Variables and Formulas

I. Variables and Their Uses

Discuss in groups the following questions:

1. What is a variable?

2. What are some ways in which variables are used?

3. What is an algebraic expression?

4. What is an algebraic equation?

II. Verifying "Guess the Number" Conjectures

Recall that in our "Guess the Number" activities, we determined the relationship between the original and final numbers and attempted to justify this relationship. Using variables, we can actually *prove* the relationship is correct.

For each of the following procedures, determine the relationship between the original number and the final number, and verify the relationship by using a variable. You may wish to try a few specific examples first to see the pattern.

1. Step 1 Pick a number (N).
   Step 2 Triple the number.
   Step 3 Add 2 to the result.
   Step 4 Multiply the result by 2.
   Step 5 Subtract 5 times the number that you started with.
   Step 6 Subtract 4 to obtain the final number.

2. Step 1 Pick a number (N).
   Step 2 Add 3 to the number.
   Step 3 Multiply the result by 3.
   Step 4 Add 27.
   Step 5 Divide the result by 9.
   Step 6 Subtract one-third of the number you started with to obtain the final number.

3. Step 1 Pick a *nonzero* number (N).
   Step 2 Add 2 to the number.
   Step 3 Multiply the result by itself.
   Step 4 Subtract 4.
   Step 5 Divide the result by the number you started with to obtain the final number.
   (Why did we need to pick a *nonzero* number in this case?)