

## **HANDS-ON MANIPULATIVE PROBLEMS WITH UNITS, LONGS, FLATS AND BLOCKS**

**Instructions:** In a group of two or more, go through each of the problems below and have a discussion about the questions being asked. If a problem seems confusing to any member of the group, the group should come up with variations of the questions posed. As time permits, you may want to try to imagine (or use pen and paper or some other means to demonstrate) how one might handle similar questions for different size longs, flats and blocks (for example, consider similar questions for what I called units, five-longs, five-flats and five-blocks in class). As usual, have fun.

1. Pick up 6 units, 4 longs, 8 flats and 2 blocks. What is the expanded form (in base 10) of the number represented by this collection? Notice that the longs, flats and blocks are themselves formed by unit cubes. How is the expanded form you found related to the total number of unit cubes you have collected?
2. Pick up 2103 unit cubes. If you don't have enough individual units, consider taking advantage of the fact that the longs, flats and blocks are made up of unit cubes. What is the minimum number of pieces (each unit, long, flat and block is one piece) that you need in order to pick up 2103 unit cubes.
3. Use as few units, longs, flats and blocks as possible to represent the same quantity (the same number of unit cubes) as 12 units, 9 longs, 4 flats, and 2 blocks. What is the number that is represented? How many unit cubes did you end up with? How many unit cubes did you start with? Is there any other way you can think to ask the same question over again? (I wasn't being serious with that last question, but you can take it seriously if you want.)
4. Use as few units, longs, flats and blocks as possible to represent the same quantity (the same number of unit cubes) as 10 units, 8 longs and 12 flats. What is the whole number that is represented?
5. One person collect together 6 units, 5 longs, 8 flats and 1 block. What is the number this first collection represents? Another person in your group collect together 8 units, 7 longs, 4 flats and 3 blocks. What is the number this second collection represents? Combine all the collected pieces together and trade (or regroup) pieces with the unused pieces so that the total remains the same and so that you end up with as few pieces as possible. What number does this represent? How is this last number related to the first two you obtained?
6. Have one person collect 3 units, 5 longs and 3 blocks, and have a second person collect 4 units and 7 longs. Trade pieces with unused pieces to find the total. Check your work by doing an addition problem.