```java
/**
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 * AIML B2
 */

package assignment5;

import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        ShapeCalculator shapeCalculator = new ShapeCalculator();

        while (true) {
            System.out.println("Menu:");
            System.out.println("1. Calculate Area");
            System.out.println("2. Calculate Volume");
            System.out.println("3. Exit");
            System.out.print("Enter your choice: ");
            int choice = scanner.nextInt();

            switch (choice) {
                case 1:
                    shapeCalculator.calculateArea();
                    break;
                case 2:
                    shapeCalculator.calculateVolume();
                    break;
                case 3:
                    System.out.println("Exiting...");
                    System.exit(0);
                default:
                    System.out.println("Invalid choice. Please try again.");
            }
        }
```

```
38      }
39  }
40
41
42
43
```

```java
package assignment5;
public abstract class Shape {
    public abstract double area();

    public abstract double perimeter();

    public abstract void calculateArea();
    public abstract void calculatePerimeter();
    public void showShape(String shape) {
        System.out.println("Shape: " + shape);
    }
}


```

```java
package assignment5;

import java.util.Scanner;

public class Circle extends Shape {
    private double radius;

    @Override
    public double area() {
        return 0;
    }

    @Override
    public double perimeter() {
        return 0;
    }

    @Override
    public void calculateArea() {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter radius of the circle : ");
        radius = scanner.nextDouble();
        double area = Math.PI * radius * radius;
        System.out.println("Area of the circle: " + area);
    }

    @Override
    public void calculatePerimeter() {
        // Not implemented for a circle
    }
}


```

```java
package assignment5;

import java.util.Scanner;

public class Sphere extends Shape implements Volume {
    private double radius;

    @Override
    public double area() {
        return 0;
    }

    @Override
    public double perimeter() {
        return 0;
    }

    @Override
    public void calculateArea() {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter radius of the sphere: ");
        radius = scanner.nextDouble();
        double area = 4 * Math.PI * radius * radius;
        System.out.println("Surface area of the sphere: " + area);
    }

    @Override
    public void calculatePerimeter() {
        // Not implemented for a sphere
    }

    @Override
    public void calculateVolume() {
        double volume = (4.0 / 3.0) * Math.PI * Math.pow(radius, 3);
        System.out.println("Volume of the sphere: " + volume);
    }
}
```

38
39

```java
package assignment5;

import java.util.Scanner;

public class Square extends Shape {
    private double side;

    @Override
    public double area() {
        return 0;
    }

    @Override
    public double perimeter() {
        return 0;
    }

    @Override
    public void calculateArea() {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter side length of the square: ");
        side = scanner.nextDouble();
        double area = side * side;
        System.out.println("Area of the square: " + area);
    }

    @Override
    public void calculatePerimeter() {
        double perimeter = 4 * side;
        System.out.println("Perimeter of the square : " + perimeter);
    }
}


```

```java
package assignment5;

public interface Volume {
    void calculateVolume();
}


