

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

Arun wants to calculate the age gap between the grandfather and the son and determine the father's age after 5 years.

Your task is to assist him in developing a program using three classes: GrandFather, Father, and Son, where the GrandFather stores the grandfather's age, the Father extends GrandFather to include the father's age and calculates his age after 5 years, and Son extends Father to include the son's age and calculate the age difference between the grandfather and the son.

Input Format

The input consists of three integers representing the ages of the grandfather, father, and son, one per line.

Output Format

The first line of output prints "Grandfather and son's age gap:" followed by an integer representing the age gap between the grandfather and the son, ending with "years".

The second line prints "Father's Age:" followed by an integer representing the father's age after 5 years, ending with "years".

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 50

30

3

Output: Grandfather and son's age gap: 47 years

Father's Age: 35 years

Answer

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

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

```
class GrandFather{  
    int grandFatherAge;
```

```
    public void setGrandfatherAge(int grandFatherAge){  
        this.grandFatherAge=grandFatherAge;  
    }  
}
```

```
class Father extends GrandFather{  
    int fatherAge;
```

```
    public void setFatherAge(int fatherAge){  
        this.fatherAge=fatherAge;  
    }  
}
```

```
    public int calculateFatherAgeAfter5Years(){  
        return (fatherAge+5);  
    }  
}
```

```

    }
}

class Son extends Father{
    int sonAge;

    public void setSonAge(int sonAge){
        this.sonAge=sonAge;
    }

    public int calculateGrandfatherSonAgeDifference(){
        return (grandFatherAge-sonAge);
    }
}

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

        int grandfatherAge = scanner.nextInt();
        son.setGrandfatherAge(grandfatherAge);

        int fatherAge = scanner.nextInt();
        son.setFatherAge(fatherAge);

        int sonAge = scanner.nextInt();
        son.setSonAge(sonAge);

        System.out.println("Grandfather and son's age gap: "+
            son.calculateGrandfatherSonAgeDifference() + " years");

        int fatherAgeAfter5Years = son.calculateFatherAgeAfter5Years();
        System.out.println("Father's Age: " + fatherAgeAfter5Years + " years");
    }
}

```

Status : Correct

Marks : 10/10

2. 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: $(\text{principal amount} * \text{duration in years} * \text{rate of interest}) / 100$

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
```

```
abstract class Account{
```

```
    String accHolder;
```

```
    double principal;
```

```
    Account(String accHolder, double principal){
```

```
        this.accHolder=accHolder;
```

```
        this.principal=principal;
```

```
    }
```

```
    public abstract double calculateInterest();
```

```
}
```

```
class FixedDeposit extends Account{
```

```
    int duration;
```

```
    double rate;
```

```
    FixedDeposit(String accHolder, double principal, int duration, double rate){
```

```
        super(accHolder, principal);
```

```
        this.duration=duration;
```

```
        this.rate=rate;
```

```
    }
```

```
    public double calculateInterest(){
```

```
        return ((principal*duration*rate)/100);
```

```
    }
```

```
}
```

```
class RecurringDeposit extends FixedDeposit{
```

```
    double monthlyDeposit;
```

```
int monthlyDuration;  
double rate;
```

```
RecurringDeposit(String accHolder, double monthlyDeposit, int  
monthlyDuration, double rate){  
    super(accHolder, monthlyDeposit*monthlyDuration, monthlyDuration, rate);  
    this.monthlyDeposit=monthlyDeposit;  
    this.monthlyDuration=monthlyDuration;  
    this.rate=rate;  
}
```

```
public double calculateInterest(){  
    double maturity = principal;  
    return ((maturity*monthlyDuration*rate)/(12*100));  
}
```

