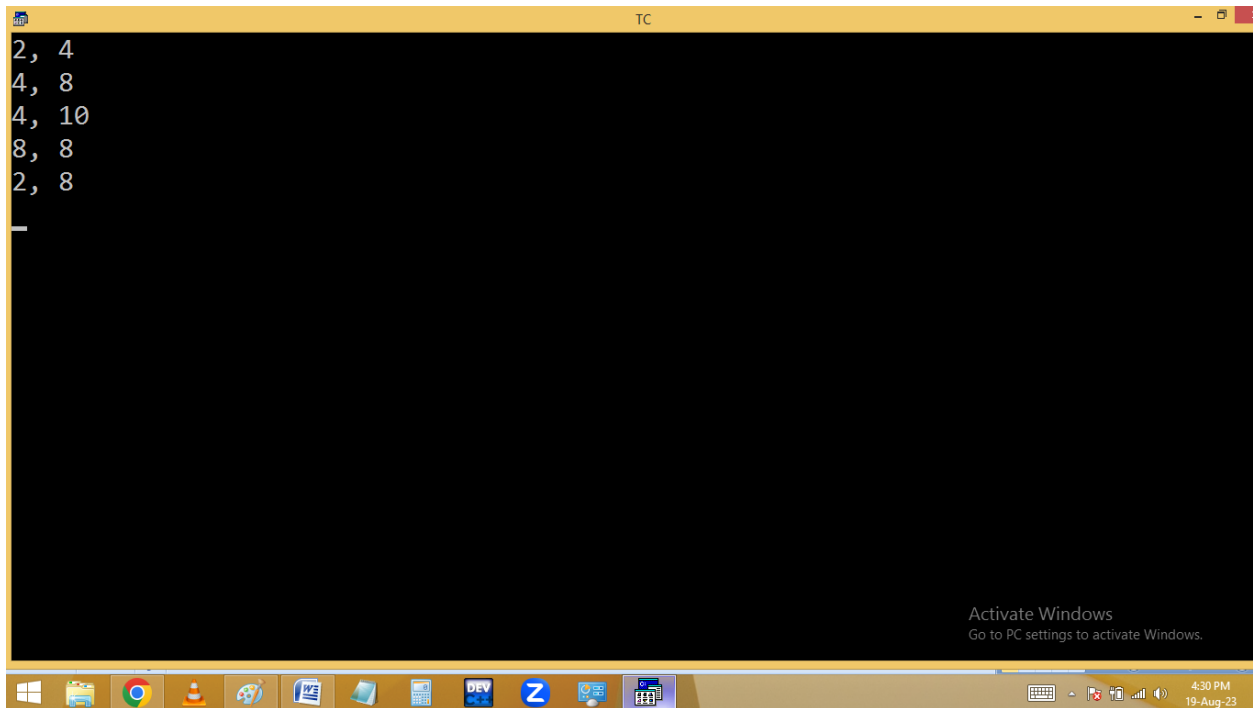


The screenshot shows the Turbo C++ IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a toolbar. The code editor contains the following C program:

```
Line 12 Col 1 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
float a=1.2;
clrscr();
printf("%d, %d\n",sizeof((unsigned)100000), sizeof(100000u));
printf("%d, %d\n",sizeof(a), sizeof(1.2));
printf("%d, %d\n",sizeof(1.2f), sizeof(1.2l));
printf("%d, %d\n",sizeof(1.2+12), sizeof(12+1.2));
printf("%d, %d\n",sizeof(1.2,12), sizeof(12,1.2));
getch();
}
/* The default floating value is double i.e. 8 bytes */
```

The Windows taskbar at the bottom shows the Start button, taskbar icons for File Explorer, Google Chrome, VLC media player, Paint, Word, Excel, and several other applications. The system tray on the right shows the date and time as 4:30 PM on 19-Aug-23.



The screenshot shows the Turbo C++ IDE with the same menu bar and toolbar. The code editor now displays the output of the program:

```
2, 4
4, 8
4, 10
8, 8
2, 8
```

The Windows taskbar at the bottom is identical to the first screenshot, showing the Start button, taskbar icons, and system tray with the date and time as 4:30 PM on 19-Aug-23.

