Grade Level/Course: Grade 2, Grade 3, and Grade 4

Lesson/Unit Plan Name: Subtracting Multiple Ways, With or Without Regrouping

Rationale/Lesson Abstract: Teachers and students often know multiple ways to subtract. However, the connections between the different methods used to subtract are often not made or misunderstood. The focus of the lesson will be on making connections between subtracting by regrouping using base 10 blocks, decomposition, and the traditional algorithm. A secondary focus will be how to subtract without regrouping using decomposition and open number lines. Finally, this lesson will show how to use bar models to visually show subtraction and to relate it to addition.

Timeframe: one period, ongoing

Common Core Standard(s):

2.NBT.7

Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

3.NBT.2

Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

4.NBT.4

Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Instructional Resources/Materials: Lesson Plan, Notebooks, Pencils, Base 10 Blocks (optional, if you choose to build them you will need them)
Activity/Lesson:

BAR MODELS: RELATING ADDITION AND SUBTRACTION

**Example 1:** Show $23 - 16$ using a Bar Model and create as many equations as you can that fit this model:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>16</td>
<td>?</td>
</tr>
</tbody>
</table>

What equations can be created given this bar model above?

$$23 - 16 = ?$$
$$16 + ? = 23$$
$$23 - ? = 16$$
$$? + 16 = 23$$

**You Try 1:** Show $32 - 14$ using a Bar Model and create as many equations as you can that fit this model:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>14</td>
<td>?</td>
</tr>
</tbody>
</table>

What equations can be created given this bar model above?

$$32 - 14 = ?$$
$$14 + ? = 32$$
$$32 - ? = 14$$
$$? + 14 = 32$$
**SUBTRACTION WITH REGROUPING**

**Example 2:** Find the difference with regrouping using Base 10 Blocks, Decomposition, and the Traditional Algorithm: \(23 - 16\)

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Base 10 Blocks" /></td>
<td>(20 + 3) (-10 - 6)</td>
<td>23 (-16)</td>
</tr>
<tr>
<td></td>
<td>(= (10 + 10) + 3) (-10 - 6)</td>
<td>(= 10 + (10 + 3)) (-10 - 6)</td>
</tr>
<tr>
<td></td>
<td>(= 10 + 13) (-10 - 6)</td>
<td>(= 0 + 7) (-10 - 6)</td>
</tr>
<tr>
<td></td>
<td>(= 0 + 7)</td>
<td>(= 7)</td>
</tr>
</tbody>
</table>

Starting from the ones place, can we take six from three? The correct answer is YES, it is \(-3\). However, let the students know that for now we are only working with positives so we need to somehow get more ones. We do this by taking one of our tens and “regrouping” it to the ones place as ten ones.

Explicitly make the connection between all three methods of regrouping the ten from the tens place as ten ones in the ones place.

Now we have enough ones to take 6 away and then we have enough tens to take ten away and we can finish the subtraction problem after this regrouping.
**You Try 2:** Find the difference with regrouping using Base 10 Blocks, Decomposition, and the Traditional Algorithm \(32 - 14\)

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
</table>
| ![Base 10 Blocks diagram](image) | \[
\begin{align*}
30 + 2 \\
10 - 4
\end{align*}
\] | \[
\begin{align*}
32 \\
-14
\end{align*}
\] |

Starting from the ones place, can we take four from two? The correct answer is YES, it is \(-2\). However, let the students know that for now we are only working with positives so we need to somehow get more ones. We do this by taking one of our tens and “regrouping” it to the ones place as ten ones.

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
</table>
| ![Base 10 Blocks diagram](image) | \[
\begin{align*}
20 + (10 + 2) \\
10 - 4
\end{align*}
\] | \[
\begin{align*}
2_{12} \\
\underline{3 \bar{1}} \\
-14
\end{align*}
\] |

Explicitly make the connection between all three methods of regrouping the ten from the tens place as ten ones in the ones place.

Now we have enough ones to take 4 away and then we have enough tens to take ten away and we can finish the subtraction problem after this regrouping.

