Java & C++ 3-Month Study Plan

3-Month Mastery Plan for Java and C++ (Beginner to Competitive)

Overview:

- Duration: 12 Weeks (3 Months)
- Languages Covered: Java and C++
- Goal: Build solid foundation + competitive problem-solving readiness
- Structure:
  - Mon-Fri: Learning + Practice
  - Sat: Weekly Revision + 1 Mock Contest
  - Sun: Weekly Summary + Light Revision/Project

Month 1: Language Fundamentals & Core DSA

Week 1: Java & C++ Basics

- Topics:
  - Data types, variables, input/output
  - Operators, conditionals, loops
- Resources:
  - Java: Java Programming by Joyce Farrell (Ch. 1-3)
  - C++: C++ Primer by Lippman (Ch. 1-3)
  - Practice: W3Schools, HackerRank Basic I/O
- Project: Console Calculator (Java & C++)

Week 2: Functions, Arrays, and Strings

- Topics:
  - Defining/Calling functions
  - 1D/2D Arrays, String handling

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- Resources:
  - Java: Head First Java (Ch. 4-5)
  - C++: LearnCpp.com (Ch. 6-8)
  - Practice: HackerRank Arrays, Strings
- Project: Palindrome Checker (Java & C++)

Week 3: OOP + STL/Basics of Collections

- Topics:
  - Java: Classes, Objects, Inheritance, ArrayList
  - C++: OOP, STL: vector, map, set
- Resources:
  - Java: Head First Java (Ch. 6-8)
  - C++: Lippman or LearnCpp STL
  - Practice: GeeksForGeeks, LeetCode Easy

Week 4: Recap + Practice + Mock

- Revision of past 3 weeks
- 1 Mock Contest (AtCoder Beginner or Codeforces Div 4)
- Project: Student Record System

Month 2: Data Structures and Algorithms

Week 5: Recursion & Sorting Algorithms

- Topics:
  - Recursion, Merge Sort, Quick Sort
- Resources: CLRS, Java/C++ implementations on GeeksForGeeks
- Practice: Sort-related Leetcode & Recursion problems

Week 6: Searching, Binary Search, Time Complexity

- Topics:

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  - Linear/Binary Search, Big-O, Time & Space Analysis

- Project: Binary Search Tree Builder (Java & C++)

Week 7: Stacks, Queues, Linked Lists

- Topics:

  - Stack & Queue implementation

  - Singly & Doubly Linked Lists

- Resources: DSA Made Easy, CodeHelp YouTube

- Practice: 50 Easy-Medium problems

Week 8: Trees and Hashing

- Topics:

  - Tree Traversals, HashMaps, Sets

- Practice: Leetcode Trees + HashMap patterns

- Mock Contest: Codeforces Div 3 / AtCoder Beginner

Month 3: CP Topics + Advanced Concepts

Week 9: Graph Algorithms

- Topics:

  - BFS, DFS, Cycle Detection, Dijkstra

- Practice: 20 Graph Problems (Leetcode + Codeforces tags)

Week 10: Dynamic Programming Basics

- Topics:

  - Memoization, Tabulation, Knapsack, LCS

- Resources: Aditya Verma YouTube, CP Handbook

- Practice: 20 Beginner DP problems (Leetcode/AtCoder)

Week 11: Math & Bit Manipulation

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- Topics:
  - GCD/LCM, Modulo Arithmetic, Bitwise Ops
- Practice: Number Theory on Codeforces
- Contest: Codeforces Div 2 C-D Problems

Week 12: Final Week - Review + Full-Length Practice

- Revise all major concepts (STL, OOP, DP, Graphs, etc.)
- Solve 2 full-length contests
- Build a Competitive Template in C++ and Java

Resources Summary:

Books:

- Java: Head First Java, Java Programming by Joyce Farrell
- C++: C++ Primer, DSA Made Easy, CP Handbook

Websites:

- https://leetcode.com
- https://codeforces.com
- https://atcoder.jp
- https://geeksforgeeks.org
- https://learncpp.com