```java
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int choice = 0;

        while (choice != 6) {
            System.out.println("1. Circle\n2. Rectangle\n3. Square\n4. Sphere\n5. Cylinder\n6. Pyramid\n7. Exit");
            System.out.print("Enter your choice: ");
            choice = sc.nextInt();

            switch(choice) {
                case 1:
                    System.out.print("Enter radius of circle: ");
                    double radius = sc.nextDouble();
                    Circle circle = new Circle(radius);
                    circle.showShape("circle");
                    System.out.println("Area of circle: " + circle.calculateArea());
                    System.out.println("Perimeter of circle: " + circle.calculatePerimeter());
                    break;

                case 2:
                    System.out.print("Enter length of rectangle: ");
                    double length = sc.nextDouble();
                    System.out.print("Enter breadth of rectangle: ");
                    double breadth = sc.nextDouble();
                    Rectangle rectangle = new Rectangle(length, breadth);
                    rectangle.showShape("rectangle");
                    System.out.println("Area of rectangle: " + rectangle.calculateArea());
                    System.out.println("Perimeter of rectangle: " + rectangle.calculatePerimeter());
                    break;

                case 3:
                    System.out.print("Enter side of square: ");
                    double side = sc.nextDouble();
                    Square square = new Square(side);
                    square.showShape("square");
                    System.out.println("Area of square: " + square.calculateArea());
```

```
40                      System.out.println("Perimeter of square: "
    + square.calculatePerimeter());
41                      break;
42
43                  case 4:
44                      System.out.print("Enter radius of sphere: "
    );
45                      double sphereRadius = sc.nextDouble();
46                      Sphere sphere = new Sphere(sphereRadius);
47                      sphere.showShape("sphere");
48                      System.out.println("Surface area of sphere
    : " + sphere.calculateArea());
49                      System.out.println("Volume of sphere: " +
    sphere.calculateVolume());
50                      break;
51
52                  case 5:
53                      System.out.print("Enter radius of cylinder
    : ");
54                      double cylinderRadius = sc.nextDouble();
55                      System.out.print("Enter height of cylinder
    : ");
56                      double cylinderHeight = sc.nextDouble();
57                      Cylinder cylinder = new Cylinder(
    cylinderRadius, cylinderHeight);
58                      cylinder.showShape("cylinder");
59                      System.out.println("Surface area of
    cylinder: " + cylinder.calculateArea());
60                      System.out.println("Volume of cylinder: "
    + cylinder.calculateVolume());
61                      break;
62
63                  case 6:
64                      System.out.print("Enter length of base of
    pyramid: ");
65                      double pyramidLength = sc.nextDouble();
66                      System.out.print("Enter width of base of
    pyramid: ");
67                      double pyramidWidth = sc.nextDouble();
68                      System.out.print("Enter height of pyramid
    : ");
69                      double pyramidHeight = sc.nextDouble();
70                      Pyramid pyramid = new Pyramid(pyramidLength
    , pyramidWidth, pyramidHeight);
71                      pyramid.showShape("pyramid");
72                      System.out.println("Surface area of pyramid
    : " + pyramid.calculateArea());
73                      System.out.println("Volume of pyramid: " +
    pyramid.calculateVolume());
```

```
                    break;

                case 7:
                    System.out.println("Exiting...");
                    break;

                default:
                    System.out.println("Invalid choice!");
            }

            System.out.println();
        }

        sc.close();
    }
}

```

```
class Circle extends Shape {
    double radius;

    // Constructor to set radius
    public Circle(double r) {
        radius = r;
    }

    // Method to calculate area of circle
    public double calculateArea() {
        return Math.PI * radius * radius;
    }

    // Method to calculate perimeter of circle
    public double calculatePerimeter() {
        return 2 * Math.PI * radius;
    }
}
```

```java
class Cylinder extends Shape implements Volume {
    double radius, height;

    // Constructor to set radius and height
    public Cylinder(double r, double h) {
        radius = r;
        height = h;
    }

