Get started with JUnit

Last modified: 19 September 2024

In this tutorial, you will learn how to set up JUnit for your projects, create tests, and run them to see if your code is operating correctly. It contains just the basic steps to get you started.

If you want to know more about JUnit, refer to the official documentation ↗. To learn more about testing features of IntelliJ IDEA, refer to other topics in this section.

You can choose to follow the tutorial using either Maven, Gradle, or the IntelliJ builder.

Maven Gradle IntelliJ build tool

Create a project

1. In the main menu, go to **File | New | Project**.
2. In the **New Project** wizard, select **Java** from the list on the left.
3. Specify the name for the project, for example, `junit-tutorial`, and select **Maven** as a build tool.
4. From the **JDK** list, select the JDK that you want to use in your project.

   If the JDK is installed on your computer, but not defined in the IDE, select **Add JDK** and specify the path to the JDK home directory.

If you don't have the necessary JDK on your computer, select **Download JDK**.

5. Click **Create**.

For more information about working with Maven projects, refer to Maven.

Add dependencies

For our project to use JUnit features, we need to add JUnit as a dependency.

1. Open `pom.xml` in the root directory of your project.

   To quickly navigate to a file, press Ctrl Shift N and enter its name.

2. In `pom.xml`, press Alt Insert and select **Dependency**.

3. In the dialog that opens, type `org.junit.jupiter:junit-jupiter` in the search field.

   Locate the necessary dependency in the search results and click **Add**.

4. When the dependency is added to `pom.xml`, press Ctrl Shift O or click ⟳ in the **Maven** tool window to import the changes.

The procedure above shows the 'manual' way so that you know what happens behind the scenes and where you set up the testing framework. However, if you just start writing tests, IntelliJ IDEA will automatically detect if the dependency is missing and prompt you to add it.

Write application code

Let's add some code that we'll be testing.

1. In the **Project** tool window Alt 1, go to `src/main/java` and create a Java file called `Calculator.java`.

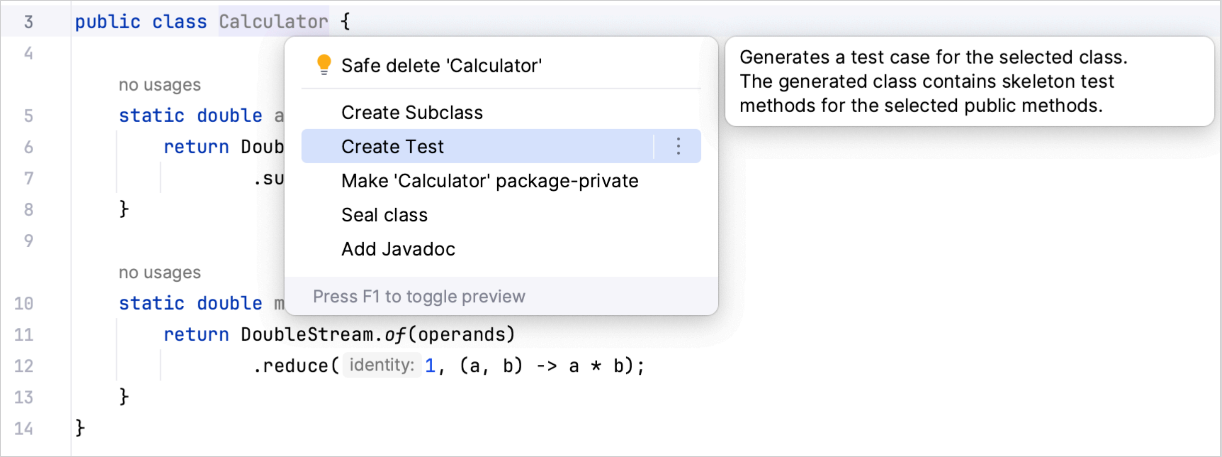
2. Paste the following code in the file:

```
import java.util.stream.DoubleStream;

public class Calculator {

    static double add(double... operands) {
        return DoubleStream.of(operands)
                .sum();
    }

    static double multiply(double... operands) {
        return DoubleStream.of(operands)
                .reduce(1, (a, b) -> a * b);
    }
}
```

Create tests

Now let's create a test. A **test** is a piece of code whose function is to check if another piece of code is operating correctly. In order to do the check, it calls the tested method and compares the result with the predefined **expected result.** An expected result can be, for example, a specific return value or an exception.

