Co-Teaching: Administrators and Teachers Get Better Together

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Principles of Responsive Instruction

Teachers and leaders...

- position students as competent sense-makers
- know students
- engage students in rigorous content
- challenge inequities
- haven’t taught until students have learned
- learn to learn from their teaching

3.NBT.A2: 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.
Activity 1: Expanded Form Subtraction with Decomposing

Jada's way to subtract 491 - 315 with base ten blocks is shown.

1. Show how you would use expanded form to subtract 491 - 315.

2. Explain how you recorded the decomposition of the ten into more ones.
Activity 2: Expanded Form Subtraction with Decomposing

Use expanded form to subtract. You can use base ten blocks to help you think through the steps.

1. 283 - 159

2. 425 - 192

3. 639 - 465

4. 591 - 128

5. 832 - 575
Lesson 13: Not Enough Tens, Not Enough Ones

<table>
<thead>
<tr>
<th>Unit 3: Wrapping up 1,000</th>
<th>Lesson 13: Not Enough Tens, Not Enough Ones</th>
</tr>
</thead>
</table>

**Teacher-facing Learning Goals**
- Subtract within 1,000 using algorithms based on place value and properties of operations.

**Addressing CCSS:** 3.NBT.A.2

**Lesson Purpose**
The mathematical purpose of this lesson is for students to use base ten block drawings to make sense of how we record that a hundred or a ten has been decomposed to make more tens or ones in a subtraction algorithm.

**Materials Needed**

<table>
<thead>
<tr>
<th>Gather</th>
<th>Copy</th>
</tr>
</thead>
<tbody>
<tr>
<td>base ten blocks</td>
<td>none</td>
</tr>
</tbody>
</table>

**Cool-down: Using Expanded Form**

Use expanded form to subtract 342 - 190. You can use base ten blocks to help you think through the steps.

**Student Responses**

\[
\begin{array}{c}
200 \\
300 \\
100 \\
100 \\
\end{array} + \begin{array}{c}
140 \\
40 \\
90 \\
50 \\
\end{array} + \begin{array}{c}
2 \\
2 \\
0 \\
\end{array}
\]

**Teacher Reflection Question**
In grade 2 students learned how to read and write numbers using expanded form. How did they build on that work today?

**Lesson Narrative**

In previous lessons, students learned how to use expanded form algorithms to subtract within 1,000 and analyzed an error that involved the decomposition of a hundred to get more tens.

The purpose of this lesson is to spend more time on problems that involve the decomposition of a...
hundred or a ten to get more tens or ones. Students connect the decomposed units represented in base ten block drawings to the recording of decomposed units in an algorithm. It is especially important that students make sense of this recording of decomposed units before they move on to an algorithm in which the recording of decomposed units is more condensed. After decomposing a hundred or a ten to make more tens or ones, students may choose to begin subtracting at the hundreds, working left to right or begin subtracting with the ones, working right to left. Students should have access to base ten blocks as needed.

**Student-facing Learning Goal:** Let's use expanded form to subtract.

<table>
<thead>
<tr>
<th>Warm-up Narrative</th>
<th>Addressing CCSS:</th>
<th>Building Toward CCSS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>How Many Do You See? Products of 4 and 6</td>
<td>3.OA.B.5</td>
<td>3.OA.C.7</td>
</tr>
</tbody>
</table>

**Launch/Activity**
- Groups of 2
- "How many do you see and how do you see them?"
- Flash image.
- 30 seconds: quiet think time
- Display image.
- 1 minute: partner discussion
- Record responses.
- Repeat for each image.

**Synthesis**
Focus question:
"How were products of 5 helpful today as you found products of 4 and 6?" (I was able to think about a product of 5 and think of one more group to find a product of 6. I was able to think about a product of 5 and think of one less group to find a product of 4.)
### Student Responses
1. 20: because I counted by 5 like 5, 10, 15, 20.
2. 16: because there's 1 less in each group than the first group so there would be 4 less. 20 - 4 is 16.
3. 24: because each row has one more. So there would be 4 more than the first array. 20 + 4 is 24.

