PW 02 : Basic concept of OOP

Exercise 01: From Procedural to Object-Oriented Programming / Calculating the Area and Perimeter of a Rectangle

This exercise aims to help you understand the difference between:

- Procedural programming (using the C language), and
- Object-Oriented Programming (OOP) (using Java),

through a simple mathematical problem: calculating the area and perimeter of a rectangle.

Part 1 – Procedural Version (C Language)

Write a C program named **rectangle_procedural.c** that calculates:

- the area of a rectangle, and
- the perimeter of a rectangle.

Your program should:

1. Declare two variables length and width (type double).
2. Define a constant named NUMBER_OF_SIDES with the value 4.
3. Implement two functions:
    - calculateArea(double length, double width)
    - calculatePerimeter(double length, double width)
4. In the main() function, assign values to length and width, then display:
    - the length and width,
    - the calculated area,
    - the calculated perimeter.

In this version, data and functions are kept separate (this is the procedural approach).

Part 2 – Object-Oriented Version (Java Language)

Write a Java program named **RectangleOOP.java** that performs the same calculation, but this time following the object-oriented programming model.

Your program should:

1. Define a **class** named RectangleOOP.
2. Declare two **variables**: length and width (type double).
3. Define a **constant** named NUMBER_OF_SIDES with the value 4.
4. Create two **methods**:
    - calculateArea()
    - calculatePerimeter()
5. In the main(String[] args) method:
    - Assign values to length and width.
    - Call the two methods to display the results.

In this version, both data and operations are grouped together inside the same class (this is the essence of object-oriented programming.)

Part 3 – Reflection: Comparing the Two Approaches

After writing both programs on your notebook and testing them, answer the following questions:

1. What are the **main differences** between the procedural (C) and object-oriented (Java) versions?
2. Where are the **data** and **functions/methods** located in each version?
3. What are the **advantages** of procedural programming?
4. What are the **advantages** of object-oriented programming?
5. What are the **disadvantages** of each approach?