Combining Fractions – Part 2

Finding the Least Common Multiple

List the first few multiples of the larger number. Then find the first multiple that is divisible by the smaller number.

Example

\[
\frac{1}{3} + \frac{1}{4}
\]

\[
\begin{align*}
4, 8, 12, 16, \ldots & \leftarrow \text{multiples of 4} \\
\text{First multiple divisible by 3} & (12 \div 3 = 4)
\end{align*}
\]

The least common multiplier (LCM) of 3 and 4 is 12

Adding Unlike Fractions

Step 1 – Find the least common multiple (LCM) which would be 10 for the following example

Step 2 – Rewrite the fractions with the least common multiple as the denominator by multiplying each fraction by the factor that gets the denominator of that fraction equal to the LCM.

Step 3 – Add the numerators, place the sum over the common denominator, and simplify the answer

Example

\[
\frac{1}{2} + \frac{1}{5} + \frac{1}{10}
\]

LCM of 2, 5, and 10 = 10

\[
\begin{align*}
\frac{1}{2} &= \frac{1 \times 5}{2 \times 5} = \frac{5}{10} \\
\frac{1}{5} &= \frac{1 \times 2}{5 \times 2} = \frac{2}{10} \\
\frac{1}{10} &= \frac{1 \times 1}{10 \times 1} = \frac{1}{10}
\end{align*}
\]

\[
= \frac{5}{10} + \frac{2}{10} + \frac{1}{10} = \frac{8}{10} = \frac{4}{5}
\]

Subtracting Unlike Fractions

Step 1 – Find the least common multiple (LCM)

Step 2 – Rewrite the fractions with the least common multiple as the denominator

Step 3 – Subtract the numerators, place the difference over the common denominator, and simplify the answer

Example

\[
\frac{5}{6} - \frac{1}{4}
\]

LCM of 6 and 4 = 12
Adding Mixed Numbers

Step 1 – Add the fractions, using the lowest common denominator (same as the LCM) which happens to be 12

Step 2 – Add the whole numbers (4 + 6) which results to 10

Step 3 – Combine and simplify.

Example

\[
\frac{1}{3} + \frac{2}{4} \quad \text{LCM of 3 and 4 is 12}
\]

\[
= \frac{4}{12} + \frac{6}{12}
\]

\[
= \frac{10}{12} \div \frac{2}{12} \rightarrow 10 \frac{5}{6}
\]

Subtracting Mixed Numbers

Step 1 – Subtract the fractions, using the lowest common denominator (same as the LCM).

Step 2 – Subtract the whole numbers (6 – 3 = 3)

Step 3 – Combine the differences of the whole numbers and the fractions and simplify.

Example

\[
\frac{6}{2} - \frac{3}{4} \\
\frac{2}{4} - \frac{1}{4}
\]

\[
3 \frac{1}{4}
\]
Using Order of Operations with Fractions

Step 1 – Do all operations inside the parentheses first

Step 2 – Simplify any expressions with exponents and find any square roots

Step 3 – Multiply or divide, proceeding from left to right

Step 4 – Add or subtract, proceeding from left to right

Example

\[
\frac{1}{2} \left( \frac{2}{3} \right) - \left( \frac{1}{4} \right)^2
\]

\[
= \frac{2}{6} - \frac{1}{16}
\]

\[
= \frac{1}{3} - \frac{1}{16}
\]

\[
= \frac{16}{48} - \frac{3}{48}
\]

\[
= \frac{13}{48}
\]