Subtracting Mixed Numerals

Subtraction:

Subtraction is organized similarly to addition. The fractions are aligned, and the whole numbers are aligned. However, both parts of the bottom number are subtracted from the top number.

\[
\begin{align*}
6 \frac{1}{3} & \quad 4 \frac{3}{12} \\
- 4 \frac{1}{4} & \\
\hline
2 \frac{1}{12} &= 2 \frac{1}{12}
\end{align*}
\]

The tricky part of subtraction comes in the borrowing. If the bottom fraction is bigger than the top fraction one unit must be borrowed from the top’s whole number, but that one unit is not ten of the fraction’s pieces unless the fraction’s denominator is ten.

\[
\begin{align*}
6 \frac{1}{4} & \quad 3 \frac{3}{12} \\
- 4 \frac{1}{3} & \\
\hline
\end{align*}
\]

This time we must subtract \( \frac{4}{12} \) from \( \frac{3}{12} \). We cannot subtract 4 from 3, so we borrow a unit from the 6. The 6 becomes 5\( \frac{12}{12} \). Now the 6\( \frac{3}{12} \), also known as 6 + \( \frac{3}{12} \), becomes 5\( \frac{12}{12} \) + \( \frac{3}{12} \) or 5\( \frac{15}{12} \), and the problem becomes:

\[
\begin{align*}
5 \frac{15}{12} & \\
- 4 \frac{4}{12} & \\
\hline
1 \frac{11}{12}
\end{align*}
\]

Done from the beginning without the explanations it would look like:
Examples of Subtraction:

\[
\begin{array}{c}
6 \frac{1}{4} - 4 \frac{2}{3} \\
\frac{3}{12} - \frac{8}{12} \\
\hline
1 \frac{7}{12}
\end{array}
\]

\[
\begin{array}{c}
15 \frac{2}{15} - 5 \frac{2}{3} \\
\frac{6}{15} - \frac{10}{15} \\
\hline
9 \frac{11}{15}
\end{array}
\]

\[
\begin{array}{c}
16 \frac{3}{20} - 9 \frac{4}{5} \\
\frac{15}{20} - \frac{16}{20} \\
\hline
6 \frac{19}{20}
\end{array}
\]

\[
\begin{array}{c}
25 \frac{4}{15} - 15 \frac{2}{15} \\
\frac{12}{15} - \frac{2}{15} \\
\hline
10 \frac{10}{15} = 10 \frac{2}{3}
\end{array}
\]

For the purpose of instruction the first three of those examples were made to look longer than necessary. This is how they would appear if they were done without the need to be instructive:
Subtraction with Mixed Numerals, Exercise Set #1

Subtraction:

Subtraction is organized similarly to addition. The fractions are aligned, and the whole numbers are aligned. However, both parts of the bottom number are subtracted from the top number.

\[
\begin{align*}
6 \frac{1}{3} & \quad 4 \frac{3}{12} \\
- 4 \frac{1}{4} & \quad 4 \frac{3}{12} \\
\hline
2 & = 2 \frac{1}{12}
\end{align*}
\]

The tricky part of subtraction comes in the borrowing. If the bottom fraction is bigger than the top fraction one unit must be borrowed from the top’s whole number, but that one unit is not ten of the fraction’s pieces unless the fraction’s denominator is ten.

\[
\begin{align*}
6 \frac{1}{4} & \quad 3 \frac{12}{12} \\
- 4 \frac{1}{3} & \quad 4 \frac{12}{12} \\
\hline
\end{align*}
\]

This time we must subtract \( \frac{4}{12} \) from \( \frac{3}{12} \). We cannot subtract 4 from 3, so we borrow a unit from the 6. The 6 becomes \( 5 \frac{12}{12} \). Now the \( 6 \frac{3}{12} \), also known as \( 6 + \frac{3}{12} \), becomes \( 5 \frac{12}{12} + \frac{3}{12} \) or \( 5 \frac{15}{12} \), and the problem becomes:

\[
\begin{align*}
5 \frac{15}{12} & \quad And \text{ without explanation it looks like:} \\
- 4 \frac{4}{12} & \quad \frac{5}{4} \quad \frac{15}{12} \\
\hline
1 \frac{11}{12} & \quad -4 \frac{1}{3} \quad \frac{4}{12} \\
\end{align*}
\]
Exercises:

