# C++ Concepts for Beginners

## What is a class in C++?

A class in C++ is a blueprint for creating objects. It encapsulates data for the object and methods that operate on the data. It serves as the fundamental building block of object-oriented programming.

## What are constructors and destructors?

Constructors and destructors are special member functions of a class. Constructors initialize new objects, while destructors clean up before an object is destroyed, ensuring proper resource management.

## What is inheritance?

Inheritance is a feature of C++ that allows a class to derive properties and behaviors from another class, referred to as the base class. This promotes code reusability and establishes a hierarchical classification.

## What is the purpose of the `public`, `protected`, and `private` access specifiers?

These access specifiers control access to the members of a class. `Public` members are accessible everywhere, `protected` members are accessible within the class and its derived classes, and `private` members are only accessible within the class itself.

## What is the difference between composition and aggregation in C++?

Composition and aggregation are both associative relationships but differ in the lifetime of the involved objects. Composition implies ownership and the same lifetime, whereas aggregation suggests a weaker relationship without direct ownership.

## What is polymorphism?

Polymorphism allows methods to do different things based on the object it is acting upon. In C++, it can be achieved through overloading and overriding—enabling objects to interact in more flexible ways.

## What is a copy constructor and how does it differ from an assignment operator?

A copy constructor initializes a new object as a copy of an existing object. An assignment operator assigns the values of one existing object to another existing object. Both handle copying but are used in different contexts.

## What is a pointer and what is its use in C++?

A pointer is a variable that stores the memory address of another variable. In C++, pointers are used for dynamic memory management, accessing resources outside the program, and for achieving polymorphism and other complex data structures.

## What is object slicing and when can it occur?

Object slicing occurs when an object of a derived class is assigned to an object of a base class, leading to loss of derived part information. This typically happens when derived class objects are passed by value to a function expecting a base class object.

## What are virtual functions and why are they used?

Virtual functions are a mechanism in C++ to support late binding on functions, allowing a function to be overridden in any derived class, promoting more flexible and dynamic interactions through pointers or references to base class objects.