

# Rajalakshmi Engineering College

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## 2024\_28\_III\_OOPS Using Java Lab

### REC\_2028\_OOPS using Java\_Week 7\_CY

Attempt : 1  
Total Mark : 40  
Marks Obtained : 40

#### Section 1 : Coding

##### 1. Problem Statement

Jeevan is developing a fitness-tracking application to monitor daily physical activity.

The application incorporates a FitnessTracker class that implements two interfaces: StepCounter for tracking the number of steps taken and CalorieCalculator for estimating total calories burned based on total steps.

Jeevan needs your help creating a program.

##### Note

The calorie calculation formula is:  $\text{Total caloriesBurned} = (\text{total steps} / 100.0) * 20.0$ .

### ***Input Format***

The first line of input is an integer  $n$ , representing the number of days Jeevan wants to input data.

The second line consists of space-separated integers, representing the number of steps Jeevan took on each day.

### ***Output Format***

The first line of output prints: "Total Steps: <totalSteps>", where '<totalSteps>' is the sum of steps (integer) taken over ' $n$ ' days.

The second line prints: "Calories Burned: <caloriesBurned>", where '<caloriesBurned>' is the estimated total calories (double-point number) burned based on the total steps taken rounded off to two decimal places.

Refer to the sample output for the formatting specifications.

### ***Sample Test Case***

Input: 3

340 234 987

Output: Total Steps: 1561

Calories Burned: 312.20

### ***Answer***

```
import java.util.Scanner;

// You are using Java
interface StepCounter {
    void countSteps(int steps);
    int getTotalSteps();
}
interface CalorieCalculator {
    double calculateCaloriesBurned(int totalSteps);
}
class FitnessTracker implements StepCounter, CalorieCalculator {

    private int totalSteps = 0;

    @Override
    public void countSteps(int steps) {
```

```

        totalSteps += steps;
    }

    @Override
    public int getTotalSteps() {
        return totalSteps;
    }

    @Override
    public double calculateCaloriesBurned(int totalSteps) {
        return (totalSteps / 100.0) * 20.0;
    }
}

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

        FitnessTracker tracker = new FitnessTracker();

        int n = scanner.nextInt();

        for (int i = 0; i < n; i++) {
            int steps = scanner.nextInt();
            tracker.countSteps(steps);
        }

        int totalSteps = tracker.getTotalSteps();
        System.out.println("Total Steps: " + totalSteps);

        double caloriesBurned = tracker.calculateCaloriesBurned(totalSteps);
        System.out.printf("Calories Burned: %.2f%n", caloriesBurned);

        scanner.close();
    }
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement

A developer aims to create a budget management system using two interfaces, ExpenseRecorder for recording expenses and BudgetCalculator for calculating remaining budgets.

The ExpenseTracker class implements these interfaces, allowing users to input an initial budget and record expenses iteratively until entering 0.0 as a sentinel value.

The program then computes and displays the remaining budget or notifies of budget exceedance.

### Example

#### Input

100.0

20.0 30.0 10.0 0.0

#### Output

Remaining budget: Rs. 40.00

### Explanation

The initial budget is 100.0. Expenses of 20.0, 30.0, and 10.0 are recorded.

Remaining budget is calculated ( $100.0 - 20.0 - 30.0 - 10.0 = 40.0$ ).

### ***Input Format***

The first line of input is the initial budget as a double-point number (double type). The budget is a positive number.

The second line of input consists of individual expenses as double-point numbers. Each expense is separated by space.

To end the input, an expense of 0.0 is used.

### ***Output Format***

The output displays the remaining budget, formatted to two decimal places, in

the following format:

If the remaining budget (double type) is non-negative, it prints "Remaining budget: Rs. [remainingBudget]".

If the remaining budget is negative, it prints "No remaining budget, You've exceeded your budget!".

Refer to the sample output for the formatting specifications.

### **Sample Test Case**

Input: 100.0  
20.0 30.0 10.0 0.0

Output: Remaining budget: Rs. 40.00

### **Answer**

```
import java.util.Scanner;

// You
interface ExpenseRecorder {
    void recordExpense(double amount);
}
interface BudgetCalculator {
    double calculateRemainingBudget();
}
class ExpenseTracker implements ExpenseRecorder, BudgetCalculator {

    private double initialBudget;
    private double totalExpenses = 0.0;

    public ExpenseTracker(double budget) {
        this.initialBudget = budget;
    }

    @Override
    public void recordExpense(double amount) {
```

```

        totalExpenses += amount;
    }

    @Override
    public double calculateRemainingBudget() {
        return initialBudget - totalExpenses;
    }
}

class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        double budget = scanner.nextDouble();

        ExpenseTracker tracker = new ExpenseTracker(budget);

        double expense;
        do {
            expense = scanner.nextDouble();
            tracker.recordExpense(expense);
        } while (expense != 0.0);

        double remainingBudget = tracker.calculateRemainingBudget();
        if (remainingBudget >= 0) {
            System.out.printf("Remaining budget: Rs. %.2f", remainingBudget);
        } else {
            System.out.println("No remaining budget, You've exceeded your budget!");
        }
    }
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement:

Sam is developing a geometry application and needs a class for trapezoid calculations. Create a "Trapezoid" class implementing a "ShapeInput" interface with a method to input trapezoid dimensions.