1. \(36 \frac{5}{9} - 25 \frac{7}{8}\)

   The LCD = 72. \(72/9=8, 72/8=9\). Fill in the blanks.

   \[
   \begin{array}{c|c|c}
   \hline
   \frac{5}{9} & \frac{7}{8} & 10 \frac{49}{72} \\
   \hline
   36 & 72 \\
   -25 & 72 \\
   \hline
   \end{array}
   \]

   Ans: ___________

2. \(25 \frac{13}{24} - 8 \frac{47}{48}\)

   The LCD = 48. \(48/24=2\) and \(48/48=1\). Fill in the blanks.

   \[
   \begin{array}{c|c|c}
   \hline
   \frac{13}{24} & \frac{47}{48} & 16 \frac{9}{16} \\
   \hline
   25 & 48 \\
   -8 & 48 \\
   \hline
   \end{array}
   \]

   Ans: ___________

Simplify the following completely. Execute the problems using mixed numerals, and write the answers as mixed numerals.

3. \(48 \frac{31}{48} - 31 \frac{13}{16}\)

   LCD=__________

   Ans:__________

4. \(42 \frac{1}{6} - 21 \frac{2}{3}\)

   LCD=__________

   Ans:__________
5. \(53 \frac{2}{9} - 23 \frac{11}{36}\)
   LCD = \_

   Ans: \_

6. \(73 \frac{1}{24} - 25 \frac{11}{12}\)
   LCD = \_

   Ans: \_

7. \(65 \frac{1}{6} - 17 \frac{13}{18}\)
   LCD = \_

   Ans: \_

8. \(35 \frac{1}{21} - 21 \frac{5}{7}\)
   LCD = \_

   Ans: \_

29 \frac{11}{12}, 47 \frac{1}{8}, 47 \frac{4}{9}, 13 \frac{1}{3}
9. \( 51 \frac{1}{6} - 31 \frac{4}{15} \)  
   LCD=________  
   Ans:_______

10. \( 81 \frac{7}{16} - 43 \frac{25}{48} \)  
    LCD=________  
    Ans:_______

11. \( 18 \frac{1}{108} - 12 \frac{5}{54} \)  
    LCD=________  
    Ans:_______

12. \( 102 \frac{1}{48} - 81 \frac{2}{15} \)  
    LCD=________  
    Ans:_______
Subtraction with Mixed Numerals, Exercise Set #2

Subtraction:

Subtraction is organized similarly to addition. The fractions are aligned, and the whole numbers are aligned. However, both parts of the bottom number are subtracted from the top number. $6\frac{1}{3} - 4\frac{1}{4}$ is done as follows:

$$
\begin{array}{c}
6 \frac{1}{3} \\
- 4 \frac{1}{4} \\
\hline
2 \frac{1}{12}
\end{array}
$$

The tricky part of subtraction comes in the borrowing. If the bottom fraction is bigger than the top fraction one unit must be borrowed from the top’s whole number, but that one unit is not ten of the fraction’s pieces unless the fraction’s denominator is ten.

$$
\begin{array}{c}
6 \frac{1}{4} \\
- 4 \frac{1}{3} \\
\hline
2 \frac{1}{12}
\end{array}
$$

This time we must subtract $\frac{4}{12}$ from $\frac{3}{12}$. We cannot subtract 4 from 3, so we borrow a unit from the 6. The 6 becomes $6\frac{12}{12}$. Now the $6\frac{3}{12}$, also known as $6 + \frac{3}{12}$, becomes $5\frac{12}{12} + \frac{3}{12}$ or $5\frac{15}{12}$, and the problem becomes:

$$
\begin{array}{c}
5 \frac{15}{12} \\
- 4 \frac{12}{12} \\
\hline
1 \frac{11}{12}
\end{array}
$$

