PRACTICE TASK: Rolling Around with Decimals

STANDARDS FOR MATHEMATICAL CONTENT

MCC5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

STANDARDS FOR MATHEMATICAL PRACTICE

1. **Make sense of problems and persevere in solving them.**
6. **Reason abstractly and quantitatively.**
7. **Construct viable arguments and critique the reasoning of others.**
8. **Model with mathematics.**
9. **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

Students should have had prior experiences identifying and representing decimal numbers. Students should be able to read decimal numbers and understand the value of the whole number compared to tenths and hundredths.

Also, students should have an understanding of how to represent subtraction with decimal numbers. Below are some sample subtraction problems from the National Library of Virtual Manipulatives at the following web address.
http://nlvm.usu.edu/en/nav/frames_asid_264_g_2_t_1.html?from=category_g_2_t_1.html

Common Misconceptions

Students might compute the sum or difference of decimals by lining up the right-hand digits as they would whole number. For example, in computing the sum of 13.96- 2.9, students will write the problem in this manner:

13.96
- 2.9
13.67

To help students add and subtract decimals correctly, have them first estimate the sum or difference. Providing students with a decimal-place value chart will enable them to place the digits in the proper place.

ESSENTIAL QUESTIONS

- Why is place value important when subtracting whole numbers and decimal numbers?
- How do we subtract decimal numbers?
- How does the placement of a digit affect the value of a decimal number?

MATERIALS

- "Rolling Around with Decimals, Game Directions" student sheet (one per group)
- "Rolling Around with Decimals, Recording Sheet" student recording sheet (one per pair)
- Dice (three dice per group, two different colors)

GROUPING

Partner/Small Group Task

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Students learn a game that allows them to practice subtracting and comparing decimal numbers. The focus of this game is on subtracting decimal numbers to the hundredths place.

Comments

To introduce and teach this game, display the game recording sheet. Play the game with the class against the teacher or one side of the room against the other. You can play an abbreviated game if students quickly understand what to do.

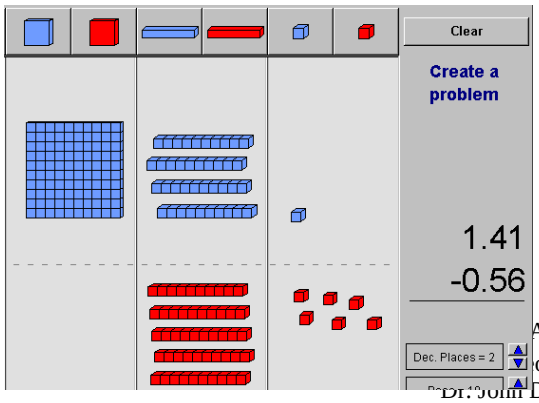
While students are playing the game, be sure decimal materials (base ten blocks, money, etc.) are available to students who wish to use them.

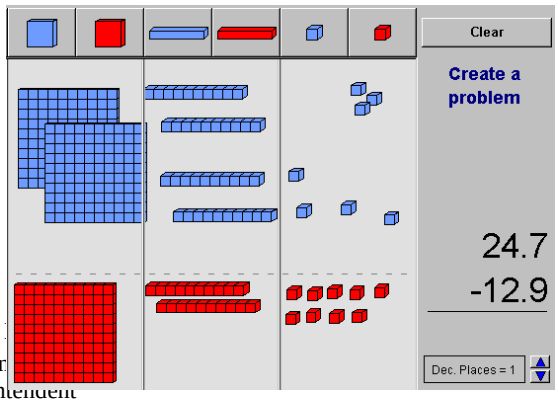
One way student understanding can be quickly assessed is by asking students to write a few sentences to explain why place value is important in this game and/or the strategies they used while playing the game. Student recording sheets can also be used to assess student understanding of addition with decimal numbers.

