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:

23	
16	?

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:

32	
14	?

What equations can be created given this bar model above?

$$32-14=?$$
$$14+?=32$$
$$32-?=14$$
$$?+14=32$$

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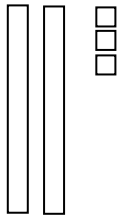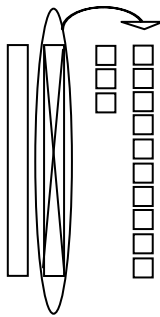
Example 2: Find the difference with regrouping using Base 10 Blocks, Decomposition, and the Traditional Algorithm: $23-16$

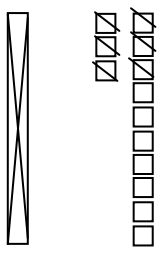| Base 10 Blocks	Decomposition	Traditional Algorithm
	$20+3$ $-10-6$ Be sure to subtract 10 **AND** subtract 6.	23 -16

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.
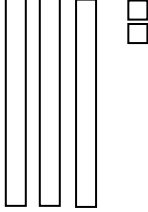
Base 10 Blocks	Decomposition	Traditional Algorithm
	$20+3$ $-10-6$ $=(10+10)+3$ $-10-6$ $=10+(10+3)$ $-10-6$ $=10+13$ $-10-6$	23 -16 1_{13} $\cancel{2}\cancel{3}$ -16

Explicitly make the connection between all three methods of regrouping the ten from the tens place as ten ones in the ones place.
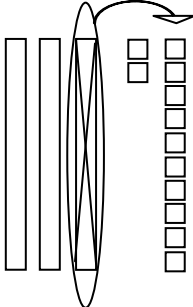
Now we have enough ones to take 6 away and then we have enough tens to take ten away and we can finish the subtraction problem after this regrouping.

Base 10 Blocks	Decomposition	Traditional Algorithm
         $=0+7$ $=7$	$=10+13$ $-10-6$ $=0+7$ $=7$	1_{13} $\cancel{2}\cancel{3}$ -16 7

You Try 2: Find the difference with regrouping using Base 10 Blocks, Decomposition, and the Traditional Algorithm $32-14$

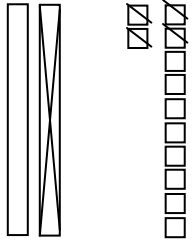| Base 10 Blocks	Decomposition	Traditional Algorithm
	$\begin{aligned}30+2\\-10-4\end{aligned}$ Be sure to subtract 10 **AND** subtract 4.	$\begin{aligned}32\\-14\end{aligned}$

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.

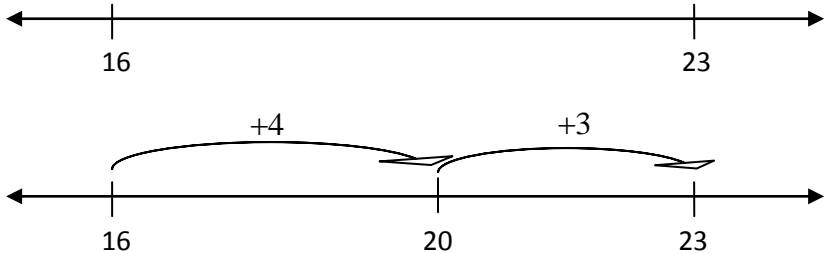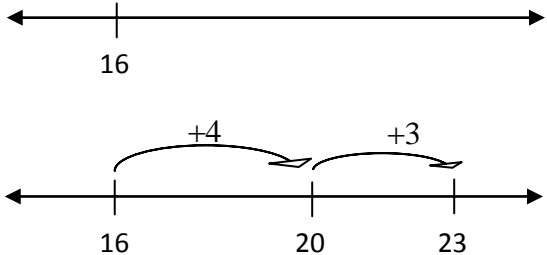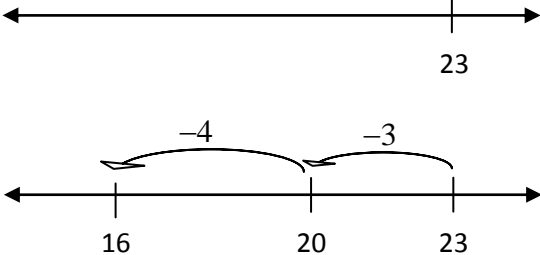| Base 10 Blocks	Decomposition	Traditional Algorithm
	$\begin{aligned}30+2\\-10-4\end{aligned}$	$\begin{aligned}32\\-14\end{aligned}$
	$\begin{aligned}=(20+10)+2\\-10\ \ -4\end{aligned}$	$\begin{aligned}\overset{2\ \ 12}{\cancel{32}}\\-14\end{aligned}$
	$\begin{aligned}=20+(10+2)\\-10\ \ -4\end{aligned}$	
	$\begin{aligned}=\ 20+12\\-10\ \ -4\end{aligned}$	

