CPP Tom's Triangle Calculator (Functions Headers)

Contents

CPP Tom's Triangle Calculator (Functions Headers).....1
Why I Want You to Do This.....1
What I Want You to Do 2
C++ Square Root Function 2
Algorithm 2
Requirements 3
Assignment Submission 3

Time required: 90 minutes

Let's write a program that accepts the lengths of three sides of a triangle from the user and prints the area.

Why I Want You to Do This

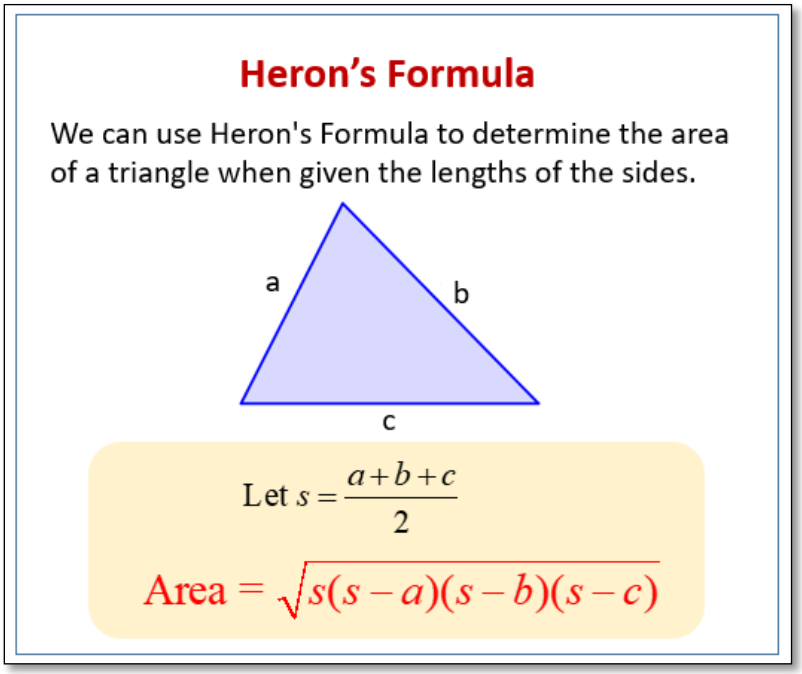
Build your program one part at a time. Get one small part working. Get another part working. It is not a good practice to code the entire program, then start debugging. Test and debug as you go.

Take what you have learned in the previous CPP Activities Functions Headers tutorial to build this program step by step. That is what AGILE development is about. Iterating through successful programs one step at a time until you build a complete working program.

Math and statistics are a big part of programing. We are going to work on solving more math problems as we go along.

What I Want You to Do

To calculate the area of a triangle from the three given sides, use Heron's Formula:




```
Area = √(s*(s-a)*(s-b)*(s-c))
where s = (a+b+c)/2.0
```

C++ Square Root Function

The **sqrt** function is part of the **math.h** library.

```
#include <math.h>
double answer
answer = sqrt(number)
```

Algorithm

1. Prompt the user for input.
2. Get the length of the three sides of the triangle from the user and store them in 3 double type variables. (a, b, and c above. You may want better variable names)
3. Declare a double type variable perimeter (s above. You may want a better variable name) to calculate and store the half perimeter in it.
4. Declare a result double type to store the area of the triangle in the given formula.

5. Calculate the perimeter.
6. Calculate the area.
7. Display perimeter and the area.
8. Ask them if they want to compute another triangle.

Requirements

Use the same development process demonstrated in the **CPP Activities: Functions and Header Files** assignment.

TriangleCalculator.cpp – contains the main program and function calls to **TriangleCalculator.h**

TriangleCalculator.h – contains all functions.

The main program calls the following functions from **TriangleCalculator.h**:

getSides() - This function will be called three times and will ask the user to enter the triangle's length then return that value as a double.

getPerimeter() Calculate and return the perimeter divided by 2.

calculateArea() - This function will accept the perimeter calculation, sides lengths, and return the area.

displayResults() – Display the final results.

Example run:

```
+---------------------------------------------------------+
|          * * * Tom's Triangle Calculator * * *          |
|  Find the area of any triangle using Heron's Formula    |
+---------------------------------------------------------+
Length of side 1: 2.12
Length of side 2: 2
Length of side 3: 3.12
2.09721
The perimeter is: 7.24
The area is: 2.09721
```

Assignment Submission

Number each version as you build your program step by step. Each state should have a working program as in Agile development.

Example naming convention.

1. **TriangleCalculator1.cpp**
    a. Hard code side values
    b. No functions, just a simple calculation and display
2. **TriangleCalculator2.cpp**
    a. Get input from user
    b. Add functions into the main program
3. **TriangleCalculator3.cpp** – **TriangleCalculator3.h**
    a. Move functions to header file
4. **TriangleCalculator.cpp** – **TriangleCalculator.h** (final version)
    a. Polish up program.

Please have at the minimum of 3 iterations before the final product.

Submit all C++ code files and a screenshot of the final program being used.