5TH GRADE MATHEMATICS LESSON PLAN

For the public lessons on Friday May 14, 2010
Central Valley Lesson Study Conference, Fresno, CA
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1. Title of the Lesson: How many cards do we need to display the dates of the month on the wall?

2. Goals of the Lesson:
   - Students will deepen their understanding of the concept of place value notation through solving a problem related to their everyday life.
   - Students will understand that organizing their thinking processes and thinking logically are important for problem solving

3. Instruction of the Lesson
Understanding the base-ten place-value system is one of the most important objectives for the early grades. This notation system is based on the principles of grouping and place-value. In this system, objects are grouped by ten so that only ten symbols, digits 0 through 9, are needed to represent any number of objects. In order to represent any size of numbers in this system, the place that the digit appears in the numeral has a particular size of the group. For example, the ones place represents how many of ones are there, the tens place represents how many tens there are, and so on. Thus the 5 in 523 represents five hundreds and the 5 in 675 represents five ones. This means that the same digit can represent different numbers based on its place in the numeral. Unless students understand that each place in the numeral holds different value, it is very difficult for students not only to understand or to express numbers by using this notation system, but it is also difficult to understand how addition, subtraction, multiplication, and division work. In order to deepen students' understanding of the concept of place value notation, this lesson is designed to help students think about how their previous learning of the base-ten place-value system can be used to solve problems in their everyday life. Through the problem solving students are expected to deepen their understanding of the concept of place value as well as to develop problem-solving skills. It is also expected that the solution to this problem, only six cards are sufficient to display the number of dates in each month for each day throughout a year, which could attract students' interest by using mathematics in their life.

4. Plan of the Lessons
Goal of the lesson:
- Students will deepen their understanding of the place value notation through solving a problem related to students' everyday life

Steps, Learning Activities Teacher's Questions and Expected Student Reactions	Teacher's Support	Points of Evaluation
1. Introduction Encourage students to see the pattern among the (2-digit number) – (2-digit number) subtraction problems. a. The instructor will show the students 9 number cards. Each number card has a single-digit number from 1 to 9. 1 2 3 4 5 6 7 8 9 b. The instructor will work with a volunteer student to make two 2-digit numbers using selected two single-digit numbers from 1 to 9. For example, if the instructor and the student chose 5 and 7, two 2-digit numbers, 57 and 75 can be made. Thus a subtraction problem using these two single-digit numbers will be 75 – 57. c. The students will calculate the subtraction. d. The instructor will work with a few volunteer students to make more subtraction problems and ask the students to calculate e. The instructor will ask the students if they can see a pattern associated with these subtraction problems.	Using large size number cards on the board so that all the students can see the cards. Help the students see that many two-digit numbers can be made by using these single-digit number cards. In order to help students find the pattern among the subtraction problems, the instructor will choose the number in a specific way. Make sure that all the students are able to calculate the subtraction problems correctly so that they can find the pattern. Use the board effectively in order for the students to see the pattern.	Do all the students understand how to make the subtraction problem using the number cards for this activity? Do all the students see the pattern among the subtraction problems?
2. Posing the Problem Because the number cards can make many two-digit numbers, it might be a good idea to use such cards to display the dates on the wall in your classroom so that you can use them instead of writing the dates all the time. Think about if these nine cards are enough to display each date in a month. If these cards are not enough to display each date in a month, what number card(s) do you need in addition to these nine cards? **3. Anticipated Student Responses** 1 more card, 0: 10 cards altogether 11 more cards, 0 and another set of 0-9: 20 cards altogether 4 more cards, 0, 1, 2, 3: 13 cards altogether 3 more cards, 0, 1, 2: 12 cards altogether	Help student awareness that you do not need too many cards to display dates. Ask students to work with a partner. Help students notice that we may not need 31 cards if we put a digit on each card and use them for ones and tens. Provide students actual blank cards if students request.	Do all the students understand that the largest number of dates in a month is 31?

4. Comparing and Discussing
 	
a. 20 cards
    Cards for ones: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0
    Cards for tens: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0
 	
b. 13 cards
    Cards for ones: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0
    Cards for tens: 1, 2, 3
 	
c. 12 cards
    Cards for ones: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0
    Cards for tens: 1, 2
 	
d. 12 cards
    Cards for ones: 1, 2, 3, 4, 5, 6, 7, 8, 0
    Cards for tens: 1, 2, 3
 	
e. 11 cards
    Cards for ones: 1, 2, 3, 4, 5, 6, 7, 8, 0
    Cards for tens: 1, 2
	Begin the discussion with the group that shows the larger number of cards. Encourage students to share with other groups not only how many cards but also what kind of cards they want to use. Help other groups understand how the group came up with the idea and see if the method works for all the dates.
	
	For the fewest number of the cards, let each student make the cards and try one by one to make sure all the dates of a month can be displayed with 11 cards. (If a student does not want to use 6 to display 9, he/she can use 12 cards).
		Does each student understand other students' ideas?
		
		Does each student understand that only 11 cards with a digit in each card are necessary to display all the dates of each month?

4. Extending the problem How many cards do we need to display all the dates if you can use both sides of each card? **5. Anticipated Student Responses** **6 cards** • Front 1, 2, 3, 4, 5, 6 • Back 0, 1, 2, 7, 8, 9 **6 cards** • It looks like we can use only 6 cards to display the dates if we use both sides of cards. • What kinds of rules do we need to keep in mind so that the date cards created always work? ○ Any combination would work if the following pair of digits are not put on the same cards, 1 & 1, 2 & 2, 3 & 0	Provide students enough cards so that they can actually try to find how their ideas work. Help students understand that there are multiple correct solutions to this problem.	Do the students understand the methods for displaying all the dates of a month using both sides of six cards?
6. Summing up • Ask students to write what he/she learned from today's lesson.	Encourage students to use what is on the board to summarize what they learned from today's lesson.	

5. Evaluation:
   • Do students see that a digit can be used for not only ones but also tens place, i.e., 3 can be used not only for displaying the 23rd but also the 31st?
   • Do students recall their understanding of decimal notation?
   • Do students understand that organizing their thinking processes and thinking logically are important for problem solving?