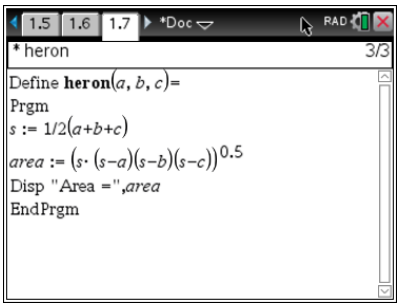
Unit 2: Assigning Values to Variables — Skill Builder 1: Global Variables

In this first lesson for Unit 2, you will use variables in a program, assign values to variables, and discover the effect in the document.

Objectives:

- Use a variable in a program
- Learn the impact of creating a variable in a program to the rest of the document
- Explore the 'scope' of the arguments to a program

Storing a Value in a Variable Using :=



Often you need to assign a value to a variable within your program. Our example will use Heron's formula for calculating the area of a triangle from the lengths of its three sides, a, b, and c. This is a two-step formula and the computations will be assigned to variables:

Determine half of the perimeter, and assign the value to variable **s**:
s:=1/2(a+b+c)
Calculate the area, and assign the value to variable **area**:
area:=(s*(s-a)*(s-b)*(s-c))$^{0.5}$

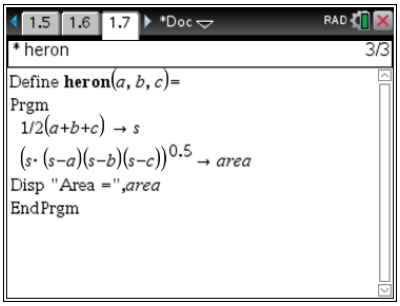
The program is in the image to the right. Notice how the symbol [:=] is used to assign the value of a computation to a variable; it is not just an equals sign.

[:=] means "**gets the value of…**" or, more simply, "**gets**", so the statement **s:= ½ * (a + b + c)** is read "s **gets** ½ the perimeter of the triangle."

On the TI-Nspire™ CX, this symbol, [:=], is accessed by pressing ctrl [÷].

On a computer or the handheld, you can also type the two characters (colon and equals sign) separately. On the handheld, press [?!▸] to access the colon. For the equals sign, press [=]. On a handheld, it is simpler to just select the symbol [:=].

Storing a Value in a Variable Using →



You can use the **store** operator (→) in place of the **gets** operator ([:=]) but the order is a bit different. See the program shown at the right. Notice the reverse order of the statements in which the computation comes first, then the store operator → (**ctrl+var**), and then the variable. This is the order in which the statement is executed (left-to-right).

<expression> → *<variable>*

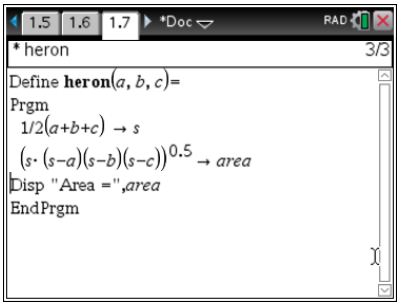
Either the **gets** operator ([:=]) or the **store** operator (→) can be used in any assignment statement. Just remember the order of the statement for each method.

Both methods 'assign' a value (usually the result of a computation) to a variable so these are called assignment statements.

Teacher Tip: The **gets** operator ([:=]) processes the statement backwards (right-to-left) since the expression on the right is processed and the resulting value is stored in the variable on the left side of the operator. This is typical of most programming languages. The **store** operator (→) is identical to the same operator on the TI-84 Plus family and the

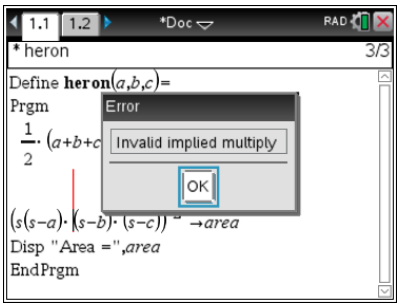
statement is processed the way it is read (left-to-right).

1. Enter the complete *heron( )* program as shown in the image to the right.



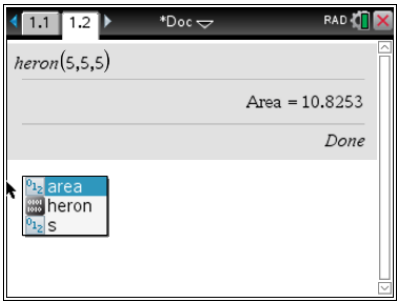
2. When the code has been entered, 'Check Syntax & Store' the program by selecting **menu > Check Syntax & Store > Check Syntax & Store** (or use the shortcut **ctrl+B**).

Be sure to use a multiplication sign after the first s in the area formula. Without that multiplication sign, the TI-Nspire treats the expression ***s(*** as a function, and the error message 'Invalid implied multiply' appears when you 'Check Syntax & Store' (**ctrl+B** or **ctrl+R**).



3. Test the program with the known values of 3, 4, 5 to make sure you get a result of 6 for the area. (Why is the area 6?)

4. Next, in the Calculator app, select the **var** key and notice the list of variables. The variables **area**, **heron** and **s** appear in the list.
   heron is the program name.
   The variables **area** and **s** were created by the program.



a, b, and *c* were also used in the program. Why are they not listed? The answer lies in the fact that *a, b,* and *c* are *arguments* to the program and, as *arguments,* they only exist *within* the program and are not created in the document. In fact, we really do not want the variables **area** and **s** in the document either. We'll learn how to fix this 'side effect' in the next lesson.

5. Remember to save the document (**ctrl+S**) so that you save the program. We will use this program in the next lesson.

Teacher Tip: The triangle with sides 3, 4, 5 is a right triangle so the area is .5*3*4 = 6.

Variables (including programs) are defined in a current *problem*, not the entire document. Creating a new problem in a document starts with a 'clean slate' - a whole new (empty) set of variables; so *f1(x)* in problem 1 is not the same as *f1(x)* in problem 2.

Programs can populate a problem with unwanted variables. Programs can also modify variables already defined in the problem. **Local** variables are used to prevent these 'side effects' and are introduced in the next lesson.

Getting Exact Symbolic Answers
On a TI-Nspire CX CAS, you may see symbolic answers for some programs. For decimal (or approximate) answers:
- Use a number with a decimal point in the calculations within the program, or
- Press **ctrl+enter** when running the program rather than just **enter**, or

- Use the **approx( )** function around your result

In the *heron( )* program, change the exponent 0.5 to ½ to see a symbolic answer, or use the square root operator.