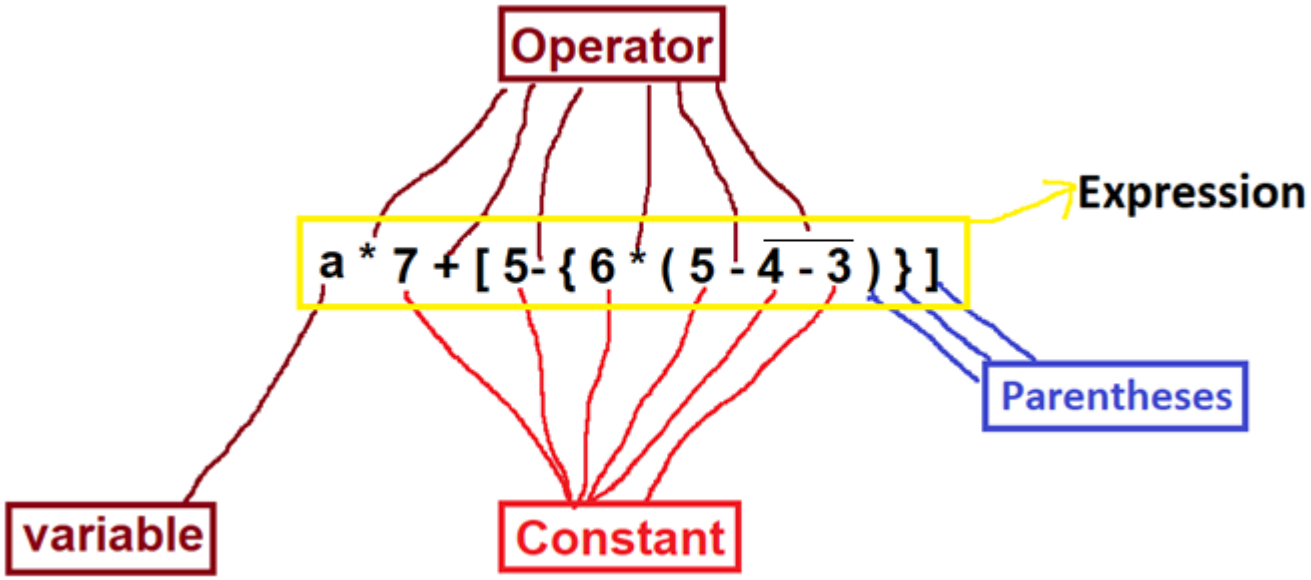
S.P.M College,Udantpuri

Bachelor Of Computer Application (BCA)

Part – 3 **– Hira Kumar**

❖ What is an Expression in C++?

- An expression is a valid arrangement/combinations of variables, constants,operators and sometimes parentheses.
- In C++, each expression can be evaluated to compute a value of a given type.
- An expression in mathematics is a finite combination of constant or variable using operators such as addition (+), subtraction (-), multiplication (×), or division (÷).



Types of Expression

- **Numerical Expression** → involves numerals (constants) and arithmetic operations.

E.g. (a) 5 - 2 + 1/2 (b) 5 + 2 - (3 × (-1) + 7)

- **Algebraic Expression**→ variables, constants, and algebraic operations

E.g (a) $3x - 3xy^3$ (monomial expression) (b) 5xy + 8 (binomial) (c) $ax^2 + by + c$ (polynomial)

- **Radical Expression** → use square root, cube root, or fourth root

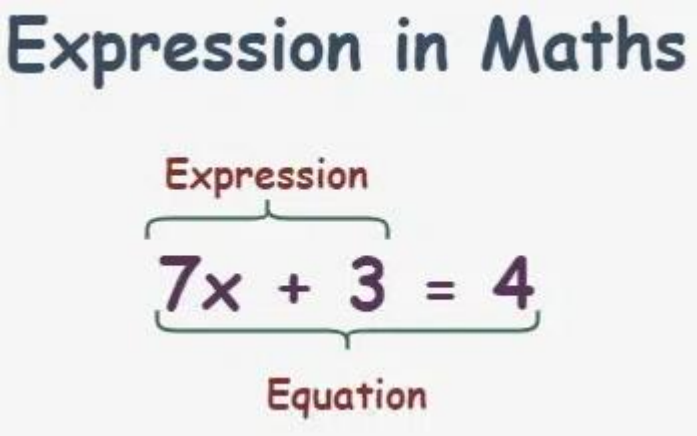
E.g. (a) $3\sqrt{(2)} - 7$ (b) $\sqrt{(x^2 + 2x - 1)}$ (c) $\sqrt{(9x^2)} + 1/2$