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.

Base 10 Blocks	Decomposition	Traditional Algorithm
	$\begin{aligned}=\ 20+12\\-10\ \ -4\\ \hline =\ 10+\ 8\\=\ 18\end{aligned}$	$\begin{aligned}\overset{2\ \ 12}{\cancel{32}}\\-14\\ \hline 18\end{aligned}$
$\begin{aligned}=\ 10\ \ +\ \ \ \ 8\\=\ 18\end{aligned}$		

SUBTRACTING WITHOUT REGROUPING

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

Decomposition Without Regrouping	Number Line Finding Difference by Counting On
$23 \quad = \quad 19+4$ $\underline{-16} \qquad \underline{-16}$ $\quad = \quad 3+4$ $\quad = \quad 7$	$23-16$ 16 .... 23 +4 ... +3 16 ... 20 ... 23 $23-16$ $=4+3$ $=7$

Number Line Counting On	Number Line Taking Away
$23-16$ 16 +4 ... +3 16 ... 20 ... 23 $23-16$ $=4+3$ $=7$	$23-16$ 23 -4 ... -3 16 ... 20 ... 23 How much did we take away altogether? $=7$

SUBTRACTING WITHOUT REGROUPING

You Try 3: Find the difference without regrouping using Decomposition and a Number Line: $32-14$

<table>
<tr>
<td colspan="1">Decomposition
Without Regrouping</td>
<td colspan="1">Number Line
Finding Difference by Counting On</td>
</tr>
<tr>
<td>

$$32 \quad = \quad 29+3$$
$$\underline{-14} \qquad \underline{-14}$$
$$= \quad 15+3$$
$$= \quad 18$$

</td>
<td>

$32-14$

$$32-14$$
$$=6+10+2$$
$$=18$$

</td>
</tr>
<tr>
<td colspan="1">Number Line
Counting On</td>
<td colspan="1">Number Line
Taking Away</td>
</tr>
<tr>
<td>

$32-14$

$$32-14$$
$$=6+12$$
$$=18$$

</td>
<td>

$32-14$

How much did we take away altogether?
$$=18$$

</td>
</tr>
</table>

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

227	
185	?

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:

214	
132	?

What equations can be created given this bar model above?

$$214 - 132 = ?$$
$$132 + ? = 214$$
$$214 - ? = 132$$
$$? + 132 = 214$$

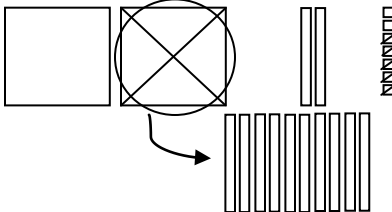**Example 6:** Find the difference with regrouping using Base 10 Blocks, Decomposition, and the Traditional Algorithm: $227 - 185$