Also, implement a "ShapeCalculator" interface with methods to compute area and perimeter. In the "Main" class, instantiate Trapezoid, gather user input, and display the calculated area and perimeter with two decimal places.

Note

Area of Trapezoid =  $(1/2) * (base1 + base2) * height$

Perimeter of Trapezoid =  $base1 + base2 + side1 + side2$

### ***Input Format***

The first line of input is a double-point value representing base1 of the trapezoid.

The second line of input is a double-point value representing base2 of the trapezoid.

The third line of input is a double-point value representing the height of the trapezoid.

The fourth line of input is a double-point value representing side1 of the trapezoid.

The fifth line of input is a double-point value representing side2 of the trapezoid.

### ***Output Format***

The output displays the two lines of the calculated area (double type) and perimeter (double type) of the trapezoid, each rounded to two decimal places in the following format:

"Area of the Trapezoid: <<calculated area>>".

Perimeter of the Trapezoid: <<calculated perimeter>>".

Refer to the sample output for the formatting specifications.

### Sample Test Case

Input: 1.0

2.0

1.0

3.0

1.0

Output: Area of the Trapezoid: 1.50

Perimeter of the Trapezoid: 7.00

### Answer

```
import java.util.Scanner;
```

```
// You are using Java
```

```
interface ShapeInput {
```

```
    void getInput();
```

```
}
```

```
interface ShapeCalculator {
```

```
    double calculateArea();
```

```
    double calculatePerimeter();
```

```
}
```

```
class Trapezoid implements ShapeInput, ShapeCalculator {
```

```
    private double base1, base2, height, side1, side2;
```

```
    @Override
```

```
    public void getInput() {
```

```
        Scanner sc = new Scanner(System.in);
```

```
        base1 = sc.nextDouble();
```

```
        base2 = sc.nextDouble();
```

```
        height = sc.nextDouble();
```

```
        side1 = sc.nextDouble();
```

```
        side2 = sc.nextDouble();
```

```
}
```

```
    @Override
```

```
    public double calculateArea() {
```

```
        return 0.5 * (base1 + base2) * height;
```

```
}
```

```
    @Override
```



```

    public double calculatePerimeter() {
        return base1 + base2 + side1 + side2;
    }
}

public class Main {
    public static void main(String[] args) {
        Trapezoid trapezoid = new Trapezoid();
        trapezoid.getInput();

        double area = trapezoid.calculateArea();
        double perimeter = trapezoid.calculatePerimeter();

        System.out.println("Area of the Trapezoid: " + String.format("%.2f", area));
        System.out.println("Perimeter of the Trapezoid: " + String.format("%.2f",
        perimeter));
    }
}

```

**Status :** Correct

**Marks : 10/10**

#### 4. Problem Statement

John is developing a car loan calculator and has structured his program using two interfaces, Principal and InterestRate, defining methods for principal and interest rate retrieval.

The Loan class implements these interfaces, taking principal and annual interest rates as parameters. User input is solicited for these values, and the program ensures their validity before performing calculations. If input values are invalid (less than or equal to zero), an error message is displayed.

Note: Total interest = principal \* interest rate \* years

##### **Input Format**

The first line of input consists of a double value P, representing the principal.

The second line consists of a double value R, representing the annual interest rate.

The third line consists of an integer value N, representing the loan duration in years.

### **Output Format**

If the input values are valid, print "Total interest paid: Rs. " followed by a double value, representing the total interest paid, rounded off to two decimal places.

If the input values are invalid (negative or zero values for principal, annual interest rate, or loan duration), print "Invalid input values!".

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 20000.00

0.05

5

Output: Total interest paid: Rs.5000.00

### **Answer**

```
import java.util.Scanner;
```

```
// You are using Java
```

```
//Typ your code
```

```
interface Principal {  
    double getPrincipal();  
}
```

```
interface InterestRate {  
    double getInterestRate();  
}
```

```
class Loan implements Principal, InterestRate {
```

```
    private double principal;
```

```
    private double annualInterestRate;
```

```
    public Loan(double principal, double annualInterestRate) {  
        this.principal = principal;  
        this.annualInterestRate = annualInterestRate;  
    }
```

```

@Override
public double getPrincipal() {
    return principal;
}

@Override
public double getInterestRate() {
    return annualInterestRate;
}

public double calculateTotalInterest(int years) {
    return principal * annualInterestRate * years;
}
}

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

        double carPrice = scanner.nextDouble();

        double annualInterestRate = scanner.nextDouble();

        int loanDuration = scanner.nextInt();

        if (carPrice <= 0 || annualInterestRate <= 0 || loanDuration <= 0) {
            System.out.println("Invalid input values!");
            return;
        }

        Loan carLoan = new Loan(carPrice, annualInterestRate);
        double totalInterest = carLoan.calculateTotalInterest(loanDuration);

        System.out.printf("Total interest paid: Rs.%.2f%n", totalInterest);
    }
}

```

**Status :** Correct

**Marks :** 10/10