

# JAVA PROGRAMS USING CLASSES

## 1)Bank Management System

```
import java.util.Scanner;

class Account {

    protected String accountNumber;

    protected double balance;

    public Account(String accountNumber) {

        this.accountNumber = accountNumber;

        this.balance = 0.0;

    }

    public void deposit(double amount) {

        balance += amount;

        System.out.println("Deposited: " + amount);

    }

    public void withdraw(double amount) {

        if (amount <= balance) {

            balance -= amount;

            System.out.println("Withdrawn: " + amount);

        } else {

            System.out.println("Insufficient balance.");

        }

    }

    public void checkBalance() {

        System.out.println("Account Balance: " + balance);

    }

}

class SavingsAccount extends Account {

    private double interestRate;

    public SavingsAccount(String accountNumber, double interestRate) {
```

```

        super(accountNumber);

        this.interestRate = interestRate;
    }

    public void addInterest() {
        double interest = balance * (interestRate / 100);
        balance += interest;
        System.out.println("Interest added: " + interest);
    }
}

class CurrentAccount extends Account {
    private double overdraftLimit;

    public CurrentAccount(String accountNumber, double overdraftLimit) {
        super(accountNumber);
        this.overdraftLimit = overdraftLimit;
    }

    @Override
    public void withdraw(double amount) {
        if (amount <= balance + overdraftLimit) {
            balance -= amount;
            System.out.println("Withdrawn: " + amount);
        } else {
            System.out.println("Withdrawal amount exceeds overdraft limit.");
        }
    }
}

class FixedDepositAccount extends Account {
    private int tenureMonths;
    private double interestRate;

    public FixedDepositAccount(String accountNumber, int tenureMonths, double interestRate) {
        super(accountNumber);
        this.tenureMonths = tenureMonths;
    }
}

```

```

        this.interestRate = interestRate;
    }

    public void withdraw() {
        System.out.println("Withdrawal not allowed before maturity.");
    }

    public void withdraw(int months) {
        if (months >= tenureMonths) {
            double interest = balance * (interestRate / 100);
            balance += interest;
            System.out.println("Interest added: " + interest);
            balance -= balance; // Withdraw all amount after maturity
            System.out.println("Withdrawn: " + balance);
        } else {
            System.out.println("Withdrawal not allowed before maturity.");
        }
    }
}

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

        SavingsAccount savingsAccount = new SavingsAccount("SA12345", 5.0);
        CurrentAccount currentAccount = new CurrentAccount("CA54321", 2000.0);
        FixedDepositAccount fixedDepositAccount = new FixedDepositAccount("FDA98765", 12, 8.0);
        savingsAccount.deposit(5000);
        currentAccount.deposit(3000);
        fixedDepositAccount.deposit(10000);
        savingsAccount.withdraw(2000);
        currentAccount.withdraw(4000);
        fixedDepositAccount.withdraw(6);
        savingsAccount.checkBalance();
        currentAccount.checkBalance();
    }
}

```

```
        fixedDepositAccount.checkBalance();  
        scanner.close();  
    } }
```

## 2) Character Counter

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

```
public class CharacterCounter {  
    public static void main(String[] args) {  
        Scanner scanner = new Scanner(System.in);  
  
        System.out.print("Enter a string: ");  
        String input = scanner.nextLine();  
  
        int letterCount = 0;  
        int spaceCount = 0;  
        int numberCount = 0;  
        int otherCount = 0;  
  
        for (int i = 0; i < input.length(); i++) {  
            char ch = input.charAt(i);  
            if (Character.isLetter(ch)) {  
                letterCount++;  
            } else if (Character.isDigit(ch)) {  
                numberCount++;  
            } else if (Character.isWhitespace(ch)) {  
                spaceCount++;  
            } else {  
                otherCount++;  
            }  
        }  
    }  
}
```

```

        System.out.println("Letter count: " + letterCount);
        System.out.println("Space count: " + spaceCount);
        System.out.println("Number count: " + numberCount);
        System.out.println("Other characters count: " + otherCount)
        scanner.close();
    }
}

```

### 3)Exam Attendance

```

import java.util.Scanner;

public class ExamAttendance {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the total number of classes held: ");

        int totalClasses = scanner.nextInt();


        System.out.print("Enter the number of classes attended: ");

        int attendedClasses = scanner.nextInt();


        double attendancePercentage = (double) attendedClasses / totalClasses * 100;


        System.out.println("Percentage of classes attended: " + attendancePercentage + "%")
        if (attendancePercentage >= 75) {

            System.out.println("Student is allowed to sit in the exam.");

        } else {

            System.out.println("Student is not allowed to sit in the exam.");

        }

        scanner.close();

    } }