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
</table>
| ![Base 10 Blocks diagram](image) | \[
\begin{align*}
10 + 8 \\
= 18
\end{align*}
\] | \[
\begin{align*}
2_{12} \\
\underline{3 \bar{1}} \\
-14 \\
\underline{18}
\end{align*}
\] |
SUBTRACTING WITHOUT REGROUPING

Example 3: Find the difference without regrouping using Decomposition and a Number Line: \(23 - 16\)

<table>
<thead>
<tr>
<th>Decomposition Without Regrouping</th>
<th>Number Line Finding Difference by Counting On</th>
</tr>
</thead>
</table>
| \[
\begin{align*}
23 & = 19 + 4 \\
-16 & = 3 + 4 \\
\hline
= & 7
\end{align*}
\]
| \[
\begin{align*}
23 - 16 & \\
\hline
= 4 + 3 & \\
= 7
\end{align*}
\]

<table>
<thead>
<tr>
<th>Number Line Counting On</th>
<th>Number Line Taking Away</th>
</tr>
</thead>
</table>
| \[
\begin{align*}
23 - 16 & \\
\hline
= 4 + 3 & \\
= 7
\end{align*}
\] | \[
\begin{align*}
23 - 16 & \\
\hline
= 4 - 3 & \\
= 7
\end{align*}
\] |

How much did we take away altogether? = 7
**You Try 3:** Find the difference without regrouping using Decomposition and a Number Line: \(32 - 14\)

<table>
<thead>
<tr>
<th>Decomposition Without Regrouping</th>
<th>Number Line Finding Difference by Counting On</th>
</tr>
</thead>
<tbody>
<tr>
<td>(32) (-14) (= 29 + 3) (-14) (= 15 + 3) (= 18)</td>
<td>(32 - 14) (14) (32) (+6) (+10) (+2) (14) (20) (30) (32)</td>
</tr>
<tr>
<td>(14) (20) (32) (+6) (+12) (32 - 14) (= 6 + 12) (= 18)</td>
<td>(32 - 14) (14) (24) (32) (-10) (-8) (14) (24) (32) (= 18)</td>
</tr>
</tbody>
</table>

How much did we take away altogether? \(= 18\)
**BAR MODELS: RELATING ADDITION AND SUBTRACTION**

**Example 5:** Show $227 - 185$ using a Bar Model and create as many equations as you can that fit this model:

<table>
<thead>
<tr>
<th>227</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>185</td>
<td></td>
</tr>
</tbody>
</table>

What equations can be created given this bar model above?

$227 - 185 = ?$
$185 + ? = 227$
$227 - ? = 185$
$? + 185 = 227$

**You Try 5:** Show $214 - 132$ using a Bar Model and create as many equations as you can that fit this model:

<table>
<thead>
<tr>
<th>214</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>132</td>
<td></td>
</tr>
</tbody>
</table>

What equations can be created given this bar model above?

$214 - 132 = ?$
$132 + ? = 214$
$214 - ? = 132$
$? + 132 = 214$
**Example 6:** Find the difference with regrouping using Base 10 Blocks, Decomposition, and the Traditional Algorithm: \(227 - 185\)

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Base 10 Blocks" /></td>
<td>(200 + 20 + 7) (\rightarrow 227) (-100 - 80 - 5) (\rightarrow -185)</td>
<td></td>
</tr>
</tbody>
</table>

Starting from the ones place, can we take five from seven? Yes, it is \(2\).

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image2" alt="Base 10 Blocks" /></td>
<td>(200 + 20 + 7) (\rightarrow 227) (-100 - 80 - 5) (\rightarrow -185)</td>
<td></td>
</tr>
</tbody>
</table>

Moving to the tens place, can we take eight tens from 2 tens? The correct answer is YES, it is \(-6\) tens or \(-60\). However, let the students know that for now we are only working with positives so we need to somehow get more tens. We do this by taking one of our hundreds and “regrouping” it to the tens place as ten tens.

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Base 10 Blocks" /></td>
<td>(200 + 20 + 7) (\rightarrow 227) (-100 - 80 - 5) (\rightarrow -185)</td>
<td></td>
</tr>
</tbody>
</table>

Explicitly make the connection between all three methods of regrouping the hundred from the hundreds place as ten tens in the tens place. Now we have enough tens to take 8 tens away and then we have enough hundreds to take one away and we can finish the subtraction problem after this regrouping.

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Base 10 Blocks" /></td>
<td>(200 + 20 + 7) (\rightarrow 227) (-100 - 80 - 5) (\rightarrow -185)</td>
<td></td>
</tr>
</tbody>
</table>

\[= \begin{array}{c} \text{Regrouped} \\
\phantom{=}+ 100 \phantom{=}+ 20 \phantom{=}
\end{array}\]

\[= \begin{array}{c} \text{Regrouped} \\
\phantom{=}+ \phantom{=}+ 40 \phantom{=}+ 2
\end{array}\]

\[= 42\]
**You Try 6:** Find the difference with regrouping using Base 10 Blocks, Decomposition, and the Traditional Algorithm: \(214 - 132\)

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
</table>
| ![Base 10 Blocks](image) | \[\begin{align*}
200 + 10 + 4 \\
-100 - 30 - 2 \\
2
\end{align*}\] | 214 \\
-132 |

Starting from the ones place, can we take two from four? Yes, it is 2.

