Student Probe
Represent 234 using a non-proportional model*.

* Non-proportional models include money, shapes, color, etc. or any manipulative where the size of the ones, tens, and hundreds are not proportional for the quantity they represent.

Lesson Description
This lesson asks the student to represent a two-digit or three-digit number using non-proportional models. Non-proportional model includes: money, shapes, color, etc. The size of the ones, tens, and hundreds are not proportional for the quantity they represent.

Rationale
Non-proportional models can be used when students no longer need to see how ten units make a ten rod. A non-proportional model, such as money, shapes, color, etc., do not show the model for ten is ten times larger than one or that a hundred is ten times larger than a ten. Non-proportional models are not used by students who already have a conceptual understanding of place-value, but by those who need reinforcement.

Preparation
Have non-proportional models such as money, shapes, color, etc. available for students.

At a Glance
What: Base ten representation using non-proportional models
Common Core Standard: 2.NBT.1: Understand that the three digits of a three-digit number represents amounts of hundreds, tens, and ones; e.g., 706 counts 7 hundreds, 0 tens, and 5 ones.
Mathematical Practices: Use appropriate tools strategically.
Who: Students who have had experiences with using groupable and pregroupable models and do not need to see how ten tens is the same as a hundred and ten ones is the same as one ten; and see a group of ten or hundred as a “unit”.
Grade Level: 2
Prerequisite Vocabulary: None
Prerequisite Skills: Experiences with representing three-digit numbers using grouped and pre-grouped models
Delivery Format: individual, small group, or large group
Lesson Length:
Materials, Resources, Technology: Non-proportional models, such as money, shapes, color, etc.
Student Worksheets: None
### Lesson

<table>
<thead>
<tr>
<th>The teacher says or does...</th>
<th>Expect students to say or do...</th>
<th>If students do not, then the teacher says or does...</th>
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</thead>
<tbody>
<tr>
<td>1. Represent 63 using a non-proportional model, such as:</td>
<td>6 squares and 3 triangles or 6 green tiles and 3 red tiles</td>
<td>Ask the student represent 63 using base ten blocks.</td>
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<td>triangles represents ones and squares represent tens, or red tiles represents ones and green tiles represents tens.</td>
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<td>2. Ask the student to count the number represented.</td>
<td>10, 20, 30, 40, 50, 60, 70, 71, 72, 73, 74</td>
<td>Refer to Base Ten Representation—Pregrouped Models.</td>
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<td>3. Represent 251 using non-proportional models in multiple ways.</td>
<td>2 hundreds, 5 tens, 1 units 2 hundreds, 4 tens, 11 units 2 hundreds, 3 tens, 21 units 2 hundreds, 2 tens, 31 units 2 hundreds, 1 tens, 41 units 2 hundreds, 0 tens, 51 units 1 hundred, 15 tens, 1 units etc.</td>
<td>Ask the student to represent a three-digit number in one way and count how many is represented. Refer to Base Ten Representation—Pregrouped Models.</td>
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<td>4. Ask the student to count the number of items for the different representations</td>
<td>100, 200, 210, 220, 230, 240, 250, 251; 100, 200, 210, 220, 230, 240, 241, 242, 243, ... 250, 251</td>
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<td>5. Give the students a large collection of items (more than 50). Ask the student to count the number of objects and record the number of items.</td>
<td>Record the number of items: for example, 78 for seventy-eight items.</td>
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</tbody>
</table>

**Teacher Notes:**

Continue giving the student collections to count and record the number until the student is able to represent and count the number of items.

Observe how the student records the numerals:

- Does the student recognize that the 78 represents 7 groups of ten and 8 singles?
- Student does not record the numerals in reverse order—87?
Variations
None

Formative Assessment

Represent 83 using a non-proportional model.

References