```

## 4) Bonus Calculator

```
import java.util.Scanner;

public class BonusCalculator {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter salary: ");

        double salary = scanner.nextDouble();

        System.out.print("Enter years of service: ");

        int yearsOfService = scanner.nextInt();

        double bonus = 0;

        if (yearsOfService > 5) {

            bonus = 0.05 * salary; // 5% of salary

        }

        System.out.println("Net bonus amount: " + bonus);

    }

}
```

## 5) Grade Calculator

```
import java.util.Scanner;

public class GradeCalculator {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter marks: ");

        int marks = scanner.nextInt();

        char grade;
```

```
if (marks < 25) {  
    grade = 'F';  
} else if (marks >= 25 && marks < 45) {  
    grade = 'E';  
} else if (marks >= 45 && marks < 50) {  
    grade = 'D';  
} else if (marks >= 50 && marks < 60) {  
    grade = 'C';  
} else if (marks >= 60 && marks < 80) {  
    grade = 'B';  
} else {  
    grade = 'A';  
}  
  
System.out.println("Grade: " + grade);  
}  
}
```

## 6) Quadratic Equation Solver

```
import java.util.Scanner;  
  
public class QuadraticEquationSolver {  
    public static void main(String[] args) {  
        Scanner scanner = new Scanner(System.in);  
  
        System.out.println("Enter the coefficients of the quadratic equation  $ax^2 + bx + c = 0$ :");  
  
        System.out.print("Enter a: ");  
        double a = scanner.nextDouble();  
  
        System.out.print("Enter b: ");
```

```

double b = scanner.nextDouble();

System.out.print("Enter c: ");
double c = scanner.nextDouble();

double discriminant = b * b - 4 * a * c;

if (discriminant < 0) {
    System.out.println("The quadratic equation has no real solutions.");
} else if (discriminant == 0) {
    double solution = -b / (2 * a);
    System.out.println("The quadratic equation has one real solution: x = " + solution);
} else {
    double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);
    double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);
    System.out.println("The quadratic equation has two real solutions:");
    System.out.println("x1 = " + root1);
    System.out.println("x2 = " + root2);
}
}
}

```

## 7)Tax Calculator

```

import java.util.Scanner;

public class TaxCalculator {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the income: ");
        double income = scanner.nextDouble();
        double tax = calculateTax(income);
    }
}

```



```

    if (tax == 0) {
        System.out.println("No tax applicable.");
    } else {
        System.out.println("Tax to be paid: " + tax);
    }
    scanner.close();
}

public static double calculateTax(double income) {
    if (income <= 250000) {
        return 0;
    } else if (income <= 500000) {
        return (income - 250000) * 0.1;
    } else if (income <= 1000000) {
        return 25000 + (income - 500000) * 0.2;
    } else {
        return 125000 + (income - 1000000) * 0.3;
    }
}
}

```

## 8)Calculate Aggregate

```

import java.util.Scanner;

class Student {
    private String name;
    private double[] grades;

    public Student(String name, double[] grades) {
        this.name = name;
        this.grades = grades;
    }

    public double calculateTotal() {

```

```

        double total = 0;
        for (double grade : grades) {
            total += grade;
        }
        return total;
    }

    public double calculateAggregate() {
        return calculateTotal() / grades.length;
    }

    public String calculateGrade() {
        double aggregate = calculateAggregate();
        if (aggregate > 75) {
            return "Distinction";
        } else if (aggregate >= 60 && aggregate <= 75) {
            return "First Division";
        } else if (aggregate >= 50 && aggregate < 60) {
            return "Second Division";
        } else if (aggregate >= 40 && aggregate < 50) {
            return "Third Division";
        } else {
            return "FAIL";
        }
    }
}

public class GradeCalculator {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.println("Enter student's name:");

        String name = scanner.nextLine();

        double[] grades = new double[6];

        System.out.println("Enter grades for six subjects:");
    }
}

```

```

for (int i = 0; i < 6; i++) {
    System.out.print("Grade for subject " + (i + 1) + ": ");
    grades[i] = scanner.nextDouble();
}

Student student = new Student(name, grades);
double total = student.calculateTotal();
double aggregate = student.calculateAggregate();
String grade = student.calculateGrade();
System.out.println("Total marks: " + total);
System.out.println("Aggregate: " + aggregate);
System.out.println("Grade: " + grade);
scanner.close();
}
}

