Mathematics Lesson Plan *(for Grade 1)*

For the lesson on Wednesday, August 8, 2001
At Brewer Island School, San Mateo, CA
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1. **Title of the Lesson: Ways to Break Apart 10**
2. **Goal:** As a result of participating in this lesson, students will:

    a. Increase their understanding of the embedded nature of numerical quantities, by using their ideas about ***ten*** to solve a developmentally-appropriate, contextually-based problem
    b. Increase their problem-solving skills by engaging in open-ended, contextually-based problem solving
    c. Increase their appreciation for cooperative work and social skills by working with their peers as they deepen their understanding of mathematics

3. **Relationship between this Lesson and Mathematics Content Standards for California Public Schools K-Grade12.**

Kindergarten Students understand the relationship between numbers and quantities (i.e., that a set of objects has the same number of objects in different situations regardless of its position or arrangement) (1.0)

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Grade one **Students represent equivalent forms of the same numbers through the use of physical models, diagrams, and number expressions (1.3)**

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Grade two Students understand the relationship between numbers, quantities, and place value in whole numbers up to 1,000 (1.0)

4. **Instruction of the lesson**

    This lesson will provide an opportunity for students entering Grade 1 to experience the flexible nature of the numerical quantity of 10. In Kindergarten, students explored numbers through a variety of counting activities. They have experienced and discovered different counting sequences, the quantities the numbers represent (cardinality), and different ways to represent the quantities they counted. This lesson will build on their prior learning experiences by presenting them with a challenging yet contextually-based question: how to break apart 10 in different ways. Decomposing and recomposing numerical quantities will help them see the numbers as flexible entities that are interrelated with one another. 10 is also a very special number in the base-10 system we use, and knowing the nature of 10-ness and being able to decompose and recompose 10 flexibly will establish a strong foundation for students' future exploration with larger numerical quantities. Especially as students learn multi-digit addition and subtraction using algorithms in the future, their knowledge of different equivalent forms of 10

will help them understand the place-value system and the process and the mechanics of the algorithms better.

In this lesson, two teachers play important roles in supporting one another and creating a cooperative and safe problem-solving atmosphere for students in the classroom. They will model the mathematics discourse for students and supplement the discussion whenever necessary as noted in the lesson plan.

5.   Lesson Procedure

Activities; Teachers' questions; Anticipated student responses	Teacher support	Evaluation
1. Introduction to the lesson: Introduction of teachers will lead to the core problem of the lesson (finding different combinations of red and blue arms of the alien with 10 arms).		
What are the different combinations of red and blue arms of the alien?		Are students interested in the problem?
2. Teacher-guided problem solving Using an alien picture and cutout magnet arms on the board, teacher 1 and a student volunteer (or 2) will show the activity to the whole class. a. Place 10 magnet arms in different red-blue combinations b. Identify the number of arms using the magnets c. Represent the combination with numerals		Do students understand the activity?
3. Individual Problem Solving With student worksheet with a smaller alien picture (1/2 page size), students work as a pair or small groups to find different combination of the alien arms. *Anticipated student responses* *1. Just color with visually different patterns, and then count the numbers of arms (may repeat the same number combinations).* *2. Color with the increasing pattern with one color, color the remaining arms with another, and then count the numbers of arms.* *3. Identify the number combinations first numerically, and then color the arms (fast students).*	If some groups find many combinations quickly, they may spread their work on the floor or table to examine the relationships and seek a pattern.	Are students working as a group? Are students engaged in the activity?
4. Sharing of ideas a. Using a prepared chart on the board, teacher 2 leads students to share the combinations they found with alien pictures. b. While identifying the combinations, teacher 2 also puts up number combination cards (prepared) to make the pattern visible.	Teacher 1 walks around and checks students' work. When certain combination is missing on the chart, teacher 1 tries to find it in a student's work.	
5. Synthesizing the ideas a. Teachers help students identify any pattern through		Do students notice a pattern?

discussion.		

Anticipated student responses
 1. *Numbers are reverse for some combinations*
 2. *Each column has numbers 1 through 9 (10).*
 3. *When number increases in one column, it decreases in the other.*
 4. *When number increases in one column by one, it decreases in the other by one.*
 	
   b. Discuss why there is a pattern.
   c. Identify the combinations to break apart 10 and the patterns among them.		

6. Summing Up With the list on the board with students' comments about relational patterns they noticed, students write in their journals (or on pieces of paper) what they have learned today, using any method they may be able to use to record (words, numbers, pictures, etc.)		Do students use different ways to express and record their learning?

6. Evaluations:

1) Does a student find more than one way to break apart 10?
2) Does a student notice a pattern in number combinations to break apart 10?
3) Does a student use his/her prior understanding of numerical quantities to approach the problem of breaking apart 10?
4) Does a student work cooperatively in a group situation?