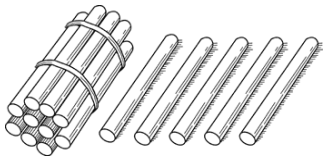
CONSTRUCTING TASK: Place Value Play



Approximately 3 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

MCC2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

*****Mathematical Practices 1 and 6 should be evident in EVERY lesson. *****

BACKGROUND KNOWLEDGE

(Information adapted from North Carolina DPI Instructional Support Tools)

**This task is very similar to "Group It and Move It", a task found within First Grade, Unit 1.

Students should have had prior experiences and/or instruction with place value with ones and tens. This task will review and expand on this understanding by introducing larger numbers. Students should also have experience using base-ten blocks. While using base ten blocks, take the opportunity to discuss with your students the three forms in which a numeral can be displayed: using base-ten numerals (both standard form and modeling), number names, and expanded form. Incorporate this throughout the three parts of this task.

The questions in this task are designed to get them to talk about how many bundles it will take to make 100 and further, for example, how many bundles it will take to make 999. These questions are also designed to help students understand how and why the digits 0-9 are used to represent a particular amount. Many students should already have an understanding of the bundling, but provide manipulatives, such as straws or sticks for students that need to physically move them. Making a connection to money at this point is a natural medium for students to use. Asking the question like, "If we thought about this place value mat in terms of money and we were building up to dollar, what would be the place value positions represent?" Ones (pennies), tens (dimes) and hundreds (dollars). Listen for students to make the connection that 100 pennies equal a dollar and 10 dimes equal a dollar. Once it is clear that the students understand that it takes 10 groups of ten to make 100, then students are prepared to complete the next portion of the task.

This standard calls for students to read, write and represent a number of objects with a written numeral (number form or standard form). These representations can include place value (base 10) blocks, pictorial representations or other concrete materials. Please be cognizant that when reading and writing whole numbers, the word "and" should not be used. Example: 235 is written as two hundred thirty-five. Non-example: 235 should not be written as two hundred and thirty-five. However, when *describing* numbers, you may say, for example, 706 equals 7 hundreds, 0 tens, *and* 6 ones.

This standard builds on the work of **CCGPS.2.NBT.1** and **CCGPS.2.NBT.3** by having students compare two numbers by examining the amount of hundreds, tens and ones in each number. Students are introduced to the symbols greater than (>), less than (<) and equal to (=) in First Grade, and use them in Second Grade with numbers within 1,000. Students should have ample experiences communicating their comparisons in words before using only symbols in this standard.

Example: 452 __ 455

Student 1	**Student 2**
452 has 4 hundreds, 5 tens, 2 ones. 455 has 4 hundreds, 5 tens, 5 ones. They have the same number of hundreds and the same number of tens, but 455 has 5 ones and 452 only has 2 ones. 452 is less than 455. 452 < 455.	452 is less than 455. I know this because when I count up I say 452 before I say 455. 452 < 455.

The purpose of this part of the task is to get students discussing number comparison. **The focus is not to write number comparisons using >, =, or <. If you feel your students have a solid understanding of building and comparing numbers based on their magnitude, instead of on a rule taught to them, they may be ready to begin incorporating those symbols.

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades K-3, pages 37-38)

"The concepts of "more," "less," and "same" are basic relationships contributing to the overall concept of number. Children begin to develop these ideas before they begin school. An entering kindergarten child can almost always choose the set that is *more* if presented with two sets that are quite obviously different in number. Classroom activities should help children build on this basic notion and refine it.

Though the concept of less is logically equivalent to the concept of more (selecting the set with more is the same as *not* selecting the set with less), the word *less* proves to be more difficult for children *more*. A possible explanation is that children have many opportunities to use the word *more* but have limited exposure to the word *less*. To help children with the concept of less, frequently pair it with the word *more* and make a conscious effort to ask "which is less?" questions as well as "which is more?" questions. For example, suppose that you class has correctly selected the set that has more from two that are given. Immediately follow with the question "Which is less?" In this way, the less familiar term and concept can be connected with the better-known idea.

For all three concepts (more, less, and same), children should construct sets using counters as well as make comparisons or choices between two given sets."

In comparing two numbers, it is also important to remember the magnitude of the number and to gain a better understanding of that, students can use a groupable model.

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades K-3, pages 127)

"Models that most clearly reflect the relationship of ones, tens, and hundreds are those for which the ten can actually be made or grouped from the singles. When children bundle 10 Popsicle sticks, the bundle of 10 literally is *the same as* the 10 ones from which it was made. Examples of these groupable models are shown in Figure 5.3(a). These could also be called "put-together-take-apart" models."