- **Fractional Expression** → fractions within an algebraic expression

E.g. (a) $3/x + 9/20$ (b) $4x^2/(x - 5)$

- **Trigonometric Expression** → E.g. = sin x + cos x + tan x

- **Logarithmic Expression** → E.g. = $\log_{10} 100 - \log_{10} 10 + \log_{10} 2$
- **Exponential Expression** → E.g. = $2^3 - 3^2 + 7^5$



❖ Solve Equation & Expression

1. $\frac{a*a+a}{a} = 10$
2. Find the coefficient of term y in the expression $6x^2 + 7y + 3$.
3. Find the coefficient of term 7y in the expression $6x^2 + 7y + 3$.
4. Find the terms in the expression 5x +6y +3.
5. Find the factors in the expression $7x^3 + 5x^2 + 6x + 2$.
6. Identify the terms and coefficients in the expression $3a^2 + 2ab$.

Answer

1. 9
2. 7
3. 7
4. 3 (5x,6y,3)
5. 4 ($7x^3$, $5x^2$, 6x,2)
6. Term 2 ($3a^2$,2ab), coefficient 2 (3,2)

❖ Precedence

- Precedence is the priority of operators, which decides which operator is evaluated first in an expression.
- e.g. 7 + [5 – {6 * (5-4-3)}] = ?

❖ Associativity

- Associativity decides the direction (right to left / left to right) of evaluation when two or more operators of the same precedence appear in an expression.
- e.g. 7 + [5 – {6 * (5-4-3)}] = ?

❖ Operator in C++

- An operator is a symbol / Keyword that tells the compiler to perform specific mathematical or logical manipulations.

Types of Operator

1. **Arithmetic Operators (5)**
2. **Relational Operators (6)**
3. **Increment / Decrement (2)**
4. **Logical Operators (3)**
5. **Bitwise Operators (6)**
6. **Assignment Operators (11)**
7. **Ternary or Conditional Operator (1)**
8. **Special / Miscellaneous Operators (10)**

Operand	Operator
• Any value / Variable is a Operand	• It is a Symbol / keyword to perform action/operation.
• a,b,c	• + =

a + b = c

Here a,b,c Operand + = operator

1. Arithmetic Operator

- Arithmetic operators are used to perform arithmetic or mathematical operations on the operands.

a. **Addition (+)** → Adds two operands
   e.g. 10 + 10 = 20

b. **Subtraction** (-) → Subtracts second operand from the first.
   e.g. 10 - 10 = 0

c. **Multiplication** (*) → Multiplies two operands
e.g. 10 * 10 = 100

d. **Division (/)** → Divides first operand by the second operand.
e.g. 10 / 10 = 1

e. **Modulo Operation (%)** → Returns the remainder of an integer division.
e.g. 10 % 10 = 0

Arithmetic operator	Associativity	Precedence	
		High	low
+, - , *, / , %	Left to Right	* / %	+ -

Solve Arithmetic Expression

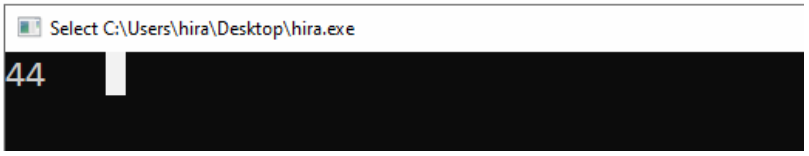
I. 10+5*2 = ?
II. 20-6/3 = ?
III. 6*5/10 = ?
IV. 30/5%4 = ?
V. 18%5+2 = ?
VI. 40-20*3/5 = ?
VII. 8 + 16/4 *2 = ?
VIII. 25%7*2 = ?
IX. 100/10+6*2 = ?
X. 50-10%4*3 = ?

Answer

i→20, ii → 18, iii → 3, iv → 2, v → 5, vi → 28, vii →16 viii → 8, ix → 22, x → 44

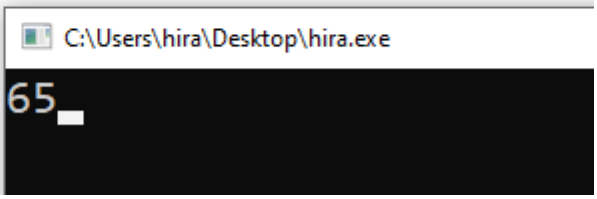
Expression solve

```
1   #include<iostream>
2   #include<conio.h>
3   using namespace std;
4   int main()
5   {
6       int a = 50-10%4*3 ;
7       cout << a;
8       getch();
9
10  }
```

