Algebra and Representation HW #6

I. Discussion Questions

1. When using variables, we often denote multiplication of two quantities by placing the variables next to each other. For example, we write ab for $a \times b$. Can we do this with numbers? Why or why not?

2. Recall that 1 foot = 12 inches. If I represents the number of inches and F represents the number of feet, are I and F related by $F = 12I$ or $12F = I$?

3. What is meant by a *solution* to the equation $3x + 4 = 19$?

4. Do the equations $3x + 4 = 19$ and $3y + 4 = 19$ have different solutions or the same solution? Explain.

II. Using Variables to Describe Number Properties

Variables can be used to describe statements that are true for *all* numbers. For example, we know that $3 + 5 = 5 + 3$ because addition is commutative. The general statement of the Commutative Law of Addition can be written in terms of variables as:

$$a + b = b + a \text{ for all numbers } a \text{ and } b.$$

5. Use variables to write the following laws:

   (a) Associative Law of Addition;
   (b) Commutative Law of Multiplication;
   (c) Associative Law of Multiplication;
   (d) Distributive Law.

III. Verifying "Guess the Number" Conjectures

6. Determine the relationship between the original number and the final number for the following procedure. Let N stand for the chosen number and perform the operations on N to verify relationship.

   Step 1 Pick a number (N).
   Step 2 Add 3 to the number.
   Step 3 Multiply the result by 6.
   Step 4 Subtract 3.
   Step 5 Divide the result by 3.
   Step 6 Subtract 5 to obtain the final number.