2-12 - (2x^2-x-6)$$

$$8x^2+28x+24+3x^2-12-2x^2+x+6$$

$$\frac{9x^2+29x+18}{2x^3+3x^2-8x-12}$$

$$(x^2-4)(2x+3)$$

$$2x^3+3x^2-8x-12$$

b. $\frac{2x}{2x^2+5x-3} + \frac{3x-2}{3x^2+13x+12}$

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

$$(3x+4)(2x-1)(x+3) \quad (3x+4)(x+3)(2x-1)$$

$$6x^3+8x^2+6x^2-7x+2$$

$$\frac{12x^2+x+2}{6x^3+23x^2+11x-12}$$

$$6x^3+23x^2+11x-12$$

$$(3x+4)(2x^2+5x-3)$$

$$6x^3+23x^2+11x-12$$

c. $\left(\frac{2x^2+5x-3}{2x^2+x-1}\right) \left(\frac{3x^2+5x+2}{4x^2+11x-3}\right)$

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

$$\frac{3x+2}{4x-1}$$

$$\frac{3x+2}{4x-1}$$

$$\frac{3x+2}{4x-1}$$

$$4x^2+12x-x-3$$

$$4x(x+3)-(x+3)$$

d. $\frac{(3x-2)^3}{6x^2-x-2}$

$$\frac{3x^2-17x+10}{2x^2-7x-4}$$

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

$$= \frac{3x^2-14x+8}{x-5}$$

$$\frac{3x^2-14x+8}{x-5}$$

$$x-5$$

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

$$2x(3x-2)+1(3x-2)$$

9.18
1 1 1 1
3 3 3 3 2

2. Find the values of a and b such that $\frac{a \cdot x}{x+6} + \frac{b}{x-4} = \frac{5x^2 - 17x + 18}{x^2 + 2x - 24}$.

$$\frac{ax(x-4) + b(x+6)}{x^2 + 2x - 24} = \frac{5x^2 - 17x + 18}{x^2 + 2x - 24}$$

$$\rightarrow ax^2 - 4ax + bx + 6b$$

$$ax^2 + (b - 4a)x + 6b$$

$$5x^2 - 17x + 18$$

$$\begin{aligned} a &= 5 \\ b - 4a &= -17 \\ b &= 3 \end{aligned}$$

3. Given that $\frac{a}{x^2 + x - 6} + \frac{b}{2x^2 + x - 10} = \frac{12x + 31}{2x^3 + 7x^2 - 7x - 30}$.

a. Confirm that the least common denominator of the left side is the same as the denominator on the right side. Show all work!

$$(x+3)(x-2)(2x+5)$$

$$(2x+5)(x-2)(x+3)$$

$$(2x^2 + x - 10)(x+3)$$

$$2x^3 + 6x^2 + x^2 + 3x - 10x - 30$$

$$2x^3 + 7x^2 - 7x - 30$$

b. Find the values of a and b that make the equation true.

$$\frac{a(2x+5) + b(x+3)}{2x^3 + 7x^2 - 7x - 30} = \frac{12x + 31}{2x^3 + 7x^2 - 7x - 30}$$

$$2xa + 5a + bx + 3b = 12x + 31$$

$$(2a + b)x + 5a + 3b = 12x + 31$$

$$\begin{aligned} -3(2a + b &= 12) \\ 5a + 3b &= 31 \\ -6a - 3b &= -36 \\ \hline -a &= -5 \end{aligned}$$

$$\begin{aligned} a &= 5 \\ 2(5) + b &= 12 \\ b &= 2 \end{aligned}$$