Dart Language and SDK tool

pubspec.yaml declares deps → `dart pub get` → **pubspec.lock** pinned versions → `dart run` → **bin/ + lib/** your code → `dart compile` → **exe / js / wasm** output

CONCEPTS

Everything goes through one dart command; dart help <command> shows the options of each subcommand.

Sound null safety: a type is non-nullable unless you add ?, and the analyzer enforces it.

PROJECT

`dart create <name>`
New console app

`dart create -t package <name>`
New library package

`dart --version`
Print SDK version

RUN AND COMPILE

`dart run`
Run the package's main

`dart run <file.dart>`
Run one file

`dart run <pkg>:<script>`
Run a package executable

`dart compile exe <file.dart>`
AOT native executable

RUN AND COMPILE (cont.)

`dart compile js <file.dart>`
Compile to JavaScript

`dart compile exe -o <out> <file>`
Name the output file

PACKAGES

`dart pub add <pkg>`
Add a dependency

`dart pub add dev:<pkg>`
Add a dev dependency

`dart pub remove <pkg>`
Remove a dependency

`dart pub get`
Fetch locked deps

`dart pub upgrade`
Upgrade within constraints

`dart pub upgrade --major-versions`
Raise constraints too

`dart pub outdated`
Show newer versions

`dart pub deps`
Print dependency tree

`dart pub global activate <pkg>`
Install a CLI tool

QUALITY

`dart format .`
Format all files

`dart format --output=none --set-exit-code .`
Check formatting (CI)

`dart analyze`
Analyze the package

`dart fix --dry-run`
Preview automated fixes

`dart fix --apply`
Apply automated fixes

`dart test`
Run all tests

`dart test <path>`
Run one test file

`dart test -n <name>`
Filter tests by name

LANGUAGE BASICS

```
var x = 1; final y = 2; const z = 3;
```
Mutable, final, compile-time

```
String? s;
```
Nullable type

```
s?.length ?? 0
```
Null-aware access with default

```
s!
```
Assert non-null

LANGUAGE BASICS (cont.)

```
late final T x;
```
Initialize later

```
'Hi $name, ${a + b}'
```
String interpolation

```
int add(int a, int b) => a + b;
```
Arrow function

```
void f({required int a, int b = 0})
```
Named parameters

```
void f(int a, [int? b])
```
Optional positional

```
class P { final int x; P(this.x); }
```
Class with ctor shorthand

```
class A extends B with M implements I
```
Inheritance, mixin, interface

```
enum Color { red, green }
```
Enum

```
switch (v) { case 1 => 'a', _ => 'b' }
```
Switch expression

COLLECTIONS AND ASYNC

```
[1, 2, 3]
```
List literal

COLLECTIONS AND ASYNC (cont.)

```
{'a': 1}
```
Map literal

```
{1, 2}
```
Set literal

```
[for (var i in xs) i * 2]
```
Collection for

```
xs.map((x) => x * 2).toList()
```
Transform a list

```
xs.where((x) => x > 1)
```
Filter

```
xs.fold(0, (a, b) => a + b)
```
Reduce

```
Future<T> f() async { await g(); }
```
Async function

```
await Future.wait([a(), b()])
```
Run futures together

```
Stream<T> f() async* { yield 1; }
```
Stream generator

```
await for (var e in stream) { }
```
Consume a stream

```
try { } on E catch (e) { } finally { }
```
Handle errors