- Consider asking:
  - "Who can restate the way ___ saw the dots in different words?"
  - "Did anyone see the dots the same way but would explain it differently?"
  - "Does anyone want to add an observation to the way ___ saw the dots?"

### Activity 1 Narrative: Expanded Form Subtraction with Decomposition

| 15 min | The purpose of this activity is to use a base ten blocks drawing to work with the expanded form method of subtraction. This task is an example in which a ten has to be decomposed into more ones. It is important that students make sense of how the decomposition of a ten into ten ones is recorded in expanded form before moving on to a more condensed form of recording the algorithm. After recording the decomposition of the ten into 10 ones, students may start subtracting with the tens, working left to right or the ones, working right to left. |

### Task Statement
Jada's way to subtract 491 - 315 with base ten blocks is shown.

1. Show how you would use expanded form to subtract 491 - 315.
2. Explain how you recorded the decomposition of the ten into more ones.

### Student Responses

| 1. | 80 11 |
| 400 + 90 + 4 |
| 300 + 10 + 5 |
| 100 + 70 + 6 |

2. I crossed out the 90 since I needed a 10 to make

### Launch/
- Groups of 2
- "This is Jada's base ten block drawing to represent the subtraction of 315 from 491. You can see she's crossed out blocks to show her thinking. Take some time to make sense of Jada's work."
- "Describe Jada's method to your partner."
- 1 minute: quiet think time
- 3 minutes: partner discussion

### Activity
- "Now, use expanded form to subtract the same problem."
- 5-7 minutes: independent work time
- "Tell your partner how you used an expanded form algorithm to subtract 315 from 491. Be sure to
more 1s. Then, I recorded 11 ones because this let me subtract 5.

discuss how you recorded the decomposing of the ten into more ones."

- 2-3 minutes: partner discussion
- Monitor for students who write both numbers out in expanded form to subtract, then subtract hundreds from hundreds, tens from tens, and ones from ones. Students may subtract left to right or right to left.

**Synthesis**

- Have students who used expanded form and subtracted hundreds from hundreds, tens from tens, and ones from ones share their work.
- Display:

\[
\begin{align*}
80 & \quad 11 \\
400 & + 90 + 4 \\
300 & + 10 + 5 \\
100 & + 70 + 6
\end{align*}
\]

- “What are the new numbers at the top of the problem showing?” (They show that you didn’t have enough ones to subtract 5 so you broke apart a ten to make more ones. You changed 90 and 1 into 80 and 11. It’s still the same amount though.)

**Activity 2 Narrative:** Expanded Form Subtraction with Decomposing

**Addressing CCSS:** 3.NBT.A.2

| 20 min | The purpose of this activity is for students to use expanded form subtraction without the support of the provided base ten block drawing. Students should still have access to base ten blocks if they need this support. All the problems in this activity involve decomposing a hundred or a ten to get more tens or ones. The final problem involves decomposing a hundred and a ten... |
to get more tens and ones. It's important that students make sense of how these decomposed units are recorded before moving on to a more condensed algorithm.

**Task Statement**
Use expanded form to subtract. You can use base ten blocks to help you think through the steps.

1. 283 - 159
2. 425 - 192
3. 639 - 465
4. 591 - 128
5. 832 - 575

**Student Responses**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70</td>
<td>13</td>
</tr>
<tr>
<td>200</td>
<td>80</td>
<td>3</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>9</td>
</tr>
<tr>
<td>100</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>300</td>
<td>120</td>
</tr>
<tr>
<td>400</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>100</td>
<td>90</td>
<td>2</td>
</tr>
<tr>
<td>200</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>500</td>
<td>130</td>
</tr>
<tr>
<td>600</td>
<td>30</td>
<td>9</td>
</tr>
<tr>
<td>400</td>
<td>60</td>
<td>5</td>
</tr>
<tr>
<td>100</td>
<td>70</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>80</td>
<td>11</td>
</tr>
<tr>
<td>500</td>
<td>90</td>
<td>4</td>
</tr>
<tr>
<td>100</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>400</td>
<td>60</td>
<td>3</td>
</tr>
</tbody>
</table>