An alternative way to play this game is to limit it to 10 rounds. The winner can be the player with the smallest difference or the largest difference – this should be determined before the game begins. Also, "Rolling Around with Decimals" can be modified to include addition as follows:

- For addition, players keep a running total of rolls. The winner is the player with the highest sum after 10 rounds.

http://nlvm.usu.edu/en/nav/frames_asid_264_g_2_t_1.html?from=category_g_2_t_1.html

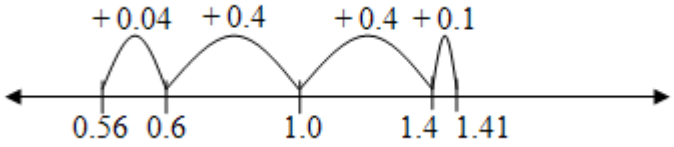




Students should be able to represent subtraction of decimal numbers, including regrouping. Also, it is important for students to recognize that they need to line up decimal place values in order to subtract correctly. If some students recognize that the decimal points are always lined up as well, that is fine, but more importantly students must recognize that each place value needs to be lined up.

Another strategy that is often helpful for students to use to find the difference between two numbers is an open number line. The problem 1.41 – 0.56 = __ can be solved using an open number line as shown below.

Start by placing 0.56 on the number line. Count up from 0.56 to 1.41 to determine the difference between the two decimal numbers. The difference can be found by adding 0.04 + 0.4 + 0.4 + 0.1 = 0.85.



Task Directions

Students will follow the directions below for "Playing with Decimals, Rolling Around with Decimals, Game Directions" student sheet.

Number of Players: 2-3

Materials:

- 3 dice (1 one color, 2 another color);
- Recording Sheet (one for each pair of players)
- Pencil

Directions:

1. The one die will represent the whole number portion of the number. The other two dice will represent the decimal portion of the number.
2. Take turns with a partner rolling the number cubes.
3. With the number cubes you have rolled, create the largest decimal you can using the single color for the whole number and the additional two dice for the decimal.
4. Record your roll on the recording sheet.
5. After all players have completed their first roll, each player subtracts the decimal created from 50.
6. After each additional roll, each player will subtract the new decimal amount from the previous decimal difference.
7. The first player with zero remaining or whose roll is larger than the remaining difference is the winner.

FORMATIVE ASSESSMENT QUESTIONS

- Why is place value important when subtracting decimal numbers?
- How do you know you created the largest possible decimal?
- How would this game be different if you used all three dice to make the largest possible decimal number?

- What strategy (strategies) are you using to win the game? How are your strategies working?
- What strategy (strategies) are you using to subtract the decimal numbers? How are your strategies working?

DIFFERENTIATION

Extension

- Ask students to write a story for a subtraction problem with decimals. If necessary, help students brainstorm contexts for which decimal numbers would be applicable. Allow students to trade stories with a peer to solve.

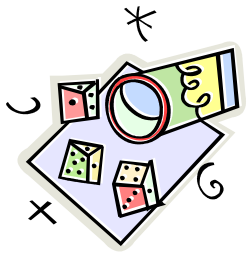
Intervention

- Allow students to play the game with money. Students can start with $50.00, make trades and subtract or count back change to determine the running totals.

Name _____ Date _____

Rolling Around With Decimals

Game Directions



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Example:

Player 1 has the following rolls:

1st turn: Ones place 2
Decimal places 1, 5
The largest possible number would be 2.51

2nd turn: Ones place 3
Decimal places 2, 1
The largest possible number would be 3.21

Player 1's score sheet would look as shown.

Player 1's Record Sheet

Rolling Around With Decimals				
Ones Place	•	Tenths Place	Hundredths Place	50.00
2	•	5	1	47.49
3	•	2	1	44.28
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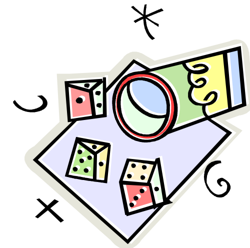

Rolling Around with Decimals

Recording Sheet

Player 1 ________________________

Rolling Around With Decimals				
Ones Place	.	Tenths Place	Hundredths Place	50.00
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Player 2________________________

Rolling Around With Decimals				
Ones Place	.	Tenths Place	Hundredths Place	50.00
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