```

## 9) Perfect Square With Digit Sum

```

import java.util.ArrayList;
import java.util.List;

public class PerfectSquareWithDigitSum {
    public static void main(String[] args) {
        int startRange = 1;
        int endRange = 100;
        List<Integer> result = findPerfectSquaresWithDigitSumLessThanTen(startRange, endRange);
        System.out.println("Perfect squares with digit sum less than 10 in the range " + startRange + " to " + endRange + ":");
        System.out.println(result);
    }

    public static List<Integer> findPerfectSquaresWithDigitSumLessThanTen(int start, int end) {
        List<Integer> resultList = new ArrayList<>();
        for (int i = start; i <= end; i++) {

```

```

if (isPerfectSquare(i) && digitSum(i) < 10) {
    resultList.add(i);
}
}

return resultList;
}

public static boolean isPerfectSquare(int n) {
    int sqrt = (int) Math.sqrt(n);
    return sqrt * sqrt == n;
}

public static int digitSum(int n) {
    int sum = 0;
    while (n > 0) {
        sum += n % 10;
        n /= 10;
    }
    return sum;
}
}

```

## 10)FactorFinder

```

import java.util.Scanner;

public class FactorFinder {

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

        System.out.print("Enter a number: ");

        int number = scanner.nextInt();

        System.out.println("Number of factors: " + countFactors(number));

        System.out.print("Enter the index of the factor to find: ");

        int index = scanner.nextInt();

        int factor = findNthFactor(number, index);
    }
}

```

```

        if (factor != -1)
            System.out.println("The " + index + "th factor of " + number + " is: " + factor);
        else
            System.out.println("Factor not found.");
        scanner.close();
    }

    public static int countFactors(int n) {
        int count = 0;
        for (int i = 1; i <= n; i++) {
            if (n % i == 0) {
                count++;
            }
        }
        return count;
    }

    public static int findNthFactor(int n, int index) {
        int count = 0;
        for (int i = 1; i <= n; i++) {
            if (n % i == 0) {
                count++;
                if (count == index) {
                    return i;
                }
            }
        }
        return -1;
    }
}

```

## 11)Roman To Integer

```
import java.util.*;
```

```

public class RomanToInteger {

    public static int romanToInt(String s) {

        Map<Character, Integer> romanValues = new HashMap<>();

        romanValues.put('I', 1);
        romanValues.put('V', 5);
        romanValues.put('X', 10);
        romanValues.put('L', 50);
        romanValues.put('C', 100);
        romanValues.put('D', 500);
        romanValues.put('M', 1000);

        int result = 0;
        int prevValue = 0;
        for (int i = s.length() - 1; i >= 0; i--) {
            int value = romanValues.get(s.charAt(i));
            if (value < prevValue) {
                result -= value;
            } else {
                result += value;
            }
            prevValue = value;
        }
        return result;
    }

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a Roman numeral: ");

        String romanNumeral = scanner.nextLine();

        int integerEquivalent = romanToInt(romanNumeral);

        System.out.println("Integer equivalent: " + integerEquivalent);

        scanner.close();
    } }

```

## 12)Bank Account

```
import java.util.Scanner;

class BankAccount {

    private String depositorName;

    private int accountNumber;

    private String accountType;

    private double balance;

    public BankAccount(String depositorName, int accountNumber, String accountType) {

        this.depositorName = depositorName;

        this.accountNumber = accountNumber;

        this.accountType = accountType;

        this.balance = 500.00;

    }

    public void deposit(double amount) {

        balance += amount;

        System.out.println("Amount deposited successfully.");

    }

    public void withdraw(double amount) {

        if (balance - amount >= 500.00) {

            balance -= amount;

            System.out.println("Amount withdrawn successfully.");

        } else {

            System.out.println("Insufficient balance. Minimum balance must be maintained.");

        }

    }

    public void displayBalance() {

        System.out.println("Account Holder: " + depositorName);

        System.out.println("Account Number: " + accountNumber);

        System.out.println("Account Type: " + accountType);

        System.out.println("Balance: Rs." + balance);

    }

}
```

```

    }
}

public class BankAccountMain {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter depositor name: ");
        String name = scanner.nextLine();
        System.out.print("Enter account number: ");
        int accNumber = scanner.nextInt();
        System.out.print("Enter account type (Savings/Current): ");
        scanner.nextLine();
        String accType = scanner.nextLine();
        BankAccount account = new BankAccount(name, accNumber, accType);
        System.out.print("Enter amount to deposit: ");
        double depositAmount = scanner.nextDouble();
        account.deposit(depositAmount);
        System.out.print("Enter amount to withdraw: ");
        double withdrawAmount = scanner.nextDouble();
        account.withdraw(withdrawAmount);
        account.displayBalance();
        scanner.close();
    }
}

