

Place Value and Other Mathematical Mysteries

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Problem of the Day:

The Place Value Game

- Sylvia has the following cards:

49298 83483 43281

If Ms. Descartes pulls a 3, how many points will Sylvia have?

- What digit does she hope Ms. Descartes will pull next week so that she will have the highest possible score?

Extra

- Sylvia's friend Carina has these cards:

89378

42327

49734

- What's one digit that Ms. Descartes could pull next week that would give Carina a higher score than Sylvia?
(Remember that both Sylvia and Carina have to compare scores using the number Ms. Descartes draws.)

Procedural vs. Conceptual Understandings

- Procedural Knowledge: Based on a series of actions involving rules and algorithms.
- Conceptual Knowledge: Based on connected networks which help us link ideas and see relationships.



Place Value: Procedural Knowledge

Connecting numbers to their
appropriate places:

- The tens place is the second place to the right.
- In the number, 235, 2 is in the hundreds place



Place Value: Conceptual Knowledge

- Understanding the relationship between each place (10 times the one next to its left).
- Understanding the components of a number:

$$235 = 200 + 30 + 5 \text{ or}$$

2 hundreds + 3 tens + 5 ones

General Process for Developing the Meaning of Mathematical Ideas

- Concrete: Start with concrete situations. Use manipulatives to illustrate or act out a situation.
- Semiconcrete: Representing situations with pictures, diagrams, etc.
- Abstract: Representing situations with symbols (particularly numeric symbols).



Learning a New Number System: Counting

- Select a partner.
- Count out 30 objects
- Partner 1: Recorder - Number a piece of paper from 1 to 30.
- Partner 2: Counter - Move the objects from the uncounted pile to the counted pile as we count them.



Learning a New Number System: Place Value

- What number is our new number system based upon?
- How many digits in this system?
- Give the names of the first three “places” for this system.
- How are these places related to each other?



Learning a New Number System: Manipulatives

- Sort the place value blocks into groups by size.
- Which block represents which place?
- Using your place value mats, represent the following numbers with your blocks:

24 103 231 430

Learning a New Number System: Adding

Using whatever methods you choose, practice adding in the new number system by completing these problems:

$$12 + 11 =$$

$$14 + 34 =$$

$$24 + 232 =$$

$$133 + 324 =$$

Learning a New Number System: Subtracting

Using whatever methods you choose, practice adding in the new number system by completing these problems:

$$33 - 12 =$$

$$41 - 14 =$$

$$123 - 44 =$$

$$321 - 132 =$$

Reflecting on Our New Knowledge

- How did you feel as you were learning this new number system?
- What helped you to understand the new number system?
- How is this number system related to our own number system?



Moving from Counting to Place Value

- Build upon counting experiences
- Move to counting by groups
- Practice equivalent grouping (regrouping)
- Reinforce counting by groups with oral names (standard and place value) and written names.



A Transitional Game: Race to 100

- Work with a partner.
- Each partner takes turns rolling a dice.
- Whatever number you get on the dice, you take that many objects.
- When you get ten of an object, you trade in for a ten.
- The first person to 100 wins!



Models for Place Value

- Groupable - Grouped by learner.
- Pregrouped/Trading - Base 10 blocks
- Proportional - 10 is ten times bigger than 1.
- Non-Proportional - More abstract; money, chip trading, etc.
- 0-99 chart and place value chart

Resources

- Problems of the week:
Mathforum.org
- Games: Race to 100, I am the Greatest
- Connections to Operations:
Digits Game and Multiplication Challenge.
- Use with the calculator and computer



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