CONSTRUCTIVE EXPERIENCES WITH DECIMALS

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The following are the first of a series of decimal exercises to be published in delta-k.

The 10-Slicer

MATERIALS: A number of 10 X 10 grids
1 X 10 strips and unit squares

Suppose you have just received a Pizza Jenie pizza cutter at your house. This machine takes any sized piece of pizza and cuts it into *10 equal pieces.*

You and a friend have just taken 2 pizzas from the oven when a second friend arrives. You want to split the 2 pizzas 3 ways evenly, and you say, "Let's try my Pizza Jenie."

You put the 2 pizzas into the slicer and get 20 equal pieces.
What part of a pizza is each slice?

You distribute these 20 pieces among the 3 of you equally and get *6 each* and 2 left over. "No problem," you say, and put these 2 pieces in the Pizza Jenie and get 20 smaller equal pieces.
What part of a previous slice is each of these pieces?
What part of a whole pizza is each of these?
In distributing these pizza pieces what happens?

Can you repeat this process again with the 2 "leftover" pieces?

Using the Pizza Jenie, each of the three of you get:

	Part of a Whole	
6 slices	6 _____	= .6
then 6 small pieces	6 _____	=
then 6 smaller pieces	6 _____	=
then 6 even smaller pieces	6 _____	=
then _____	6 _____	=

How long can this continue?

We know that each person should get 2/3 of a pizza to be fair. We know the Pizza Jenie process should work out fairly as well. So:

2/3 should equal 6 tenths + 6 hundredths + 6 _____ + 6 _____ + ...
or 2/3 = .666... = $.\overline{6}$.

Use the squares and strips *and* your imagination to solve the following "pizza problems" using the Pizza Jenie.

1. 1 pizza for 2 persons. *Each get* _____.

2. 5 pizzas for 4 persons. *Each get* _____.

3. 2 pizzas for 6 persons. *Each get* _____.

4. 1 pizza for 4 persons. *Each get* _____.

5. 5 pizzas for 15 persons. *Each get* _____.

6. 1 pizza for 10 persons. *Each get* _____.

7. 1 pizza for 100 persons. *Each get* _____.

8. 3 pizzas for 200 persons. *Each get* _____.

9. 3 pizzas for 5 persons. *Each get* _____.

10. 6 pizzas for 8 persons. *Each get* _____.

11. 1 pizza for 7 persons. *Each get* _____.

12. 1 pizza for 9 persons. *Each get* _____.

Write a report which describes what you have found out about repeatedly cutting up objects into 10 parts and distributing these among differing numbers of persons. For example, does it always come out evenly? How do the results relate to decimal notation? For example, what does 5/4 equal? Or suppose at a party each person received .125 or .1 + .02 + .005 parts of a pizza. Can you tell how many poeple and pizzas there were? Is there more than one answer?

Native Speaker

MATERIALS: One calculator

10 X 10 grids

1 X 10 strips and unit squares

It is said that calculators "speak decimal." Try to experiment and see if you can learn something about "decimal" by "talking" with your calculator.

1. Consider 2.17. Represent this with squares and strips. Suppose you were to give 10 persons each such a set of squares and strips. You would need:

   - 20 large squares
   - 10 strips
   - 70 small squares

   You could get these using only large squares and strips. You could get 10 strips from _____ large squares. You could get 70 small squares from _____ strips.

   Thus, 10 X 21.7 = 10 X 2 + 10 X .1 + 10 X .07

   = 20 + 1 + .7

   = 21.7

   Now key 2.17 into your calculator. Multiply by 10. What is the result? _____

   Multiply by 10 again. What is the result? _____

   Again. What is the result? _____

   Key in 2.17. Multiply by 100. What is the result? _____

   Key in 2.17. Multiply by 1000. What is the result? _____

   Key in 2.17. Multiply by 100,000. What do you think will result? Check it.

2. Again think of 2.17 in terms of strips and squares. What would happen if you divide these evenly among 10 people?

   Each will get _____ strips → .2

_____ small squares → .01

_____ smaller squares → .007

Key in 2.17 in your calculator. Divide by 10. _____

Divide by 10 again. _____

Again. _____

Again. _____

Key in 2.17. Divide by 100. _____

Key in 2.17. Divide by 1000. _____

3. Explore 3741 by keying it into your calculator.

   Repeatedly divide by 10.

   Key it in again, repeatedly multiply by 10.

   Key 3741 in and divide by 100.

   multiply by 1000.

   divide by 10,000.

   multiply by 100.

   Make up other activities involving powers of 10.

4. Do similar explorations for
   (a) 36.81
   (b) 3.579
   (c) .00036
   (d) 486590 (What happens when you multiply this by 10,000 on your calculator? What does this mean?)

5. Write up what you know about dividing and multiplying decimal fractions by various powers of 10.

6. Suppose you multiply $.\overline{6}$ by 10. What happens to the result? Explore this on your calculator: Divide 2 by 3. What happens? Do you get .66666666 or .66666667? What might each mean? Now multiply your results by 10. What happens? Again. What is the result? What seems to be going on here?