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Exercise 1.b (classes and objects)

Q1. Create a Student class with attributes such as name, age, and grade. Write a program that creates an instance of the Student class, takes user input to set the values of the attributes, and then prints the details of the student.

```java
import java.util.Scanner;

public class Student {
    String name;
    int age;
    String grade;

    public Student(String name, int age, String grade) {
        this.name = name;
        this.age = age;
        this.grade = grade;
    }

    public void displayDetails() {
        System.out.println("Student Details:");
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
        System.out.println("Grade: " + grade);
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter student name: ");
        String name = scanner.nextLine();
        System.out.print("Enter student age: ");
        int age = scanner.nextInt();
        scanner.nextLine();
        System.out.print("Enter student grade: ");
        String grade = scanner.nextLine();
        Student student = new Student(name, age, grade);
        student.displayDetails();
        scanner.close();
    }
}
```

```
Output
java -cp /tmp/XA1bGV7U0Y Student
Enter student name: Vinayak
Enter student age: 21
Enter student grade: A
Student Details:
Name: VinayakAge: 21
Grade: A
```

Q2. Create a Circle class with a radius attribute and methods to calculate the area and circumference. Write a program that takes user input for the radius, creates an instance of the Circle class, and prints the calculated area and circumference.

```java
import java.util.Scanner;

public class Circle {
    public double radius;
    public Circle(double radius) {
        this.radius = radius;
    }
    public double calcArea() {
        return Math.PI * radius * radius;
    }
    public double calcCircumference() {
        return 2 * Math.PI * radius;
    }
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the radius of circle: ");
        double radius = scanner.nextDouble();
        Circle circle = new Circle(radius);
        System.out.println("\n Area of circle: " + circle.calcArea());
        System.out.println("\n Circumference of circle: " + circle.calcCircumference());
        scanner.close();
    }
}
```

```
Output
java -cp /tmp/XA1bGV7U0Y Circle
Circle Details:
Radius:5
Area: 78.54
Circumference: 31.42
```

Q3. Create a Rectangle class with attributes length and width and a method to calculate the area. Write a program that takes user input for the length and width, creates an instance of the Rectangle class, and prints the calculated area.

```java
import java.util.Scanner;

public class Rectangle {
    public double length;
    public double width;
    public Rectangle(double length, double width) {
        this.length = length;
        this.width = width;
    }
    public double calcArea() {
        return length * width;
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the length of the rectangle: ");
        double length = scanner.nextDouble();
        System.out.print("Enter the width of the rectangle: ");
        double width = scanner.nextDouble();
        Rectangle rectangle = new Rectangle(length, width);
        System.out.println("Area of the rectangle: " + rectangle.calcArea());

        scanner.close();
    }
}
```

Output

```
java -cp /tmp/XA1bGV7UOY Rectangle
Enter the length of the rectangle: 4
Enter the width of the rectangle: 5
Area of the rectangle: 20.0
```

Q4. Create a BankAccount class with attributes such as accountNumber, accountHolder, and balance. Include methods to deposit and withdraw money. Write a program that takes user input to perform these operations on a bank account.

```java
import java.util.Scanner;

public class BankAccount {
    public int accountNumber;
    public String accountHolder;
    public double balance;
    public BankAccount(int accountNumber, String accountHolder, double balance) {
        this.accountNumber = accountNumber;
        this.accountHolder = accountHolder;
        this.balance = balance;
    }
    public void deposit(double amount) {
        balance += amount;
    }
    public boolean withdraw(double amount) {
        if (amount <= balance) {
            balance = balance - amount;
            return true;
        }
        return false;
    }

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

        System.out.print("Enter account number: ");
        int accountNumber = scanner.nextInt();
        scanner.nextLine();

        System.out.print("Enter account holder name: ");
        String accountHolder = scanner.nextLine();

        System.out.print("Enter initial balance: ");
        double initialBalance = scanner.nextDouble();
        BankAccount account = new BankAccount(accountNumber, accountHolder, initialBalance);

        System.out.print("Enter amount to deposit: ");
        double depositAmount = scanner.nextDouble();

        System.out.print("Enter amount to withdraw: ");
        double withdrawAmount = scanner.nextDouble();
        account.deposit(depositAmount);
        boolean isWithdrawn = account.withdraw(withdrawAmount);

        System.out.println("\n Account Details:");
```

```
        System.out.println("\n Account Number: " + account.accountNumber);
        System.out.println("\n Account Holder: " + account.accountHolder);
        System.out.printf("\n Current Balance: %.2f\n", account.balance);

        if (isWithdrawn) {
            System.out.println("\n Withdrawal successful.");
        } else {
            System.out.println("\n Insufficient balance for withdrawal.");
        }

        scanner.close();
    }
}
```

Output

```
java -cp /tmp/XA1bGV7U0Y BankAccount
Enter account number: 12345
Enter account holder name: Vinayak
Enter initial balance: 10000
Enter amount to deposit: 1000
Enter amount to withdraw: 500
Account Details:
Account Number: 12345
Account Holder: Vinayak
Current Balance: 10500.00

 Withdrawal successful.
```