Write a program to input marks of students in 5 subjects, calculate total, average, and grade using methods and handle invalid marks using exception handling.

```
import java.util.*;

public class MarksCalculator {
    static char calculateGrade(double avg) {
        if (avg >= 90) return 'A';
        else if (avg >= 75) return 'B';
        else if (avg >= 60) return 'C';
        else if (avg >= 45) return 'D';
        else return 'F';
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int marks[] = new int[5];
        int total = 0;

        try {
            for (int i = 0; i < 5; i++) {
                System.out.println("Enter marks for subject " + (i + 1) + ": ");
                marks[i] = sc.nextInt();
                if (marks[i] < 0 || marks[i] > 100)
                    throw new IllegalArgumentException("Marks must be between 0
and 100.");
                total += marks[i];
            }

            double avg = total / 5.0;
            System.out.println("\nTotal = " + total);
            System.out.println("Average = " + avg);
            System.out.println("Grade = " + calculateGrade(avg));

        } catch (Exception e) {
            System.out.println("Error: " + e.getMessage());
        }
    }
}
```

Accept item names, price, and quantity. Calculate total, apply a discount if total > 2000, and display formatted bill using methods.

```
import java.util.*;

public class BillCalculator {
    static double calculateTotal(double price, int qty) {
        return price * qty;
    }

    static double applyDiscount(double total) {
        if (total > 2000) total *= 0.9; // 10% discount
        return total;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter item name: ");
        String item = sc.nextLine();
        System.out.println("Enter price: ");
        double price = sc.nextDouble();
        System.out.println("Enter quantity: ");
        int qty = sc.nextInt();

        double total = calculateTotal(price, qty);
        double finalBill = applyDiscount(total);

        System.out.println("\n====== BILL ======");
        System.out.println("Item: " + item);
        System.out.println("Total: ₹" + total);
        System.out.println("Payable after discount: ₹" + finalBill);
    }
}
```

Take a sentence and count the number of words and occurrences of a specific word using arrays and string methods.

```
import java.util.*;

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

```
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter a sentence: ");
        String sentence = sc.nextLine();

        String[] words = sentence.split("\\s+");
        System.out.println("Total words: " + words.length);

        System.out.print("Enter word to count occurrences: ");
        String target = sc.nextLine();
        int count = 0;
        for (String w : words)
            if (w.equalsIgnoreCase(target))
                count++;

        System.out.println("Occurrences of '" + target + "': " + count);
    }
}
```

Check password strength: Length ≥ 8, contains uppercase, lowercase, digit, and symbol, throw exception if invalid.

```
import java.util.*;

class WeakPasswordException extends Exception {

      WeakPasswordException(String msg) { super(msg); }

}

public class PasswordStrength {

      static void validate(String p) throws WeakPasswordException {

            if (p.length() < 8 ||

            !p.matches(".[A-Z].") ||

            !p.matches(".[a-z].") ||

            !p.matches(".\d.") ||

            !p.matches(".[!@#$%^&()].*"))

            throw new WeakPasswordException("Password must be ≥8 chars with
      uppercase, lowercase, digit, and symbol.");
```

```
      }

public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.print("Enter password: ");
    try {
        validate(sc.nextLine());
        System.out.println(" Strong Password!");
    } catch (WeakPasswordException e) {
        System.out.println("Weak Password! ");
    }
}


}
```

Simulate ATM operations like deposit, withdraw, and check balance. Use methods for each operation and handle insufficient balance with exception handling.

```
import java.util.*;

class InsufficientBalanceException extends Exception {
  InsufficientBalanceException(String msg) { super(msg); }
}

public class ATMSimulator {
  static double balance = 1000;

  static void deposit(double amt) { balance += amt; System.out.println("Deposited ₹" + amt
+ " | Balance: ₹" + balance); }


  static void withdraw(double amt) throws InsufficientBalanceException {
    if (amt > balance) throw new InsufficientBalanceException(" Insufficient Balance!");
    balance -= amt;
    System.out.println("Withdrew ₹" + amt + " | Balance: ₹" + balance);
  }

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

```
    while (true) {
      System.out.print("\n1.Deposit  2.Withdraw  3.Check Balance  4.Exit\nEnter choice:
");
      try {
        switch (sc.nextInt()) {
          case 1 -> { System.out.print("Amount: "); deposit(sc.nextDouble()); }
          case 2 -> { System.out.print("Amount: "); withdraw(sc.nextDouble()); }
          case 3 -> System.out.println("Current Balance: ₹" + balance);
          case 4 -> { System.out.println("Thank you!"); return; }
          default -> System.out.println("Invalid choice!");
        }
      } catch (Exception e) {
        System.out.println(e.getMessage());
        sc.nextLine();
      }
    }
  }
}
```