```

```java
package assignment5;

import java.util.Scanner;

public class Pyramid extends Shape implements Volume {
    private double baseLength;
    private double baseWidth;
    private double height;

    @Override
    public void calculateArea() {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter base length of the pyramid: ");
        baseLength = scanner.nextDouble();
        System.out.print("Enter base width of the pyramid: ");
        baseWidth = scanner.nextDouble();
        System.out.print("Enter height of the pyramid: ");
        height = scanner.nextDouble();

        double baseArea = baseLength * baseWidth;
        double lateralArea = baseLength * Math.sqrt(Math.pow(baseWidth / 2, 2) + Math.pow(height, 2)) +
                baseWidth * Math.sqrt(Math.pow(baseLength / 2, 2) + Math.pow(height, 2));
        double surfaceArea = baseArea + lateralArea;
        System.out.println("Surface area of the pyramid: " + surfaceArea);
    }

    @Override
    public void calculatePerimeter() {
        // Not implemented for a pyramid
    }

    @Override
    public void calculateVolume() {
        double volume = (1.0 / 3.0) * baseLength *
```

```
34 baseWidth * height;
35         System.out.println("Volume of the pyramid: "
    + volume);
36     }
37 
38     @Override
39     public double area() {
40         return 0;
41     }
42 
43     @Override
44     public double perimeter() {
45         return 0; // Since a pyramid doesn't have a
   traditional perimeter, return 0
46     }
47 }
48 
49 
```

```java
package assignment5;

import java.util.Scanner;

public class Cylinder extends Shape implements Volume {
    private double radius;
    private double height;

    @Override
    public double area() {
        return 0;
    }

    @Override
    public double perimeter() {
        return 0;
    }

    @Override
    public void calculateArea() {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter radius of the cylinder: ");
        radius = scanner.nextDouble();
        System.out.print("Enter height of the cylinder: ");
        height = scanner.nextDouble();

        double surfaceArea = 2 * Math.PI * radius * (radius + height);
        System.out.println("Surface area of the cylinder: " + surfaceArea);
    }

    @Override
    public void calculatePerimeter() {
        // Not implemented for a cylinder
    }

    @Override
```

```
37     public void calculateVolume() {
38         double volume = Math.PI * radius * radius *
   height;
39         System.out.println("Volume of the cylinder: "
    + volume);
40     }
41 }
42
43
44
```

```java
package assignment5;

public class Triangle extends Shape {
    double base, side1, side2, height;
    public Triangle(double base, double side1, double side2,
                    double height) {
        super();
        this.base = base;
        this.height = height;
        this.side1 = side1;
        this.side2 = side2;
    }
    @Override
    public double area() {
// TODO Auto-generated method stub
        return (0.5 * base * height);
    }
    @Override
    public double perimeter() {
// TODO Auto-generated method stub
        return (base + side1 + side2);
    }

    @Override
    public void calculateArea() {

    }

    @Override
    public void calculatePerimeter() {

    }
}

```

```java
package assignment5;

import java.util.Scanner;

public class Rectangle extends Shape {
    private double length;
    private double width;

    @Override
    public double area() {
        return 0;
    }

    @Override
    public double perimeter() {
        return 0;
    }

    @Override
    public void calculateArea() {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter length of the rectangle: ");
        length = scanner.nextDouble();
        System.out.print("Enter width of the rectangle: ");
        width = scanner.nextDouble();
        double area = length * width;
        System.out.println("Area of the rectangle: " + area);
    }

    @Override
    public void calculatePerimeter() {
        // Not implemented for a rectangle
    }
}

```

```java
package assignment5;

import java.util.Scanner;

public class ShapeCalculator {
    private Scanner scanner;

    public ShapeCalculator() {
        scanner = new Scanner(System.in);
    }

    public void calculateArea() {
        System.out.println("Choose a shape:");
        System.out.println("1. Circle");
        System.out.println("2. Rectangle");
        System.out.println("3. Square");
        System.out.println("4. Sphere");
        System.out.println("5. Cylinder");
        System.out.println("6. Pyramid");

        System.out.print("Enter your choice: ");
        int choice = scanner.nextInt();

        Shape shape = null;

        switch (choice) {
            case 1:
                shape = new Circle();
                break;
            case 2:
                shape = new Rectangle();
                break;
            case 3:
                shape = new Square();
                break;
            case 4:
                shape = new Sphere();
                break;
            case 5:
                shape = new Cylinder();
                break;
```

```
42              case 6:
43                  shape = new Pyramid();
44                  break;
45              default:
46                  System.out.println("Invalid choice."
   );
47                  return;
48          }
49
50          shape.calculateArea();
51          shape.calculatePerimeter();
52      }
53
54      public void calculateVolume() {
55          System.out.println("Choose a shape:");
56          System.out.println("1. Sphere");
57          System.out.println("2. Cylinder");
58          System.out.println("3. Pyramid");
59
60          System.out.print("Enter your choice: ");
61          int choice = scanner.nextInt();
62
63          Volume volumeShape = null;
64
65          switch (choice) {
66              case 1:
67                  volumeShape = new Sphere();
68                  break;
69              case 2:
70                  volumeShape = new Cylinder();
71                  break;
72              case 3:
73                  volumeShape = new Pyramid();
74                  break;
75              default:
76                  System.out.println("Invalid choice."
   );
77                  return;
78          }
79
80          volumeShape.calculateVolume();
```

```
81      }
82  }
83
84
```