Lab 12 - Task 1 - Abstract Class

Implement the following classes:

Create an object for Triangle class and invoke area and perimeter method.

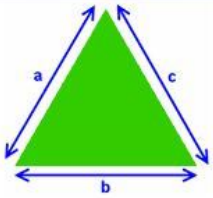
Input Format

Take triangle sides (sideA,sideB,sideC) as input from user.

Constraints

For Triangle, sideB+sideC > sideA

Heron's Formula



Area of a Triangle from Sides

You can calculate the area of a triangle if you know the lengths of all three sides, using a formula that has been known for nearly 2000 years.

It is called "Heron's Formula" after Hero of Alexandria (see below)

Just use this two step process:

Step 1: Calculate **"s"** (half of the triangles perimeter):

$$s = \frac{a+b+c}{2}$$

Step 2: Then calculate the **Area**:

$$A = \sqrt{s\,(s-a)\,(s-b)\,(s-c)}$$

Output Format

Print Triangle area and perimeter as shown in sample output.

Sample Input 0

```
24
30
18
```

Sample Output 0

```
216.00
72.00
```

Explanation 0

```
Here,
sideA = 24.00
sideB = 30.00
sideC = 18.00

Triangle Area = 216.00
Triangle Perimeter = 72.00
```

Sample Input 1

```
54
105
45
```

Sample Output 1

```
INVALID
```

Explanation 1

The **Triangle** Inequality Theorem states **that** the **sum of any 2 sides of a triangle** must be **greater** than the measure of the **third side**. Note: This rule must be satisfied for **all 3** conditions of the **sides**.

Current Buffer (saved locally, editable) Java 8

```java
import java.util.Scanner;

abstract class Polygon{
    private int numSide;

    Polygon(){

    }

    Polygon(int numSide){
        this.numSide = numSide;
    }

    public int getNumSide() {
        return numSide;
    }

    public void setNumSide(int numSide) {
        this.numSide = numSide;
    }

    public abstract double area();


    public abstract double perimeter();


}

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

    Triangle(){

    }

    Triangle(double sideA,double sideB,double sideC){
        this.sideA = sideA;
        this.sideB = sideB;
        this.sideC = sideC;
    }

    public double getSideA() {
        return sideA;
    }

    public double getSideB() {
        return sideB;
    }

    public double getSideC() {
        return sideC;
    }

    public void setSideA(double sideA) {
        this.sideA = sideA;
    }

    public void setSideB(double sideB) {
        this.sideB = sideB;
```

```
    }

    public void setSideC(double sideC) {
        this.sideC = sideC;
    }

    @Override
    public double area() {
        double s = perimeter()/2.0;
        return Math.sqrt(s*(s-sideA)*(s-sideB)*(s-sideC));
    }

    @Override
    public double perimeter() {
        return (sideA+sideB+sideC);
    }
}
public class LAB12_Task1 {

    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        //System.out.println();
        double a = input.nextDouble();
        double b = input.nextDouble();
        double c = input.nextDouble();
        input.close();

        if(isValid(a,b,c)) {

            Triangle obj = new Triangle(a,b,c);
            System.out.printf("%.2f\n",obj.area());
            System.out.printf("%.2f",obj.perimeter());

        }else {
            System.out.println("INVALID");
        }

    }

    public static boolean isValid(double a,double b,double c) {
        if(a+b > c && b+c > a && a+c > b)
            return true;
        else return false;
    }

}
```

Line: 85 Col: 11

Upload Code as File Test against custom input Run Code Submit Code

Testcase 0 ✔ Testcase 1 ✔

Congratulations, you passed the sample test case.

Click the **Submit Code** button to run your code against all the test cases.

Input (stdin)

```
24
30
18
```

Your Output (stdout)

```
216.00
72.00
```

Expected Output

```
216.00
72.00
```