

Testing

Exercise 1: Setting Up Junit

The screenshot displays the IntelliJ IDEA IDE interface. The top toolbar shows the 'Testing' tab selected. The left sidebar shows the project structure for 'Testing' at 'C:\Users\rupsh\OneDrive\Desktop\Java_Testing\Testing'. The project structure includes 'src' (main, test) and 'target' directories. The 'test' directory contains 'AppTest' and 'AssertionTest' classes. The 'pom.xml' file is open in the editor, showing the Maven configuration. The configuration includes the project name 'Testing', the URL 'http://maven.apache.org', and the dependencies for JUnit 4.13.2. The 'Run' button is visible in the bottom toolbar. The bottom panel shows the test results for 'AssertionTest' (org.example), indicating that 1 test passed in 13 ms. The console output shows the command 'C:\Program Files\Java\jdk-21\bin\java.exe' and the message 'Process finished with exit code 0'.

```
<?xml version="1.0" encoding="UTF-8" ?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>

    <groupId>org.example</groupId>
    <artifactId>Testing</artifactId>
    <version>1.0-SNAPSHOT</version>
    <packaging>jar</packaging>

    <name>Testing</name>
    <url>http://maven.apache.org</url>

    <properties>
        <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
    </properties>

    <dependencies>
        <dependency>
            <groupId>junit</groupId>
            <artifactId>junit</artifactId>
            <version>4.13.2</version>
            <scope>test</scope>
        </dependency>
    </dependencies>
</project>
```

Run AssertionTest x

✓ AssertionTest (org.example) 13 ms

✓ testAssertions 13 ms

✓ 1 test passed 1 test total, 13 ms

"C:\Program Files\Java\jdk-21\bin\java.exe" ...

Process finished with exit code 0

Exercise 2: Writing Basic JUnit Tests

The screenshot shows the IntelliJ IDEA IDE interface. The top toolbar includes icons for Testing and Version control. The Project view on the left shows a project structure with a 'test' directory containing 'AppTest'. The main editor displays the 'Calculator.java' file, which defines a 'Calculator' class and a 'Calc' class. The 'Calculator' class has a 'main' method that uses the 'Calc' class to perform arithmetic operations. The 'Calc' class has methods for addition, subtraction, multiplication, and division, with a check for division by zero. The bottom panel shows the Run configuration for 'Calculator' and the output of the program, which prints the results of the operations: 5, 1, 12, and 0.

```
package org.example;

class Calc {
    public int add(int a, int b) {
        return a + b;
    }
    public int subtract(int a, int b) {
        return a - b;
    }
    public int multiply(int a, int b) {
        return a * b;
    }
    public int divide(int a, int b) {
        if (b == 0) {
            throw new IllegalArgumentException("Cannot divide by zero!");
        }
        return a / b;
    }
}

public class Calculator {
    public static void main( String[] args ) {
        Calc c = new Calc();
        int r1=c.add( 2, 3);
        System.out.println(r1);
        int r2=c.subtract( 4, 3);
        System.out.println(r2);
        int r3=c.multiply( 3, 4);
        System.out.println(r3);
        int r4=c.divide( 5, 6);
        System.out.println(r4);
    }
}
```

Run Configuration: Calculator

Command: "C:\Program Files\Java\jdk-21\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2025.1.1\lib\idea_rt.jar=49704" -Dfile.encoding=UTF-8 -Dsun.st...

Output:

```
5
1
12
0
```

Testing > src > main > java > org > example > Calculator.java

Testing Version control

Project

- Testing C:\Users\rupsh\OneDrive\Desktop\Java_Testing\Testing
 - .idea
 - .mvn
 - src
 - main
 - java
 - org.example
 - Calculator.java
 - AppTest
 - test
 - java
 - org.example
 - AppTest
 - target
 - .gitignore
 - pom.xml
 - External Libraries
 - Scratches and Consoles

pom.xml (Testing) Calculator.java AppTest.java

```
1 package org.example;
2
3 import org.junit.Test;
4 import static org.junit.Assert.assertEquals;
5
6 public class AppTest {
7     Cal c = new Cal(); 5 usages
8     @Test
9     public void testAdd() {
10         assertEquals( expected: 5, c.add( a: 2, b: 3));
11     }
12     @Test
13     public void testSubtract() {
14         assertEquals( expected: 1, c.subtract( a: 4, b: 3));
15     }
16     @Test
17     public void testMultiply() {
18         assertEquals( expected: 12, c.multiply( a: 3, b: 4));
19     }
20     @Test
21     public void testDivide() {
22         assertEquals( expected: 2, c.divide( a: 10, b: 5));
23     }
24     @Test(expected = IllegalArgumentException.class)
25     public void testDivideByZero() {
26         c.divide( a: 10, b: 0); // should throw exception
27     }
28 }
```