```

### 13)Grade Calculator

```

import java.util.Scanner;

public class GradeCalculator {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in)
        System.out.print("Enter the marks in Python: ")
    }
}

```



```

int pythonMarks = scanner.nextInt();

System.out.print("Enter the marks in C Programming: ");

int cProgrammingMarks = scanner.nextInt();

System.out.print("Enter the marks in Mathematics: ");

int mathematicsMarks = scanner.nextInt();

System.out.print("Enter the marks in Physics: ");

int physicsMarks = scanner.nextInt();


int totalMarks = pythonMarks + cProgrammingMarks + mathematicsMarks + physicsMarks;

double aggregate = totalMarks / 4.0;


System.out.println("Total= " + totalMarks);

System.out.println("Aggregate= " + aggregate);


String grade = calculateGrade(aggregate);

System.out.println("Grade obtained: " + grade);


scanner.close();
}

```

```

public static String calculateGrade(double aggregate) {
    if (aggregate > 75) {
        return "Distinction";
    } else if (aggregate >= 60 && aggregate < 75) {
        return "First Division";
    } else if (aggregate >= 50 && aggregate < 60) {
        return "Second Division";
    } else if (aggregate >= 40 && aggregate < 50) {
        return "Third Division";
    } else {
        return "Fail";    } } }

```

## 14) Bonus Calculator

```
import java.util.Scanner;

public class BonusCalculator {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the grade of the employee: ");

        char grade = scanner.next().charAt(0);

        System.out.print("Enter the employee salary: ");

        double salary = scanner.nextDouble();

        double bonus = calculateBonus(grade, salary);

        double totalSalary = salary + bonus;

        System.out.println("Salary = " + salary);

        System.out.println("Bonus = " + bonus);

        System.out.println("Total to be paid: " + totalSalary);

        scanner.close();

    }

    public static double calculateBonus(char grade, double salary) {

        double bonusPercentage = 0;

        if (salary < 10000) {

            bonusPercentage += 0.02;

        }

        switch (grade) {

            case 'A':

                bonusPercentage += 0.05;

                break;

            case 'B':

                bonusPercentage += 0.1;

                break;

        }

        return salary * bonusPercentage;

    }

}
```

```
}
```

## 15)Swap Numbers

```
import java.util.Scanner;

public class SwapNumbers {

    public static void main(String[] args) {

        Scanner input = new Scanner(System.in);

        System.out.print("Enter the first number: ");

        int num1 = input.nextInt();

        System.out.print("Enter the second number: ");

        int num2 = input.nextInt();

        System.out.println("Before swapping:");

        System.out.println("First number: " + num1);

        System.out.println("Second number: " + num2);

        num1 = num1 + num2;

        num2 = num1 - num2;

        num1 = num1 - num2;

        System.out.println("After swapping:");

        System.out.println("First number: " + num1);

        System.out.println("Second number: " + num2);

        input.close();

    }

}
```

## 16)Multiplication Table

```
import java.util.Scanner;

public class MultiplicationTable {

    public static void main(String[] args) {
```

```

Scanner input = new Scanner(System.in);

System.out.print("Enter the number for multiplication table: ");

int number = input.nextInt();

System.out.print("Enter the range for multiplication table: ");

int range = input.nextInt();

System.out.println("Multiplication Table for " + number + ":");

for (int i = 1; i <= range; i++) {

    System.out.println(number + " x " + i + " = " + (number * i));

}

input.close();

}

}

```

## 17)Sum Of Natural Numbers

```

import java.util.Scanner;

public class SumOfNaturalNumbers {

    public static void main(String[] args) {

        Scanner input = new Scanner(System.in);

        System.out.print("Enter a positive integer: ");

        int n = input.nextInt();

        int sum = 0;

        for (int i = 1; i <= n; i++) {

            sum += i;

        }

        System.out.println("The sum of the first " + n + " natural numbers is: " + sum);

        input.close();

    }

}

```

## 18)Biggest Among Three

```
import java.util.Scanner;

public class BiggestAmongThree {

    public static void main(String[] args) {

        Scanner input = new Scanner(System.in);

        System.out.println("Enter three numbers:");

        double num1 = input.nextDouble();

        double num2 = input.nextDouble();

        double num3 = input.nextDouble();

        double biggest = num1;

        if (num2 > biggest) {

            biggest = num2;

        }

        if (num3 > biggest) {

            biggest = num3;

        }

        System.out.println("The biggest number is: " + biggest);

        input.close();

    }

}
```

