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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:

Ray is developing a tax calculation program in Java. The program includes an interface named TaxCalculator with a method to calculate tax based on salary. The SimpleTaxCalculator class implements this interface and determines the tax to be paid based on the salary amount using progressive tax slabs.

Your task is to implement this system. The program first takes an integer T representing the number of test cases, followed by T salary values. For each salary, calculate the total tax to be paid based on the following progressive tax rules:

For the first 50,000 of salary, the tax rate is 5%.For the next 50,000 (i.e., from 50,001 to 1,00,000), the tax rate is 10%.For any amount above 1,00,000, the tax rate is 20%. (That is, only the amount above 1,00,000 is

taxed at 20%.)

Example

Input

3

78000

110000

23000

Output

5300

9500

1150

Explanation

For Salary Rs. 78,000

Tax = 0.1 * (78,000 - 50,000) + 0.05 * 50,000 = 5,300

For Salary Rs. 1,10,000

Tax = 0.2 * (110000 - 100000)+ 0.1 * 50,000 + 0.05 * 50,000 = 9,500

For Salary Rs. 23,000

Tax = 0.05 * 23,000 = 1,150

Input Format

The first line of the input consists of an integer, T, representing the number of test cases.

The next T lines of the input consist of a single integer, representing the annual salary of an individual, separated by a line.

Output Format

The output displays the calculated tax as an integer for each test case, separated by a line.

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 2
100
300

Output: 5
15

Answer

```
import java.util.Scanner;

interface TaxCalculator {
    int calculateTax(int salary);
}

class SimpleTaxCalculator implements TaxCalculator {
    public int calculateTax(int salary) {
        int tax = 0;
        if (salary <= 50000) {
            tax = (int)(salary * 0.05);
        } else if (salary <= 100000) {
            tax = (int)(50000 * 0.05 + (salary - 50000) * 0.10);
        } else {
            tax = (int)(50000 * 0.05 + 50000 * 0.10 + (salary - 100000) * 0.20);
        }
        return tax;
    }
}

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

        TaxCalculator taxCalculator = new SimpleTaxCalculator();

        for (int i = 0; i < T; i++) {
            int salary = scanner.nextInt();
```

```
            int tax = taxCalculator.calculateTax(salary);
            System.out.println(tax);
        }

        scanner.close();
    }
}
```

Status : Correct **Marks : 10/10**

2. 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;

interface Principal {
    double getPrincipal();
}

interface InterestRate {
    double getInterestRate();
}

class Loan implements Principal, InterestRate {
    private double principal;
    private double rate;

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

    public double getPrincipal() {
        return principal;
    }

    public double getInterestRate() {
        return rate;
    }

    public double calculateTotalInterest(int years) {
```

```
        return principal * rate * 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***

3. Problem Statement

Maria, an online store owner, is looking to implement a pricing system that calculates the final price of products after applying discounts. She needs a program that takes the original price of a product and the discount percentage as input and computes the final discounted price. The discount is applied as a percentage of the original price. Maria wants to ensure that the final price is formatted to display exactly two decimal places.

Implement this functionality using the PriceCalculator interface and the DiscountCalculator class.

Input Format

The first line of input consists of the original price (a double value).

The second line of input consists of a discount percentage (a double value).

Output Format

The output displays the final price after the discount, adhering to the following format: "Final Price after discount: $[final_price]".

Here, [final_price] should be replaced with the calculated final price, formatted as a currency value with two decimal places.

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 100.0
10.0
Output: Final Price after discount: $90.00

Answer

```
import java.util.Scanner;

// You are using Java
interface PriceCalculator {
    double calculatePrice(double originalPrice, double discount);
}

class DiscountCalculator implements PriceCalculator {
    public double calculatePrice(double originalPrice, double discount) {
        return originalPrice - (originalPrice * discount / 100);
    }
}

class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        double originalPrice = scanner.nextDouble();
        double discount = scanner.nextDouble();
        PriceCalculator calculator = new DiscountCalculator();
        double finalPrice = calculator.calculatePrice(originalPrice, discount);
        System.out.printf("Final Price after discount: $%.2f%n", finalPrice); //
```

```
Formats output to 2 decimal places
    }
}
```

Status : Correct **Marks : 10/10**

4. 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: Total caloriesBurned = (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;



interface StepCounter {
    void countSteps(int steps);
    int getTotalSteps();
}

interface CalorieCalculator {
    double calculateCaloriesBurned(int totalSteps);
}

class FitnessTracker implements StepCounter, CalorieCalculator {
    private int totalSteps;

    public FitnessTracker() {
        this.totalSteps = 0;
    }

    @Override
    public void countSteps(int steps) {
        this.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***