Source Code:

package projectjava;

public class GeometricCalculator {

public static void main(String[] args) {

// Example usage

double circleArea = calculateArea("circle", 5);

double rectangleArea = calculateArea("rectangle", 4, 6);

double triangleArea = calculateArea("triangle", 3, 4, 5);

System.out.println("Circle Area: " + circleArea);

System.out.println("Rectangle Area: " + rectangleArea);

System.out.println("Triangle Area: " + triangleArea);

}

public static double calculateArea(String shape, double... dimensions) {

switch (shape.toLowerCase()) {

case "circle":

return calculateCircleArea(dimensions);

case "rectangle":

return calculateRectangleArea(dimensions);

case "triangle":

return calculateTriangleArea(dimensions);

default:

throw new IllegalArgumentException("Unsupported shape: " + shape);

}

}

private static double calculateCircleArea(double... dimensions) {

if (dimensions.length != 1) {

throw new IllegalArgumentException("Invalid number of parameters for circle");

}

double radius = dimensions[0];

return Math.PI \* Math.pow(radius, 2);

}

private static double calculateRectangleArea(double... dimensions) {

if (dimensions.length != 2) {

throw new IllegalArgumentException("Invalid number of parameters for rectangle");

}

double length = dimensions[0];

double width = dimensions[1];

return length \* width;

}

private static double calculateTriangleArea(double... dimensions) {

if (dimensions.length != 3) {

throw new IllegalArgumentException("Invalid number of parameters for triangle");

}

double a = dimensions[0];

double b = dimensions[1];

double c = dimensions[2];

double s = (a + b + c) / 2;

return Math.sqrt(s \* (s - a) \* (s - b) \* (s - c));

}

}