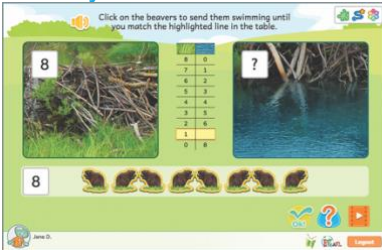# DECOMPOSE, STEP 2

Lesson Plan: Number Concept, Decompose, Step 2

Activity Screen Shot

Theme Host: Chuck

Animal Friend: Squirrel

OVERVIEW
This step focuses on the decomposition table and patterns in it, reinforcing the association between partitioning a set (of beavers) and decomposing a number.

PRINCIPAL LEARNING GOAL(S)
- Familiarize students with decomposition tables for numbers between 3 and 9
- Connect decomposition tables to partitioning a set of objects
- Observe patterns in decomposition tables

PREREQUISITE KNOWLEDGE AND SKILLS
- Completed the first step in this idea

RESOURCES FOR THE LESSON
- Lego blocks
- A stack of coloured papers (three different colours)
- Images of towers partitioning numbers 4, 5 and 6

POTENTIAL DIFFICULTIES
- Students may focus on clicking on beavers/matching the numeral in the left number box with the numeral on the highlighted line instead of using the patterns in the table, but questions such as "Which line in the table would you match after clicking on just one beaver?", "What difference do you see between consecutive lines in the table?" help
- Students may focus on clicking and matching numerals ignoring the partition of the set of beavers, but engaging such students by asking "How many beavers are left in grass?", and following up their answers with "I am not sure of that" to prompt students to try to convince you, thereby revealing how they think allows you to provide guidance
- Due to a technical problem the software never uses the first or last line of a decomposition table, so explore this during Consolidation.

WARM UP
The suggested warm up activity will take longer than the usual 3 - 5 minutes. Given the time, carry it out as warm up.

Alternatively do the "warm up" as a whole class activity one day before, and then warm up by reminding them of the previous day, rewriting some decomposition tables on the board. The page below has a sample of the full warm up:

- Place a red sheet and a green sheet on your desk. Build a 5 block tower on the green sheet. Ask students for suggestions concerning rearranging blocks so as to have two towers, one on each sheet, but using only the same 5 blocks. After building a rearrangement, pull out a picture of that rearrangement (Appendix 1) and ask one student to hold this picture at the front of the class. Repeat this until all 6 possible rearrangements have been built.

- Ask the class if they can think of a way to organize the students standing at the front so that a pattern is seen. Specifically, pick one student, say the one holding a picture with 3 blocks on the red sheet and 2 blocks on the green sheet, say her name is Sally and ask, "Who should be to the left of Sally and who should be to her right?" Continue this process until all six children have been rearranged to represent either the sequence (0R, 5G), (1R, 4G), (2R, 3G), Sally=(3R, 2G), (4R, 1G), (5R, 0G) or the reverse, (5R, 0G), (4R, 1G), Sally=(3R, 2G), (2R, 3G), (1R, 4G), (0R, 5G). Make a table on the board showing two columns, labelled Red and Green, with rows beneath that follow one of these two patterns.

- Discuss with students prompting them to explain how the pattern on the board works (as the number of blocks in one tower goes up by one block, the number of blocks in the other tower goes down by one block so that the total number of blocks in the two towers always remains the same).

- For a next day review draw a few two-column tables on the board (say for 4, 5 and 6). Try to have a student articulate the principle of the pattern in the tables. You can also ask if they see any pattern connecting the total number of blocks being used and the number of ways to split that number of blocks into two towers. Namely when there are 4 blocks, there are 5 different pairs of towers; when there are 5 blocks, there are 6 different pairs of towers; when there are 6 blocks, there are 7 different pairs of towers. Ask them how many different pairs there would be if you start with 8 or 3 blocks.

CONSOLIDATION ~15 MINUTES

To help students consolidate their new knowledge and make connections to prior learning, allow time for subsequent discussion. The questions below raise important issues:

1) *Ask the students to explain patterns seen in the various "decomposition tables" used in this step.*
   The goal is to help students to develop their own language for discussing patterns of change.

2) *Students are never asked to recreate the top or bottom line in any decomposition table. However, it is important that students realize that # + 0 = # and 0 + # = #, i.e., these two lines are real parts of the table. Say "Suppose you had 6 candies in your pocket and your brother/sister/friend came up to you and said, will you share your candies with me?" If you were angry and decided not to share at all, how many candies would you have and how many candies would he/she have?*
   This question promotes discussion concerning the top line of the decomposition table, # + 0 = #. Also reverse the discussion by asking what happens if all the candies are given to their brother/sister/friend, i.e., the bottom line. Ask how they would represent these (e.g., using a concrete number such as 6 - so 0 + 6 = 6 or 6 + 0 = 6). The important issue is that these two lines are an integral part of the overall table, and of understanding numbers. In later grades this promotes understanding of the idea that the empty set and a given set itself are both "subsets" of the given set.