In general, program writing is composed of three major steps:

1. Define the problem.
2. Decide how the problem is to be solved.
3. Write down the keystrokes that need to be repeated.

You have already learned how to do step 3. Now for steps 1 and 2.

Example of program writing:

1. Define the problem: What is the program supposed to do? Write a program to solve the Pythagorean theorem:

$$c = \sqrt{a^2 + b^2}$$

2. Decide how the problem is to be solved: What steps would you take to solve the problem on paper?

   For this you must decide what you want to solve for; what inputs will be required for that solution; what program control keys you will use and how they will be used.

   These questions are most easily decided by drawing the key art for the magnetic cards. If you wanted to solve only for c your card might look like this:

Pythagorean Theorem
| $a\uparrow b$ $\to c$ | | | | |
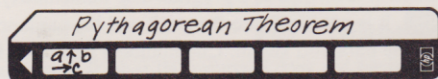
If you write your program this way, you will have to key in a value for a and **ENTER↑** it, then key in a value for b and press **A**. However, you could solve the same problem with a card that looked like this:

Pythagorean Theorem
| a | $b \to c$ | | | |
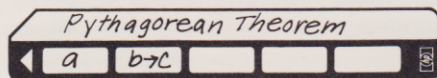
You would key in a value for a and press **A**, then key in a value for b and press **B**. This way would allow you to store your a value so that you would not have to continually key it in for varying values of b. A third way to

solve the same problem would have a card that looked like this:

Pythagorean Theorem
| a | b | $\to c$ | | |
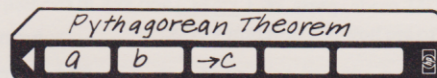
With this program, you would be able to store both your a and b values so that either could vary without having to key in the other again. You would key in a value for a and press **A**, key in a value for b and press **B**, and then press **C** to calculate c.

Or you might decide that you would like to be able to solve for any variable given the other two. For this you would have a card that looks like this:

Pythagorean Theorem
| a | b | c | | Calc |
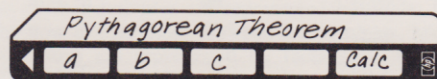
This program would probably require setting a flag in an initialization routine by pressing **RTN** and **R/S**. Then you would key in a value for one variable and press the corresponding program control key, key in a value for the second variable and press its program control key, and finally solving for the third variable by pressing **E** and the corresponding program control key.

So you can see that deciding how the problem is to be solved is a creative process. It depends heavily on your needs and the data to be processed. The way you approach your problem will largely determine how your program will be written.

3. Write down the steps for the calculator. Often on the first tries to write down keystrokes it is helpful to use the COMMENTS column of the program forms supplied with the calculator to keep track of the values in X, Y, Z, and T. Later, when you record your final documentation, you can replace those annotations with useful comments that will help you remember what various parts of your program do.