

Rajalakshmi Engineering College

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2024_28_III_OOPS Using Java Lab

REC_2028_OOPS using Java_Week 6_CY

Attempt : 1
Total Mark : 40
Marks Obtained : 40

Section 1 : Coding

1. Problem Statement

A bank provides two types of deposit schemes: Fixed Deposits (FD) and Recurring Deposits (RD). Customers want to calculate the interest they can earn based on their selected scheme.

Develop a Java program using inheritance to compute the interest for FD and RD. The program should include:

A base class Account with attributes accountHolder and principalAmount, along with a method for interest calculation. A subclass FixedDeposit that calculates interest for FD. A subclass RecurringDeposit that calculates interest for RD.

Formulas Used:

Interest for FD: (principal amount * duration in years * rate of interest) / 100

Interest for RD: $(\text{maturity amount} * \text{duration in months} * \text{rate of interest}) / (12 * 100)$, where maturity amount = monthly deposit * duration in months.

Input Format

The first line of input consists of the choice (1 for FD, 2 for RD).

If the choice is 1, the following lines consist of account holder (string), principal amount (double), duration in years (int), and rate of interest (double).

If the choice is 2, the following lines consist of account holder (string), monthly deposit (int), duration in months (int), and rate of interest (double).

Output Format

The output prints the calculated interest with one decimal place in the following format.

For choice 1: "Interest for FD: <calculated interest >"

For choice 2: "Interest for FD: <calculated interest >"

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 1
Alice
50000.56
5
6.5

Output: Interest for FD: 16250.2

Answer

```
import java.util.Scanner;  
  
// You are using Java  
import java.util.Scanner;  
  
class Account {  
    protected String accountHolder;
```

```
protected double principalAmount;

public Account(String accountHolder, double principalAmount) {
    this.accountHolder = accountHolder;
    this.principalAmount = principalAmount;
}

public double calculateInterest() {
    return 0.0;
}

class FixedDeposit extends Account {
    private int durationYears;
    private double rateOfInterest;

    public FixedDeposit(String accountHolder, double principalAmount, int
durationYears, double rateOfInterest) {
        super(accountHolder, principalAmount);
        this.durationYears = durationYears;
        this.rateOfInterest = rateOfInterest;
    }

    @Override
    public double calculateInterest() {
        return (principalAmount * durationYears * rateOfInterest) / 100.0;
    }
}

class RecurringDeposit extends Account {
    private int monthlyDeposit;
    private int durationMonths;
    private double rateOfInterest;

    public RecurringDeposit(String accountHolder, int monthlyDeposit, int
durationMonths, double rateOfInterest) {
        super(accountHolder, 0.0);
        this.monthlyDeposit = monthlyDeposit;
        this.durationMonths = durationMonths;
        this.rateOfInterest = rateOfInterest;
    }
}
```

```
@Override  
public double calculateInterest() {  
    double maturityAmount = monthlyDeposit * durationMonths;  
    return (maturityAmount * durationMonths * rateOfInterest) / (12.0 * 100.0);  
}  
}  
  
public class Main {  
    public static void main(String[] args) {  
        Scanner sc = new Scanner(System.in);  
  
        int choice = sc.nextInt();  
  
        switch (choice) {  
            case 1:  
                sc.nextLine();  
                String fdName = sc.nextLine();  
                double fdPrincipal = sc.nextDouble();  
                int fdDuration = sc.nextInt();  
                double fdRate = sc.nextDouble();  
  
                FixedDeposit fd = new FixedDeposit(fdName, fdPrincipal, fdDuration,  
fdRate);  
                System.out.printf("Interest for FD: %.1f", fd.calculateInterest());  
                break;  
  
            case 2:  
                sc.nextLine();  
                String rdName = sc.nextLine();  
                int rdDeposit = sc.nextInt();  
                int rdDuration = sc.nextInt();  
                double rdRate = sc.nextDouble();  
  
                RecurringDeposit rd = new RecurringDeposit(rdName, rdDeposit,  
rdDuration, rdRate);  
                System.out.printf("Interest for RD: %.1f", rd.calculateInterest());  
                break;  
  
            default:  
                System.out.println("Invalid Choice");  
        }  
    }  
}
```