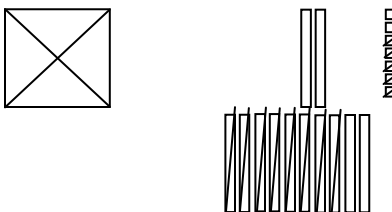| Base 10 Blocks	Decomposition	Traditional Algorithm
	$200 + 20 + 7$ $\underline{-100 - 80 - 5}$	227 $\underline{-185}$

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

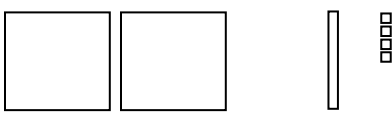| Base 10 Blocks	Decomposition	Traditional Algorithm
	$200 + 20 + 7$ $\underline{-100 - 80 - 5}$ 2	227 $\underline{-185}$ 2

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.

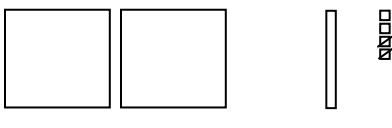| Base 10 Blocks	Decomposition	Traditional Algorithm
	$200 + 20 + 7$ $\underline{-100 - 80 - 5}$ 2 $= (100 + 100) + 20 + 7$ $\underline{-100 - 80 - 5}$ 2 $= 100 + (100 + 20) + 7$ $\underline{-100 - 80 -5}$ 2 $= 100 + 120 + 7$ $\underline{-100 -80 - 5}$ 2	227 $\underline{-185}$ 2 $\overset{1}{\cancel{2}}\overset{12}{\cancel{2}}7$ $\underline{-185}$ 2

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.

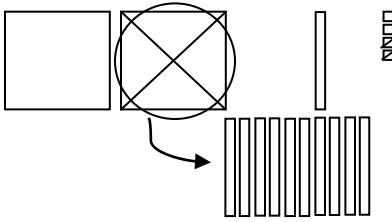| Base 10 Blocks	Decomposition	Traditional Algorithm
$= +40 +2$ $= 42$	$= 100 + 120 + 7$ $\underline{-100 -80 - 5}$ $= 40 + 2$ $= 42$	$\overset{1}{\cancel{2}}\overset{12}{\cancel{2}}7$ $\underline{-185}$ 42

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You Try 6: Find the difference with regrouping using Base 10 Blocks, Decomposition, and the Traditional Algorithm: $214-132$

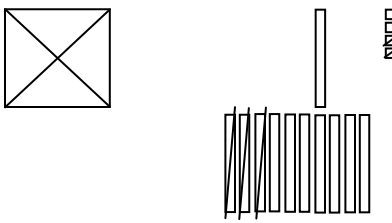| Base 10 Blocks	Decomposition	Traditional Algorithm
	$\begin{aligned}200+10+4\\-100-30-2\end{aligned}$	$\begin{aligned}214\\-132\end{aligned}$

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

Base 10 Blocks	Decomposition	Traditional Algorithm
	$\begin{aligned}200+10+4\\\underline{-100-30-2}\\2\end{aligned}$	$\begin{aligned}214\\\underline{-132}\\2\end{aligned}$

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.
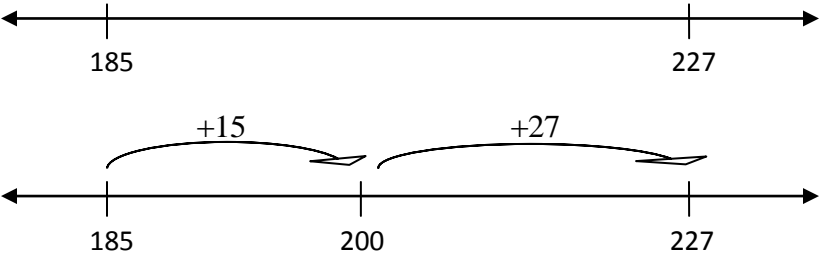
Base 10 Blocks	Decomposition	Traditional Algorithm
	$\begin{aligned}200+10+4\\\underline{-100-30-2}\\2\end{aligned}$	$\begin{aligned}214\\\underline{-132}\\2\end{aligned}$
	$\begin{aligned}=(100+100)+10+4\\\underline{-100\qquad-30-2}\\2\end{aligned}$	$\begin{aligned}{}^{1}{}_{11}\\\cancel{2}\cancel{1}4\\\underline{-132}\\2\end{aligned}$
	$\begin{aligned}=100+(100+10)+4\\\underline{-100\qquad-30-2}\\2\end{aligned}$	
	$\begin{aligned}=100+110+4\\\underline{-100\ -30-2}\\2\end{aligned}$	

