

Adding and Subtracting

Just remember what these guys taught you!

Remember when multiplying was hard, and adding was easy?




We'll do a quick example to see how much you remember / know about adding fractions.

$$\begin{aligned} & \frac{3}{x^3} + \frac{8}{x^3} - \frac{4}{x^3} \\ = & \frac{3+8-4}{x^3} \\ = & \frac{7}{x^3} \end{aligned} \quad x \neq 0$$

Here's your algorithm. (The steps you need to take every time:
I'll wait for you to write it down)

1. State the restrictions.
 - Always. Every question. Every time. You can not divide by zero. It is nonsensical.
2. Find a common denominator.
 - This is the step that makes adding difficult.
3. Write an equivalent fraction
 - Be able to write one denominator with all the numerator stuff above one line.
4. Add and subtract like terms in the numerator.
5. Make sure your final answer is simplified.

$$\begin{aligned} & \frac{2x}{3} - \frac{x-2}{3} \\ & = \frac{2x - (x-2)}{3} \\ & = \frac{2x - x + 2}{3} \\ & = \frac{x + 2}{3} \end{aligned}$$




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

$x \neq 3$

Ok, all those were "best case scenario" you will not have questions that already have a common denominator. Getting one will be your job. Expect to do this every question.

$$\frac{5m}{6} - \frac{3m}{4} + \frac{m}{8}$$

There are 2 ways to get your common denominator. The *best* way is to see that $6(4)=4(6)=8(3)=24$.

However, if you can't see the **lowest** common denominator like that you can always multiply all the bottom terms together to get a common denominator. $6(4)(8)=192$... big numbers usually do not make the question easier though...

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$$\begin{aligned} &= \frac{4(5m) - 3(6)m + 3m}{24} \\ &= \frac{20m - 18m + 3m}{24} \\ &= \frac{5m}{24} \end{aligned}$$

$$\frac{2n-7}{8n} - \frac{3n-4}{6n}$$

$$= \frac{3(2n-7) - 4(3n-4)}{24n}$$
$$= \frac{6n - 21 - 12n + 16}{24n}$$

$$= \frac{-6n - 5}{24n}$$

2.1 (6X)

$$= -\frac{6n+5}{24n}$$

$\neq 0$



Greenshot
Exported to
preferred

$6x(2y)$

$$\frac{2y}{5x^2} + \frac{1}{10x} - \frac{6}{15x^3}$$

$$= \frac{2y(6x) + 3x^2 - 6(2)}{30x^3}$$

$$= \frac{12xy + 3x^2 - 12}{30x^3}$$

$$= \frac{4xy + x^2 - 4}{10x^3}$$

$x \neq 0$

Let's kick it up a notch!



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

$$\frac{2x}{x+5} + \frac{3x}{x-3}$$

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

$$= \frac{2x^2 - 6x + 3x^2 + 15x}{(x+5)(x-3)}$$

$$= \frac{5x^2 + 9x}{(x+5)(x-3)}$$

$$= \frac{x(5x+9)}{(x+5)(x-3)}$$

✓✓☺

$$\frac{1}{2} - \frac{1}{3}$$

$$\frac{\textcircled{1}x}{2x-4} - \frac{\textcircled{3}}{3x-6}$$

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

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

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

$$= \frac{1}{2} \quad \text{N.P.V.} \quad \begin{matrix} x-2 \neq 0 \\ x \neq 2 \end{matrix}$$

$$= \frac{1(3) - 1(2)}{6}$$

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

$$\rightarrow \frac{\textcircled{4}}{x^2+x-6} - \frac{5}{x^2-x-12}$$

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

$$= \frac{4x - 16 - 5x + 10}{(x+3)(x-2)(x-4)}$$

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

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

N.P.V

$$\begin{matrix} x+3 \neq 0 \\ x-2 \neq 0 \\ x-4 \neq 0 \end{matrix}$$

$$x \neq -3, 2, 4$$

$$x^2 + x - 6 = (x+3)(x-2)$$

$$x^2 - x - 12 = (x+3)(x-4)$$

$$\frac{1}{3} + \frac{1}{2} = \frac{\textcircled{2} + \textcircled{3}}{6}$$

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

$$\begin{aligned}
 & \boxed{\frac{x-1}{x^2+x-6}} - \boxed{\frac{x-2}{x^2+4x+3}} \qquad \frac{\underline{(x+3)}\underline{(x-2)}}{\underline{(x+3)}\underline{(x+1)}} \\
 & = \frac{(x-1)(x+1) - (x-2)(x-2)}{(x+3)(x-2)(x+1)} = \cancel{x^2+x-1} \\
 & = \frac{x^2+x-x-1 - (x^2-2x-2x+4)}{(x+3)(x-2)(x+1)} \\
 & = \frac{4x-5}{(x+3)(x-2)(x+1)}
 \end{aligned}$$

Homework (the easy stuff):
 Pg: 336: #1,2,4ab,5,12
 Next Level: (to be handed in)
 Pg: 336: 6,7,8,15ac

