

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.

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

$$12 \left(\frac{3}{4} + \frac{1}{3} \right)$$

$$12 \left(\frac{5}{6} - \frac{3}{2} \right)$$

$$\frac{12 \left(\frac{3}{4} \right) + 12 \left(\frac{1}{3} \right)}{12 \left(\frac{5}{6} \right) - 12 \left(\frac{3}{2} \right)} = \frac{9 + 4}{10 - 18} = \frac{13}{-8} = \boxed{-\frac{13}{8}}$$

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.

$$a) \frac{\frac{2}{3}}{\frac{1}{5}} \quad \text{LCD}=15$$

$$\frac{15\left(\frac{2}{3}\right)}{15\left(\frac{1}{5}\right)}$$

$$b) \frac{2 + \frac{3}{8} - \frac{1}{6}}{\frac{5}{12} - 1} \quad \text{LCD}=24$$

$$\frac{24\left(2 + \frac{3}{8} - \frac{1}{6}\right)}{24\left(\frac{5}{12} - 1\right)}$$

$$\frac{24(2) + 24\left(\frac{3}{8}\right) - 24\left(\frac{1}{6}\right)}{24\left(\frac{5}{12}\right) - 24(1)}$$

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.

$$\frac{2 + \frac{3}{8} - \frac{1}{6}}{\frac{5}{12} - 1} \quad \text{LCD} = 24$$

$$\frac{48 + 9 - 4}{10 - 24}$$

$$\boxed{\frac{53}{14}}$$

Answer the following homework questions.

In Exercises 1 - 6, simplify each complex fraction.

$$1) \frac{\frac{8}{7}}{\frac{6}{5}}$$

$$3) \frac{1 + \frac{3}{4}}{\frac{11}{6} - 1}$$

$$5) \frac{2 - \frac{2}{3} + \frac{3}{4}}{\frac{1}{2} - 3 + \frac{5}{6}}$$

$$2) \frac{\frac{3}{8}}{\frac{2}{9}}$$

$$4) \frac{3 - \frac{2}{3} + \frac{1}{2}}{\frac{7}{10} + \frac{4}{5}}$$

$$6) \frac{\frac{1}{3} + 2 - \frac{1}{6}}{\frac{2}{9} + \frac{5}{6} - 1}$$