Accept basic salary and compute HRA, DA, PF, and gross salary. Display results using methods and handle invalid inputs with exceptions.

```
import java.util.*;

public class SalaryCalculator {
    static void computeSalary(double basic) {
        double hra = 0.2 * basic;
        double da = 0.1 * basic;
        double pf = 0.05 * basic;
        double gross = basic + hra + da - pf;

        System.out.println("\nHRA = " + hra);
        System.out.println("DA = " + da);
        System.out.println("PF = " + pf);
```

```
        System.out.println("Gross Salary = " + gross);
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        try {
            System.out.print("Enter basic salary: ");
            double basic = sc.nextDouble();
            if (basic <= 0)
                throw new IllegalArgumentException("Salary must be positive!");
            computeSalary(basic);
        } catch (Exception e) {
            System.out.println("Error: " + e.getMessage());
        }
    }
}
```

Accept total bill and membership type (Silver/Gold/Platinum) and apply discounts accordingly using if-else and methods.

```
import java.util.Scanner;

public class MembershipDiscount {

  static double applyDiscount(double bill, String type) {
    double discount = 0;
    if (type.equalsIgnoreCase("Silver")) discount = 0.05;
    else if (type.equalsIgnoreCase("Gold")) discount = 0.10;
    else if (type.equalsIgnoreCase("Platinum")) discount = 0.15;
    return bill - (bill * discount);
  }

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

    System.out.println("Enter total bill: ");
    double bill = sc.nextDouble();
```

```
        System.out.println("Enter membership type (Silver/Gold/Platinum): ");
        String type = sc.next();

        double finalBill = applyDiscount(bill, type);
        System.out.println("Final bill after discount: " + finalBill);
    }
}
```

For ‘n’ products, store product name, price, and quantity in arrays. Calculate total stock value and handle out-of-stock errors via exception handling.

```
import java.util.Scanner;

class OutOfStockException extends Exception {
    public OutOfStockException(String message) {
        super(message);
    }
}

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

        System.out.println("Enter number of products: ");
        int n = sc.nextInt();

        String[] names = new String[n];
        double[] prices = new double[n];
        int[] quantities = new int[n];
```

```
        for (int i = 0; i < n; i++) {
            System.out.println("Enter product " + (i + 1) + " name: ");
            names[i] = sc.next();
            System.out.println("Enter price: ");
            prices[i] = sc.nextDouble();
            System.out.println("Enter quantity: ");
            quantities[i] = sc.nextInt();
        }
             double totalValue = 0;
        for (int i = 0; i < n; i++) {
            try {
                if (quantities[i] <= 0)
                    throw new OutOfStockException(names[i] + " is out of stock!");
                totalValue += prices[i] * quantities[i];
            } catch (OutOfStockException e) {
                System.out.println(e.getMessage());
            }
        }
     System.out.println("Total stock value: " + totalValue);
       }
}
```

Process a coffee order: take customer size choice, calculate total price based on size and add-ons, and handle a list of 5 drink types.

```
import java.util.Scanner;


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

```
        String[] drinks = {"Espresso", "Latte", "Cappuccino", "Mocha", "Americano"};
        double[] prices = {100, 120, 150, 130, 110};

        System.out.println("Available drinks:");
        for (String d : drinks) System.out.println(d);

        System.out.println("Choose drink (0-4): ");
        int choice = sc.nextInt();

        System.out.println("Size (S/M/L): ");
        char size = sc.next().toUpperCase().charAt(0);

        System.out.println("Add-ons price: ");
        double addons = sc.nextDouble();

        double total = prices[choice] + addons;
        if (size == 'M') total += 20;
        else if (size == 'L') total += 40;

        System.out.println("Total price: " + total);
    }
}
```

Create a method that accepts two numbers and an operation symbol. Use a switch to perform and return the result of addition, subtraction, multiplication, or division.

