

LAB # 2

Good practices of programming

OBJECTIVE

Implementing good code practices and code optimization techniques.

Lab Task:

1. Create a design for the mark sheet by taking runtime value of student name, total marks, obtained marks and calculate its percentage, grade and GPA. Use good practices of programming that we have studied and ensure that the outcomes should be presented in a proper Viewable approach.

```
*MarkSheet.java X
1 package marksheet;
2 import java.util.Scanner;
3 public class MarkSheet {
4     public static void main(String[] args) {
5
6         Scanner input = new Scanner(System.in);
7
8         System.out.print("Enter Student Name: ");
9         String studentName = input.nextLine();
10
11         System.out.print("Enter Total Marks: ");
12         double totalMarks = input.nextDouble();
13
14         System.out.print("Enter Obtained Marks: ");
15         double obtainedMarks = input.nextDouble();
16
17         double percentage = (obtainedMarks / totalMarks) * 100;
18
19         String grade;
20         double gpa;
21
22         if (percentage >= 85) {
23             grade = "A+";
24             gpa = 4.0;
25         } else if (percentage >= 75) {
26             grade = "A";
27             gpa = 3.7;
28         } else if (percentage >= 65) {
29             grade = "B";
30             gpa = 3.0;
31         }
32     }
33 }
```

```

        grade = "A";
        gpa = 3.7;
    } else if (percentage >= 65) {
        grade = "B";
        gpa = 3.0;
    } else if (percentage >= 55) {
        grade = "C";
        gpa = 2.5;
    } else if (percentage >= 45) {
        grade = "D";
        gpa = 2.0;
    } else {
        grade = "F";
        gpa = 0.0;
    }
}

```

```

System.out.println(" STUDENT MARK SHEET ");
System.out.println("Student Name : " + studentName);
System.out.println("Total Marks : " + totalMarks);
System.out.println("Obtained Marks : " + obtainedMarks);
System.out.println("Percentage % : " + percentage);
System.out.println("Grade : " + grade);
System.out.println("GPA : " + gpa);
input.close();
}

```

OUTPUT:

```

C:\Users\habiba> java StudentMarkSheet
Enter Student Name: habiba
Enter Total Marks: 550
Enter Obtained Marks: 480
STUDENT MARK SHEET
Student Name : habiba
Total Marks : 550.0
Obtained Marks : 480.0
Percentage % : 87.27272727272727
Grade : A+
GPA : 4.0

```

2. Create a class Rectangle with attributes length and width, each of which defaults to 1. Provide methods that calculate the rectangle's perimeter and area. It has set and get methods for both length and width. The set methods should verify that length and width are each floating-point numbers larger than 0.0 and less than 20.0. Write a program to test class Rectangle.

```

package rectangle;
public class Rectangle {

    private double length;
    private double width;
    public Rectangle() {
        this.length = 1.0;
        this.width = 1.0;
    }
    public Rectangle(double length, double width) {
        setLength(length);
        setWidth(width);
    }
    public void setLength(double length) {
        if (length > 0.0 && length < 20.0) {
            this.length = length;
        } else {
            System.out.println("Invalid length! It must be between 0.0 and 20.0");
        }
    }
    public void setWidth(double width) {
        if (width > 0.0 && width < 20.0) {
            this.width = width;
        } else {
            System.out.println("Invalid width! It must be between 0.0 and 20.0");
        }
    }
    public double getLength() {
        return length;
    }

    public void setWidth(double width) {
        if (width > 0.0 && width < 20.0) {
            this.width = width;
        } else {
            System.out.println("Invalid width! It must be between 0.0 and 20.0");
        }
    }

    public double getLength() {
        return length;
    }

    public double getWidth() {
        return width;
    }

    public double calculateArea() {
        return length * width;
    }

    public double calculatePerimeter() {
        return 2 * (length + width);
    }
}

```

```

MarkSheet.java  Rectangle.java  RectangleTest.java  X
1 package rectangle;
2
3 import java.util.Scanner;
4
5 public class RectangleTest {
6     public static void main(String[] args) {
7         Scanner input = new Scanner(System.in);
8
9         Rectangle rect = new Rectangle();
10
11         System.out.print("Enter length of rectangle: ");
12         double length = input.nextDouble();
13         rect.setLength(length);
14
15         System.out.print("Enter width of rectangle: ");
16         double width = input.nextDouble();
17         rect.setWidth(width);
18
19         System.out.println("Length: " + rect.getLength());
20         System.out.println("Width : " + rect.getWidth());
21         System.out.println("Area  : " + rect.calculateArea());
22         System.out.println("Perimeter : " + rect.calculatePerimeter());
23
24         input.close();
25     }
26 }

```

OUTPUT:

```

C:\Users\user> java RectangleTest.java
Enter length of rectangle: 2
Enter width of rectangle: 4
Length: 2.0
Width : 4.0
Area  : 8.0
Perimeter : 12.0

```