

# TP08

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## 1 exercise 01

```
public class Calculator { no usages

    /**
     * Returns the sum of two integers.
     */
    public int add(int a, int b) {
        return a + b;
    }
}
```

Figure 1: Calculator class

```
import static org.junit.jupiter.api.Assertions.*;
import org . junit . jupiter . api . Test ;

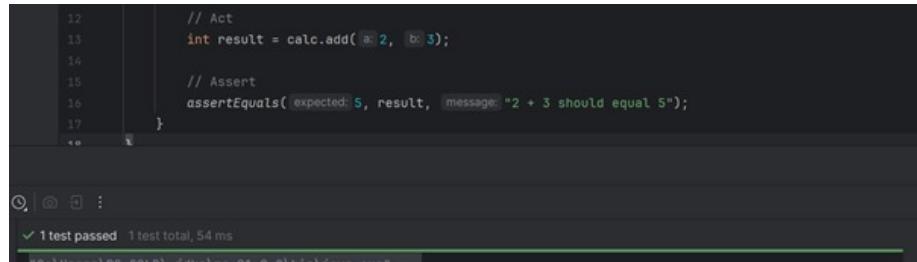
public class CalculatorTest {

    @Test
    void addTwoPositiveNumbersShouldReturnSum() {
        // Arrange
        Calculator calc = new Calculator();

        // Act
        int result = calc.add( a: 2, b: 3);

        // Assert
        assertEquals( expected: 5, result, message: "2 + 3 should equal 5");
    }
}
```

Figure 2: test class



```
12     // Act
13     int result = calc.add( a: 2, b: 3);
14
15     // Assert
16     assertEquals( expected: 5, result, message: "2 + 3 should equal 5");
17 }
```

Output: ✓ 1 test passed 1 test total, 54 ms

Figure 3: Test passed

```
public class Calculator { 2 usages

    /**
     * Returns the sum of two integers.
     */
    public int add(int a, int b) {
        return a - b;
    }
}
```

Figure 4: replacing the addition with the subtraction

A screenshot of an IDE interface. The code editor shows a Java test class with one test method. The test fails with the message "1 test failed".

```
11     // Act
12     int result = calc.add( a: 2, b: 3 );
13
14     // Assert
15     assertEquals( expected: 5, result, message: "2 + 3 should equal 5" );
16 }
17
18 }
19
```

1 test failed 1 test total, 87 ms  
src\CalculatorTest.java:21: in method void add(int, int)

Figure 5: Test failed

A screenshot of an IDE interface. The code editor shows the `Calculator` class with four new methods: `subtract`, `multiply`, and `divide`.

```
public class Calculator { 2 usages

    /**
     * Returns the sum of two integers.
     */
    public int add(int a, int b) {
        return a + b;
    }

    public int subtract(int a,int b){ no usages
        return a - b;
    }

    public int multiply(int a, int b){ no usages
        return a * b;
    }

    public float divide(int a, int b){ no usages
        return a / b;
    }
}
```

Figure 6: adding new methods to Calculator

A screenshot of an IDE interface. The code editor shows a new test method `subtracttwoPositiveNumbersShouldReturnSubtraction` that tests the `subtract` method.

```
void subtracttwoPositiveNumbersShouldReturnSubtraction() { no usages
    // Arrange
    Calculator calc = new Calculator();

    // Act
    int result = calc.subtract( a: 2, b: 3);

    // Assert
    assertEquals( expected: -1, result, message: "2 - 3 should equal -1");
}
```

Figure 7: adding subtract tester

```
        }
    }

    void multiplyTwoNumbersShouldReturnmultiplication() { no usages
        // Arrange
        Calculator calc = new Calculator();

        // Act
        int result = calc.multiply( a: 2, b: 3);

        // Assert
        assertEquals( expected: 6, result, message: "2 * 3 should equal 6");
    }
}
```

Figure 8: adding multiply tester

```
        }
    }

    void devideTwoNumbersShouldReturndevision() { no usages
        // Arrange
        Calculator calc = new Calculator();

        // Act
        float result = calc.divide( a: 3, b: 2);

        // Assert
        assertEquals( expected: 1.5, result, message: "2 / 3 should equal 1.5");
    }
}
```

Figure 9: Adding divide tester

```
java
    42
    43     // Act
    44     float result = calc.divide( a: 3, b: 2);
    45
    46     // Assert
    47     assertEquals( expected: 1.5, result, message: "2 / 3 should equal 1.5");
    48 }

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```

    @Test
    void divideByZeroShouldThrowException() {
        // Arrange
        Calculator calc = new Calculator();

        // Act & Assert
        assertThrows(IllegalArgumentException.class, () -> {
            |   calc.divide( 10, 0 );
        }, message: "Dividing by zero should throw IllegalArgumentException");
    }
}

```

46 ms 2 tests passed 2 tests total, 46 ms  
"C:\Users\PC GOLD\.jdks\ms-21.0.8\bin\java.exe" ...  
Process finished with exit code 0

Figure 12: Editing CalculatorTest and we find that the test has passed

## 2 Exercise 02

### Task 1: Boundary Value Analysis Test Cases

The regulator has a tolerance zone of  $\pm 0.5^{\circ}\text{C}$  around the target temperature. The following test cases are derived using Boundary Value Analysis (BVA):

1. **Test 1:** Current temperature = target - 0.51°C → Expected action: HEAT
2. **Test 2:** Current temperature = target - 0.50°C → Expected action: STANDBY
3. **Test 3:** Current temperature = target - 0.49°C → Expected action: STANDBY
4. **Test 4:** Current temperature = target → Expected action: STANDBY
5. **Test 5:** Current temperature = target + 0.49°C → Expected action: STANDBY
6. **Test 6:** Current temperature = target + 0.50°C → Expected action: STANDBY
7. **Test 7:** Current temperature = target + 0.51°C → Expected action: COOL