```
import java.util.Scanner;

public class Calculator {

        static double calculate(double a, double b, char op) {

                return switch(op) {
```

```
                    case '+' -> a + b;
                    case '-' -> a - b;
                    case '*' -> a * b;
                    case '/' -> b != 0 ? a / b : Double.NaN;
                    default -> Double.NaN;
            };
      }
public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter two numbers: ");
    double x = sc.nextDouble(), y = sc.nextDouble();
    System.out.println("Enter operation (+,-,*,/): ");
    char op = sc.next().charAt(0);
    System.out.println("Result: " + calculate(x, y, op));
}


}
```

Input a string and count vowels, consonants, digits, and special characters using loops and conditionals.

import java.util.Scanner;

public class CountChars { public static void main(String[] args) { Scanner sc = new Scanner(System.in); System.out.print("Enter a string: "); String s = sc.nextLine();

```
   int vowels=0, consonants=0, digits=0, special=0;
    for (char c : s.toLowerCase().toCharArray()) {
        if ("aeiou".indexOf(c) != -1) vowels++;
        else if (c >= 'a' && c <= 'z') consonants++;
        else if (c >= '0' && c <= '9') digits++;
        else special++;
    }
    System.out.println("Vowels:"+vowels+", Consonants:"+consonants+",
Digits:"+digits+", Special:"+special);
}
```

} Problem 4: Customer Accounts Question: For n customers, input name, account type, and balance. Apply 4% interest for savings and 6% for fixed accounts, then display updated balances.

java Copy code import java.util.Scanner;

public class CustomerInterest { public static void main(String[] args) { Scanner sc = new Scanner(System.in); System.out.print("Number of customers: "); int n = sc.nextInt(); String[] names = new String[n], types = new String[n]; double[] balances = new double[n];

```
   for (int i=0; i<n; i++) {
        System.out.print("Name: "); names[i] = sc.next();
        System.out.print("Account type (Savings/Fixed): "); types[i] = sc.next();
        System.out.print("Balance: "); balances[i] = sc.nextDouble();

        if (types[i].equalsIgnoreCase("Savings")) balances[i] *= 1.04;
        else if (types[i].equalsIgnoreCase("Fixed")) balances[i] *= 1.06;
    }

    for (int i=0; i<n; i++)
        System.out.println(names[i] + " updated balance: " + balances[i]);
}
```

} Problem 5: Celsius to Fahrenheit Question: Read 5 daily temperatures into an array. Use a loop and a method to convert each temperature from Celsius to Fahrenheit, displaying both.

java Copy code import java.util.Scanner;

public class TempConvert { static double toFahrenheit(double c) { return c * 9/5 + 32; }

```
public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    double[] temps = new double[5];
    for (int i=0; i<5; i++) {
        System.out.print("Enter temp "+(i+1)+": ");
        temps[i] = sc.nextDouble();
    }
    for (double c : temps)
        System.out.println(c+"C = "+toFahrenheit(c)+"F");
}
```

} Problem 6: Electricity Bill Question: Accept number of units consumed and calculate bill based on slab rates using conditionals and methods.

java Copy code import java.util.Scanner;

public class ElectricityBill { static double calcBill(int units) { if (units <= 100) return units*5; else if (units <= 200) return 100*5 + (units-100)*7; else return 100*5 + 100*7 + (units-200)*10; }

```
public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.print("Enter units: ");
    int u = sc.nextInt();
    System.out.println("Bill: " + calcBill(u));
}
```

} Problem 7: Palindrome Check Question: Input a string and check if it's a palindrome (ignore case and spaces). Use string methods and exception handling.

java Copy code import java.util.Scanner;

public class PalindromeCheck { public static void main(String[] args) { Scanner sc = new Scanner(System.in); System.out.print("Enter string: "); String s = sc.nextLine().replaceAll("\s", "").toLowerCase();

```
   try {
        String rev = new StringBuilder(s).reverse().toString();
        System.out.println(rev.equals(s) ? "Palindrome" : "Not Palindrome");
    } catch (Exception e) {
        System.out.println("Error: " + e.getMessage());
    }
}
```

} Problem 8: Character Replacement Question: Read a word (String). Use a loop and a switch on each character to replace 'a' with '4', 'e' with '3', and 'o' with '0'.

java Copy code import java.util.Scanner;

public class ReplaceChars { public static void main(String[] args) { Scanner sc = new Scanner(System.in); System.out.print("Enter a word: "); String s = sc.next();

```
   StringBuilder sb = new StringBuilder();
    for (char c : s.toCharArray()) {
        switch(c) {
            case 'a': sb.append('4'); break;
            case 'e': sb.append('3'); break;
            case 'o': sb.append('0'); break;
            default: sb.append(c);
```

```
        }
    }
    System.out.println("Modified word: " + sb);
}


}
```