

## Data Types :-

**Fundamental data types** : These are the basic data types which are not composed of any other data types.

1. **Int** : Integers are whole numbers like 17, 19, -89, etc. without any fractional part. They are represented in C++ by int data type. A variable declared as int (for example, int a) is of integer type and can hold integer values only. Int occupies **two bytes** of memory normally.
2. **Char** : Characters can store any one of the values from 'a' to 'z' and 'A' to 'Z' and all the punctuation marks and special symbols. All the 256 characters which are there in the global character set can be stored in a variable defined as char. Char occupies **one byte** of memory. Characters are stored in the memory with the associated number codes (ASCII values) which are integers only. Here's the **character set** of C++ :-

Alphabets	A, B, ....., Y, Z a, b, ....., y, z
Digits	0, 1, 2, 3, 4, 5, 6, 7, 8, 9
Special symbols	~ ' ! @ # % ^ & * ( ) _ - + =   \ { } [ ] : ; " ' < > , . ? /

3. **Float** : A number having fractional part, i.e., decimal value, is a floating point number. They are represented in C++ by float data type. The number 12 is an integer, but 12.0 is a floating point number. Floating-point numbers can also be written in exponent form. For example, 147.9101 will be written as 1.479101E02. Float occupies **four bytes** of memory.
4. **Double** : Double stands for double-precision floating point. Double occupies twice the memory by float, i.e. **eight bytes**. It is used when the value is very huge or very small, like the size of galaxy or the size of an electron.

5. **Void** : The void type represents an empty set of values. It is used as the return type of functions that do not return any value. No variables of type void can be declared.

### ASCII Values Table :-

```
D:\programs>ascii.exe
```

## ASCII CHARACTERS

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	^	_	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@	^	_	`	{		}	~	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	:	;	<	=	>	?	@
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## **Operators** :-

Below is the list of most commonly used operators in C++ :

- **Arithmetic Operators** : + (Add), - (Subtract), \* (Multiply), / (Divide) and % (Modulo or Remainder)
- **Increment/Decrement Operators** : ++, -- (a++ is equivalent to writing a=a+1)
- **Relational Operators** : < (less than), > (greater than), <= (less than or equal to), >= (greater than or equal to), ==(equal to), != (not equal to)
- **Logical Operators** (used to combine two statements) : || (logical OR – evaluates to true, if any one of the operands is true), && (logical AND – evaluates to true, if and only if all the operands are true), !(logical NOT – if A is true, !A returns false and vice versa)
- **Sizeof Operator** : This is used to calculate the size of the variables or any other data type. For example, suppose we have int a=0; Then, sizeof(a) will return the value 2.
- **Conditional Operator** : This can be used as an alternate to if-else. But, only if there is a single condition to be checked. The syntax is as follows :  
**condition ? True block : False block;**  
For example, result >=50 ? cout<<"Pass" : cout<<"Fail";

## **The if-else Condition statements** :-

Basic syntax :

1.

**if(condition)**

**{**

**Statements to be executed if the condition is true**

**}**

2.

**if(condition)**

**{**

**Statements to be executed if the condition is true**

**}**

**else**

**{**

**Statements to be executed if the condition is false**

**}**

3.

**if(condition1)**

**{**

**Statements to be executed if the condition1 is true**

**}**

**else if(condition2)**

**{**

**Statements to be executed if the condition2 is false**

**}**

**else if(condition3)**

**{**

**Statements to be executed if the condition3 is false**

**}**

**else**

**{**

**Statements to be executed if all the condition are false**

**}**

4.

**if(condition1)**

**{**

**if(condition2)**

**Statements to be executed if the condition2 is true**

**else**

**Statements to be executed if the condition2 is false**

**else**

**{**

**if(condition3)**

**Statements to be executed if the condition3 is true**

**else**

**Statements to be executed if the condition2\3 is false**

**}**

**Notes :-**

- The 3<sup>rd</sup> syntax is widely used and is popularly referred to as the 'if-else-if ladder'.
- There can be an if block, without else block, but the reverse is not possible.
- As is clear from the 4<sup>th</sup> syntax, 'nesting' of if-else is possible. You can have an if inside if, or an if inside the else.

## **Practice Problems :**

- (i) Write a code to find the greater of two numbers. Extend the same to find out the largest of three numbers.
- (ii) Write a program for temperature conversion. It should take the choice of the user, i.e. whether the temperature is to be converted from Celsius to Fahrenheit or the vice versa.

The output should be somewhat like :

Temperature conversion menu :

- 1. Fahrenheit to Celsius
- 2. Celsius to Fahrenheit

Enter your choice : 2

Enter temperature in Celsius : 37

The temperature in Fahrenheit is : 98.6

- (iii) Write a program to read the marks of a student and display whether the student has passed or not.
- (iv) Write a code to calculate the area or the perimeter of a square depending on the choice of the user.