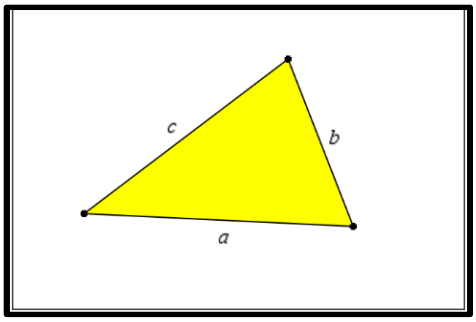
Unit 2: Input, Output and Functions | **Skill Builder 2: Heron's Formula**

In this lesson, you will use one of the program templates, create a function to evaluate and return a value, and explore the mathematical operators.

Objectives:

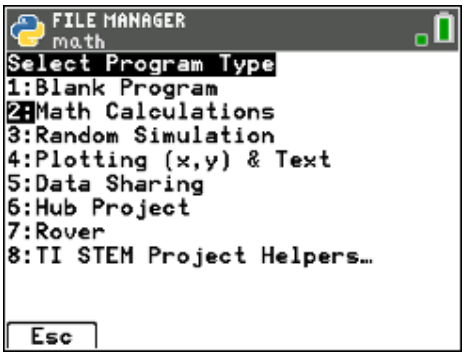
- Use a program template (Type:)
- Create a function for Heron's Formula

You are given a triangle with only the side measurements. Can you determine the area? **Yes**, using Heron's Formula. ☺



In this lesson you will create a function to determine the area of a triangle using the three side lengths and then complete the program that uses that function

1. This program, like the last one, requires the sqrt() function. This time we will use one of the included Python "templates" which preloads the most commonly needed functions for the project.



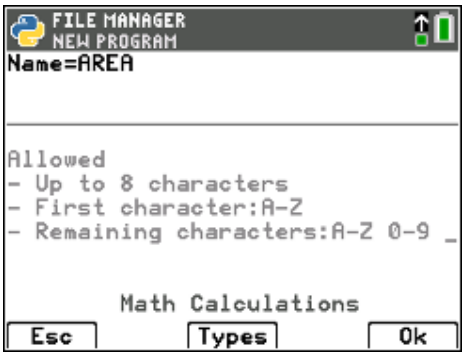
   Go to the FILE MANAGER (either start Python on the **[prgm]** key or select **<Files>** within the app).

   When you are entering the name of a **<New> program** in the FILE MANAGER and are entering the name of the Python file (we use "AREA" for this filename) there is a <Type> menu on the bottom of the screen. Select **<Type>** and see a list of the types of programming templates that are available. The default type is "Blank Program." Select the **Math Calculations** program type.

2. The filename entry screen now shows the template selected:

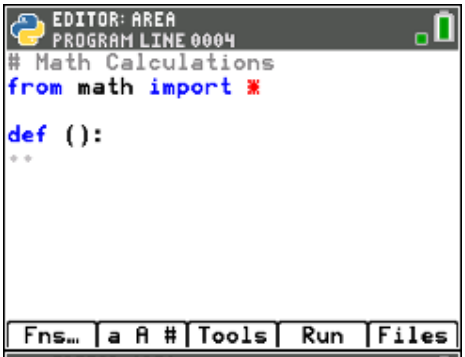
   Math Calculations

   at the bottom.



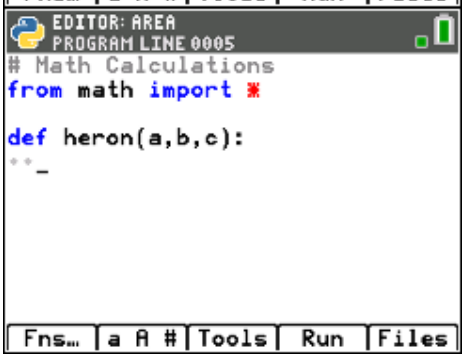
3. Press **[enter]** to start the Program Editor. Notice the comment at the top indicating the type of project you are making: **#Math Calculations**. The **import** statement has been provided for you.

   Now insert the **def function()** statement by selecting **<Fns…> [enter]**.



4. Make the name of the function **heron**. There are three arguments, **a**, **b** and **c**, which represent the three sides of the triangle.
   Be sure to leave the colon (:) at the end of this line!

   See the next step for the code for the block.