**Launch/Activity**
- Groups of 2
- “Now you’re going to use one of the expanded form algorithms to solve three subtraction problems. Work on them independently, then you’ll have some time to discuss the problems with a partner. You can use base ten blocks if you need them to think through the steps.”
- 7-10 minutes: independent work time
- “Now, discuss how you solved the problems with your partner. Be sure to discuss how you recorded decomposing a hundred into 10 tens or a ten into 10 ones.”
- 3-5 minutes: partner discussion
- Monitor for students who use the notation similar to the notation in the previous task to record the decomposition of a hundred or ten into more tens or ones.
- If students struggle with the notation used to record the decomposition of a hundred or ten into more tens or ones consider asking:
  - “Is there any place in the problem where you don’t have enough tens or ones?”
  - “How could you get more tens (or ones)?”
  - “How could you record the decomposing of the hundred (or ten)?”
Lesson Synthesis

"Today we learned how to use place value to decompose a hundred or a ten when we need more tens or ones to subtract."

Display:

<table>
<thead>
<tr>
<th></th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>20 12</td>
</tr>
<tr>
<td>800 + 30 + 2</td>
<td></td>
</tr>
<tr>
<td>500 + 70 + 5</td>
<td></td>
</tr>
<tr>
<td>200 + 50 + 7</td>
<td></td>
</tr>
</tbody>
</table>

Ask:

"Noah says the problem above has been changed into a completely different problem because the 832 has been crossed out. How would you explain the crossed out numbers to Noah?" (The 832 is still there. It's just been reorganized. Like 700 plus 120 is 820. 820 + 12 is 832. So, it's still 832, it just looks different. It's been grouped differently so you can subtract in every place value.)

2 minute: partner discussions
Share and record responses.
Use expanded form to subtract. You can use base ten blocks to help you think through the steps.

283 - 159
\[
\begin{align*}
200 + 80 + 3 & \quad 400 + 120 + 5 \\
100 + 50 + 9 & \quad 100 + 90 + 2 \\
\hline
100 + 20 + 4 & \quad 200 + 30 + 3 \\
\end{align*}
\]
\[124 \quad 233\]

425 - 192
\[
\begin{align*}
300 + 20 + 5 & \quad 300 + 10 + 2 \\
100 + 90 + 2 & \quad 200 + 30 + 3 \\
\hline
100 + 20 + 4 & \quad 200 + 30 + 3 \\
\end{align*}
\]
\[124 \quad 233\]

639 - 465
\[
\begin{align*}
500 + 30 + 9 & \quad 500 + 90 + 1 \\
400 + 60 + 5 & \quad 100 + 20 + 8 \\
\hline
100 + 70 + 4 & \quad 400 + 60 + 3 \\
\end{align*}
\]
\[174 \quad 463\]

591 - 128
\[
\begin{align*}
8 & \quad 80 + 11 \\
500 + 90 + 1 & \quad 100 + 20 + 8 \\
\hline
400 + 60 + 3 & \quad 463 \\
\end{align*}
\]
Use expanded form to subtract. You can use base ten blocks to help you think through the steps.

283 - 159 = 124

\[
\begin{align*}
200 + 80 & \quad 13 \\
- 100 + 50 & \quad 1 \\
\hline 
100 + 30 + 4 & = 124
\end{align*}
\]

425 - 192 = 373

\[
\begin{align*}
400 + 20 & + 5 \\
100 + 90 & + 2 \\
\hline 
300 + 70 + 3 & = 373
\end{align*}
\]

639 - 465 = 234

\[
\begin{align*}
600 + 30 & + 4 \\
- 400 + 60 & + 5 \\
\hline 
200 + 30 + 4 & = 234
\end{align*}
\]

591 - 128 = 463

\[
\begin{align*}
500 & + 90 + 11 \\
100 + 20 & + 8 \\
\hline 
200 + 60 + 3 & = 463
\end{align*}
\]
Use expanded form to subtract. You can use base ten blocks to help you think through the steps.

