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Chapter 2: Instructions and Operators

A C program is a set of Instructions. Just like a recepie - which contains Instructions to prepare a particular Dish.

Types of Instructions

1. Type declaration Instruction
2. Arithmetic Instruction
3. Control Instruction

Type declaration Instruction

```
int a;
float b;
```

Other Variations:

```
int i=10; int j=i; int a=2
int j1= a + j - i;
```

```
float b = a+3; float a=1.1
```

=> ERROR! as we are trying to use a before defining it.

```
int a, b, c, d;
a = b = c = d = 30;
```

=> Value of a, b, c & d will be 30 each.

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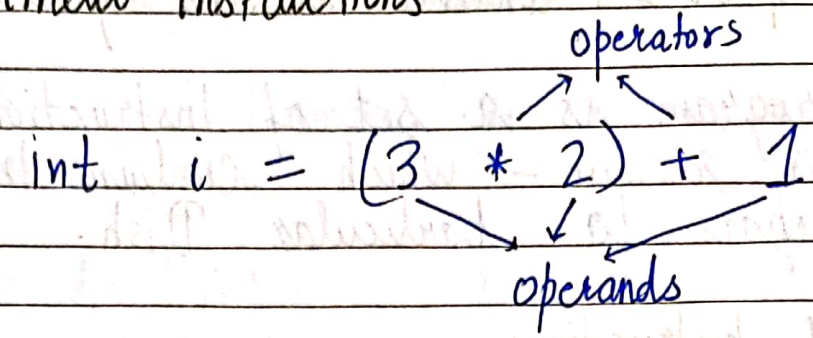
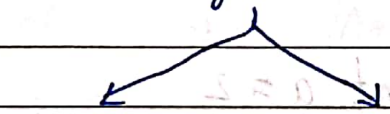
Arithmetic Instructions



Operands can be int / float etc.
+ - * / are arithmetic operators

```
int b=2, c=3;
int z; z = b*c;   ✓ legal
int z;  b*c = z;  ✗ Illegal (Not allowed)
```

% → Modular division operator
% → Returns the remainder
% → Cannot be applied on float
% → Sign is same as of numerator (-5%2 = -1)



Note :-

17 No operator is assumed to be present

```
int i = ab   → Invalid
int i = a*b  → valid
```

27 There is no operator to perform exponentiation in C
However we can use pow(x, y) from <math.h> (More later)

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Type Conversion

An Arithmetic operation between

Int and Int → Int
Int and float → float
float and float → float

$5/2 \rightarrow 2$ $\quad$ $5.0/2 \rightarrow 2.5$

$2/5 \rightarrow 0$ $\quad$ $2.0/5 \rightarrow 0.4$

} Important!!

Note :-

`int a = 3.5;` In this case 3.5 (float) will be demoted to 3 (int) because a is not able to store floats.

`float a = 8;` a will store 8.0
8 → 8.0 (promotion to float)

Quick Quiz :

Q) `int k = 3.0/9` Value of k? and why?

S) $3.0/9 = 0.333..$ but since k is an int, it cannot store floats & value 0.33 is demoted to 0.

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Operator precedence In C

$3 * x - 8 y$ is $(3x) - (8y)$ or $3(x - 8y)$?

In C language simple mathematical rules like BODMAS, no longer applies.

The answer to the above question is provided by operator precedence & associativity.

Operator precedence :- The following table lists the operator priority in C

Priority	Operators
1st	* / %
2nd	+ -
3rd	=

Operators of higher priority are evaluated first in the absence of parenthesis.

Operator Associativity :- When operators of equal priority are present in an expression, the tie is taken care of by associativity.

$x * y / z \Rightarrow (x * y) / z$

$x / y * z \Rightarrow (x / y) * z$

*, / follows Left to right associativity

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Control Instructions

Determines the flow of control in a program

Four types of control Instructions in C are:

1. Sequence Control Instruction
2. Decision Control Instruction
3. Loop Control Instruction
4. Case Control Instruction.