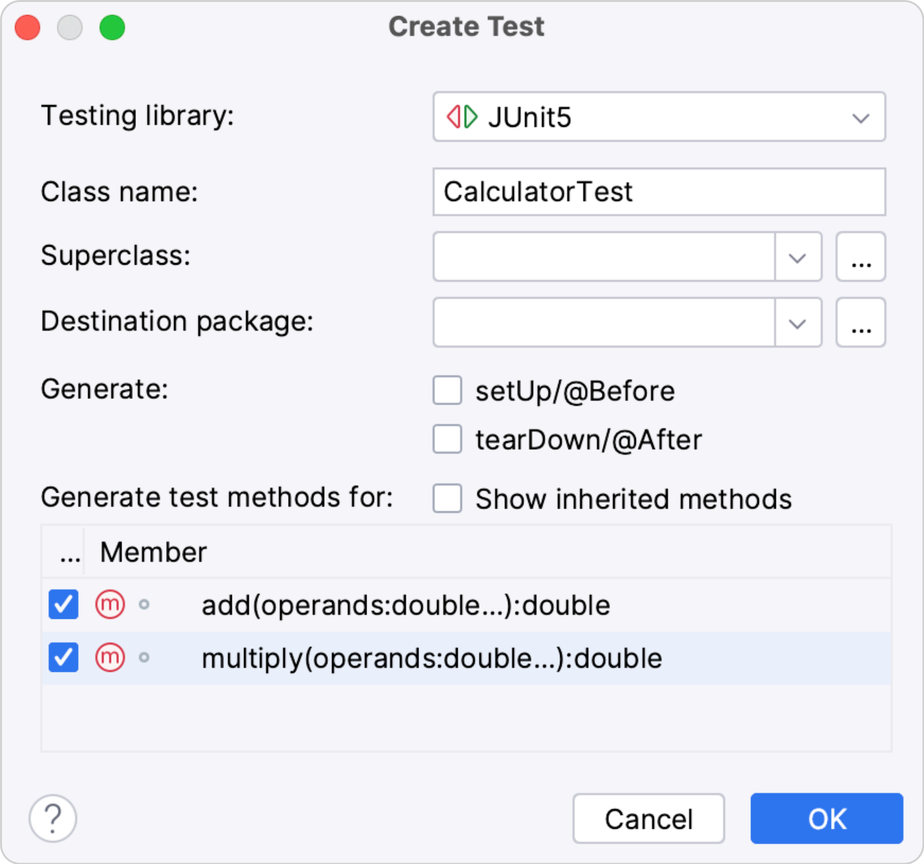
1. Place the caret at the `Calculator` class declaration and press Alt Enter. Alternatively, right-click it and select **Show Context Actions**. From the menu, select **Create test**.



```
public class Calculator {

    no usages
    static double a
        return Doub
                .su
    }

    no usages
    static double m
        return DoubleStream.of(operands)
                .reduce( identity: 1, (a, b) -> a * b);
    }
}
```

Generates a test case for the selected class. The generated class contains skeleton test methods for the selected public methods.

2. Select the two class methods that we are going to test.



Testing library: JUnit5

Class name: CalculatorTest

Superclass:

Destination package:

Generate: □ setUp/@Before □ tearDown/@After

Generate test methods for: □ Show inherited methods

...	Member
☑	add(operands:double...):double
☑	multiply(operands:double...):double

3. The editor takes you to the newly created test class. Modify the `add()` test as follows:

```
@Test
@DisplayName("Add two numbers")
void add() {
    assertEquals(4, Calculator.add(2, 2));
}
```

This simple test will check if our method correctly adds 2 and 2. The `@DisplayName` annotation specifies a more convenient and informative name for the test.

4. Now what if you want to add multiple assertions in a single test and execute all of them regardless of whether some of them fail? Let's do it for the `multiply()` method:

```
@Test
@DisplayName("Multiply two numbers")
```

```
void multiply() {
    assertAll(() -> assertEquals(4, Calculator.multiply(2, 2)),
    () -> assertEquals(-4, Calculator.multiply(2, -2)),
    () -> assertEquals(4, Calculator.multiply(-2, -2)),
    () -> assertEquals(0, Calculator.multiply(1, 0)));
}
```

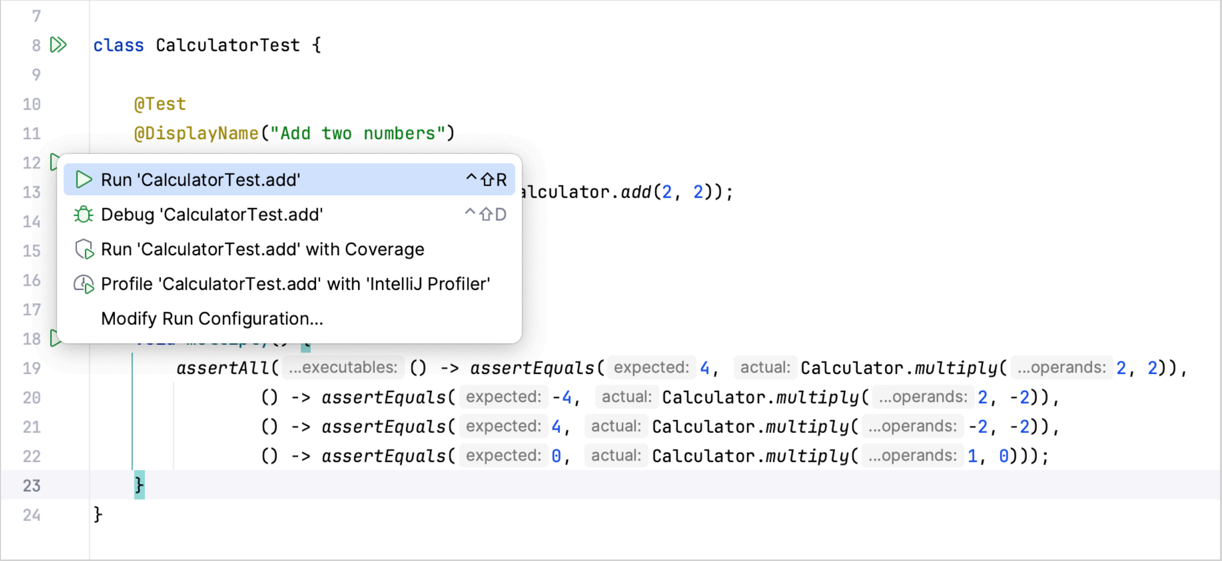
The `assertAll()` method takes a series of assertions in form of lambda expressions and ensures all of them are checked. This is more convenient than having multiple single assertions because you will always see a granular result rather than the result of the entire test.

