PRACTICE TASK: High Roller Revisited

STANDARDS FOR MATHEMATICAL CONTENT

MCC5.NBT.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

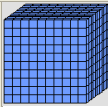**MCC5.NBT.3 Read, write, and compare decimals to thousandths.**
   c. **Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 x 100 + 4 x 10 + 7 x 1 + 3 x (1/10) + 9 x (1/100) + 2 x (1/1000).**
   d. **Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.**

STANDARDS FOR MATHEMATICAL PRACTICE

1. **Make sense of problems and persevere in solving them.**
1. **Reason abstractly and quantitatively.**
2. **Construct viable arguments and critique the reasoning of others.**
3. **Model with mathematics.**
4. **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.**

BACKGROUND KNOWLEDGE

You may want to share the chart below with your students to show the multiple representations for place value, fractions, and decimals.

Thousands	Hundreds	Tens	Ones	•	Tenths	Hundredths	Thousandths
1,000	100	10	1	•	$\dfrac{1}{10}$	$\dfrac{1}{100}$	$\dfrac{1}{1,000}$
				•			
1,000 wholes	100 wholes	10 wholes	1 whole	•	1 part of 1 whole that has been divided into 10 parts	1 part of 1 whole that has been divided into 100 parts	1 part of 1 whole that has been divided into 1,000 parts

It is important to use the language of fractions in the decimal unit because students' understanding of decimals is based on the relationship between fractions and decimals beginning in third grade. For example:

- Read 0.003 as 3 thousandths, 0.4 as 4 tenths
- Read 0.2 + 0.03 = 0.23 as "2 tenths plus 3 hundredths equals 23 hundredths"
- Also, read 0.2 + 0.03 = 0.23 as "20 hundredths and 3 hundredths is 23 hundredths"
- Relate 0.2 + 0.03 to $\dfrac{20}{100} + \dfrac{3}{100} = \dfrac{23}{100}$

Common Misconceptions

A common misconception that students have when trying to extend their understanding of whole number place value to decimal place value is that as you move to the left of the decimal point, the number increases in value. Reinforcing the concept of powers of ten is essential for addressing this issue.

A second misconception that is directly related to comparing whole numbers is the idea that the longer the number, the greater the number. With whole numbers, a 5-digit number is always greater that a 1-, 2-, 3-, or 4-digit number. However, with decimals, a number with one decimal place may be greater than a number with two or three decimal places. For example, 0.5 is greater than 0.12, 0.009 or 0.499. One method for comparing decimals is to make all numbers have the same number of digits to the right of the decimal point by adding zeros to the number, such as 0.500, 0.120, 0.009 and 0.499. A second method is to use a place-value chart to place the numerals for comparison.

ESSENTIAL QUESTIONS

- How does the location of digit in the number affect the size of a number?
- Why does placement or position of a number matter?
- How is place value different from digit value?
- How can we use models to demonstrate decimal values?

MATERIALS

- "High Roller Revisited" Recording Sheet
- One die (6-sided, 8-sided, or 10-sided); or a deck of number cards (4 sets of 0-9)

GROUPING

Partner/Small Group Task

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

In this task students will play games using different place value charts to create the largest possible number by rolling a die and recording digits on the chart one at a time.

Comments

These games should be played multiple times for students to begin to develop strategies for number placement. Students should discuss their strategies for playing the game and any problems they encountered. For example, students may roll several smaller (or larger) numbers in a row and must decide where to place them. Or, they may need to decide where to place any given number such as a 3.

Variations:

- Students could also try to make the least number by playing the game "Low Roller."
- Players could keep score of who created the greatest or least number during the game.
- Students could be required to write the word name, read the number aloud, or write the number in expanded notation.

These games can also be played with the whole class. The class can be divided into two teams and a student from each team can take turns rolling the die or drawing a card. Students from each team would complete the numbers on a chart. Alternatively, the students can play individually against each other and the teacher. The teacher can play on the white board and use a think-aloud strategy when placing digits on the board. This provides students with an opportunity to reflect on the placement of digits.

Students will follow the directions below from the two versions of High Roller Revisited and for The Smallest Difference Game.

High Roller Revisited – Version 1

Directions:

- Players will work in groups to play the game "High Roller Revisited."
- Roll the die 10 times. <u>After each roll</u>, decide where to record the digit on the place value chart.
- Use the 10 digits to make the greatest number possible.
- Once a digit is recorded, players may not make changes to their number.
- Pass the die to the next player and continue to play.
- Compare numbers. The player with the higher number wins the round.
- Play 5 rounds. The player who wins the most rounds wins the game.

	Millions	,	Hundred Thousands	Ten Thousands	Thousands	,	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
1.		,				,				.			
2.		,				,				.			
3.		,				,				.			
4.		,				,				.			
5.		,				,				.			

High Roller Revisited – Version 2

Directions:
- Players will work in groups to play the game "High Roller Revisited."
- Roll the die 4 times. Under each roll, decide where to record the digit on the place value chart.
- Use the 4 digits to make the greatest number possible.
- Once a digit is recorded, players may not make changes to their number.
- Pass the die to the next player and continue to play.
- Compare numbers. The player with the highest number wins the round.
- Play 5 rounds. The player who wins the most rounds wins the game.

Round	Ones	.	Tenths	Hundredths	Thousandths
1.		.			
2.		.			
3.		.			
4.		.			
5.		.			

