EXPLORATION 5.19 Operations: A Decimal Game

This game requires you to examine the effects of the four operations on decimal computation. As you move through the games, you should see improvement. At the end of each game, you will be asked to stop and reflect on your improvement.

Directions for playing the game

1. Make up four decimal numbers—for example, 3.6, 45.3, 1.23, 0.005.
2. From your list, select the three decimals that will make the answer to the given equation as large (or as small) as possible. Describe your strategy in words. For example, to make the equation

   $$\square + \square - \square =$$

   as large as possible using the decimals 3.6, 45.3, 1.23, and 0.005, you might try $45.3 + 3.6 - 0.005$. Description of strategy: "I picked the two largest decimals to add and then picked the smallest decimal to subtract because I wanted to take away as little as possible."
3. If you are confident that you have the maximum number, go to Step 4. If not, try other combinations of numbers until you feel you have the combination that produces the largest number.
4. Make up four new decimal numbers. Give your strategy to another group. Have them use your strategy.
   Now check: Does this strategy produce the largest number?
   If yes, move on. If not, revise your strategy, and repeat Step 2.

1. ***First Game*** Make the answer to the equation below as large as possible.

   $$\square \times \square + \square =$$

2. ***Second Game*** Make the answer to the equation below as *small* as possible.

   $$\square \times \square \div \square =$$

3. Would your strategy in the second game (Step 2) change if we added parentheses as shown below?

   $$\square \times (\square \div \square) =$$

   Describe your hypothesis before doing any computations with the calculator. Then do some computations and decide whether to keep your original strategy or to revise it.
4. ***Third Game*** This time you pick the operations, write the equation, and decide whether to make the answer to the equation as large or as small as possible.

Looking Back on Exploration 5.19

1. Does your strategy depend on the numbers chosen? For example, for the sample exploration, we would pick the two largest numbers to put in the first two boxes and the smallest number for the third box, regardless of the numbers. Is there a simple, general strategy for every game?

EXPLORATION 5.20 Target: A Decimal Game

Materials

- Game sheets on pages 143–144

Directions for playing the game

Note: These directions are written using an example that involves the operation of multiplication. The game can also be played using any of the other three operations: addition, subtraction, or division.

1. Select a number, an operation, a goal, and a winning zone; for example:

Starting number	145
Operation	multiplication
Goal	1
Winning zone	0.9 to 1.1 (or 0.99 to 1.01, or 1 to 1.1)

2. The first player selects a number to multiply the starting number by, trying to get the product of the two numbers in the winning zone (in this case, between 0.9 and 1.1).
3. If the product is not in the winning zone, then the product becomes the starting number for the second player.
4. Play continues in this manner until the product is within the winning zone.

1. Use the game sheets on pages 143–144. Play the game several times with a partner. Record your game in the table provided on the game sheet. For example, the first turn in the game described in the directions might look like this:

Turn	Computation	Product	Reasoning
1	145×0.006	0.87	I knew that 100×0.01 would be 1. Because 145 is bigger than 100, I picked a number smaller than 0.01.

2. Describe one mental math strategy that you learned during this game.

Target Game Sheet for EXPLORATION 5.20

Starting number _____

Operation _____

Goal _____

Winning zone _____ to _____

Turn	Computation	Product	Reasoning
1			
2			
3			
4			
5			
6			
7			
8			

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