

King Saud University College of Computer and Information Sciences Computer Science Department		
CSC 111:Introduction to Programming with Java	Sheet 6 Class and object (part 2)	First Quarter 1444

Shape
- name: String - area: double - <b>perimeter</b> : double + <u>numOfCircle</u> : int + <u>numOfRectangle</u> : int
+ Shape (String n) + Shape (String n, double length, double width) + Shape (String n, double radius) + setName(String n): void + calculateArea(double length, double width ): void + calculateArea(double radius): void + <b>calculatePerimeter</b> (double length, double width ): void + <b>calculatePerimeter</b> (double radius ): void + getName(): String + getArea(): double + getDimeter (): double + equals(Shape shape): boolean + <u>getTotalNunerOfShapes</u> (): int

Test
+ <u>main</u> (): void + <u>CheckShape</u> (Shape sh ): void

Develop the Java class **Shape** that represents either rectangle or circle. The class contains the following:

- **private members:**
  - name (String), which represents the type of shape (rectangle or circle).
  - area (double), which represents the area of the shape.
  - **perimeter** (double), which represents the **perimeter** of the shape.
  - **numOfCircle** (int), which indicates how many circle objects are created.
  - **numOfRectangle** (int), which indicates how many rectangle objects are created.
- **constructors:**
  - **Shape** (String n, double length, double width):  
it initializes the name attribute to a given value. Area and **perimeter** are initialized by calling the correct **calculateArea** and **calculatePerimeter** methods.
  - **Shape** (String n, double radius):  
it initializes the name attribute to given value. Area and **perimeter** are initialized by calling the correct **calculateArea** and **calculatePerimeter** methods.
- **methods:**
  - **setters and getters** as specified in the UML.
  - **calculateArea**(double length, double width ): calculates the area of the rectangle and then assigns it to the area attribute.
  - **calculateArea**(double radius ): calculates the area of the circle and then assigns it to the area attribute ( **Note:** you must use the constants and methods of class Math).
  - **calculatePerimeter** (double length, double width): calculates the **perimeter** of rectangle and then assigns it to the **perimeter** attribute.
  - **calculatePerimeter** (double radius): calculates the **perimeter** of the circle and then assigns it to the **perimeter** attribute.( **Note:** you must use the constants of class Math).
  - **getTotalNumerOfShapes**: returns the total number of created rectangles and circles.
  - **equals**: return true if the area and **perimeter** of this object are equal to the area and **perimeter** of the object.

Develop the java class **Test** that contains the following:

- **Method CheckShape**: must do the following:
  - **Print the area, **perimeter**, number of created rectangles and number of created circles in a meaningful message.**
  - Check the area of the shape object; if its greater than 100, print “Big Shape Size”; otherwise print “Small Shape Size”
- **Method main:**
  - Display a menu to ask the user which shape he wants to create, then read the information based on his selection. After that, call CheckShape method.
  - The program allows the user to create other shapes until he enters an option to exit from the program.
  - Print the total number of shapes.

## Sample Run

```
----jGRASP exec: java Test
Enter R for rectangle and C for circle
>> R
Entre the length and width of the rectangle
>> 9 8
area =72.00 perimeter =34.00
The number Of Rectangle is 1 and number Of Circle is 0
Small Shape Size
Do you want to create other shape Y/N
>> Y
Enter R for rectangle and C for circle
>> C
Entre the radius of the circle
>> 20
area =1256.64 perimeter =125.66
The number Of Rectangle is 1 and number Of Circle is 1
Big Shape Size
Do you want to create other shape Y/N
>> Y
Enter R for rectangle and C for circle
>> T
wrong choice
Do you want to create other shape Y/N
>> Y
Enter R for rectangle and C for circle
>> R
Entre the length and width of the rectangle
>> 15 9.8
area =147.00 perimeter =49.60
The number Of Rectangle is 2 and number Of Circle is 1
Big Shape Size
Do you want to create other shape Y/N
>> N
Total number of created shapes is 3
```