Before I start to teach **algebraic fractions** to young secondary school students, I often find that they have **very limited understanding** of basic addition of **numerical fractions**.

My first comment is PLEASE do not write fractions like this...

2/3 + 7/5

Secondly, it is evident that many students are still being taught old "**rote**" methods that do not promote "**understanding**" at all.



Students who follow rote methods like this, only "know a routine" which, the teacher says, gives "the correct answer"!

Students **could** be taught this similar routine just as easily under the misapprehension that "understanding" is being taught!



If students are **"taught**" that this is **how** to add fractions they will think that they **"know"** how to add fractions but they clearly have no **"understanding"**!

There is a big difference between "knowing" and "understanding"

I often need to re-teach the following...

ADDITION OF FRACTIONS.



Clearly, we can add ANY fractions directly, as long as they have the SAME DENOMINATORS.

Consider these examples: 1. $\frac{5}{17} + \frac{6}{17}$ $= \frac{11}{17}$ 2. $\frac{a}{c} + \frac{b}{c}$ $= \frac{(a+b)}{c}$

3. $\frac{x+5}{x+7} + \frac{x+3}{x+7}$
$= \frac{2x+8}{x+7}$
4. $\frac{3x+4}{x-6} + \frac{5x-7}{x-6}$
$= \frac{8x-3}{x-6}$



We can only tell what the sum is when we divide the number line into 12^{ths} :



<u>ADDING FRACTIONS WITH DIFFERENT DENOMINATORS!</u> (Clearly, we must make the denominators EQUAL)

2.

$$\frac{1}{b} + \frac{1}{c}$$

$$= \frac{1 \times c}{b c} + \frac{1 \times b}{c b}$$

$$= \frac{c + b}{bc}$$

.

$$\frac{a}{b} + \frac{d}{c}$$

$$= \frac{a \times c}{b} + \frac{d}{c} \times \frac{b}{b}$$

$$= \frac{ac + db}{bc}$$

4.

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

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

$$= \frac{4x-20}{(x+2)(x-5)} + \frac{3x+6}{(x-5)(x+2)}$$

$$= \frac{7x - 14}{(x+2)(x-5)}$$

5.

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

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

$$= (\frac{x^{2} + x - 6}{(x - 5) (x - 2)} + (\frac{x^{2} - x - 20}{(x - 2) (x - 5)})$$

$$= \frac{(2x^2 - 26)}{(x - 5)(x - 2)}$$

The concept that just *"knowing a thing"* is not the same as *"understanding it"* has been the focus of my teaching for many years.

I have devoted a whole website to this concept and I encourage educators to see my ideas...

www.knowingisnotunderstanding.weebly.com
