

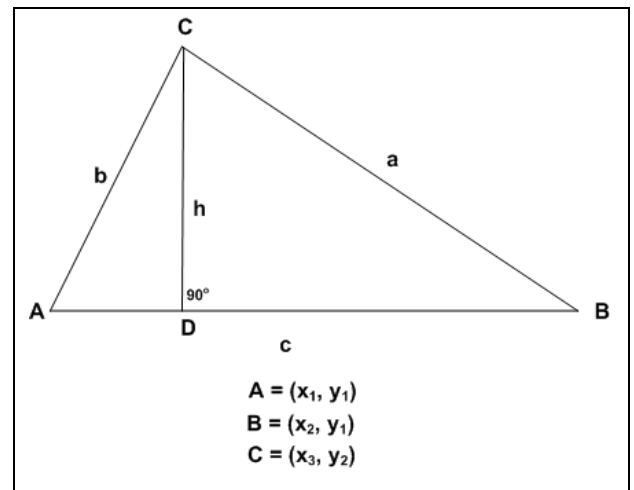
ISTE-120 Homework Assignment 5 – Math Help

Some students may have some trouble figuring out how to attack Homework 5. This document is intended to help students structure the problem in a way that is easier to implement.

Remember that every problem has to be broken into parts. Get into the habit of breaking the project into discrete pieces, a necessary process when designing programs. Each part can be written and tested in incremental steps.

Look at the triangle picture. The graph is labeled in a traditional mathematical fashion. Points on the graph are labeled by capital letters A, B, C and D. Each point is defined by x and y coordinates. The sides (lines) can be defined by the endpoints (e.g. line AB) or by a lowercase letter opposite the angle (e.g. side b is opposite angle B also called angle ABC). The line h is the height and forms a right angle with the base (line c).

Triangle ABC as pictured is not a right triangle, although the program should allow for that. In other words, do not assume that the program should work for only one triangle.



Again, look at the picture. Right triangles are easier to work with. The triangle ABC can be turned into two right triangles around the height (line h). So now work with the two triangles ADC and BDC. That will allow the use of simpler formulas.

With this as an explanation, follow the steps below to build the class:

1. Begin by developing methods to calculate the line length:
 - a. To make this easier, assume that points A and B are on the same y-axis
 - b. The lengths of the following lines are easy to calculate based on the coordinates of the end points: Lines AB, AD, and DB. The length of the height, h, can be calculated because it forms a right angle with the base (simple arithmetic)
 - c. Given the above calculations, the lengths of lines AC and CB are found using the Pythagorean Theorem ($a^2 + b^2 = c^2$) and with the help of `Math.sqrt`
2. For the angles:
 - a. The sine of an angle can be calculated using the sides of the smaller right triangles
 - b. Arcsine is the inverse of sine (given the sine it gives the angle). It takes the sine and converts it into the angle size in radians. Use `Math.asin` to calculate arcsine
 - c. Then convert radians to degrees with `Math.toDegrees`
 - d. The sum of a triangle's angles is 180° , so given two angles, the third angle can be computed

Hopefully this will help you with Homework Assignment 5.