    // Method to calculate surface area of cylinder
    public double calculateArea() {
        return 2 * Math.PI * radius * height + 2 * Math.PI * radius * radius;
    }

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

    // Method to calculate volume of cylinder
    public double calculateVolume() {
        return Math.PI * radius * radius * height;
    }
}
```

```java
public class Pyramid extends Shape implements Volume {
    private double length;
    private double width;
    private double height;

    public Pyramid(double length, double width, double height) {
        this.length = length;
        this.width = width;
        this.height = height;
    }

    @Override
    public double calculateArea() {
        double slantHeight = Math.sqrt(Math.pow(length/2, 2) + Math.pow(height, 2));
        double baseArea = length * width;
        double lateralArea = length * slantHeight / 2 + width * slantHeight / 2;
        double totalArea = baseArea + lateralArea;
        return totalArea;
    }

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

    @Override
    public double calculateVolume() {
        double baseArea = length * width;
        double volume = baseArea * height / 3;
        return volume;
    }

    @Override
    public void showShape(String shape) {
        System.out.println("Selected shape: " + shape);
        System.out.println("Length: " + length);
        System.out.println("Width: " + width);
        System.out.println("Height: " + height);
    }
}

```

```java
class Rectangle extends Shape {
    double length, breadth;

    // Constructor to set length and breadth
    public Rectangle(double l, double b) {
        length = l;
        breadth = b;
    }

    // Method to calculate area of rectangle
    public double calculateArea() {
        return length * breadth;
    }

    // Method to calculate perimeter of rectangle
    public double calculatePerimeter() {
        return 2 * (length + breadth);
    }
}
```

```
class Sphere extends Shape implements Volume {
    double radius;

    // Constructor to set radius
    public Sphere(double r) {
        radius = r;
    }

    // Method to calculate surface area of sphere
    public double calculateArea() {
        return 4 * Math.PI * radius * radius;
    }

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

    // Method to calculate volume of sphere
    public double calculateVolume() {
        return 4/3 * Math.PI * radius * radius * radius;
    }
}
```

```java
class Square extends Shape {
    double side;

    // Constructor to set side
    public Square(double s) {
        side = s;
    }

    // Method to calculate area of square
    public double calculateArea() {
        return side * side;
    }

    // Method to calculate perimeter of square
    public double calculatePerimeter() {
        return 4 * side;
    }
}
```

```
"C:\Program Files\Java\jdk-19\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2022.3.1\lib\idea_rt.jar=53124:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2022.3.1\bin" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.encoding=UTF-8 -classpath "D:\College\Fourth SEM\java\javA\out\production\javA" Main
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Pyramid
7. Exit
Enter your choice: 1
Enter radius of circle: 5
Calculating area and volume of circle
Area of circle: 78.53981633974483
Perimeter of circle: 31.41592653589793

1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Pyramid
7. Exit
Enter your choice: 2
Enter length of rectangle: 20
Enter breadth of rectangle: 5
Calculating area and volume of rectangle
Area of rectangle: 100.0
Perimeter of rectangle: 50.0

1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Pyramid
7. Exit
Enter your choice: 3
Enter side of square: 20
Calculating area and volume of square
Area of square: 400.0
Perimeter of square: 80.0

1. Circle
```

```
43 2. Rectangle
44 3. Square
45 4. Sphere
46 5. Cylinder
47 6. Pyramid
48 7. Exit
49 Enter your choice: 5
50 Enter radius of cylinder: 5
51 Enter height of cylinder: 20
52 Calculating area and volume of cylinder
53 Surface area of cylinder: 785.3981633974483
54 Volume of cylinder: 1570.7963267948967
55
56 1. Circle
57 2. Rectangle
58 3. Square
59 4. Sphere
60 5. Cylinder
61 6. Pyramid
62 7. Exit
63 Enter your choice: 4
64 Enter radius of sphere: 5
65 Calculating area and volume of sphere
66 Surface area of sphere: 314.1592653589793
67 Volume of sphere: 392.69908169872417
68
69 1. Circle
70 2. Rectangle
71 3. Square
72 4. Sphere
73 5. Cylinder
74 6. Pyramid
75 7. Exit
76 Enter your choice: 6
77 Enter length of base of pyramid: 20
78 Enter width of base of pyramid: 5
79 Enter height of pyramid: 15
80 Selected shape: pyramid
81 Length: 20.0
82 Width: 5.0
83 Height: 15.0
84 Surface area of pyramid: 325.34695471649934
85 Volume of pyramid: 500.0
86
87
88 Process finished with exit code 0
89
```