2. Problem Statement

A painter needs to determine the cost to paint different shapes based on their surface area. The program should be designed to handle the area of a sphere and calculate the total painting cost using the following formulas:

Area of sphere: $\text{Area} = 4 * \pi * r^2$ where $\pi = 3.14$
Total painting cost: Cost = cost per square meter * area of sphere

The program will consist of three classes:

Shape class: This class should set the shape type and radius.
Area class: This class should extend Shape to calculate the area.
Cost class: This class should extend Area to calculate the total painting cost.

Input Format

The input consists of a string representing the shape type, a double value representing the radius, and another double value representing the cost per square meter on each line.

Output Format

For a valid shape type of "Sphere":

- The first line prints: "Area of Sphere is: <calculated_area>" rounded to two decimal places.
- The second line prints: "Cost to paint the shape is: <total_painting_cost>" rounded to two decimal places.

For any other shape types, print: "Invalid type".

Refer to the sample output for formatting specifications.

Sample Test Case

Input: Sphere

3.4

5.8

Output: Area of Sphere is: 145.19
Cost to paint the shape is: 842.12

Answer

```
import java.util.Scanner;  
  
import java.util.Scanner;  
class Shape {  
    private String type;  
    private double radius;  
  
    public void setShape(String type,Scanner scanner) {  
        this.type = type;  
        if ("Sphere".equals(type))  
        {  
            this.radius = scanner.nextDouble();  
        }  
        else  
        {  
            this.radius = 0.0;  
        }  
    }  
    public void setShape(String type)  
    {  
        this.type = type;  
    }  
  
    public String getShape() {  
        return type;  
    }  
  
    public void setRadius(double radius) {  
        this.radius = radius;  
    }  
  
    public double getRadius() {  
        return radius;  
    }  
}  
  
class Area extends Shape {  
    public double calculateArea() {  
        if ("Sphere".equals(getShape())) {
```

```

        return 4 * 3.14 *( getRadius() * getRadius());
    } else {
        return -1;
    }
}

class Cost extends Area {
    private double costPerSqMeter;

    public void setCost(double costPerSqMeter) { this.costPerSqMeter =
costPerSqMeter; }

    public double calculateCost() {
        double area = calculateArea();
        if (area == -1) {
            System.out.println("Invalid type");
            return -1;
        }
        double cost = area * costPerSqMeter;
        System.out.printf("Area of Sphere is: %.2f\n", area);
        System.out.printf("Cost to paint the shape is: %.2f\n", cost);
        return cost;
    }
}

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        String s = scanner.next();
        Cost shape = new Cost();
        shape.setShape(s, scanner);
        double costToPaint = scanner.nextDouble();
        shape.calculateArea();
        shape.setCost(costToPaint);
        shape.calculateCost();
    }
}

```

Status : Correct

Marks : 10/10

3. Problem Statement

Teena is launching a new airline, Boeing747, and needs to calculate the total revenue generated from ticket sales based on the ticket cost and seat availability. Teena's airline offers two types of seats: regular and premium. The ticket cost and seat availability for both types of seats need to be considered for revenue calculation.

To help with this, Teena wants to implement a system using multilevel inheritance with three classes:

Airline: This class will have the ticket cost as an attribute and defines the method `setCost(double cost)` and `double getCost()`.
Indigo: This class will extend Airline and add the seat availability attribute and defines the method `getSeatAvailability()` and `setSeatAvailability(int seatAvailability)`.
Boeing747: This class will extend Indigo and include a method `calculateTotalRevenue()` based on the ticket cost and seat availability .

Teena needs to calculate the total revenue using the formula:

Total Revenue = ticket cost * seat availability

Help Teena implement this system for calculating the revenue of her airline.

