Task 1: Basic Object Manipulation

Objective

Create a simple class representing a Book and demonstrate passing an object of this class to a method.

Instructions

1. **Create a Book class** with the following attributes:
    - String title
    - String author
    - double price
2. **Implement a method** called displayBookInfo(Book book) that takes a Book object as a parameter and prints its details.
3. **Create a main class** that:
    - Instantiates a Book object.
    - Calls the displayBookInfo method to display the book's information.

Example Output

Title: Effective Java
Author: Joshua Bloch
Price: $45.00

Task 2: Modifying Object State

Objective

Learn how to modify the state of an object passed to a method.

Instructions

1. **Create a Rectangle class** with the following attributes:
    - double length
    - double width
2. **Implement a method** called resizeRectangle(Rectangle rect, double newLength, double newWidth) that modifies the dimensions of the rectangle.
3. **Create a main class** that:
    - Instantiates a Rectangle object.
    - Prints its original dimensions.
    - Calls the resizeRectangle method.
    - Prints the modified dimensions.

Example Output

Original Dimensions: Length = 5.0, Width = 3.0
Resized Dimensions: Length = 10.0, Width = 6.0

Task 3: Object Comparison

Objective

Understand how to compare two objects passed to a method.

Instructions

1. **Create a Person class** with the following attributes:
    - String name
    - int age
2. **Implement a method** called compareAges(Person p1, Person p2) that compares the ages of two Person objects and returns a string indicating which person is older or if they are the same age.
3. **Create a main class** that:
    - Instantiates two Person objects.
    - Calls the compareAges method and prints the result.

Example Output

Alice is older than Bob.

Task 4: Object Array Manipulation

Objective

Work with arrays of objects and demonstrate passing an array to a method.

Instructions

1. **Create a Student class** with the following attributes:
    - String name
    - double grade
2. **Implement a method** called printStudentGrades(Student[] students) that takes an array of Student objects and prints each student's name and grade.
3. **Create a main class** that:
    - Instantiates an array of Student objects.
    - Calls the printStudentGrades method to display the grades.

Example Output

Name: John, Grade: 90.5
Name: Sarah, Grade: 85.0
Name: Mike, Grade: 78.0

Task 5: Encapsulation and Method Overloading

Objective

Explore encapsulation and method overloading with object parameters.

Instructions

1. **Create a Car class** with private attributes:
    - String model
    - int year

Provide public getter and setter methods for these attributes.

2. **Implement two overloaded methods**:
    - void updateCar(Car car) that updates the car's model and year based on the passed object.
    - void updateCar(String model, int year) that updates the current object's attributes.
3. **Create a main class** that:
    - Instantiates a Car object.
    - Calls both overloaded methods to demonstrate their functionality.

Example Output

Original Car: Model = Toyota, Year = 2020
Updated Car (from object): Model = Honda, Year = 2022
Updated Car (from parameters): Model = Ford, Year = 2023