Program:6

Develop a JAVA program to create an abstract class Shape with abstract methods calculateArea() and calculatePerimeter(). Create subclasses Circle and Triangle that extend the Shape class and implement the respective methods to calculate the area and perimeter of each shape.

Aim: Demonstrate constructor and method overloading in java programming.

```
      import java.util.Scanner;
      public abstract class Shape {
       private String name;

          public Shape(String name) {
              this.name = name;
          }

          public String getName() {
              return name;
          }

          public abstract double calculateArea();

          public abstract double calculatePerimeter();

          public static void main(String[] args) {
              double i, j, k, l;
              System.out.println("Enter Radius of circle:");
              Scanner sc = new Scanner(System.in);
              i = sc.nextDouble();
              Circles circle = new Circles("Circle", i);
              System.out.println("Area of circle: " + circle.calculateArea());
              System.out.println("Perimeter of circle: " +
circle.calculatePerimeter());

              System.out.println("Enter sides of Triangle j, k, l:");
              j = sc.nextDouble();
              k = sc.nextDouble();
              l = sc.nextDouble();
              Shape triangle = new Triangle("Triangle", j, k, l);
              System.out.println("Area of triangle: " + triangle.calculateArea());
              System.out.println("Perimeter of Triangle: " +
triangle.calculatePerimeter());
          }
      }

      class Circles extends Shape {
          private double i; // radius is declared as variable i

          public Circles(String name, double i) {
              super(name);
              this.i = i;
          }

          @Override
          public double calculateArea() {
              return Math.PI * i * i;
```

```
        }

        @Override
        public double calculatePerimeter() {
            return 2 * Math.PI * i;
        }
    }

    class Triangle extends Shape {
        private double sideA;
        private double sideB;
        private double sideC;

        public Triangle(String name, double sideA, double sideB, double sideC) {
            super(name);
            this.sideA = sideA;
            this.sideB = sideB;
            this.sideC = sideC;
        }

        @Override
        public double calculateArea() {
            double semiperimeter = (sideA + sideB + sideC) / 2;
            return Math.sqrt(semiperimeter * (semiperimeter - sideA) * (semiperimeter
- sideB) * (semiperimeter - sideC));
        }

        @Override
        public double calculatePerimeter() {
            return sideA + sideB + sideC;
        }
    }
```

Output:

```
Enter Radius of circle:
5
Area of circle: 78.53981633974483
Perimeter of circle: 31.41592653589793
Enter sides of Triangle j, k, l:
3 4 5
Area of triangle: 6.0
Perimeter of Triangle: 12.0
```

Program:7

Develop a JAVA program to create an interface Resizable with methods resizeWidth(int width) and resizeHeight(int height) that allow an object to be resized. Create a class Rectangle that implements the Resizable interface and implements the resize methods.

Aim: Demonstrate the use of packages in java programming

```
  interface Resizable {
       void resizeWidth(int width);
       void resizeHeight(int height);
     }

     class Rectangle implements Resizable {
         private int width;
         private int height;

         public Rectangle(int width, int height) {
             this.width = width;
             this.height = height;
         }

         @Override
         public void resizeWidth(int width) {
             this.width = width;
         }

         @Override
         public void resizeHeight(int height) {
             this.height = height;
         }

         public int getWidth() {
             return width;
         }

         public int getHeight() {
             return height;
         }
     }

      class Resizable_main {
         public static void main(String[] args) {
             Rectangle rectangle = new Rectangle(10, 20);
             System.out.println("Original width: " + rectangle.getWidth());
             System.out.println("Original height: " + rectangle.getHeight());
             rectangle.resizeWidth(30);
             rectangle.resizeHeight(40);
             System.out.println("New width: " + rectangle.getWidth());
             System.out.println("New height: " + rectangle.getHeight());
         }
}
```

Output:

```
Original width: 10
Original height: 20
New width: 30
New height: 40
```