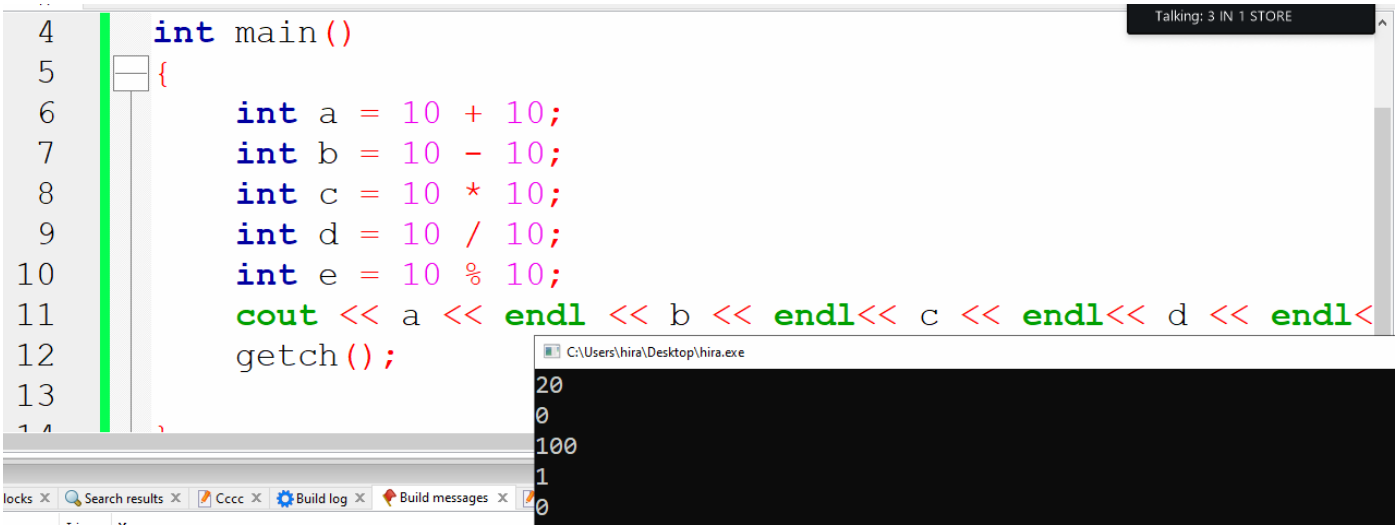


ASCII Value Print

```
1   #include<iostream>
2   #include<conio.h>
3   using namespace std;
4   int main()
5   {
6       char a ='A';
7       cout << int(a);
8       getch();
9
10  }
```



Arithmetic Operators


Talking: 3 IN 1 STORE
4 int main()
5 {
6 int a = 10 + 10;
7 int b = 10 - 10;
8 int c = 10 * 10;
9 int d = 10 / 10;
10 int e = 10 % 10;
11 cout << a << endl << b << endl<< c << endl<< d << endl<
12 getch();
13
C:\Users\hira\Desktop\hira.exe
20
0
100
1
0
Search results
Cccc
Build log
Build messages

==========Hira Kumar==========

HIRA KUMAR

Operator Name	Operator	Description	Associativity
Partentheses Operator	() [] . -> ++ --	Parentheses or function call Brackets or array subscript Dot or Member selection operator Arrow operator Postfix increment/decrement	left to right
Unary Operator	++ -- + - ! ~ (type) * & sizeof	Prefix increment/decrement Unary plus and minus not operator and bitwise complement type cast Indirection or dereference operator Address of operator Determine size in bytes	right to left
Multiplication Operator	* / %	Multiplication, division and modulus	left to right
Addition Operator	+ -	Addition and subtraction	left to right
Relational Operator	<< >>	Bitwise left shift and right shift	left to right
	< <= > >=	relational less than/less than equal to relational greater than/greater than or equal to	left to right
	== !=	Relational equal to or not equal to	left to right
Bitwise Operator	&&	Bitwise AND	left to right
	^	Bitwise exclusive OR	left to right
	|	Bitwise inclusive OR	left to right
Logical Operator	&&	Logical AND	left to right
	||	Logical OR	left to right
Conditional / Ternary Operator	? :	Ternary operator	right to left
Assignment Operator	= += -= *= /= %= &= ^= |= <<= >>=	Assignment operator Addition/subtraction assignment Multiplication/division assignment Modulus and bitwise assignment Bitwise exclusive/inclusive OR assignment	right to left
Comma Operator	,	comma operator	left to right

Precedence(Priority)

PUMAS REBL TAC
1 2 3 4 5 6789 10 11 12

solve priority number

Just like BODMAS

TAU (Right to left)
T- Ternary
A-Assignment
U-Unary operator

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Sample Program (square.cpp)