C# Phase 1 Comprehensive Notes

1. Variables & Data Types

Value Types: int, float, bool, char - stored in stack.
Reference Types: string, array, class, List<T> - stored in heap.

2. Control Flow

if-else, switch-case, ternary (?:).
Loops: for, while, foreach, do-while.

3. Arrays

Access: arr[0], Length: arr.Length
Sort: Array.Sort(arr)
Common tasks: reverse, find max/min, count evens.

4. Strings

Length: s.Length, Substring, Replace, Split.
Useful methods: IndexOf, Contains, Trim, ToUpper, ToLower.

5. List<T>

Add, Remove, Sort, Count, Contains, Clear.

6. Dictionary

Add: dict[key]=value, Remove, ContainsKey, TryGetValue.

7. HashSet

Add, Remove, Contains, useful for uniqueness.

8. Stack & Queue

Stack: Push, Pop, Peek (LIFO)
Queue: Enqueue, Dequeue, Peek (FIFO)

9. Custom Classes & OOP

Concepts: Encapsulation, Inheritance, Polymorphism, Constructors.

10. LINQ Essentials

Where, Select, Sum, Count, Min, Max, GroupBy, OrderBy, Distinct, Intersect.

C# Phase 1 Comprehensive Notes

Practice Problems (by concept)

Array: Rotate array left by k.
String: Check for anagram.
List: Merge sorted lists.
Dictionary: First non-repeating char.
Stack: Valid parentheses.
Queue: Task scheduler.
HashSet: Find duplicates.
OOP: Design Employee class.
LINQ: Count evens using Where + Count.