Accessible Algorithms for Subtraction

Introduce the accessible algorithm presented below when students learn about subtraction with regrouping. Support students’ use of the algorithm whenever they are working on subtraction that requires regrouping.

Ungroup First Method

Use with *Houghton Mifflin Math*, Ch 2, Lessons 3–4; Ch 11, Lesson 3.

This algorithm helps students to see the relationship between the two numbers in subtraction. In the traditional, alternating method of subtraction, students often view the two numbers as columns of digits that are unrelated to each number as a whole. By rewriting the top number so that it is ready for subtraction, and then subtracting, students better understand the subtraction process.

By ungrouping first where it is needed, students can work left-to-right (as they read), or right-to-left. Students can be encouraged to draw an oval “magnifying glass” around the top number before they regroup. This helps students see that ungrouping consists of breaking a number down into its parts to prepare it for subtraction.

**Subtract Multi-digit Numbers with Ungrouping**

<table>
<thead>
<tr>
<th>Left-to-Right</th>
<th>Right-to-Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 12 12</td>
<td>8 12 12</td>
</tr>
<tr>
<td>2,000</td>
<td>2,000</td>
</tr>
<tr>
<td>− 1,445</td>
<td>− 1,445</td>
</tr>
<tr>
<td>1,485</td>
<td>1,487</td>
</tr>
</tbody>
</table>

Less-advanced students may use the place-value meaning method, pictured below, until they are ready to transition to the Ungroup First Method.

\[
\begin{align*}
2,932 & = 2,000 + 900 + 30 + 2 \\
- 1,445 & = 1,000 + 400 + 40 + 5 \\
1,487 & = 1,000 + 400 + 80 + 7
\end{align*}
\]
**Subtract Decimals with Ungrouping**

The Ungroup First Method works equally well to develop facility with decimal subtraction.

<table>
<thead>
<tr>
<th>Left-to-Right</th>
<th>Right-to-Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2.567$</td>
<td>$2.567$</td>
</tr>
</tbody>
</table>

**Subtract Fractions with Ungrouping**

There are multiple methods for ungrouping mixed numbers for subtraction. Struggling students may find the Expanded Notation Method, shown below, beneficial.

\[
\begin{align*}
6\frac{1}{4} &= 5 + \frac{4}{4} + \frac{1}{4} = 5\frac{5}{4} \\
- 2\frac{3}{4} & \quad - 2\frac{3}{4} \\
\hline
3\frac{2}{4} &
\end{align*}
\]

Other students may choose to cancel and ungroup, as in this example.

\[
\begin{align*}
\frac{5}{4} - \frac{6}{4} & = \frac{5}{4} - \frac{6}{4} \\
- 2\frac{3}{4} & \\
\hline
3\frac{2}{4} &
\end{align*}
\]

The typical “smaller from larger” error that is common in multi-digit subtraction also occurs with the subtraction of mixed numbers. Some students may try to subtract the smaller fraction from the larger fraction even when it means “going the wrong way.” Encouraging these students to use the vertical format is often helpful because it looks like the ungrouping in multi-digit subtraction that they already know.