Input Format

The first line of input consists of a double value, representing the flight's ticket cost.

The second line consists of an integer, representing seat availability.

Output Format

The first line of output prints "Ticket Cost: Rs. " followed by a double value representing the ticket cost rounded to one decimal place.

The second line of output prints "Seat Availability: X seats" where X is an integer value representing the seat availability.

The third line of output prints "Total Revenue: Rs. " followed by a double value representing the total revenue rounded to one decimal place.

Refer to the sample output for the exact text and format.

Sample Test Case

Input: 1000.0
100

Output: Ticket Cost: Rs. 1000.0
Seat Availability: 100 seats
Total Revenue: Rs. 100000.0

Answer

```
import java.util.Scanner;  
  
class Airline {  
    private double cost;  
  
    public void setCost(double cost) {  
        this.cost = cost;  
    }  
  
    public double getCost() {  
        return cost;  
    }  
}  
  
class Indigo extends Airline {  
    private int seatAvailability;  
  
    public void setSeatAvailability(int seatAvailability) {  
        this.seatAvailability = seatAvailability;  
    }  
  
    public int getSeatAvailability() {  
        return seatAvailability;  
    }  
}  
  
class Boeing747 extends Indigo {  
    public double calculateTotalRevenue() {  
        return getCost() * getSeatAvailability();  
    }  
}
```

```

}

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Boeing747 plane = new Boeing747();

        double ticketCost = scanner.nextDouble();
        plane.setCost(ticketCost);
        int seatAvailability = scanner.nextInt();
        plane.setSeatAvailability(seatAvailability);

        System.out.printf("Ticket Cost: Rs. %.1f\n", plane.getCost());
        System.out.println("Seat Availability: " + plane.getSeatAvailability() + " seats");
        System.out.printf("Total Revenue: Rs. %.1f\n",
        plane.calculateTotalRevenue());
    }
}

```

Status : Correct

Marks : 10/10

4. Problem Statement

Teena's retail store has implemented a Loyalty Points System to reward customers based on their spending. The program calculates and displays the loyalty points based on whether the customer is a regular or a premium customer.

For regular customers (class Customer), the loyalty points are calculated as:

$$\text{Loyalty points} = \text{amount spent} / 10$$

For premium customers (class PremiumCustomer, which inherits from Customer), the loyalty points are calculated as:

$$\text{Loyalty points} = 2 * (\text{amount spent} / 10)$$

The program should use method overriding for premium customers to calculate their loyalty points. The method that needs to be overridden is calculateLoyaltyPoints in the Customer class.

Input Format

The first line of input consists of an integer representing the amount spent by the customer.

The second line consists of a string representing the premium customer status:

- "yes" if the customer is a premium customer.
- "no" if the customer is not a premium customer.

Output Format

The output should display the loyalty points earned based on the amount spent and the customer type.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 50
yes
Output: 10

Answer

```
import java.util.Scanner;  
  
// You are using Java  
class Customer {  
    public int calculateLoyaltyPoints(int amountSpend)  
    {  
        return amountSpend/10;  
    }  
}  
  
class PremiumCustomer extends Customer {  
    @Override  
    public int calculateLoyaltyPoints(int amountSpend)  
    {  
        return 2 * super.calculateLoyaltyPoints(amountSpend);  
    }  
}
```

```
public class Main {  
    public static void main(String[] args) {  
        Scanner scanner = new Scanner(System.in);  
  
        int amountSpent = scanner.nextInt();  
  
        String isPremium = scanner.next().toLowerCase();  
  
        Customer customer;  
  
        if (isPremium.equals("yes")) {  
            customer = new PremiumCustomer();  
        } else {  
            customer = new Customer();  
        }  
  
        int loyaltyPoints = customer.calculateLoyaltyPoints(amountSpent);  
  
        System.out.println(loyaltyPoints);  
    }  
}
```

Status : Correct

Marks : 10/10