Module 2: Working with Fractions and Mixed Numbers

Use the fraction number line diagram to answer the following questions.

For Exercises 1 – 6, represent each fraction as an equivalent fraction with the indicated denominator.

1) \(\frac{3}{4}, 16\)  
2) \(\frac{1}{4}, 12\)  
3) \(\frac{4}{10}, 5\)  
4) \(\frac{12}{16}, 4\)  
5) \(\frac{2}{3}, 12\)  
6) \(\frac{1}{2}, 10\)

For Exercises 9 – 12, use the fraction number line diagram to re-write each fraction with the same denominator. Then evaluate the expression.

9) \(\frac{3}{5} - \frac{2}{10}\)  
10) \(\frac{11}{16} - \frac{3}{8}\)  
11) \(\frac{2}{3} - \frac{1}{2} + \frac{3}{4}\)  
12) \(\frac{5}{6} - \frac{2}{3}\)

7) Where is \(\frac{0}{6}\) on the number line?

8) Where is \(\frac{8}{8}\) on the number line?

13) Can \(\frac{1}{3}\) be written as a fraction with a denominator of 16? Why or why not?

14) How do we represent the whole number 1 as a fraction with a denominator of 12?

2. Adding and Subtracting Unlike Fractions

Now, let’s look at the arithmetic approach of finding the value of the expression \(\frac{1}{3} + \frac{1}{4} + \frac{1}{6}\).

Recall that we need to make all the fractions have the same denominator before we add the fractions. Therefore, we first need to determine what the least common denominator (LCD) is.

Remember, the LCD is the smallest number that all the denominators divide evenly into.

The smallest number that a 3, 4, and 6 divide evenly into is 12. Therefore, 12 is our LCD. We now multiply each fraction by a factor of 1 to get the equivalent fraction having the LCD.

Remember, when multiplying fractions, multiply straight across the top, and straight across the bottom.

\[
\frac{1}{3} = \frac{1}{3} \times (1) = \frac{4}{12} \\
\frac{1}{4} = \frac{1}{4} \times (1) = \frac{3}{12} \\
\frac{1}{6} = \frac{1}{6} \times (1) = \frac{2}{12}
\]

\[
\frac{4}{12} + \frac{3}{12} + \frac{2}{12} = \frac{9}{12}
\]

Each fraction is now re-written with a denominator of 12.

Add the numerators of the fractions in the previous step. The denominator remains unchanged.

Reduce the fraction by dividing both the numerator and denominator by 3.
Example 1: Evaluate the expression \( \frac{5}{8} - \frac{3}{4} + \frac{1}{2} - \frac{3}{16} \).

We first determine that the LCD = 16 since it is the smallest number that 8, 4, 2, and 16 divide evenly into. We now multiply each fraction by a factor of 1 to get its equivalent fraction having the LCD of 16.

\[
\begin{align*}
\frac{5}{8} &= \frac{5}{8} \left(1\right) = \frac{10}{16} \\
\frac{3}{4} &= \frac{3}{4} \left(1\right) = \frac{12}{16} \\
\frac{1}{2} &= \frac{1}{2} \left(1\right) = \frac{8}{16} \\
\frac{3}{16} &= \frac{3}{16} \left(1\right) = \frac{3}{16}
\end{align*}
\]

Each fraction is now re-written with a denominator of 16.

Add or subtract as indicated the numerators of the fractions in the previous step. The denominator remains unchanged.

\[
\frac{5}{16} - \frac{12}{16} + \frac{8}{16} - \frac{3}{16} = \frac{3}{16}
\]

For Exercises 15 – 22, identify the LCD and then re-write each fraction as an equivalent fraction having the LCD.

15) \( \frac{2}{3}, \frac{5}{6} \)  
16) \( \frac{3}{4}, \frac{5}{8} \)  
17) \( \frac{1}{9}, \frac{2}{3} \)  
18) \( \frac{2}{7}, \frac{2}{21} \)  
19) \( \frac{5}{6}, \frac{1}{4}, \frac{3}{8} \)  
20) \( \frac{1}{2}, \frac{2}{3}, \frac{2}{5} \)  
21) \( \frac{3}{8}, \frac{4}{5}, \frac{7}{10} \)  
22) \( \frac{9}{14}, \frac{3}{4}, \frac{6}{7} \)  
23) Where is the fraction \( \frac{3}{2} \) on the number line?

24) Where is the fraction \( \frac{7}{3} \) on the number line?

For Exercises 25 – 28, find the value of each expression.

25) \( \frac{2}{3} - \frac{1}{6} + \frac{3}{2} \)  
26) \( \frac{3}{4} - \frac{2}{3} + \frac{1}{6} \)  
27) \( \frac{9}{7} - \frac{1}{2} - \frac{3}{4} \)  
28) \( \frac{13}{8} - \frac{1}{5} - \frac{3}{4} \)