Dart 2 Cheat Sheet and Quick Reference

main function

```
void main() {
  print("Hello, Dart!");
}
```

Variables, Data Types, & Comments

```
// Use var with type inference or instead use type
name directly
var myAge = 35; // inferred int created with var
var pi = 3.14; // inferred double created with var
int yourAge = 27; // type name instead of var
double e = 2.718; // type name instead of var
// This is a comment
print(myAge); // This is also a comment.
/*
 And so is this.
 */
// dynamic can have value of any type
dynamic numberOfKittens;
// dynamic String
numberOfKittens = 'There are no kittens!';
numberOfKittens = 0; // dynamic int
numberOfKittens = 1.0; // dynamic double
bool areThereKittens = true; // bool
// Compile-time constants
const speedOfLight = 299792458;
// Immutables with final
final planet = 'Jupiter';
// planet = 'Mars'; // error: planet is immutable
// Enumerations
enum Month { january, february, march, april, may,
june, july, august, september, october, november,
december
}
final month = Month.august;
```

Null

```
int age; // initialized to null
double height;
String err;
// Check for null
var error = err ?? "No error"; // No error
// Null-check compound assignment
err ??= error;
// Null-check on property access
print(age?.isEven);
```

Operators

```
// Arithmetic
40 + 2; // 42
44 - 2; // 42
21 * 2; // 42
84 / 2; // 42
84.5 ~/ 2.0; // int value 42
392 % 50; // 42
// Types can be implicitly converted
var answer = 84.0 / 2; // int 2 to double
// Equality and Inequality
42 == 43; // false
42 != 43; // true
// Increment and decrement
print(answer++); // 42, since it prints first for
postfix
print(--answer); // 42, since it decrements first
for prefix
// Comparison
42 < 43; // true
42 > 43; // false
42 <= 43; // true
42 >= 43; // false
// Compound assignment
answer += 1; // 43
answer -= 1; // 42
answer *= 2; // 84
answer /= 2; // 42
// Logical
(41 < answer) && (answer < 43); // true
(41 < answer) || (answer > 43); // true
!(41 < answer)); // false
```

Strings

```
// Can use single or double quotes for String type
var firstName = 'Albert';
String lastName = "Einstein";
// Embed variables in Strings with $
var physicist = "$firstName $lastName";
// Albert Einstein
// Escape sequences such as \' and \n
// and concatenating adjacent strings
var quote = 'If you can\'t' ' explain it simply\n'
"you don't understand it well enough.";
// Concatenation with +
var energy = "Mass" + " times " + "c squared";
// Preserving formatting with """
var model = """
I'm not creating the universe.
I'm creating a model of the universe,
which may or may not be true.""";
// Raw string with r prefix
var rawString =r"I'll\nbe\nback!";
// prints I'll\nbe\nback!
```

Control Flow: Conditionals

```
var animal = 'fox';
if (animal == 'cat' || animal == 'dog') {
  print('Animal is a house pet.');
} else if (animal == 'rhino') {
  print('That\'s a big animal.');
} else {
  print('Animal is NOT a house pet.');
}
// switch statement
enum Semester { fall, spring, summer }
Semester semester;
switch (month) {
  case Month.august:
  case Month.september:
  case Month.october:
  case Month.november:
  case Month.december:
    semester = Semester.fall;
    break;
  case Month.january:
  case Month.february:
  case Month.march:
  case Month.april:
  case Month.may:
    semester = Semester.spring;
    break;
  case Month.june:
  case Month.july:
    semester = Semester.summer;
    break;
}
```

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Control Flow: While loops

```
var i = 1;
// while, print 1 to 9
while (i < 10) {
  print(i);
  i++;
}
// do while, print 1 to 9
i = 1;
do {
  print(i);
  ++i;
} while (i < 10);
// break at 5
do {
  print(i);
  if (i == 5) {
    break;
  }
  ++i;
} while (i < 10);
```

Control Flow: For loops

```
var sum = 0;
// Init; condition; action for loop
for (var i = 1; i <= 10; i++) {
  sum += i;
}
// for-in loop for list
var numbers = [1, 2, 3, 4];
for (var number in numbers) {
  print(number);
}
// Skip over 3 with continue
for (var number in numbers) {
  if (number == 3) {
    continue;
  }
  print(number);
}
// forEach with function argument
numbers.forEach(print); // 1, 2, 3, 4 on separate
lines
// forEach with anonymous function argument
numbers = [13, 14, 15, 16];
numbers.forEach(
  (number) => print(number.toRadixString(16));
// d, e, f, 10
```

