PRACTICE TASK: Fill the Bucket

Approximately 4 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 the North Carolina DPI Instructional Support Tools)

Some students may not move beyond thinking of the number 358 as 300 ones plus 50 ones plus 8 ones to the concept of 8 singles, 5 bundles of 10 singles or tens, and 3 bundles of 10 tens or hundreds. Use base-ten blocks to model the collecting of 10 ones (singles) to make a ten (a rod) or 10 tens to make a hundred (a flat). It is important that students connect a group of 10 ones with the word ten and a group of 10 tens with the word hundred.

Refer back to the Background Knowledge portion of the Capture the Caterpillar task for further elaboration.

ESSENTIAL QUESTIONS

- Why should we understand place value?
- What are the different ways we can show or make (represent) a number?
- What is the difference between place and value?
- If we have two or more numbers, how do we know which is greater?

MATERIALS

- 2 sets of number cards (0-9)
- "Fill the Bucket" recording sheet
- Race to the Finish Line Assessment

GROUPING

Whole Group/Partners

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

(Although this activity incorporates building 4-digit numbers, students will only be formally assessed on numbers within 1000.)

Part 1 –

Whole Group Discussion: (Adapted from: http://illustrativemathematics.org/standards/k8)

Dona had cards with the numbers 0 to 9 written on them. She flipped over three of them. Her teacher said:
If those three numbers are the digits in another number, what is the largest three-digit number you can make?

1. First Dona put the 8 in the hundreds place. Is this the right choice for the hundreds place? Explain why or why not.
2. Next, Dona said, "It doesn't matter what number I choose for the other places, because I put the biggest number in the hundreds place, and hundreds are bigger than tens and ones." Is she correct? Explain.

It is important that students be asked to explain well beyond saying something like "She should choose the 8 because it is the biggest." They should be asked to think through the other possibilities and then draw on their ability to compare three digit numbers (as developed in 2.NBT.4) to complete the task.

In the second part, students are presented with an incorrect statement supported by a correct one. It is worth pausing to ask students to carefully sort this through, since attending to reasoning that is partially true and partially false lends itself to the SMP.3: Constructing viable arguments and critiquing the reasoning of others.

One can ask students if they know how to build the biggest three-digit number given any three numbers between 0 and 9 to use as digits. If students can't explain the best strategy at the greatest level of generality, one could have them play the game and explain how their method works in examples.

Solution: 1

1. Dona is correct in putting the 8 in the hundreds place. If the 8 is in the hundreds place, the number will be bigger than 800. If she puts the 5 in the hundreds place, the number must be smaller than 600. If she puts the 1 in the hundreds place, the number must be smaller than 200.

2. Dona is not correct; all the digits matter. Tens are greater than ones, so she needs to choose the next largest number for the tens place. If she chooses 1 for the tens place and then 5 for the ones place the result is 815. The only other possibility is if she chooses 5 for the tens place and then 1 for the ones place, yielding 851, which is greater than 815. So the choice matters (and 851 is the "winning" total).

Part 2 – Digit Switch – whole group

Draw a large place value chart on board (or floor) so that students can stand in front of it. Label the chart with ones, tens, hundreds, and one thousands. Write the digits 0 – 9 on separate sheets of paper. Pass out a number to three or four student volunteers. Have each student stand in front of the place value chart to form a number. Write the number on the board. Encourage the students to switch places and see how many additional numbers they can form. Discuss how the numbers are different even though they contain the same digits. Which number was the largest? Which number was the smallest? How do you know?

Part 3 – (3 digit numbers)
Students use two sets of number cards (0-9). Each student will draw 3 cards from their pile and arrange the cards to form a number. They will write the digits by the buckets on their recording sheet. The goal is to build the biggest number. After the students have filled in their first set of buckets, they will compare to see who has the largest number. The student who had the largest

number will circle their bucket. The students cannot move to the next bucket until all of the spaces are filled in.

As the students are working circulate around the room. Pay attention to the strategies they are using. Notice which students appear to put numbers down randomly with no regard to place value. Make sure to discuss the methods they are using to determine if it is a strategy or a misconception.

