

C Programming Cheat Sheet (Theory Only)

Introduction to C Programming

- C is a general-purpose programming language developed by **Dennis Ritchie** in the 1970s.
 - Used for **system programming, embedded systems, and software development**.
 - **Features:** Fast execution, portability, low-level memory access, structured programming.
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Basic Structure of a C Program

1st **Preprocessor Directives** → #include <stdio.h> (Header files).
2nd **Main Function** → Entry point of the program: int main() {}.
3rd **Variable Declaration** → Declaring data types and variables.
4th **Input/Output Functions** → printf(), scanf().
5th **Logic & Processing** → Conditions, loops, functions.
6th **Return Statement** → return 0; for successful execution.

Compilation & Linking Process

1st **Preprocessing** → Expands macros, includes header files.
2nd **Compilation** → Converts code to assembly language.
3rd **Assembly** → Converts assembly to machine code.
4th **Linking** → Links required libraries and generates executable file.

Constants & Variables

- **Constants:** Fixed values in a program (const int x = 10;).
 - **Variables:** Named storage locations to hold values (int a = 5;).
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Data Types in C

Data Type	Size	Example
int	4 bytes	10, -5
float	4 bytes	3.14
double	8 bytes	3.141592
char	1 byte	'A', 'b'
void	0 bytes	No value

Operators in C

- **Arithmetic Operators:** +, -, *, /, %
 - **Relational Operators:** ==, !=, >, <, >=, <=
 - **Logical Operators:** &&, ||, !
 - **Bitwise Operators:** &, |, ^, <<, >>
 - **Assignment Operators:** =, +=, -=, *=, /=
 - **Increment & Decrement:** ++, --
 - **Ternary Operator:** condition ? value1 : value2
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Managing Input & Output Operations

- `printf()` → Displays output on the screen.
 - `scanf()` → Takes input from the user.
 - `gets()` & `puts()` → Handles string input and output.
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Decision Making & Branching

- **if Statement**
 - ```
if (condition) {
 // Code to execute if condition is true
}
```
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  - **if-else Statement**
  - ```
if (condition) {  
    // Code if true  
} else {  
    // Code if false  
}
```
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 - **Nested if-else** → Multiple conditions inside an if block.
 - **Switch Case**
 - ```
switch(variable) {
 case 1: printf("One"); break;
 case 2: printf("Two"); break;
 default: printf("Invalid");
}
```
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## Looping Statements

1st **for Loop** (Fixed Iteration)

```
2nd for (int i = 0; i < 5; i++) {
3rd printf("%d", i);
4th}
5th
```

6th **while Loop** (Condition-Based)

```
7th while (condition) {
8th // Code to execute
9th}
10th
```

11th **do-while Loop** (Executes at least once)

```
12th do {
13th // Code to execute
14th} while (condition);
15th
```

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This cheat sheet covers the **C programming basics, structure, operators, I/O, decision making, and loops**. Let me know if you need further details!