283 - 159 = 126
200 + 80 + 3
100 + 50 + 9
139

425 - 192 = 233
400 + 20 + 5
100 + 90 + 2
200 + 10 + 4
233

639 - 465 = 244
600 + 30 + 9
400 + 60 + 5
200 + 40 + 4
244

591 - 128 = 473
500 + 90 + 1
100 + 20 + 8
460 + 70 + 7
473
Use expanded form to subtract. You can use base ten blocks to help you think through the steps.

\[
\begin{array}{c}
\text{283 - 159} \\
100 + 80 + 3 \\
100 + 50 + 9 \\
126 \\
\text{425 - 192} \\
100 + 20 + 5 \\
100 + 90 + 2 \\
372 \\
\text{639 - 465} \\
100 + 30 + 9 \\
100 + 60 + 5 \\
200 + 30 + 4 \\
223 \\
\text{591 - 128} \\
500 + 90 + 1 \\
100 + 20 + 8 \\
400 + 70 + 7 \\
477 \\
\end{array}
\]
Name: Bella

Use expanded form to subtract. You can use base ten blocks to help you think through the steps.

283 - 159

\[
\begin{align*}
\text{200} & + \text{86} + \text{19} \\
\text{100} & + \text{50} + \text{9} \\
\text{10} & + \text{3} \\
\text{1} & + 4
\end{align*}
\]

425 - 192

\[
\begin{align*}
\text{360} & + \text{120} \\
\text{100} & + \text{90} + \text{12} \\
\text{260} & + \text{30} + \text{3}
\end{align*}
\]

639 - 465

\[
\begin{align*}
\text{600} & + \text{30} + \text{9} \\
\text{400} & + \text{60} + \text{5}
\end{align*}
\]

591 - 128
Use expanded form to subtract. Use base ten blocks to help you think through the steps.

<table>
<thead>
<tr>
<th>Build 283 with base ten blocks.</th>
<th>283 - 159</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 + 80 + 3</td>
<td></td>
</tr>
<tr>
<td>100 + 50 + 9</td>
<td></td>
</tr>
</tbody>
</table>

Is there a place in the problem where you don't have enough tens or ones?

How could you get more tens or ones?

How could you record the decomposing?

<table>
<thead>
<tr>
<th>Build 591 with base ten blocks.</th>
<th>591 - 128</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 + 90 + 1</td>
<td></td>
</tr>
<tr>
<td>100 + 20 + 8</td>
<td></td>
</tr>
</tbody>
</table>

Is there a place in the problem where you don't have enough tens or ones?

How could you get more tens or ones?

How could you record the decomposing?
Solve using expanded form. Show all your thinking.

404 - 265
3 x 8
400 + 90 + 14
200 + 60 + 5
100 + 30 + 9 = 139

500 - 136
0
480
500 + 10 + 10
100 + 30 + 6
300 + 60 + 4 = 364
How would you teach someone else how to solve these problems? Write and draw step-by-step directions.

404-265
First I wrote 400 + 0 + 4 and 200 + 60 + 5 but I couldn't subtract 4 from 5 because 4 is lower than 5. So I got a ten from the 400 and added it to 4 so then I got 14. Then I could subtract 1 and got 9. Then I couldn't subtract 0 from 60 so I did the same thing and I got 30. And then I only had 300 so I subtracted 200 and got 100. So 100 + 30 + 9 = 139.

500-136
First I wrote 500 + 0 + 40 and 100 + 30 + 6 and I got ten from the 500 and then I got ten so I got 4. And I got 90 from the 490 and added to the 0.