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.
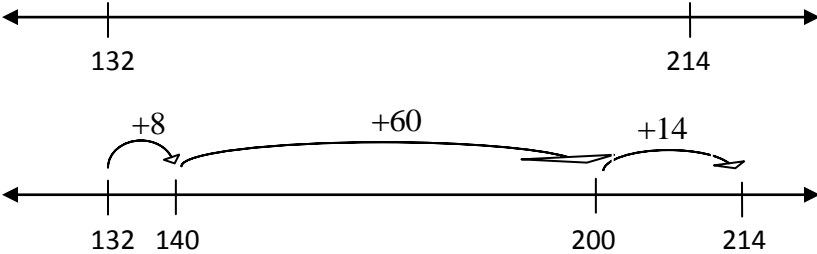
Base 10 Blocks	Decomposition	Traditional Algorithm
$\begin{aligned}=\qquad\qquad+80\ +2\\=82\end{aligned}$	$\begin{aligned}=100+110+4\\\underline{-100\ -30-2}\\=\qquad\ 80+2\\=82\end{aligned}$	$\begin{aligned}{}^{1}{}_{11}\\\cancel{2}\cancel{1}4\\\underline{-132}\\82\end{aligned}$

SUBTRACTING WITHOUT REGROUPING

Example 7: Find the difference without regrouping using Decomposition and a Number Line: $227-185$

Decomposition Without Regrouping	Number Line Finding Difference by Counting On
$\begin{aligned} 227 \quad &= \quad 199+28 \\ -185 \quad &\quad \underline{-185} \\ &= \quad 14+28 \\ &= \quad 42 \end{aligned}$	$227-185$ 185 227 $+15$ $+27$ 185 200 227 $\begin{aligned} 227-185 \\ =15+27 \\ =42 \end{aligned}$

You Try 7: Find the difference without regrouping using Decomposition and a Number Line: $214-132$

Decomposition Without Regrouping	Number Line Finding Difference by Counting On
$\begin{aligned} 214 \quad &= \quad 199+15 \\ -132 \quad &\quad \underline{-132} \\ &= \quad 67+15 \\ &= \quad 82 \end{aligned}$	$214-132$ 132 214 $+8$ $+60$ $+14$ 132 140 200 214 $\begin{aligned} 214-132 \\ =60+14+8 \\ =82 \end{aligned}$

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:

$$36-17$$

Base 10 Blocks	Decomposition	Traditional Algorithm

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

$$36-17$$

Decomposition Without Regrouping	Number Line

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:

$$226-147$$

Base 10 Blocks	Decomposition	Traditional Algorithm

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

$$226-147$$

Decomposition Without Regrouping	Number Line

Warm-Up

Review

Find the difference of $400-162$ **using decomposition (without regrouping) and a number line.**

y

x

Review

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

SBAC Grade 4.NBT.4

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

$$5 \ \square \ 8 \ 6$$
$$- \ \square \ 4 \ 8 \ \square$$
$$\overline{1 \ 4 \ \square \ 2}$$

Other

Given the following problem:

$$\begin{array}{r} 24 \\ -16 \\ \hline \end{array}$$

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?