

ADDING & SUBTRACTING RATIONAL EXPRESSIONS

Flashback to 3rd grade...

How do you add or subtract fractions?

Something to do with the denominator maybe?

Find common denominators first, mult. top & bottom by same thing.

Examples: (simplify)

$$1) \quad \overset{\bullet 3}{\downarrow} \frac{2}{5} + \overset{\bullet 5}{\downarrow} \frac{1}{3} - \frac{4}{15}$$

$$\frac{6}{15} + \frac{5}{15} - \frac{4}{15} = \frac{7}{15}$$

$$2) \quad \overset{\bullet 3}{\downarrow} \frac{2}{5m} + \overset{\bullet 5m}{\downarrow} \frac{1}{3} - \overset{\bullet m}{\downarrow} \frac{4}{15}$$

$$\frac{6}{15m} + \frac{5m}{15m} - \frac{4m}{15m} = \frac{6+m}{15m}$$

$$3) \quad \overset{\bullet 4k}{\downarrow} \frac{2k}{3j^2} + \overset{\bullet 3j}{\downarrow} \frac{3}{4jk}$$

$$\frac{8k^2}{12j^2k} + \frac{9j}{12j^2k} = \frac{8k^2+9j}{12j^2k}$$

When in doubt...

factor it out!

$$4) \quad \frac{w+12}{4w-16} - \overset{\bullet 2}{\downarrow} \frac{w+4}{2w-8}$$

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

< top > $w+12 - (2w+8)$

$$w+12 - 2w - 8$$

$$= \frac{-w+4}{4(w-4)} = \frac{-1(w-4)}{4(w-4)} = -\frac{1}{4}$$

$$5) \quad \frac{7d}{d^2+3d-28} + \overset{\bullet (d-4)}{\downarrow} \frac{5}{d+7}$$

$$\frac{7d}{(d+7)(d-4)} + \frac{5d-20}{(d+7)(d-4)}$$

< top > $12d - 20$

$$= \frac{12d-20}{(d+7)(d-4)}$$

$$6) \quad \overset{\bullet (y-2)}{\downarrow} \frac{8}{3y+6} - \overset{\bullet 3}{\downarrow} \frac{y-1}{y^2-4}$$

$$\frac{8y-16}{3(y+2)(y-2)} - \frac{3y-3}{2(y+2)(y-2)}$$

< top > $8y-16 - (3y-3)$

$$8y-16-3y+3$$

$$= \frac{5y-13}{3(y+2)(y-2)}$$

Strap yourselves in...

$$7) \quad \overset{\bullet -2(x-5)}{\downarrow} \frac{9}{x+5} - \overset{\bullet (x+5)}{\downarrow} \frac{2x+3}{10-2x} + \overset{\bullet -2(x+5)}{\downarrow} \frac{3x}{x-5}$$

$$\frac{-18(x-5)}{-2(x+5)(x-5)} - \frac{(2x+3)(x+5)}{-2(x+5)(x-5)} + \frac{-6x(x+5)}{-2(x+5)(x-5)}$$

< top > $-18x+90 - (2x^2+13x+15) + (-6x^2-30x)$

$$-18x+90-2x^2-13x-15-6x^2-30x$$

$$= \frac{-8x^2-61x+75}{-2(x+5)(x-5)}$$

$$8) \quad \overset{\bullet (1+x)}{\downarrow} \frac{x+3}{2x-2} + \overset{\bullet -2}{\downarrow} \frac{x+3}{1-x^2}$$

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

< top > $x^2+4x+3-2x-6$

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

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