# Exercise 4: Arrange-Act-Assert (AAA) Pattern, Test Fixtures, and Setup/Teardown in JUnit (Using Eclipse)

## 📘Scenario

You will:  
  
- Structure tests using the Arrange-Act-Assert (AAA) pattern  
- Use @Before and @After annotations for setup and teardown

## Prerequisites

- Eclipse IDE  
- Java JDK 8 or higher  
- Maven support in Eclipse

## Steps to Follow

### Step 1: Create a New Maven Project

1. Open Eclipse  
2. Go to: File > New > Project… > Maven > Maven Project  
3. Use default workspace → Click Next  
4. Select Archetype: maven-archetype-quickstart  
5. Provide:  
 - Group Id: com.example  
 - Artifact Id: JUnitAAATestDemo  
6. Click Finish

### Step 2: Add JUnit to pom.xml

In <dependencies>, paste:

<dependency>  
 <groupId>junit</groupId>  
 <artifactId>junit</artifactId>  
 <version>4.13.2</version>  
 <scope>test</scope>  
</dependency>

Then right-click the project → Maven > Update Project

### Step 3: Create a Calculator Class

In src/main/java/com/example, create Calculator.java:

package com.example;  
  
public class Calculator {  
 public int add(int a, int b) {  
 return a + b;  
 }  
  
 public int subtract(int a, int b) {  
 return a - b;  
 }  
}

### Step 4: Create the Test Class

In src/test/java/com/example, create CalculatorTest.java:

package com.example;  
  
import org.junit.After;  
import org.junit.Before;  
import org.junit.Test;  
import static org.junit.Assert.\*;  
  
public class CalculatorTest {  
  
 private Calculator calculator;  
  
 @Before  
 public void setUp() {  
 calculator = new Calculator();  
 System.out.println("Setup completed");  
 }  
  
 @After  
 public void tearDown() {  
 calculator = null;  
 System.out.println("Teardown completed");  
 }  
  
 @Test  
 public void testAddition() {  
 int result = calculator.add(5, 3);  
 assertEquals(8, result);  
 }  
  
 @Test  
 public void testSubtraction() {  
 int result = calculator.subtract(10, 4);  
 assertEquals(6, result);  
 }  
}

### AAA Breakdown

|  |  |
| --- | --- |
| Phase | Description |
| Arrange | @Before sets up the environment |
| Act | The method under test is executed |
| Assert | assertEquals checks the result |
| Teardown | @After resets the environment |

### Step 5: Run the Test

Right-click CalculatorTest.java → Run As > JUnit Test  
Check for the ✅ green bar (tests passed) or ❌ red (tests failed)

## Console Output

Setup completed  
Teardown completed  
Setup completed  
Teardown completed