And without explanation it looks like:

$$
\begin{array}{c}
6 \frac{1}{4} \\
- 4 \frac{4}{12} \\
\hline
1 \frac{11}{12}
\end{array}
$$

$$
\begin{array}{c}
5 \frac{15}{12} \\
- 4 \frac{3}{12} \\
\hline
1 \frac{11}{12}
\end{array}
$$
Exercises:

1. \( \frac{47}{9} - \frac{35}{8} \)

   The LCD = 72. \( \frac{72}{9}=8 \), \( \frac{72}{8}=9 \). Fill in the blanks.
   
   \[
   \begin{array}{c}
   47 \frac{4}{9} - \frac{35}{8} \\
   \hline
   \end{array}
   \]
   
   Ans: \( \underline{\quad} \frac{11}{72} \)

2. \( 29\frac{19}{24} - 8\frac{47}{48} \)

   The LCD = 48. \( \frac{48}{24}=2 \) and \( \frac{48}{48}=1 \). Fill in the blanks.
   
   \[
   \begin{array}{c}
   29 \frac{19}{24} - 8 \frac{47}{48} \\
   \hline
   \end{array}
   \]
   
   Ans: \( \underline{\quad} \frac{20}{16} \)

Simplify the following completely. Execute the problems using mixed numerals, and write the answers as mixed numerals.

3. \( 118 \frac{4}{15} - 65 \frac{2}{3} \)

   LCD= \( \underline{\quad} \)
   
   Ans: \( \underline{\quad} \)

4. \( 102 \frac{11}{48} - 53 \frac{9}{16} \)

   LCD= \( \underline{\quad} \)
   
   Ans: \( \underline{\quad} \)
5. $78 \frac{4}{9} - 47 \frac{19}{36}$

$\text{LCD}=\underline{\hspace{2cm}}$

$\text{Ans}:\underline{\hspace{2cm}}$

6. $87 \frac{5}{24} - 39 \frac{7}{12}$

$\text{LCD}=\underline{\hspace{2cm}}$

$\text{Ans}:\underline{\hspace{2cm}}$

7. $95 \frac{1}{6} - 47 \frac{7}{18}$

$\text{LCD}=\underline{\hspace{2cm}}$

$\text{Ans}:\underline{\hspace{2cm}}$

8. $87 \frac{4}{21} - 52 \frac{6}{7}$

$\text{LCD}=\underline{\hspace{2cm}}$

$\text{Ans}:\underline{\hspace{2cm}}$

$30 \frac{11}{12}, 47 \frac{5}{8}, 47 \frac{7}{9}, 34 \frac{1}{3}$
9. \(91\frac{5}{6} - 49\frac{14}{15}\)  
\(\text{LCD}=\underline{\phantom{00}}\)  
\(\text{Ans:}\underline{\phantom{00}}\)

10. \(72\frac{3}{16} - 45\frac{25}{48}\)  
\(\text{LCD}=\underline{\phantom{00}}\)  
\(\text{Ans:}\underline{\phantom{00}}\)

11. \(38\frac{11}{120} - 23\frac{13}{60}\)  
\(\text{LCD}=\underline{\phantom{00}}\)  
\(\text{Ans:}\underline{\phantom{00}}\)

12. \(93\frac{7}{48} - 71\frac{19}{30}\)  
\(\text{LCD}=\underline{\phantom{00}}\)  
\(\text{Ans:}\underline{\phantom{00}}\)

\(\frac{41}{10}, \frac{26}{3}, \frac{14}{8}, \frac{21}{41}\)
Subtraction with Mixed Numerals, Exercise Set #3

Subtraction:

Subtraction is organized similarly to addition. The fractions are aligned, and the whole numbers are aligned. However, both parts of the bottom number are subtracted from the top number.

\[
\begin{array}{c}
\frac{6}{3} \frac{4}{12} \\
- \frac{4}{1} \frac{3}{12} \\
\hline
\frac{2}{1} = \frac{1}{12}
\end{array}
\]

