# CPSC 1100 – LAB 08

Implementing Methods with Calculations

This lab will deal with implementing mathematical concepts in java. You will complete task P4.3 from the textbook. **PLEASE COMMENT YOUR CODE.** You will have points taken off if you do not comment your code. Keep your code neat.

**Some useful links:**

BlueJ tutorial [www.bluej.org/tutorial/tutorial-201.pdf](http://www.bluej.org/tutorial/tutorial-201.pdf)

Java tutorial home page: <http://docs.oracle.com/javase/tutorial/>

Start here: <http://docs.oracle.com/javase/tutorial/java/index.html>

variables <http://docs.oracle.com/javase/tutorial/java/nutsandbolts/variables.html>

data types <http://docs.oracle.com/javase/tutorial/java/nutsandbolts/datatypes.html>

java math library <http://docs.oracle.com/javase/7/docs/api/java/lang/Math.html>

Triangle info (angle calculations) <http://www.mathsisfun.com/algebra/trig-solving-triangles.html>

Area of Triangle given 3 side lengths <http://www.mathopenref.com/heronsformula.html>

Simple Video on BlueJ Debugger <http://www.youtube.com/watch?v=LUUPTbWV0g8>

**Some helpful tips:**

1. Compile often – do it.
2. Perform the tasks by hand to verify your work.
3. You will need to make use of the java Math class. (link shown above under useful links).
4. If you don’t know how to do a calculation check the links above. I give you formulas for every calculation you will need to do in the useful links.
5. If you can’t do the calculations by hand, you won’t be able to program them in java. Draw a picture of your triangle first, label every side and angle, and to the calculations by hand.

## Tasks: Follow the directions below to complete your lab assignment

Create a new project, and then add a class named Triangle. The Triangle class will need 6 instance variables to represent the x,y locations of the three corners for the triangle. These values should be doubles. Do not use any other instance variables beyond these 6 to store the three corners of our triangle. (As part of the lab you will create accessor methods for side length, and there will also be an accessor method for perimeter. The perimeter method can simply call each of the 3 side length methods and add the values together to calculate the perimeter. A method can call another method in the same class, you will need this concept for this lab!)

Add a class named TriangleRunner. This is your tester. You will need a main method in this class. You should create tests for all of the methods in your Triangle class in the TriangleRunner main method. (Create a Triangle object, call its methods, and print actual values. You do NOT need to print expected values this time because a user could enter any points they wish for a Triangle, so your program will not know what the expected values should be).

***Task01***: Problem **P4.3** from the book. In this project, you will perform calculations with triangles. A triangle is defined by the ***x*** and ***y***coordinates of its three corner points. Your job is to compute the following properties of a given triangle:

* the lengths of all sides
* the angles at all corners
* the perimeter
* the area

Implement a Triangle class with appropriate methods (method names will be listed for you below). Supply a program that prompts a user for the corner point coordinates and produces a nicely formatted table of the triangle properties. (Also be sure to print expected results).

Here is a list of methods you must include (and name exactly the same) in your Triangle class:

**Constructor**: public Triangle() – must accept 6 doubles, in the order x1, y1, x2, y2, x3, y3.

**Accessors**:

getSide1Length(), getSide2Length(), getSide3Length()

getAngle1(), getAngle2(), getAngle3()

getPerimeter(), getArea()

You may wish to visit this site to brush up on your trigonometry / geometry.

<http://www.mathsisfun.com/algebra/trig-solving-triangles.html>

Here is an interaction with the program including output:

Enter the x,y coordinates of three points in this order x1,y1,x2,y2,x3,y3:

0 0 1 0 0 1

Side 1 length: 1.000

Side 2 length: 1.000

Side 3 length: 1.414

Angle 1: 90.000

Angle 2: 45.000

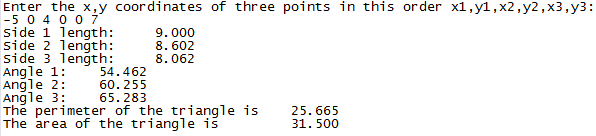
Angle 3: 45.000

The perimeter of the triangle is 3.414

The area of the triangle is 0.500

The output above is for a right triangle, and thus you can see one of the angles is 90 degrees. Make sure to convert your angle measurement to degrees. (There is a Math method to do this). You do not have to do your calculations in the same order as my output, as long as you have all the values. (i.e. you might list side 1 length as 1.414 and side 2,3 length as 1.000, and this is acceptable). You ***MUST*** use printf to make your output neat. (Limit the number of decimal places, and line up the output in neat columns).

Here is another example:



***Task02***: Get a screen capture of your final output, which should show output for Task01. (You should verify that you can duplicate the example output above – but you may submit any values you wish). Submit your project java files screen-shot to Google Drive.

Feel free to look up any information about triangle calculations you wish online. Do NOT look up how to perform these calculations in java.

## To Turn In via Google Drive

You should turn in your java files and a document containing your output.