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| 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 |

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| --- |
| Shape |
| * name: String * area: double * perimeter: double   + numOfCircle: int  + numOfRectangle: 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  + calculatePerimeter (double length, double width ): void  + calculatePerimeter (double radius ): void  + getName(): String  + getArea(): double  + getDimeter (): double  + equals(Shape shape): boolean  + getTotalNumerOfShapes(): int |

|  |
| --- |
| Test |
|  |
| +main(): void  + CheckShape (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.

# constructers:

* + **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

public class Shape  
{  
private String name;  
private double area,diameter;  
public static int numOfCircle;  
public static int numOfRectangle;  
  
public Shape (String n)  
{name = n ; }  
  
public Shape (String n, double length, double width){  
name = n ;  
calculateArea(length,width);  
calculateDiameter(length,width);  
  
numOfRectangle++;  
}  
  
public Shape (String n, double radius){  
name = n ;  
calculateArea(radius);  
calculateDiameter(radius);  
  
numOfCircle++;  
}  
  
public void setName(String n){  
name = n ;   
}  
  
public void calculateArea(double length, double width ){  
area = length \* width ;  
}  
  
public void calculateArea(double radius){  
area = Math.pow(radius,2) \* Math.PI ;  
}  
  
public void calculateDiameter(double length, double width ){  
diameter = Math.sqrt( Math.pow(length , 2 ) + Math.pow( width , 2 )) ;  
}  
  
public void calculateDiameter(double radius ){  
diameter = 2.0 \* radius ;  
}  
  
public String getName(){  
return name ; }  
  
public double getArea(){  
return area ; }  
  
public double getDimeter (){  
return diameter ; }  
  
public boolean equals(Shape shape){  
if(area == shape.area && diameter == shape.diameter)  
return true;  
else  
return false;  
}  
  
public static int getTotalNumerOfShapes(){  
return numOfCircle + numOfRectangle ;  
}  
  
}  
====================

import java.util.\*;  
public class Test{  
public static void main(String[] args){  
Scanner input = new Scanner(System.in);  
char ch , choise;  
double length , width , radius;  
  
do{  
System.out.println("Enter R for rectangle and C for circle");  
ch = input.next().charAt(0);  
  
switch(ch){  
case 'R' : case 'r':  
System.out.println("Entre the length and width of the rectangle");  
length = input.nextDouble();  
width = input.nextDouble();  
Shape obj1 = new Shape("rectangle", length , width);  
CheckShape(obj1);  
break;  
  
case 'C' : case 'c':  
System.out.println("Entre the radius of the circle ");  
radius = input.nextDouble();  
Shape obj2 = new Shape("circle" , radius);  
CheckShape(obj2);  
break;  
  
default:  
System.out.println("wrong choice");  
  
}  
System.out.println("Do you want to create other shape Y/N");  
choise = input . next().charAt(0);  
}while (choise == 'Y'|| choise =='y');  
  
System.out.println("Total number of created shapes is "+ Shape.getTotalNumerOfShapes());  
  
}  
  
public static void CheckShape (Shape sh ){  
System.out.printf("area= %.2f diameter= %.2f \n", sh.getArea() , sh.getDimeter());  
System.out.println("The number Of Rectangle is " + sh.numOfRectangle+" and number Of Circle is " +sh. numOfCircle);  
if(sh.getArea()> 100)  
System.out.println("Big Shape Size");  
else  
System.out.println("Small Shape Size");  
  
}  
}  
==================