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
</table>
| ![Base 10 Blocks](image) | \[\begin{align*}
200 + 10 + 4 \\
-100 - 30 - 2 \\
2
\end{align*}\] | 214 \\
-132 |

Moving to the tens place, can we take three tens from 1 ten? The correct answer is YES, it is -2 tens or -20. However, let the students know that for now we are only working with positives so we need to somehow get more tens. We do this by taking one of our hundreds and “regrouping” it to the tens place as ten tens.

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
</table>
| ![Base 10 Blocks](image) | \[\begin{align*}
200 + 10 + 4 \\
-100 - 30 - 2 \\
2
\end{align*}\] | 214 \\
-132 |

Explicitly make the connection between all three methods of regrouping the hundred from the hundreds place as ten tens in the tens place. Now we have enough tens to take 3 tens away and then we have enough hundreds to take one away and we can finish the subtraction problem after this regrouping.

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
</table>
| ![Base 10 Blocks](image) | \[\begin{align*}
200 + 10 + 4 \\
-100 - 30 - 2 \\
2
\end{align*}\] | 214 \\
-132 |

\[\begin{align*}
\frac{111}{1114} \\
&= 100 + 110 + 4 \\
&-100 - 30 - 2 \\
&= 80 + 2 \\
&= 82
\end{align*}\]
**SUBTRACTING WITHOUT REGROUPING**

**Example 7:** Find the difference without regrouping using Decomposition and a Number Line: \(227 - 185\)

<table>
<thead>
<tr>
<th>Decomposition Without Regrouping</th>
<th>Number Line Finding Difference by Counting On</th>
</tr>
</thead>
</table>
| \[
\begin{align*}
227 & = 199 + 28 \\
185 & = 185 \\
227 - 185 & = 42 \\
\end{align*}
| \[
\begin{align*}
227 - 185 & = 227 - 185 \\
& = 185 + 42 \\
& = 227 \\
\end{align*}
| \[
\begin{align*}
227 - 185 & = 185 + 42 \\
& = 227 \\
\end{align*}

**You Try 7:** Find the difference without regrouping using Decomposition and a Number Line: \(214 - 132\)

<table>
<thead>
<tr>
<th>Decomposition Without Regrouping</th>
<th>Number Line Finding Difference by Counting On</th>
</tr>
</thead>
</table>
| \[
\begin{align*}
214 & = 199 + 15 \\
132 & = 132 \\
214 - 132 & = 67 + 15 \\
& = 82 \\
\end{align*}
| \[
\begin{align*}
214 - 132 & = 214 - 132 \\
& = 132 + 82 \\
& = 214 \\
\end{align*}
| \[
\begin{align*}
214 - 132 & = 132 + 82 \\
& = 214 \\
\end{align*}

\(214 - 132 = 60 + 14 + 8 = 82\)
### Assessment:

**EXIT TICKET – Subtracting 2-digit Numbers**

1. Show $36 - 17$ using a Bar Model and create as many equations as you can that fit this model:

2. Find the difference with regrouping using Base 10 Blocks, Decomposition, and the Traditional Algorithm:

   \[
   36 - 17
   \]

<table>
<thead>
<tr>
<th>Base 10 Blocks</th>
<th>Decomposition</th>
<th>Traditional Algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Find the difference without regrouping using Decomposition and a Number Line:

   \[
   36 - 17
   \]

<table>
<thead>
<tr>
<th>Decomposition Without Regrouping</th>
<th>Number Line</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

--

**Name: __________________________**
Assessment:

EXIT TICKET – Subtracting 3-digit Numbers

1. Show $226 - 147$ using a Bar Model and create as many equations as you can that fit this model:

2. Find the difference with regrouping using Base 10 Blocks, Decomposition, and the Traditional Algorithm:

\[
\begin{array}{ccc}
\text{Base 10 Blocks} & \text{Decomposition} & \text{Traditional Algorithm} \\
226 - 147 \\
\end{array}
\]

3. Find the difference without regrouping using Decomposition and a Number Line:

\[
\begin{array}{ccc}
\text{Decomposition Without Regrouping} & \text{Number Line} \\
226 - 147 \\
\end{array}
\]
Find the difference of $400 - 162$ using decomposition (without regrouping) and a number line.

Find the difference of $385 - 162$ using base 10 blocks, decomposition, and the traditional algorithm.

Place one number into each box to complete the subtraction problem shown.

\[
\begin{array}{ccc}
5 & \square & 8 & 6 \\
- \square & 4 & 8 & \square \\
1 & 4 & \square & 2
\end{array}
\]

Given the following problem:

\[
\begin{array}{c}
24 \\
-16
\end{array}
\]

Is it possible to subtract 6 ones from 4 ones?

What language would you use to explain this to students in grades 2, 3, or 4?