Fraction Addition:

\( \frac{1}{4} + \frac{13}{27} \) is defined to be the length of the line segment one gets by concatenating a line segment of length \( \frac{1}{4} \) with a line segment of length \( \frac{13}{27} \).

How to compute the sum of 2 fractions:

Denominators equal:

\[
\frac{3}{7} + \frac{5}{7} = \frac{3+5}{7} = \frac{8}{7}
\]

So, \( \frac{m}{a} + \frac{n}{a} = \frac{m+n}{a} \), because we are just counting m-steps followed by n-steps, along the sequence of \( \frac{1}{a} \)'s.
The point is that two fractions with the same denominator is a straightforward addition process. The addition is similar to adding whole $\#'$s, except on a different sequence than the whole $\#'$s.

**Ex.**

$$\frac{3}{4} + \frac{80}{4} = \frac{83}{4} = \frac{83 \cdot 25}{4 \cdot 25} = \frac{2075}{100} = 20.75$$

**Non-common denominator:**

1. Find a common denominator!
2. Solve like before. 😊

**Ex.**

$$\frac{2}{5} + \frac{64}{78} = \frac{2.78}{5.78} + \frac{64.5}{78.5}$$

Common Denom

$$\begin{align*}
\frac{478}{78} \\
x 5 \\
\frac{390}{390}
\end{align*}$$

$$= \frac{2.78 + 64.5}{5.78} = \frac{156 + 320}{390}$$

$$= \frac{476}{390}$$

In summary,

$$\frac{m}{n} + \frac{k}{l} = \frac{ml + kn}{nl}$$

where $m, n, k, l$ are whole $\#'$s.
Finding the least common denominator isn't required! If a student sees the "trick" then great! You can give examples that lead them into the least common denominator, such as:

a) \( \frac{1}{2} + \frac{1}{4} \)

b) \( \frac{1}{10} + \frac{5}{100} \)

c) \( \frac{3}{12} + \frac{2}{9} \)

\[
\frac{123}{456} + \frac{789}{1001} = \frac{123 \cdot 1001 + 789 \cdot 456}{456 \cdot 1001} = \frac{379807}{4656}
\]

\& Don't be shy about giving students large #'s. \&

Addition of Decimals:

\[
3.013 + 4.2 = \frac{3.013}{7.213}\]

But why?

\[
3.013 + 4.2 = \frac{3013}{1000} + \frac{42}{10} = \frac{3013}{1000} + \frac{4200}{10000}
\]

\[
= \frac{3013}{1000} + \frac{4200}{1000} = \frac{7813}{1000} = 7.813
\]
**Associative Law**

For any fractions $A, B, C$,

$$(A + B) + C = A + (B + C)$$

**Commutative Law**:

$$A + B = B + A$$

For any fractions $A + B$,