****<u>Models for Place Value</u> activities can be found on pages 127-132 of *Teaching Student Centered Mathematics K-3* by Van de Walle. Groupable and pre-grouped base-ten models are demonstrated in a variety of learning tasks.**

<u>ESSENTIAL QUESTIONS</u>

- What are different ways we can show or make (represent) a number?
- How do the value of digits change when their position in a number changes?
- What strategies help you to compare two numbers?
- How can changing the position of your digits change the magnitude of the number?

MATERIALS

- Base Ten Blocks (each pair needs at least 8 Hundreds, 20 Tens, and 10 Ones)
- Place Value Mat (an example is included)
- String, rope, or thin pieces of fabric in lengths that will go around a group of 10 students
- Dice

GROUPING

Large group

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I

Create a large place value board on the floor (using butcher paper, masking tape, or you could even draw it on the sidewalk with chalk and play the game outside). Make sure that the area that you create for both the ones and tens columns can hold at least 9 students comfortably in each. With a large die, or a deck of cards with the numbers 1 – 9, roll/draw a number. Ask the class for volunteers and have that many students stand in the ones column.

Ask questions like:

- Why are you standing in the ones column?
- Is there room for any more students in your column?
- How many more students could join you in the ones column? What would happen if more than that number joined you?

Roll/draw another number. Ask for more volunteers and add that many more students to the ones area. The area might be getting a little more crowded now.

Ask questions like:

- How many students are now in the ones column?
- Do we now have enough students to make a group of ten? How do you know?
- What happens to the students that aren't linked with the group of ten?

If the group consists of ten or more, then have the tenth student link the arms of ten students, or "tie" them into a group of 10, and move to the tens place. If there are any extras, those students will remain in the ones column.

Ask questions like:

- Why have we moved this group to the tens place?
- What number is now represented on the place value board?
- Is that the same number as the number of children standing on the place value board?

- What digits do we use to write this number? Why do we use these particular digits? What do they stand for?

Continue with the game by rolling the die/drawing cards until all the students are standing on the board. Have students explain what is happening and why groups are moving. ***Encourage them to use the terms *place* and *value* as they are explaining the answers to the questions!**

Part II
After several rounds of the game have a class discussion:

- "How would this game change if we used all of the second grade students in our school?"
- "How would it change if we used all of the students in our school?"

Give student pairs a copy of a place value board and a baggie with at least 8 hundred blocks, 20 ten blocks, and 10 ones. Call out various 2 and 3 digit numbers and students should create these using their manipulatives. It is important for them to be able to use these manipulatives to model these 2 and 3 digit numbers, as well as explain what the digit 2 represents in the number 285, what the 8 represents and what the 5 represents. Using the base ten blocks helps students see and create what the number 285 means. Before students can understand how to combine 2 and 3 digit numbers, they must first be able to explain numbers in an expanded notion form, for example, 200+80+5. Once this understanding is established, they will use this knowledge as they expand their understanding of how numbers are combined.

Part III
After students have worked with a variety of 2 and 3 digit numbers, allow students to demonstrate their understanding of the base ten blocks**.** Have students work in pairs. Each student will roll a die three times (or roll three dice one time) and create a three digit number using base ten blocks and their place value mats. The two students will then compare the numbers that they have created and discuss their understanding. Students will begin to create strategies to build a larger number based on the place value of the digits. Foster those strategies and allow those students to share.

FORMATIVE ASSESSMENT QUESTIONS

- Why have we moved this group to the tens place?
- What number is now represented on the place value board?
- Is that the same number as the number of children standing on the place value board?
- What digits do we use to write this number? Why do we use these particular digits? What do they stand for?

Assessment Note: (Van de Walle pg. 131) "As you watch children doing these activities, you will be able to learn a lot about their base-ten concept development. For example, how do children count out the objects? Do they make groupings of 10 as they go? Do they count to 10 and then start again at 1? Children who do that are already using the base ten structure. But

what you will more likely see early on is children counting a full set without any stopping at the tens and without any effort to group the materials in piles. A second-grade teacher had her students count a jar of small beans. After they had recorded the number, they were to ask for plastic cups in which to make cups of 10. Several children, when asked how many cups they thought they might need, had no idea or made random guesses."

DIFFERENTIATION

Extension

- Have students represent 3-digit numbers with expanded notation. (Note: All students will be responsible for representing 3-digit numbers by the end of this unit.)
- Extend the place value chart to the one thousands.

Intervention

- Provide students with a ten-frame to help them recognize when to group items to move to the next column.
- Complete "Group It and Move It" only using numbers in the ones and tens place.

Hundreds	Tens	Ones