Functions

```
// Named function
bool isBanana(String fruit) {
  return fruit == 'banana';
}
var fruit = 'apple';
isBanana(fruit); // false
// Optional parameters with square brackets
String fullName(String first, String last, [String
title]) {
  return "${title == null ? "" : "$title "}$first
$last";
}
fullName("Ray", "Wenderlich"); // Ray Wenderlich
fullName("Albert", "Einstein", "Professor"); //
Professor Albert Einstein
// Optional named arguments with braces
bool withinTolerance(
  int value, {int min, int max}) {
  return (min ?? 0) <= value && value <= (max ??
10);
}
withinTolerance(11, max: 10, min: 1); // false
// Default values
bool withinTolerance(
  int value, {int min = 0, int max = 10}) {
  return min <= value && value <= max;
}
withinTolerance(5); // true
// Function as parameter
int applyTo(int value, int Function(int) op) {
  return op(value);
}
int square(int n) {
  return n * n;
}
applyTo(3, square); // 9
// Arrow syntax for one line functions
int multiply(int a, int b) => a * b;
multiply(14, 3); // 42
```

Anonymous Functions and Closures

```
// Anonymous functions (without a name)
// Assign anonymous function to a variable
var multiply = (int a, int b) {
  return a * b;
}
// Call a function variable
multiply(14, 3); // 42
// Closures
Function applyMultiplier(num multiplier){
  // Return value has access to multiplier
   return (num value) => value * multiplier;
}
var triple = applyMultiplier(3);
triple(14.0); // 42.0
```

Collections: Lists

```
// Fixed-size list
var pastries = List<String>(3);
// Element access by index
pastries[0] = 'cookies';
pastries[1] = 'cupcakes';
pastries[2] = 'donuts';
// Growable list
List<String> desserts = [];
desserts.add('cookies');
// Initialize by growable list
var desserts = ['cookies', 'cupcakes', 'pie'];
// List properties and methods
desserts.length; // 3
desserts.first; // 'cookies'
desserts.last; // 'pie'
desserts.isEmpty; // false
desserts.isNotEmpty; // true
desserts.firstWhere((str) => str.length < 4));
// pie
// Collection if
var peanutAllergy = true;
var candy = [
  'junior mints',
  'twizzlers',
  if (!peanutAllergy) 'reeses'
];
// Collection for
var numbers = [1, 2, 3];
var doubledNumbers =
  [for (var number in numbers) 2 * number];
// [2, 4, 6]
```

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Collections: List Operations

```
// Spread Operator and null-spread operator
var pastries = ['cookies', 'cupcakes'];
var desserts = ['donuts', ...pastries, ...?candy];
// Map to transform list
var numbers = [1, 2, 3, 4];
var squares = numbers.map(
  (number) => number * number).toList();
// [1, 4, 9, 16]
// Filter list using where
var evens = squares.where(
  (square) => square.isEven); // (4, 16)
// Reduce list to combined value
var amounts = [199, 299, 299, 199, 499];
var total = amounts.reduce(
  (value, element) => value + element); // 1495
```

Collections: Sets

```
// Create set of int
var someSet = <int>{};
// Set type inference
var anotherSet = {1, 2, 3, 1};
// Check for element
anotherSet.contains(1); // true
anotherSet.contains(99); // false
// Adding and removing elements
someSet.add(42);
someSet.add(2112);
someSet.remove(2112);
// Add to set from list
someSet.addAll([1, 2, 3, 4]);
// Intersection
var intersection = someSet.intersection(anotherSet);
// Union
var union = someSet.union(anotherSet);
```

Collections: Maps

```
// Map from String to int
var emptyMap = Map<String, int>();
// Map from String to String
var avengers = {
  "Iron Man": "Suit", "Captain America": "Shield",
  "Thor": "Hammer"};
// Element access by key
var ironManPower = avengers["Iron Man"]; // Suit
avengers.containsKey("Captain America"); // true
avengers.containsValue("Arrows"); // false
// Access all keys and values
avengers.keys.forEach(print); // Iron Man, Captain
America, Thor
avengers.values.forEach(print); // Suit, Shield,
Hammer
// Loop over key-value pairs
avengers.forEach((key, value) => print('$key ->
$value'));
```

