Assignment 2B – Area and Circumference of a circle

# Setup

Create a new project called 2B *yourlastname* in Eclipse. Next, import the assignment files from my inbox as follows:

1. **File/Import**
2. Select **General/File System** (click **Next**)
3. Browse to assignment 2B in my outbox, select it and click **OK**
4. Click the check box for the folder (all items should get selected)
5. Click **Finish**

Look at Circle.java and run it. It uses three variables (*PI, radius, area); PI* is a constant that holds an approximation of π. The program uses the variables to calculate and print the area of a circle with radius 10. It also *reuses* the variables to calculate and print the area of a circle with radius 20. Please run it and examine the output before continuing.

Modify the program as follows:

1. Add statements to this program so that it computes the *circumference* in addition to the area for **both** circles. You will need to do the following:
   * Declare a new variable for circumference.
   * Use it to calculate circumference for the first and second circles (like area is done.)
   * Add statements to print the circumference for the first and second circles (like area is done.) Be sure your results are clearly labeled like area is.
2. The first radius is 10, and the second is 20 (two times as big as the first.) Change the program to discover what happens to the circumference and area when the radius doubles. To do this, divide the second area by the first area, and the second circumference by the first circumference and print the results. A problem you will encounter is that the program only uses one variable for area and only one variable for circumference. Therefore, when the program calculates the second circle’s area and circumference, the first circle’s area and circumference get lost.

To fix this problem, declare and use a separate set of variables for the second circle. You’ll add an extra *area* variable and an extra *circumference* variable with different names (e.g., area1 and circumference1). Remember that each variable will have to be declared. To recap, here are the changes that need to be made:

* + Make new variables to hold area, and circumference for the second circle.
  + Change the print statements for the second circle to use the new variables.
  + At the end of the program, compute and print the area change by dividing the second area by the first area. This gives you the factor by which the area grew. The message should read

The area grew by a factor of: \_\_\_\_\_

* + Repeat the last step for circumference.

Look at the results. Is this what you expected?

1. In the program above, you showed what happened to the circumference and area of a circle when the radius went from 10 to 20. Does the same thing happen when any radius doubles? To figure this out, modify the program to read the radius from the keyboard instead of having it “hard-coded” in the program.

Modify your program as follows:

* + Add the code to get an *int* value from the keyboard
    - import java.util.\*; (at the top of the .java)
    - Scanner keyboard = new Scanner(System.in);
    - System.out.print(“Please enter the radius: “);
    - radius = keyboard.nextInt();
  + For the 2nd radius, double the 1st radius (rather than setting it to 20, or getting it from the keyboard.)