# **📘 Data Types in C++**

👉 In C++, a **data type** defines the kind of data a variable can store.  
 Example:

int age = 20; // 'int' means age can store whole numbers

## **🔹 Categories of Data Types**

### **1. Basic / Primitive Data Types**

These are the fundamental building blocks.

| **Data Type** | **Example** | **Size (approx)** | **Usage** |
| --- | --- | --- | --- |
| int | 10, -25 | 4 bytes | Stores whole numbers (positive/negative). |
| float | 3.14 | 4 bytes | Stores decimal values (single precision). |
| double | 3.14159 | 8 bytes | Stores large decimal values (more precise). |
| char | 'A', 'z' | 1 byte | Stores a single character. |
| bool | true, false | 1 byte | Stores logical values. |

💡 Example:

int rollNo = 101;

float marks = 89.5;

char grade = 'A';

bool pass = true;

### **2. Derived Data Types**

These are built using primitive types.

**Array** → Collection of same type of data.  
  
 int numbers[5] = {1, 2, 3, 4, 5};

**Pointer** → Stores address of another variable.  
  
 int x = 10;

int \*ptr = &x; // ptr holds address of x

* **Function** → Block of code that performs a task.

### **3. User-defined Data Types**

Created by programmers to represent real-world entities.

**struct** → Groups different types of data.  
  
 struct Student {

int roll;

char name[20];

float marks;

};

**enum** → Set of named constants.  
  
 enum Week {Mon, Tue, Wed, Thu, Fri, Sat, Sun};

* **class** → Basis of OOP (used for objects).

## **🔹 Why Data Types are Important?**

1. They **tell the compiler** how much memory to reserve.  
   * int x; → reserves 4 bytes.
   * double y; → reserves 8 bytes.
2. They **define the type of operations** that can be performed.  
   * You can add two int values.
   * You cannot add a char and string directly without conversion.
3. They **make code error-free and readable**.

In Short:

Data types are like **labels** on containers in a kitchen.

* A jar labeled "Sugar" (int) can hold only sugar (whole numbers).
* A jar labeled "Oil" (float) can hold only liquids (decimal numbers).
* If you mix them wrongly, the program won’t work properly!