

**PROGRAM 10**  
**More Triangles**  
**AP Computer Science Java**  
**Mr. Clausen**

**PROGRAM 10 More Triangles (40 points)**

The description for this program can be found in your textbook on pages 403-404, Project 10-4. Here is the description for your convenience (in case you don't have your book with you in class....).

First, double click on "My Computer", double click on the "APCSFileJava" folder, open the folder "3rd Edition Textbook Source Codes", open the folder "Chapter10", and find the folder "Example10.5". Copy this folder to your "S" directory and add your source codes for this program to this folder **after you copy it into your "S" directory**.

Add a **Triangle** class to the shape hierarchy from this chapter. **The filename and class name should be LastNameFirstNameTriangle**. Note the following points:

- A triangle is specified by three vertices or pairs of coordinates. The first pair is the position (xPos, yPos).
- The **move** method for a triangle, which adds the x and y distances to each of the vertices, must override the **move** method in the abstract class; therefore, the move method in the abstract class cannot be final.
- The distance between two points (x1, y1) and (x2, y2) is equal to the square root of  $((x1 - x2)^2 + (y1 - y2)^2)$ .
- The area of a triangle can be computed from its vertices using the formula  $1/2 * \text{the absolute value of } (x1 * y2 - x2 * y1 + x2 * y3 - x3 * y2 + x3 * y1 - x1 * y3)$ .
- A triangle is stretched away from its position at (xPos, yPos). Thus, the other two vertices are incremented by multiplying their distance from (xPos, yPos) by the factors. For example, the new value of x2 is equal to  $xPos + (x2 - xPos) * \text{factor}$ .

**Don't forget to add a client program named LastNameFirstNameP10.java that will be like the TestShape client programs illustrated in this chapter to test your triangle class.**

When you are finished with your program(s), have tested it thoroughly to make sure that your calculations are correct, and are sure that you don't need to make any changes, then save your program in the "W" network mapping, in the Program 10 folder.

**When you are finished, you will need to turn in 3 data files:**

- 1) **LastNameFirstNameTriangle.java**
- 2) **LastNameFirstNameTriangle.class** and
- 3) **LastNameFirstNameP10.java**