Write a Java program to create an abstract class GeometricShape with abstract methods area() and perimeter(). Create subclasses Triangle and Square that extend the GeometricShape class and implement the respective methods to calculate the area and perimeter of each shape.

Sample Solution:

Java Code:

```
// GeometricShape.java
// Define an abstract class named GeometricShape
abstract class GeometricShape {
  // Declare an abstract method named area that returns a double
  public abstract double area();

  // Declare an abstract method named perimeter that returns a double
  public abstract double perimeter();
}
```

```
// Triangle.java
// Define a class named Triangle that extends GeometricShape
class Triangle extends GeometricShape {
  // Declare private instance variables for the sides of the triangle
  private double side1;
  private double side2;
  private double side3;

  // Define a constructor that initializes the sides of the triangle
  public Triangle(double side1, double side2, double side3) {
    // Assign the parameters to the instance variables
    this.side1 = side1;
    this.side2 = side2;
    this.side3 = side3;
  }

  // Override the area method from GeometricShape
  @Override
  // Implementation of the area method that calculates and returns the area
  public double area() {
    // Calculate the semi-perimeter of the triangle
    double s = (side1 + side2 + side3) / 2;
```

```
    // Calculate and return the area using Heron's formula
    return Math.sqrt(s * (s - side1) * (s - side2) * (s - side3));
  }

  // Override the perimeter method from GeometricShape
  @Override
  // Implementation of the perimeter method that returns the perimeter of t
  public double perimeter() {
    // Return the sum of the sides of the triangle
    return side1 + side2 + side3;
  }
}
```

```
// Square.java
// Define a class named Square that extends GeometricShape
class Square extends GeometricShape {
  // Declare a private instance variable for the side of the square
  private double side;

  // Define a constructor that initializes the side of the square
  public Square(double side) {
    // Assign the parameter to the instance variable
    this.side = side;
  }

  // Override the area method from GeometricShape
  @Override
  // Implementation of the area method that calculates and returns the area
  public double area() {
    // Calculate and return the area by squaring the side length
    return side * side;
  }

  // Override the perimeter method from GeometricShape
  @Override
  // Implementation of the perimeter method that returns the perimeter of t
  public double perimeter() {
    // Calculate and return the perimeter by multiplying the side length by
    return 4 * side;
  }
```

```
    }
```

```
    // Define the Main class
    public class Main {
      // Main method: entry point of the program
      public static void main(String[] args) {
        // Create a Triangle object with sides 4, 5, and 6
        GeometricShape triangle = new Triangle(4, 5, 6);
        // Create a Square object with side length 6
        GeometricShape square = new Square(6);

        // Print the area of the triangle
        System.out.println("Triangle Area: " + triangle.area());
        // Print the perimeter of the triangle
        System.out.println("Triangle Perimeter: " + triangle.perimeter());

        // Print the area of the square
        System.out.println("Square Area: " + square.area());
        // Print the perimeter of the square
        System.out.println("Square Perimeter: " + square.perimeter());
      }
    }
```

Output:

```
Triangle Area: 9.921567416492215
Triangle Perimeter: 15.0
Square Area: 36.0
Square Perimeter: 24.0
```

Explanation: