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.

CODE:

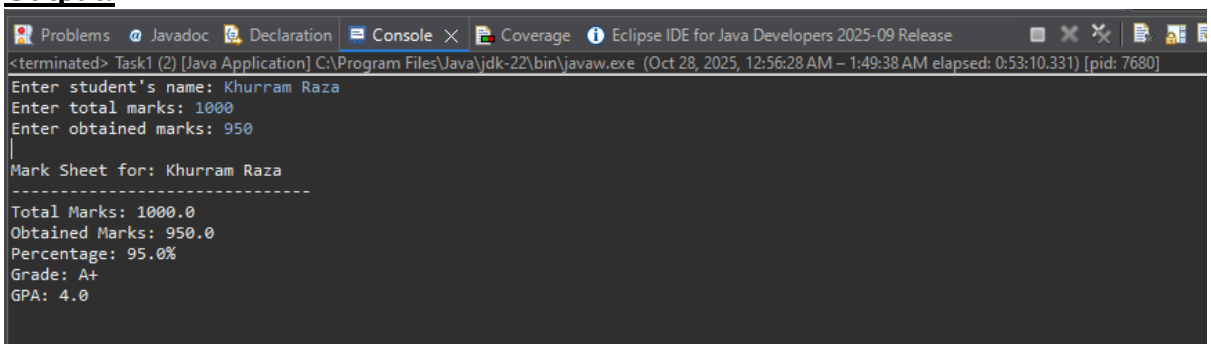
Task1.java | Task2.java

```java
package SCDLab2;
import java.util.Scanner;

class Task1 {
    public static void main(String[] args) {
        // Create Scanner object for input
        Scanner scanner = new Scanner(System.in);

        // Input student details
        System.out.print("Enter student's name: ");
        String name = scanner.nextLine();

        System.out.print("Enter total marks: ");
        double totalMarks = scanner.nextDouble();

        System.out.print("Enter obtained marks: ");
        double obtainedMarks = scanner.nextDouble();

        // Calculate percentage
        double percentage = (obtainedMarks / totalMarks) * 100;

        // Calculate Grade and GPA based on percentage
        String grade = calculateGrade(percentage);
        double gpa = calculateGPA(percentage);

        // Display the mark sheet details
        System.out.println("\nMark Sheet for: " + name);
        System.out.println("--------------------------------");
        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);

        // Close the scanner
```

Task1.java | Task2.java

```java
            return "A+";
        } else if (percentage >= 80) {
            return "A";
        } else if (percentage >= 70) {
            return "B+";
        } else if (percentage >= 60) {
            return "B";
        } else if (percentage >= 50) {
            return "C+";
        } else if (percentage >= 40) {
            return "C";
        } else {
            return "F";
        }
    }

    // Method to calculate GPA
    public static double calculateGPA(double percentage) {
        if (percentage >= 90) {
            return 4.0;
        } else if (percentage >= 80) {
            return 3.7;
        } else if (percentage >= 70) {
            return 3.0;
        } else if (percentage >= 60) {
            return 2.5;
        } else if (percentage >= 50) {
            return 2.0;
        } else if (percentage >= 40) {
            return 1.5;
        } else {
            return 0.0;
        }
    }
}
```

Output:



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.

CODE:

Task2.java

```
1  package SCDLab2;
2  import java.util.Scanner;
3      class Task2 {
4          public static void main(String[] args) {
5              // Create a Rectangle object
6              Rectangle rect = new Rectangle();
7
8              // Create Scanner object for input
9              Scanner scanner = new Scanner(System.in);
10
11             // Input length and width values
12             System.out.print("Enter length of rectangle: ");
13             double length = scanner.nextDouble();
14             rect.setLength(length);
15
16             System.out.print("Enter width of rectangle: ");
17             double width = scanner.nextDouble();
18             rect.setWidth(width);
19
20             // Display the area and perimeter
21             System.out.println("\nRectangle Details:");
22             System.out.println("Length: " + rect.getLength());
23             System.out.println("Width: " + rect.getWidth());
24             System.out.println("Area: " + rect.calculateArea());
25             System.out.println("Perimeter: " + rect.calculatePerimeter());
26
27             // Close the scanner
28             scanner.close();
29         }
30     }
31
32     class Rectangle {
33         private double length = 1.0;
34         private double width = 1.0;
35
```

Task2.java

```
    }

    // Setter for length with validation
    public void setLength(double length) {
        if (length > 0.0 && length < 20.0) {
            this.length = length;
        } else {
            System.out.println("Invalid length. It must be greater than 0.0 and less than 20.0.");
        }
    }

    // Getter for width
    public double getWidth() {
        return width;
    }

    // Setter for width with validation
    public void setWidth(double width) {
        if (width > 0.0 && width < 20.0) {
            this.width = width;
        } else {
            System.out.println("Invalid width. It must be greater than 0.0 and less than 20.0.");
        }
    }

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

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

OUTPUT:

Problems | Javadoc | Declaration | Console | Coverage | Eclipse IDE for Java Developers 2025-09 Release

<terminated> Task2 [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe (Oct 28, 2025, 1:51:18 AM – 1:51:45 AM elapsed: 0:00:26.595) [pid: 10200]

```
Enter length of rectangle: 18
Enter width of rectangle: 15

Rectangle Details:
Length: 18.0
Width: 15.0
Area: 270.0
Perimeter: 66.0
```