Problem Statement : Define a application to find the area() and perimeter() of various shapes

W3H-

| **WHAT ? 1** | | | |  | **HOW ? 2** | | | |
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| 1.What are shapes we have to consider?  Ans:Circle,Rectangle,Square and triangle  2.What are the parameters we have to consider?  Ans:Length,Breadth,Side,Radius  3.What are the formulas we have to use to  calculate area and perimeter?  Ans: AREA-  Circle:PI\*R^2, Rectangle : Length\*Breadth,  Square:Side\*side, Triangle:1/2\*Breadth\*Height  PERIMETER-  Circle:2\*PI\*R, Rectangle:2\*(Length+Breadth),  Square:4\*side, Triangle:Side1+Side2+Side3  4.Any predefined values are required?  PI=3.14 | | | |  | 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 displaythe 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 comman 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 a class called  "Shape" and implements an interface called  "ShapePlan" and calculate area and perimeter  and display the result. | | | |
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| 6. Using different classes for various shapes and  inherit the common properties from a class called  "Shape" and implements an interface called  "ShapePlan" and calculate area and perimeter  and display the result.  **JUSTIFICATION:**  1)We can able to derive the solution in an easy way.  2)We can able to group the common class.  3)We can able to define and initialize the method in abstract class.  4)We can able to achieve 100% abstraction.  5)Using inheritance we can add a new functionality without  affecting the existing one.  6)Code reusability.  7)We can able to display the solution using subclass. | | | |  | We didn't use 4 & 5 because  1.We can't achieve 100% abstraction.  2. We can't able to reuse the code without inheritance.  3.We want to call each and every class for displaying the result.  4.We cant able to group the common classes. | | | |
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| **WHY ?** | | | |  | **WHY NOT ?** | | | |

**Algorithm:**

**Step:1** Start

**Step:2** Create an Interface called ShapePlan.

**Step:3** Declare area and perimeter methods.

**Step:4** Define a variable called pi and initialize it with 3.14

**Step:5** Create an abstract class named Shape and implement it to ShapePlan.

**Step:6** Declare the parameters.

**Step:7** Create the subclass named Circle,Rectangle.Triangle,Square and extend it to Shape class(superclass).

**Step:8** Declare and define methods for area and perimeter in each class.

**Step:9** In the main class by creating objects, call the methods area and perimeter from each shape.

**Step:10** Display the results.

**Step:11** Stop.

**Code:**

**package com.domnic.problemSolving;**

**interface Shape\_Plan {**

**void area();**

**void perimeter();**

**double *PI* = 3.14;**

**}**

**abstract class Shape implements Shape\_Plan {**

**public abstract void area();**

**public abstract void perimeter();**

**}**

**class Circle extends Shape {**

**int radius;**

**Circle(int radius) {**

**this.radius = radius;**

**}**

**public void area() {**

**double area = *PI* \* (radius ^ 2);**

**System.*out*.println("Area of circle is : " + area);**

**}**

**public void perimeter() {**

**double perimeter = 2 \* *PI* \* radius;**

**System.*out*.println("Perimeter of circle is : " + perimeter);**

**}**

**}**

**class Square extends Shape {**

**int side;**

**Square(int side) {**

**this.side = side;**

**}**

**public void area() {**

**double area = side \* side;**

**System.*out*.println("Area of Square is : " + area);**

**}**

**public void perimeter() {**

**double perimeter = 4 \* side;**

**System.*out*.println("Perimeter of Square is : " + perimeter);**

**}**

**}**

**class Rectangle extends Shape {**

**int length;**

**int breadth;**

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

**this.length = length;**

**this.breadth = breadth;**

**}**

**public void area() {**

**double area = length \* breadth;**

**System.*out*.println("Area of Rectangle is : " + area);**

**}**

**public void perimeter() {**

**double perimeter = 2 \* (length + breadth);**

**System.*out*.println("Perimeter of Reactangle is : " + perimeter);**

**}**

**}**

**class Triangle extends Shape {**

**int height;**

**int breadth;**

**int side1;**

**int side2;**

**int side3;**

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

**this.height=height;**

**this.breadth=breadth;**

**this.side1=side1;**

**this.side2=side2;**

**this.side3=side3;**

**}**

**public void area() {**

**double area=(height\*breadth)/2;**

**System.*out*.println("Area of Triangle is : " + area);**

**}**

**public void perimeter() {**

**double perimeter=side1\*side2\*side3;**

**System.*out*.println("Perimeter of Triangle is : " + perimeter);**

**}**

**}**

**public class Prblmsolving1 {**

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

**Circle circle = new Circle(5);**

**circle.area();**

**circle.perimeter();**

**Square square = new Square(10);**

**square.area();**

**square.perimeter();**

**Rectangle rectangle = new Rectangle(10, 8);**

**rectangle.area();**

**rectangle.perimeter();**

**Triangle triangle=new Triangle(10,8,7,7,7);**

**triangle.area();**

**triangle.perimeter();**

**}**

**}**