```
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");
    }
}
}

```

Status : Correct

Marks : 10/10

3. Problem Statement

Mary is managing a business and wants to analyze its profitability. She operates both a regular business model and a seasonal business model. To assess profitability, she uses a program that calculates and compares the profit margins for both models based on revenue and cost.

The program defines:

BusinessUtility class with a method calculateMargin(double revenue, double cost). SeasonalBusinessUtility (inherits from BusinessUtility) and overrides calculateMargin(double revenue, double cost), adding a seasonal adjustment of 10% to the base margin. ProfitabilityChecker class with a method checkProfitability(double regularMargin), which prints "Business is profitable." if the regular margin is 10% or more, otherwise prints "Business is not profitable."

Mary inputs revenue and cost, and the program compute and display the regular and seasonal margins using:

$$\text{Margin} = ((\text{Revenue} - \text{Cost}) / \text{Revenue}) \times 100$$

$$\text{Seasonal Margin} = \text{Margin} + 10$$

Input Format

The first line of input consists of a double value r, representing the revenue.

The second line consists of a double value c , representing the cost.

Output Format

The first line prints a double value, representing the regular profit margin, rounded to two decimal places, in the format: "Regular Margin: X. XX%", where X.XX denotes the calculated regular margin.

The second line prints a double value, representing the seasonal profit margin, rounded to two decimal places, in the format: "Seasonal Margin: X. XX%", where X.XX denotes the calculated seasonal margin.

The third line prints a string, indicating whether the business is profitable or not profitable, based on the regular margin.

If the regular margin is less than 10, print "Business is not profitable.". If it is 10 or greater, print "Business is profitable."

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 1000.0

800.0

Output: Regular Margin: 20.00%

Seasonal Margin: 30.00%

Business is profitable.

Answer

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

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

```
class BusinessUtility{
```

```
    public double calculateMargin(double revenue, double cost){
```

```
        double margin = ((revenue-cost)/revenue)*100;
```

```
        return margin;
```

```
    }
```

```
}
```

```
class SeasonalBusinessUtility extends BusinessUtility{
```

```

    public double calculateMargin(double revenue, double cost){
        double margin = super.calculateMargin(revenue, cost);
        return (margin+10);
    }
}

class ProfitabilityChecker{
    public void checkProfitability(double regularMargin){

        if(regularMargin>=10)
            System.out.println("Business is profitable.");

        else
            System.out.println("Business is not profitable.");
    }
}

class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        double revenue = scanner.nextDouble();
        double cost = scanner.nextDouble();
        BusinessUtility business = new BusinessUtility();
        SeasonalBusinessUtility seasonalBusiness = new
SeasonalBusinessUtility();
        double regularMargin = business.calculateMargin(revenue, cost);
        double seasonalMargin = seasonalBusiness.calculateMargin(revenue,
cost);

        System.out.printf("Regular Margin: %.2f%%\n", regularMargin);
        System.out.printf("Seasonal Margin: %.2f%%\n", seasonalMargin);

        ProfitabilityChecker checker = new ProfitabilityChecker();
        checker.checkProfitability(regularMargin);
        scanner.close();
    }
}

```

Status : Correct

Marks : 10/10

4. Problem Statement

Bob has been tasked with creating a program using CircleUtils class to calculate and display the circumference and area of the circle.

The program should allow Bob to input the radius of a circle as both an integer and a double and compute both the circumference and area of the circle using separate overloaded methods:

calculateCircumference- To calculate the circumference using the formula $2 * 3.14 * \text{radius}$

calculateArea- To calculate the area $3.14 * \text{radius} * \text{radius}$

Write a program to help Bob.

Input Format

The first line of input consists of an integer m, representing the radius of the circle as a whole number.

The second line consists of a double value n, representing the radius of the circle as a decimal number.

Output Format

The first line of output displays two space-separated double values, rounded to two decimal places, representing the circumference of the circle with the integer radius and the double radius, respectively.

The second line displays two space-separated double values, rounded to two decimal places, representing the area of the circle with the integer radius and the double radius, respectively.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5

3.50

Output: 31.40 21.98

78.50 38.47

Answer

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

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

```
class CircleUtils{  
    public double calculateCircumference(int radius){  
        return (2*3.14*radius);  
    }  
  
    public double calculateCircumference(double radius){  
        return (2*3.14*radius);  
    }  
  
    public double calculateArea(int radius){  
        return (3.14*radius*radius);  
    }  
  
    public double calculateArea(double radius){  
        return (3.14*radius*radius);  
    }  
}
```

```
class Main {
```

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

```
        int radiusInt = scanner.nextInt();  
        double radiusDouble = scanner.nextDouble();
```

```
        CircleUtils circleUtils = new CircleUtils();
```

```
        double circumferenceInt = circleUtils.calculateCircumference(radiusInt);  
        double circumferenceDouble =  
circleUtils.calculateCircumference(radiusDouble);  
        double areaInt = circleUtils.calculateArea(radiusInt);  
        double areaDouble = circleUtils.calculateArea(radiusDouble);
```

```
        System.out.format("%.2f %.2f\n", circumferenceInt, circumferenceDouble);  
        System.out.format("%.2f %.2f", areaInt, areaDouble);
```

```
        scanner.close();
```

```
    }  
}
```

Status : Correct

Marks : 10/10