Classes and Objects

```
class Actor {
  // Properties
  String name;
  var filmography = <String>[];

  // Short-form constructor
  Actor(this.name, this.filmography);

  // Named constructor
  Actor.rey({this.name = "Daisy Ridley"}) {
    filmography = ['The Force Awakens', 'Murder on
the Orient Express'];
  }

  // Calling other constructors
  Actor.inTraining(String name) : this(name, []);

  // Constructor with initializer list
  Actor.gameOfThrones(String name)
      : this.name = name, this.filmography = ['Game
of Thrones'] {
    print('My name is ${this.name}');
  }

  // Getters and Setters
  String get debut => '$name debuted in $
{filmography.first}';
  set debut(String value) => filmography.insert(0,
value);

  // Methods
  void signOnForSequel(String franchiseName) {
    filmography.add('Upcoming $franchiseName
sequel');
  }

  // Override from Object
  String toString() =>
    "${[name, ...filmography].join("\n- ")}\n";
}

var gotgStar = Actor('Zoe Saldana', []);
gotgStar.name = 'Zoe Saldana';
gotgStar.filmography.add('Guardians of the Galaxy');
gotgStar.debut = 'Center Stage';
print(Actor.rey().debut); // The Force Awakens
var kit = Actor.gameOfThrones('Kit Harington');
var star = Actor.inTraining('Super Star');
// Cascade syntax ..
gotgStar // Get an object
  ..name = 'Zoe' // Use property
  ..signOnForSequel('Star Trek'); // Call method
```

Static Class Members

```
enum PhysicistType { theoretical, experimental, both
}
class Physicist {
  String name;
  PhysicistType type;
  // Internal constructor
  Physicist._internal(this.name, this.type);
  // Static property
  static var physicistCount = 0;
  // Static method
  static Physicist newPhysicist(
    String name,
    PhysicistType type) {
      physicistCount++;
      return Physicist._internal(name, type);
  }
}


final emmy = Physicist.newPhysicist(
  "Emmy Noether", PhysicistType.theoretical);
final lise = Physicist.newPhysicist(
  "Lise Meitner", PhysicistType.experimental);
print(Physicist.physicistCount); // 2
```

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Class Inheritance

```
// Base aka parent class
class Person {
  // Parent properties inherited by child
  String firstName;
  String lastName;
  // Parent class constructor
  Person(this.firstName, this.lastName);
  // Parent class method
  String get fullName => '$firstName $lastName';
  // Optional @override annotation
  // All class hierarchies and types have Object as
root class
  @override
  String toString() => fullName;
}
// Subclass aka child class
class Student extends Person {
  // Properties specific to child
  var grades = <String>[];
  // Call super on parent constructor
  Student(String firstName, String lastName)
    : super(firstName, lastName);
  // Optional override annotation on parent method
override
  @override
  String get fullName => '$lastName, $firstName';
}
final jon = Person('Jon', 'Snow');
final jane = Student('Jane', 'Snow'); // Calls
parent constructor
print(jon); // Jon Snow
// Use toString in parent, in turn using subclass
override of fullName
print(jane); // Snow, Jane
```

Abstract Classes, Interfaces, Mixins

```
enum BloodType { warm, cold }
abstract class Animal {
  BloodType bloodType; // Base class property
  void goSwimming(); // Abstract method without
implementation
}
mixin Milk {
  bool hasMilk;
  bool doIHaveMilk() => hasMilk;
}
// Concrete class inheriting from abstract class
class Cat extends Animal with Milk {
  BloodType bloodType = BloodType.warm; // Set value
for property
  Cat() { hasMilk = true; } // Set mixin property
  // Concrete subclass must implement abstract
methods
  @override
  void goSwimming() { print("No thanks!"); }
}
// Concrete class that also implements Comparable
interface
class Dolphin extends Animal implements
Comparable<Dolphin> {
  BloodType bloodType = BloodType.warm;
  double length; // Concrete sublcass property
  Dolphin(this.length); // Concrete subclass
constructor
  // Concrete subclass must implement abstract
methods
  @override
  void goSwimming() { print("Click! Click!"); }
  // Also must implement interface methods
  @override
  int compareTo(other) =>
length.compareTo(other.length);
  @override
  String toString() => '$length meters';
}
class Reptile extends Animal with Milk {
  BloodType bloodType = BloodType.cold;
  Reptile() { hasMilk = false; }
  @override
  void goSwimming() { print("Sure!"); }
}
```

```
// var snake = Animal(); // error: can't instantiate
abstract class
// Can instantiate concrete classes
var garfield = Cat();
var flipper = Dolphin(4.0);
var snake = Reptile();
// Call concrete methods
flipper.goSwimming(); // Click! Click!
garfield.goSwimming(); // No thanks!
// Use interface implementation
var orca = Dolphin(8.0); var alpha = Dolphin(5.0);
var dolphins = [alpha, orca, flipper];
dolphins.sort();
print(dolphins); // [4 meters, 5 meters, 8 meters]
print(snake.doIHaveMilk()); // false
print(garfield.doIHaveMilk()); // true
```