Smallest Difference Game – High Roller Revisited – Version 3

Version 3 of this game can be played with a variety of configurations. Students can use the

__ __ . __ __ configuration shown below. Alternatively, students may use decimal numbers such

as 0. __ __ __ __ or numbers with three decimal places __ . __ __ __. Teachers need to consider
the numbers on which students should focus when determining which configuration to use.

Students set up a game board as shown below:

1. ____ ____ . ____ ____ > ____ ____ . ____ ____

2. ____ ____ . ____ ____ > ____ ____ . ____ ____

3. ____ ____ . ____ ____ > ____ ____ . ____ ____

4. ____ ____ . ____ ____ > ____ ____ . ____ ____

5. ____ ____ . ____ ____ > ____ ____ . ____ ____

Directions:

- The object of each round is to make a true number sentence (the first number is greater than the second number). Then subtract the smaller number from the greater number.
  Note: If a player ends up with a false statement (i.e. the first number is not greater than the second number), then the player needs to switch the sign so that the number sentence is correct and subtract the two numbers. But that student cannot win the smallest difference for that round.
- Roll the die 8 times. <u>After each roll</u> decide where to record the digit on the game board.
- Once a digit is recorded, players may not make changes to their number.
- Pass the die to the next player and continue to play.
- When the two numbers are subtracted, the player with the <u>smallest difference</u> wins the round.
- Play five rounds. The player who wins the most rounds wins the game.

Example:

> **9   2 . 3   1** > **8   4 . 7   6**
>
> 92.31
> - 84.76
> 7.55
>
> If 7.55 is the smallest difference, then this player wins the round.

FORMATIVE ASSESSMENT QUESTIONS

- What do you do with a 1 if the hundredths place is already filled?
- How do you decide where to place a three or four (when using a six-sided die)?
- How do you decide where to place a 6 (when using a six-sided die)?

DIFFERENTIATION

Extension
- Have students write about "winning tips" for one of the games. Encourage them to write all they can about what strategies they use when they play.
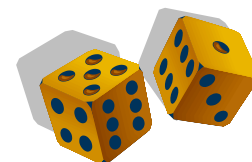
Intervention
- Prior to playing the game, give students 9 number cards at once and have them make the largest number they can. Let them practice this activity a few times before using the die and making decisions about placement one number at a time.

Name _____ Date _____

High Roller Revisited
Version 1

Materials: 1 die (can be 6-sided, 8-sided, or 10 sided); Recording Sheet
Number of Players: 2 or more
Directions:
- Roll the die 10 times. <u>After each roll</u> decide where to record the digit on the place value chart.
- Use the 10 digits to make the greatest number possible.
- Once a digit is recorded, you may not make changes to your number.
- Pass the die to the next player and continue to play.
- Compare numbers. The player with the higher number wins the round.
- Play five rounds, the player who wins the most rounds wins the game.

Game 1:

	Millions	,	Hundred Thousands	Ten Thousands	Thousands	,	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
1.		,				,				•			
2.		,				,				•			
3.		,				,				•			
4.		,				,				•			
5.		,				,				•			

Game 2:

	Millions	,	Hundred Thousands	Ten Thousands	Thousands	,	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
1.		,				,				•			
2.		,				,				•			
3.		,				,				•			
4.		,				,				•			
.		,				,								

Name _____ Date _____

High Roller Revisited
Version 2

Materials: 1 die (can be 6-sided, 8-sided, or 10-sided, numbered 0-9); Recording Sheet
Number of Players: 2 or more
Directions:

- Roll the die 4 times. <u>After each roll</u> decide where to record the digit on the place value chart.
- Use the 4 digits to make the greatest number possible.
- Once a digit is recorded, you may not make changes to your number.
- Pass the die to the next player and continue to play.
- Compare numbers. The player with the higher number wins the round.
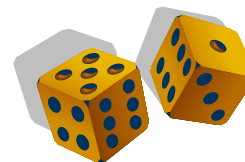- Play 5 rounds. The player who wins the most rounds wins the game.

Game 1:

Round	Ones	.	Tenths	Hundredths	Thousandths
1.		•			
2.		•			
3.		•			
4.		•			
5.		•			

Game 2:

Round	Ones	.	Tenths	Hundredths	Thousandths
1.		•			
2.		•			
3.		•			
4.		•			
5.		•			

Name _____   Date _____

Smallest Difference Game

Materials: 1 die (can be 6-sided, 8-sided, or 10-sided, numbered 0-9)
Number of Players: 2 or more
Directions:

- The object of each round is to make a true number sentence (the first number is greater than the second number). Then subtract the smaller number from the greater number.
  Note: If a player ends up with a false statement (i.e. the first number is not greater than the second number), then the player needs to switch the sign so that the number sentence is correct and subtract the two numbers. But that student cannot win the smallest difference for that round.
- Roll the die 8 times. <u>After each roll</u> decide where to record the digit on the game board.
- Once a digit is recorded, you may not make changes to your number.
- Pass the die to the next student and continue to play.
- When the two numbers are subtracted, the player with the <u>smallest difference</u> wins the round.
- Play five rounds. The player who wins the most rounds wins the game.

Example:

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  9   2  .  3   1   >   8   4  .  7   6

               92.31
             - 84.76
               -------
               7.55

If 7.55 is the smallest difference, then this player
wins the round.
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<u>Game Board:</u>

1. _____ _____ . _____ _____ > _____ _____ . _____ _____

2. _____ _____ . _____ _____ > _____ _____ . _____ _____

3. _____ _____ . _____ _____ > _____ _____ . _____ _____

4. _____ _____ . _____ _____ > _____ _____ . _____ _____

5. _____ _____ . _____ _____ > _____ _____ . _____ _____