To navigate between the test and the code being tested, use the Ctrl Shift T shortcut.

Run tests and view their results

After we have set up the code for the testing, we can run the tests and find out if the tested methods are working correctly.

- To run an individual test, click ▷ in the gutter and select **Run**.

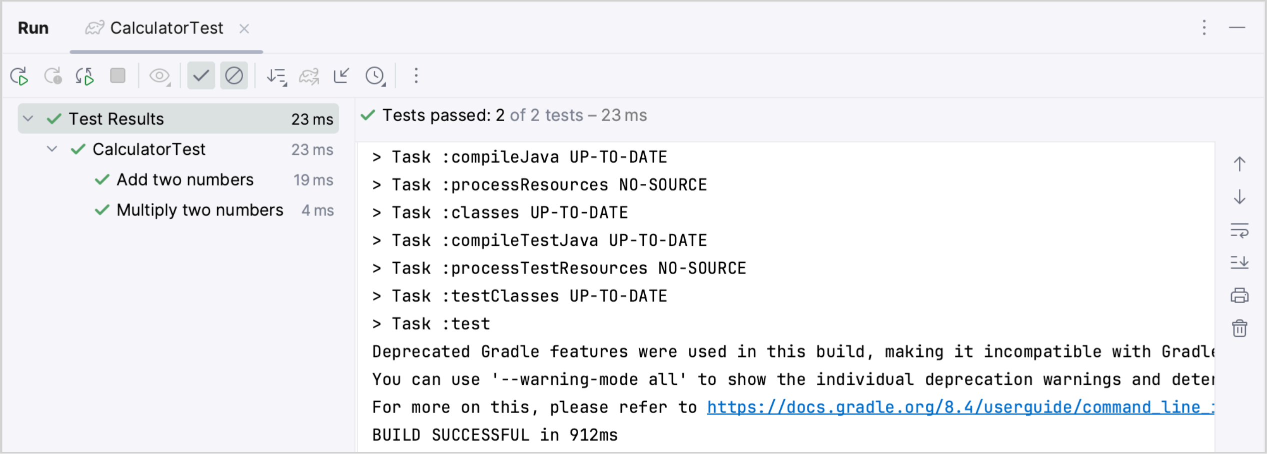


```
class CalculatorTest {

    @Test
    @DisplayName("Add two numbers")
                               alculator.add(2, 2));





        assertAll( ...executables: () -> assertEquals( expected: 4,  actual: Calculator.multiply( ...operands: 2, 2)),
                () -> assertEquals( expected: -4,  actual: Calculator.multiply( ...operands: 2, -2)),
                () -> assertEquals( expected: 4,  actual: Calculator.multiply( ...operands: -2, -2)),
                () -> assertEquals( expected: 0,  actual: Calculator.multiply( ...operands: 1, 0)));
    }
}
```

Run 'CalculatorTest.add' ^⇧R
Debug 'CalculatorTest.add' ^⇧D
Run 'CalculatorTest.add' with Coverage
Profile 'CalculatorTest.add' with 'IntelliJ Profiler'
Modify Run Configuration...

- To run all tests in a test class, click ▷▷ against the test class declaration and select **Run**.

You can view test results in the **Run** tool window.



✓ Tests passed: 2 of 2 tests – 23 ms

```
> Task :compileJava UP-TO-DATE
> Task :processResources NO-SOURCE
> Task :classes UP-TO-DATE
> Task :compileTestJava UP-TO-DATE
> Task :processTestResources NO-SOURCE
> Task :testClasses UP-TO-DATE
> Task :test
Deprecated Gradle features were used in this build, making it incompatible with Gradle
You can use '--warning-mode all' to show the individual deprecation warnings and dete
For more on this, please refer to https://docs.gradle.org/8.4/userguide/command_line_
BUILD SUCCESSFUL in 912ms
```