Complex Fractions

**Objective 1** Learn how to simplify Complex Fractions using the Clearing Fractions Technique

Consider the complex fraction \( \frac{\frac{3}{4} + \frac{1}{3}}{\frac{5}{6} - \frac{3}{2}} \).

While simplifying this complex fraction looks a bit complicated, it can be simplified rather easily using the clearing fractions technique.

Using the LCD for all four fractions, we can clear away all four fractions! This can be done by multiplying the LCD to the top and bottom of the complex fraction.

This technique is demonstrated below.

\[
g = \frac{\frac{3}{4} + \frac{1}{3}}{\frac{5}{6} - \frac{3}{2}} \quad \text{LCD} = 12
\]

\[
12\left(\frac{\frac{3}{4} + \frac{1}{3}}{\frac{5}{6} - \frac{3}{2}}\right)
\]

\[
12\left(\frac{\frac{3}{4} + \frac{1}{3}}{\frac{5}{6} - \frac{3}{2}}\right) = \frac{9 + 4}{10 - 18} = \frac{13}{-8} = \text{or } -\frac{13}{8}
\]
Again, the more you practice the clearing fractions technique, the faster you will get at simplifying the complex fraction expressions.

**Example 1:** Use the clearing fractions technique to simplify the complex fraction.

a) \( \frac{2}{3} \) \( \frac{1}{5} \) 
   \[\frac{15 \left( \frac{2}{3} \right)}{15 \left( \frac{1}{5} \right)}\]

b) \[\frac{2 + \frac{3}{8} - \frac{1}{6}}{\frac{5}{12} - 1}\]
   \[\frac{24 \left( 2 + \frac{3}{8} - \frac{1}{6} \right)}{24 \left( \frac{5}{12} - 1 \right)}\]
   \[\frac{24(2) + 24 \left( \frac{3}{8} \right) - 24 \left( \frac{1}{6} \right)}{24 \left( \frac{5}{12} \right) - 24(1)}\]
Part b) in Example 1 can be done very quickly once you master this technique. Here’s what the work of a “math Kung Fu” black belt would look like. See if you can follow the work.

\[
\begin{align*}
\frac{2 + \frac{3}{8} - \frac{1}{6}}{\frac{5}{12} - 1} & \quad \text{LCD} = 24 \\
48 + 9 - 4 & = 10 - 24 \\
- \frac{53}{14}
\end{align*}
\]

Answer the following homework questions.

In Exercises 1 - 6, simplify each complex fraction.

1) \(\frac{\frac{8}{7}}{\frac{6}{5}}\)  
3) \(\frac{1 + \frac{3}{4}}{\frac{11}{6} - 1}\)  
5) \(\frac{2 - \frac{2}{3} + \frac{3}{4}}{\frac{1}{2} - 3 + \frac{5}{6}}\)

2) \(\frac{\frac{3}{8}}{\frac{2}{9}}\)  
4) \(\frac{3 - \frac{2}{3} + \frac{1}{2}}{\frac{7}{4} + \frac{4}{5}}\)  
6) \(\frac{\frac{1}{3} + 2 - \frac{1}{6}}{\frac{2}{9} + \frac{5}{6} - 1}\)