5. **Heron's Formula** is a two-step calculation:

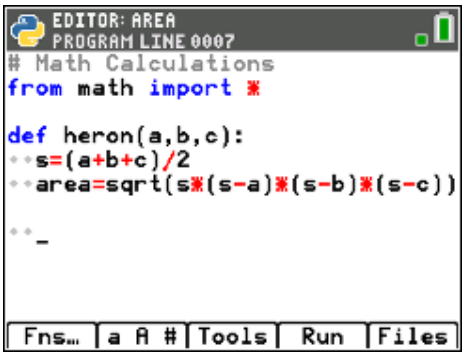
   First, calculate half the perimeter (the semi-perimeter):

   s = (a + b + c) / 2

   Then the area is:

   area = sqrt(s*(s - a)*(s - b)*(s - c))

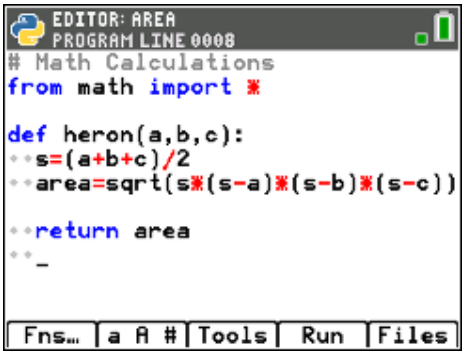
   Remember that both statements in this function block are indented. The two diamond (♦♦) spaces are provided for you on each line.



6. Finish the function by providing the **return** statement:

   return area

   found on **<Fns…>**. You must type the variable name **area**.



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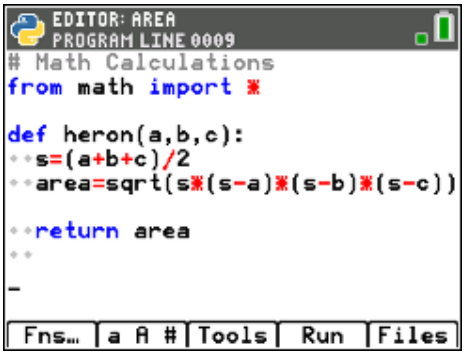
7. Now it's time to write the main program using just the statements:

   input() (three times for the three sides)
   print() (to print the area)

   Before going to the next step, try writing them yourself.



8. Start with the cursor at the beginning of a line (delete any indentation spaces).

   The three **input**() statements request the lengths of the three sides, convert each length to a number, and store the values in three variables. We use x, y and z.

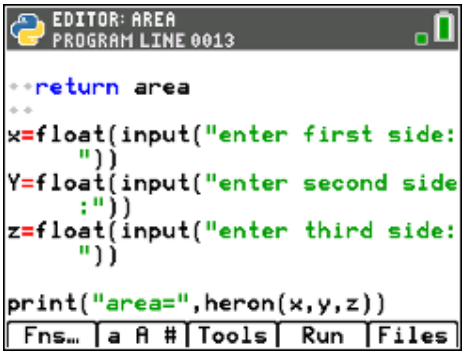
   x = float(input("enter first side: "))

   The other two are similar, so take advantage of copy/paste on the **<Tools>** menu.

   The **print**( ) statement prints the value of the **heron** function using the three variables as arguments:

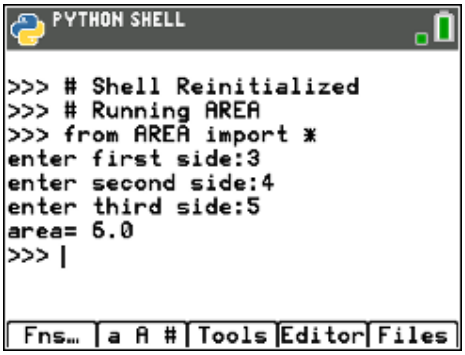
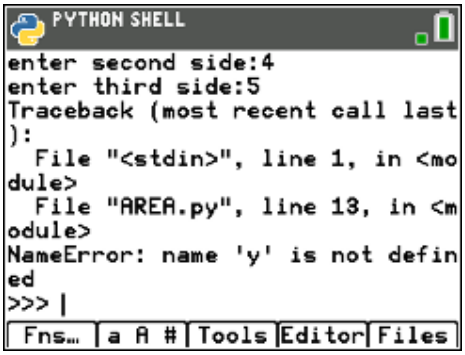
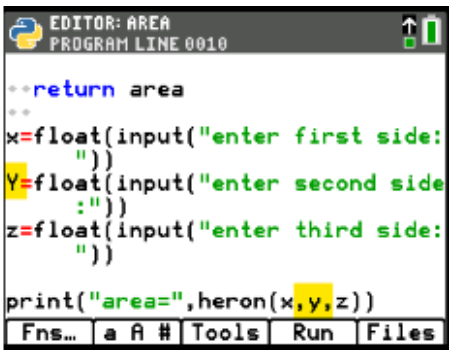
   print("area = " , heron(x, y, z))

   Note that these last four statements are not indented.



9. Test your program with numbers for which you know the area, like 3, 4 and 5. Why is the area 6? What other triangles have areas that are easy to compute when given the three sides?

   See the next step if you get an error message.



10. If you get an error message when you run the program, read the message carefully, paying attention to the line numbers mentioned and the type of the error. For example: The **NameError** to the right occurred because the code contained a capital **Y** in one place and a lowercase **y** in another place.