Run AppTest

AppTest (org.example) 13 ms

- testDivideByZero 9 ms
- testAdd 1 ms
- testSubtract 1 ms
- testDivide 1 ms
- testMultiply 1 ms

5 tests passed 5 tests total, 13 ms

*C:\Program Files\Java\jdk-21\bin\java.exe" ...

Process finished with exit code 0

Testing > src > test > java > org > example > AppTest > testDivide

Testing Version control

Project

- Testing C:\Users\rupsh\OneDrive\Desktop\Java_Testing\Testing
 - .idea
 - .mvn
 - src
 - main
 - java
 - org.example
 - Calculator.java
 - AppTest
 - test
 - java
 - org.example
 - AppTest
 - target
 - .gitignore
 - pom.xml
 - External Libraries
 - Scratches and Consoles

pom.xml (Testing) Calculator.java AppTest.java

```
1 package org.example;
2
3 import org.junit.Test;
4 import static org.junit.Assert.assertEquals;
5
6 public class AppTest {
7     Cal c = new Cal(); 5 usages
8     @Test
9     public void testAdd() {
10         assertEquals( expected: 5, c.add( a: 2, b: 3));
11     }
12     @Test
13     public void testSubtract() {
14         assertEquals( expected: 1, c.subtract( a: 4, b: 3));
15     }
16     @Test
17     public void testMultiply() {
18         assertEquals( expected: 12, c.multiply( a: 3, b: 4));
19     }
20     @Test
21     public void testDivide() {
22         assertEquals( expected: 2, c.divide( a: 10, b: 0));
23     }
24     @Test(expected = IllegalArgumentException.class)
25     public void testDivideByZero() {
26         c.divide( a: 10, b: 0); // should throw exception
27     }
28 }
```

Run AppTest

AppTest (org.example) 39ms

- testDivideByZero 13 ms
- testAdd 0ms
- testSubtract 2ms
- testDivide 24ms
- testMultiply 0ms

1 test failed, 4 passed 5 tests total, 39ms

*C:\Program Files\Java\jdk-21\bin\java.exe" ...

java.lang.IllegalArgumentException: Cannot divide by zero!

at org.example.Cal.divide(Calculator.java:15)
> at org.example.AppTest.testDivide(AppTest.java:28) <6 internal lines>
> <19 folded frames>

Process finished with exit code -1

Testing > src > test > java > org > example > AppTest

Exercise 3: Assertions in Junit

The screenshot displays the IntelliJ IDEA IDE interface. The top toolbar shows 'Testing' and 'Version control' tabs. The left sidebar shows the project structure for 'Testing' at 'C:\Users\rupsh\OneDrive\Desktop\Java_Testing\Testing'. The main editor window shows the code for 'AssertionTest.java' with the following content:

```
1 package org.example;
2
3 import org.junit.Test;
4 import static org.junit.Assert.*;
5
6 public class AssertionTest {
7
8     @Test
9     public void testAssertions() {
10         assertEquals( expected: 5, actual: 2 + 3);
11
12         assertTrue( condition: 5 > 3);
13
14         assertFalse( condition: 5 < 3);
15
16         assertNull( object: null);
17
18         assertTrue( condition: 5>2);
19         assertFalse( condition: 5<2);
20         assertNull( object: null);}
21
22         assertNotNull(new Object());
23     }
24 }
25
26
27
```

The bottom panel shows the 'Run' configuration for 'AssertionTest'. The test results indicate that 1 test passed (testAssertions) in 13 ms. The console output shows the command executed: `"C:\Program Files\Java\jdk-21\bin\java.exe" ...` and the message: `Process finished with exit code 0`.