Triangle Calculator

Create a program that calculates the perimeter and area of a triangle.

Note: **Bold** words are output while non-bold words are input in the following console samples.

Console Sample 1 (valid input)

```
Triangle Calculator

Enter the side 1: .2
Enter the side 2: .3
Enter the side 3: .4

Perimeter: 0.9
Area: 0.0290474
```

Console Sample 2 (non-positive side1)

```
Triangle Calculator

Enter the side 1: 0
Enter the side 2: 1
Enter the side 3: 1

All three sides must be positive!
The sum of every two sides must be larger than the third one!
```

Console Sample 3 (non-positive side2)

```
Triangle Calculator

Enter the side 1: 1
Enter the side 2: 0
Enter the side 3: 1

All three sides must be positive!
The sum of every two sides must be larger than the third one!
```

Console Sample 4 (non-positive side3)

```
Triangle Calculator

Enter the side 1: 1
Enter the side 2: 1
Enter the side 3: 0

All three sides must be positive!
The sum of every two sides must be larger than the third one!
```

Console Sample 5 (sum of two sides not larger than the third one)

```
Triangle Calculator
```

```
Enter the side 1: 1
Enter the side 2: 1
Enter the side 3: 2

All three sides must be positive!
The sum of every two sides must be larger than the third one!
```

Specifications

- You have to define a class *Triangle* with three private data members *side1*, *side2* and *side3*. All data members must be positive and satisfy the property that the sum of every two sides must be larger than the third one:

$$\mathbf{side1} + \mathbf{side2} > \mathbf{side3}$$

$$\mathbf{side1} + \mathbf{side3} > \mathbf{side2}$$

$$\mathbf{side2} + \mathbf{side3} > \mathbf{side1}$$

- Declare and define a non-default constructor for the class *Triangle* which requires parameters corresponding to all the data members.
- Declare and define the necessary getter and setter for each private data member in the class *Triangle*.
- Declare and define a public member function *get_perimeter()* in the class *Triangle* to calculate the perimeter and return the result. The formula for this calculation is:

$$\mathbf{perimeter} = \mathbf{side1} + \mathbf{side2} + \mathbf{side3}$$

- Declare and define a public member function *get_area()* in the class *Triangle* to calculate the area and return the result. The formula for this calculation is:

$$\mathbf{area} = \sqrt{\mathbf{s}(\mathbf{s} - \mathbf{side1})(\mathbf{s} - \mathbf{side2})(\mathbf{s} - \mathbf{side3})}$$

$$, \text{where } \mathbf{s} = \frac{\mathbf{perimeter}}{\mathbf{2}}$$

- Declare and define a public member function *display_results()* in the class *Triangle* to display all the calculation results as shown in Console Sample 1 above. In this function, you are supposed to call the other member functions *get_perimeter()* and *get_area()* directly to get the perimeter and area respectively.
- In the *main()*, after displaying the title and getting all the input values from the user, you must first check the validity of those input values as requested. If all the input values are valid, a *RightTriangle* object will be created and the member function *display_results()* will be called on the object. Otherwise, the application will quit after displaying the error messages as shown in Console Sample 2, 3, 4 or 5.
- No requirement on the precision of the results.