|  | **Problem Statement : Define a application to find the area and Perimeter of various shapes**  **[Ex: Rectangle,Square, Triangle, Circle]** | | | | | | | | |
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| What? | | | | |  | How? | | | |
| 1. What are the shapes we have to consider?  Ans: Rectangle, Circle, Square and Triangle  2. What are the parameters we have to consider?  Ans: Length, breadth,side,Radius  3. What are the formulas have to use for calculating area and perimeter?  Ans: **Area Formula**: Circle:pi\*r\*r,  Rectangle: Length \*Breadth  Square:side\*side  Triangle:1/2\*breadth\*height  **Perimeter Formula:** Circle: 2\*PI\*R,  Rectangle: 2\*(Length+Breadth),  Square: 4\*Side,  Triangle: Side1+Side2+Side3 | | | | |  | 1) Using Single class read all the required inputs and calculate area and perimeter and display the result  2) Using Single class and method overloading, calculate area and perimeter and display the result  3) Using different classes for various shapes and calculate area and perimeter and display the result  4) Using different classes for various shapes and inherit the common properties from a class  called "Shape" and calculate area and perimeter and display the result  5) Using different classes for various shapes and inherit the common properties from a abstract class  called "Shape" and calculate area and perimeter and display the result  6) Using different classes for various shapes and inherit the common properties from abstract class  called "Shape" and implements an interface called "Shapeplan" and calculate area and perimeter and display the result. | | | |
| Why? | | | | |  | Why Not? | | | |
| 6) Using different classes for various shapes and inherit  the common properties from abstract class called "Shape" and  implements an interface called "Shapeplan" and calculate area  and perimeter and display the result  **Reason:**  1) It is fully abstraction because of interface  2) We can achieve multiple inheritance using interface  3) Code reusability using inheritance  4) We can declare and define in abstract class  5) We can only declare in interface. | | | | |  | 4) Using different classes for various shapes and inherit the common properties from a class  called "Shape" and calculate area and perimeter and display the result  5) Using different classes for various shapes and inherit the common properties from a abstract class  called "Shape" and calculate area and perimeter and display the result  **Reason:**  1) We cannot instantiate object for an abstract class  2) Abstract class does not support multiple inheritance | | | |

**Write an algorithm for shapes(rectangle,square,triangle,circle)**

**Algorithm:**

**Step1:** Start

**Step-2:** create an interface called “ShapePlan”

**Step-3:** Declare an area and perimeter methods inside the interface

**Step-4:** Define PI value in the interface “ShapePlan”

**Step-5:** Implement the interface “ShapePlan” in abstract class named “Shape”

**Step-6:** Declare the variables length,breadth,side and height

**Step-7:** Define area and perimeter methods in abstract class

**Step-8:** create a class for various shapes(Rectangle,square,triangle,circle) and extends by

Shape class and define methods

**Step-9:** Apply the correct formula for all the shapes

**Step-10:** call the all subclass shapes,area and perimeter methods using objects

**Step-11:** Display the result

**Step-12:** Stop

**Coding:**

**package com.madhan.day23;**

**interface ShapePlan**

**{**

**final double *pi*=3.14;**

**void area();**

**void perimeter();**

**}**

**abstract class Shapes implements ShapePlan**

**{**

**public abstract void area();**

**public abstract void perimeter();**

**}**

**class Rectangle extends Shapes**

**{**

**int length,breadth;**

**Rectangle(int length,int breadth)**

**{**

**this.length=length;**

**this.breadth=breadth;**

**}**

**public void area()**

**{**

**System.*out*.println("Area of rectangle:"+(length\*breadth));**

**}**

**public void perimeter()**

**{**

**System.*out*.println("Perimeter of rectangle:"+2\*(length+breadth));**

**}**

**}**

**class Square extends Shapes**

**{**

**int side;**

**Square(int side)**

**{**

**this.side=side;**

**}**

**public void area()**

**{**

**System.*out*.println("Area of Square:"+(side\*side));**

**}**

**public void perimeter()**

**{**

**System.*out*.println("Perimeter of Square:"+4\*(side));**

**}**

**}**

**class Triangle extends Shapes**

**{**

**int breadth,height,side1,side2,side3;**

**Triangle(int breadth,int height,int side1,int side2,int side3)**

**{**

**this.breadth=breadth;**

**this.height=height;**

**this.side1=side1;**

**this.side2=side2;**

**this.side3=side3;**

**}**

**public void area()**

**{**

**System.*out*.println("Area of Triangle:"+1/2\*(breadth\*height));**

**}**

**public void perimeter()**

**{**

**System.*out*.println("Perimeter of Triangle:"+(side1+side2+side3));**

**}**

**}**

**class Circle extends Shapes**

**{**

**int radius;**

**Circle(int radius)**

**{**

**this.radius=radius;**

**}**

**public void area()**

**{**

**System.*out*.println("Area of Circle:"+*pi*\*(radius\*radius));**

**}**

**public void perimeter()**

**{**

**System.*out*.println("Perimeter of Circle:"+(2\**pi*\*radius));**

**}**

**}**

**public class PsShapes {**

**public static void main(String[] args) {**

**Rectangle obj1=new Rectangle(2,2);**

**obj1.area();**

**obj1.perimeter();**

**Square obj2=new Square(4);**

**obj2.area();**

**obj2.perimeter();**

**Triangle obj3=new Triangle(2,2,3,2,2);**

**obj3.area();**

**obj3.perimeter();**

**Circle obj4=new Circle(2);**

**obj4.area();**

**obj 4.perimeter();**

**}**

**}**