Set and Map in Dart – Short Detailed Guide

This document explains **Set** and **Map** in Dart with clear concepts, examples, real-life scenarios, and practice questions. It is designed for beginners who want solid understanding without overload.

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1. Set in Dart

What is a Set?

A **Set** is a collection of **unique values**. It does not allow duplicate elements.

You should use a Set when:

- You want to avoid duplicate data
- You only care about values, not index positions

Creating a Set

```
Set<int> numbers = {1, 2, 3, 4};
```

Adding a duplicate value:

```
numbers.add(3);
print(numbers);
```

Output:

```
{1, 2, 3, 4}
```

Common Set Methods

```
numbers.add(5);              // Add element
numbers.remove(2);           // Remove element
numbers.contains(3);         // Check if value exists
numbers.length;              // Number of elements
numbers.clear();             // Remove all elements
numbers.isEmpty;             // Check if set is empty
```

```
numbers.isNotEmpty;          // Check if set is not empty
numbers.addAll({6, 7, 8});   // Add multiple elements
numbers.removeAll({1, 3});   // Remove multiple elements
numbers.retainAll({2, 4});   // Keep only these elements
```

Real-Life Use Cases (Set)

- Unique email addresses
- Unique user IDs
- Unique product codes
- Removing duplicate data

Practice Questions (Set)

1. Suppose you are building a login system. How can a Set help you prevent the same user from logging in multiple times at once?

Guess the Output (Set)

```
Set<int> data = {1, 2, 3};
data.add(2);
data.add(4);
print(data.length);
````

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2. Map in Dart

What is a Map?

A **Map** stores data in **key-value pairs**. Each key is unique and is used to access its value.

You should use a Map when:

- You need a relationship between two values
- You want fast access using keys

Creating a Map

```dart
Map<String, int> marks = {
  "Math": 90,
  "Science": 85
};
```

Accessing and Updating Values

```dart
print(marks["Math"]);
marks["English"] = 88;   // Add
marks["Math"] = 95;      // Update
```

Common Map Methods

```dart
marks.remove("Science");
marks.containsKey("Math");
marks.containsValue(100);
marks.keys;
marks.values;
marks.length;
```

Real-Life Use Cases (Map)

- Student name → marks
- Product ID → product details
- Username → password
- Country code → country name

Practice Questions (Map)

1. Why is a Map better than a List for storing student marks?
2. What happens if the same key is used twice in a Map?
3. Where would you use a Map in a shopping app?

Guess the Output (Map)

```
Map<String, int> data = {"A": 1, "B": 2};
data["A"] = 10;
data["C"] = 3;
print(data);
```

Set vs Map (Quick Comparison)

Feature	Set	Map
Stores	Only values	Key–value pairs
Duplicates	Not allowed	Keys not allowed
Access	By value	By key
Best for	Unique data	Paired data

Flutter Point of View: Using Set and Map in Real Apps

Understanding Set and Map is very important when building Flutter applications because most UI and backend data is **collection-based**.

Using Set in Flutter

1. Preventing Duplicate UI Items

If you are showing a list of selected categories or tags, duplicates should not appear.

```
Set<String> selectedTags = {"Sports", "Music"};
selectedTags.add("Sports"); // Duplicate ignored
```

This ensures your UI does not show the same tag twice.

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2. Tracking Unique User Actions

For example, tracking unique users who liked a post:

```
Set<String> likedUsers = {"user1", "user2"};
```

Using Map in Flutter

1. Handling Form Data

When users fill a form, data is usually stored as key–value pairs.

```
Map<String, String> formData = {
  "name": "Alex",
  "email": "alex@gmail.com"
};
```

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2. API Responses

Most APIs return data in JSON format, which is converted into Maps in Dart.

```
Map<String, dynamic> user = {
  "id": 1,
  "name": "Sam",
  "isActive": true
};
```

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3. Shopping Cart Example

```
Map<String, int> cart = {
  "Apple": 2,
  "Banana": 3
};

cart["Apple"] = 4; // Update quantity
```

Flutter-Based Practice Questions

1. Why is a Set useful for storing selected filters in a Flutter app?
2. Why is a Map better than a List for storing form data?

3. How would you store user profile information using a Map?
4. Why is `Map<String, dynamic>` commonly used with APIs?
5. Where would using a Set prevent UI bugs?

Flutter-Based Output Thinking

1. Guess the output:

```
Set<String> tags = {"A", "B"};
tags.add("A");
tags.add("C");
print(tags);
```

1. Guess the output:

```
Map<String, int> likes = {"post1": 10};
likes["post1"] = 20;
print(likes["post1"]);
```

Key Takeaway

- Flutter apps heavily use **Set** to avoid duplicate UI elements.
- Flutter apps heavily use **Map** to manage structured data.
- APIs, forms, user profiles, and carts mostly rely on Maps.
- Learning these well makes Flutter development much easier.

Understanding Set and Map will help you write **cleaner UI logic**, **safer data handling**, and **better Flutter apps**.