The tricky part of subtraction comes in the borrowing. If the bottom fraction is bigger than the top fraction one unit must be borrowed from the top’s whole number, but that one unit is not ten of the fraction’s pieces unless the fraction’s denominator is ten.

\[
\begin{array}{c}
\frac{6}{4} \frac{3}{12} \\
- \frac{4}{3} \frac{4}{12} \\
\hline
\frac{1}{12}
\end{array}
\]

This time we must subtract \( \frac{4}{12} \) from \( \frac{3}{12} \). We cannot subtract 4 from 3, so we borrow a unit from the 6. The 6 becomes \( \frac{12}{12} \). Now the \( \frac{3}{12} \), also known as \( \frac{6}{12} \), becomes \( \frac{12}{12} + \frac{3}{12} \) or \( \frac{15}{12} \), and the problem becomes:

\[
\begin{array}{c}
\frac{5}{12} \frac{15}{12} \\
- \frac{4}{12} \\
\hline
\frac{1}{12}
\end{array}
\]

And without explanation it looks like:

\[
\begin{array}{c}
\frac{5}{4} \frac{15}{12} \\
- \frac{4}{3} \frac{4}{12} \\
\hline
\frac{1}{11} \frac{11}{12}
\end{array}
\]
Exercises:

1. \(39\frac{2}{9} - 24\frac{3}{8}\)

The LCD = 72. \(72/9=8, 72/8=9\). Fill in the blanks.

\[
\begin{array}{c}
\underline{39\frac{2}{9}} \\
\underline{-24\frac{3}{8}} \\
\hline
\underline{14\frac{61}{72}}
\end{array}
\]

Ans: ___________

2. \(23\frac{17}{24} - 8\frac{43}{48}\)

The LCD = 48. \(48/24=2\) and \(48/48=1\). Fill in the blanks.

\[
\begin{array}{c}
\underline{23\frac{17}{24}} \\
\underline{-8\frac{43}{48}} \\
\hline
\underline{14\frac{13}{16}}
\end{array}
\]

Ans: ___________

Simplify the following completely. Execute the problems using mixed numerals, and write the answers as mixed numerals.

3. \(68\frac{1}{6} - 59\frac{2}{3}\)

LCD=_________

Ans: _______

4. \(102\frac{5}{48} - 51\frac{7}{16}\)

LCD=_________

Ans: _______
5. \(103 \frac{4}{9} - 23 \frac{25}{36}\)
   \[\text{LCD} = \underline{\hspace{2cm}}\]
   \[\text{Ans:} \underline{\hspace{2cm}}\]

6. \(93 \frac{7}{24} - 28 \frac{11}{12}\)
   \[\text{LCD} = \underline{\hspace{2cm}}\]
   \[\text{Ans:} \underline{\hspace{2cm}}\]

7. \(74 \frac{5}{6} - 37 \frac{17}{18}\)
   \[\text{LCD} = \underline{\hspace{2cm}}\]
   \[\text{Ans:} \underline{\hspace{2cm}}\]

8. \(65 \frac{8}{21} - 41 \frac{5}{7}\)
   \[\text{LCD} = \underline{\hspace{2cm}}\]
   \[\text{Ans:} \underline{\hspace{2cm}}\]
9. \(78 \frac{1}{6} - 51 \frac{7}{15}\)  
\(\text{LCD=}_______\)  
\(\text{Ans:}_______\)

10. \(69 \frac{5}{16} - 47 \frac{23}{48}\)  
\(\text{LCD=}_______\)  
\(\text{Ans:}_______\)

11. \(41 \frac{7}{150} - 22 \frac{13}{60}\)  
\(\text{LCD=}_______\)  
\(\text{Ans:}_______\)

12. \(98 \frac{7}{48} - 76 \frac{7}{30}\)  
\(\text{LCD=}_______\)  
\(\text{Ans:}_______\)

\(26 \frac{7}{10}, 21 \frac{5}{6}, 18 \frac{83}{100}, 21 \frac{73}{80}\)