Part 4 - (4 digit numbers)- Optional

Repeat as above but have students draw 4 cards and use recording sheet for 4-digit numbers.

Part 5
Students take the largest and smallest number and represent it in four different ways.

Ask questions such as:
Do you have a strategy for choosing where to write the numbers down?
How did you determine who had the largest number when the first number was the same?

Comment: Students should be able to record both their number and their partner's number on the recording sheet. If not, a recording sheet can be shared between pairs.

Part 6
Building on what the students have learned about place value and number comparisons to complete Race to the Finish.

Three cars are in a race. The numbers on the cars are 8, 5, and 2. Using these numbers, create six possible combinations that could be created as the cars cross the finish line.
List these numbers in order from least to greatest.

_____ _____ _____ _____ _____ _____
Even though the numbers use the same digits, they do not have the same value. How does moving a digit change the value of the number?

FORMATIVE ASSESSMENT QUESTIONS

- What is the difference between place and value?
- How does the order of the digits change the value?
- How did you know that you created the largest number?
- How did you know that you created the smallest number?
- What symbol would you use to compare these numbers?
- How would you say this number in word form?

DIFFERENTIATION

Extension

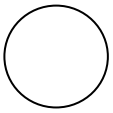
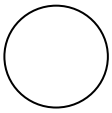
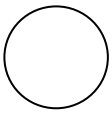
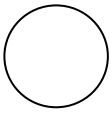
- Vary the task by having students build the smallest number.
- Expand the group to four players if students are comfortable with making numbers. Comparing between multiple players will reinforce the importance of place value.
- Ask students to write in Math Journal about their experience.

Intervention

- Allow the students work on their own to fill their bucket. Students may move or change a number one time per play. If they choose to change a number, have them explain why they want to make that change.

Name: _____

Fill the Bucket (3-Digit Numbers)

Player One		**Player Two**
 **1.** _____ _____ _____	**<, >, or =** 	 **1.** _____ _____ _____
 **2.** _____ _____ _____	**<, >, or =** 	 **2.** _____ _____ _____
 **3.** _____ _____ _____	**<, >, or =** 	 **3.** _____ _____ _____
 **4.** _____ _____ _____	**<, >, or =** 	 **4.** _____ _____ _____

My Largest Number:

_____

My Smallest Number:

_____

Explain how you knew which number was the largest and which was the smallest.

_____

_____

_____

Fill the Bucket (4-Digit Numbers)

Player One		Player Two
1. _____ _____ _____ _____	<, >, or =	1. _____ _____ _____ _____
2. _____ _____ _____ _____	<, >, or =	2. _____ _____ _____ _____
3. _____ _____ _____ _____	<, >, or =	3. _____ _____ _____ _____
4. _____ _____ _____ _____	<, >, or =	4. _____ _____ _____ _____

My Largest Number: _____

My Smallest Number: _____

Explain how you knew which number was the largest and which was the smallest.

_____

_____

_____

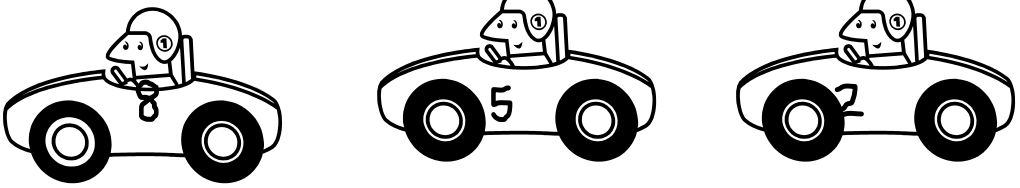
_____

Fill the Bucket- Digit Cards

0	1
2	3
4	5
6	7
8	9

Name: _____

Constructing Task - Race to the Finish Line



Three cars are in a race. The numbers on the cars are 8, 5, and 2. Using these numbers, create six possible combinations that could be created as the cars cross the finish line.

List these 3-digit numbers in order from least to greatest.

_____ , _____ , _____ , _____ , _____ , _____

Even though the numbers use the same digits, they do not have the same value. How does moving a digit change the value of the number?