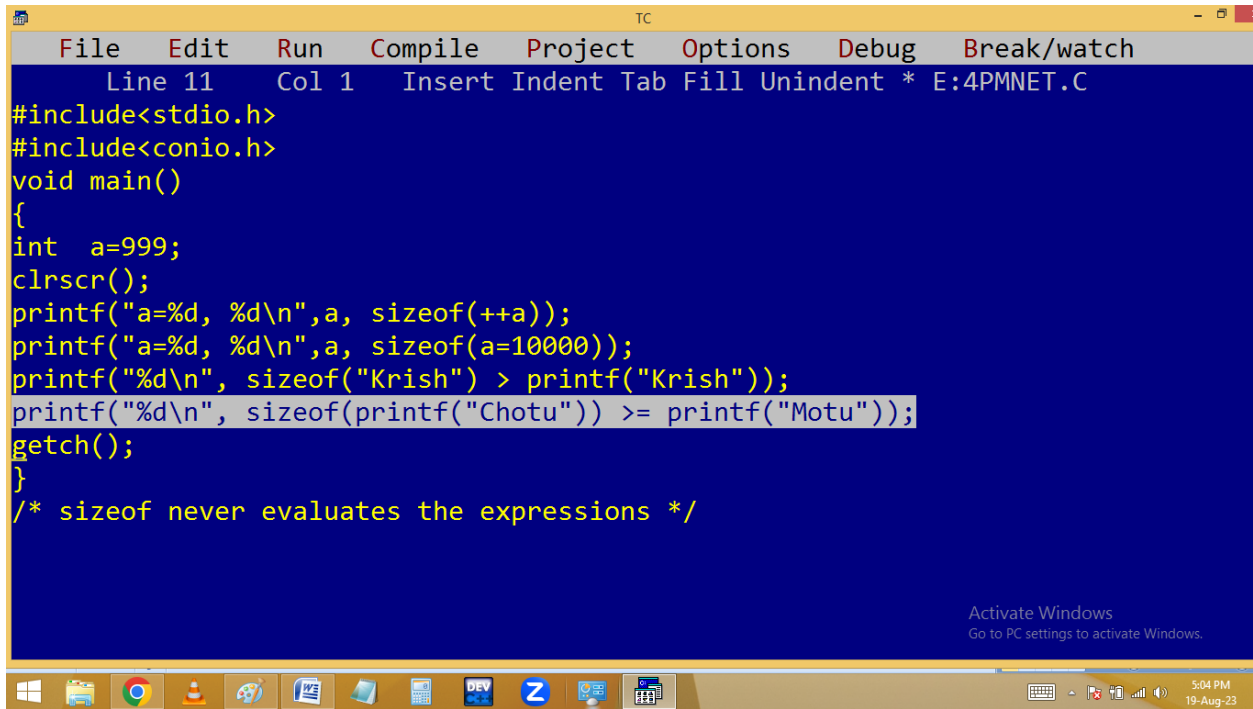
```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 16 Col 1 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
char c='x'; char a[5]="ab", b[]="ab"; clrscr();
printf("%d, %d\n",sizeof(c), sizeof("x"));
printf("%d, %d\n",sizeof("abc"), sizeof("Kishore Naidu"));
printf("%d, %d\n",sizeof(a), sizeof(b));
printf("%d, %d\n",sizeof("ab\0"), sizeof("\0"));
printf("%d, %d\n",sizeof("1.23"), sizeof("float"));
printf("%d, %d\n",sizeof(""), sizeof(sizeof("Kishore")));
printf("Ram address = %u\n","Ram");
printf("%d, %d\n",sizeof("Ram")+1, sizeof("Ram")+1);
getch();
}
/* sizeof counts null char in strings. */
```

Activate Windows
Go to PC settings to activate Windows.

```
TC
1, 2
4, 14
5, 3
4, 2
5, 6
1, 2
Ram address = 478
2, 5
_
```

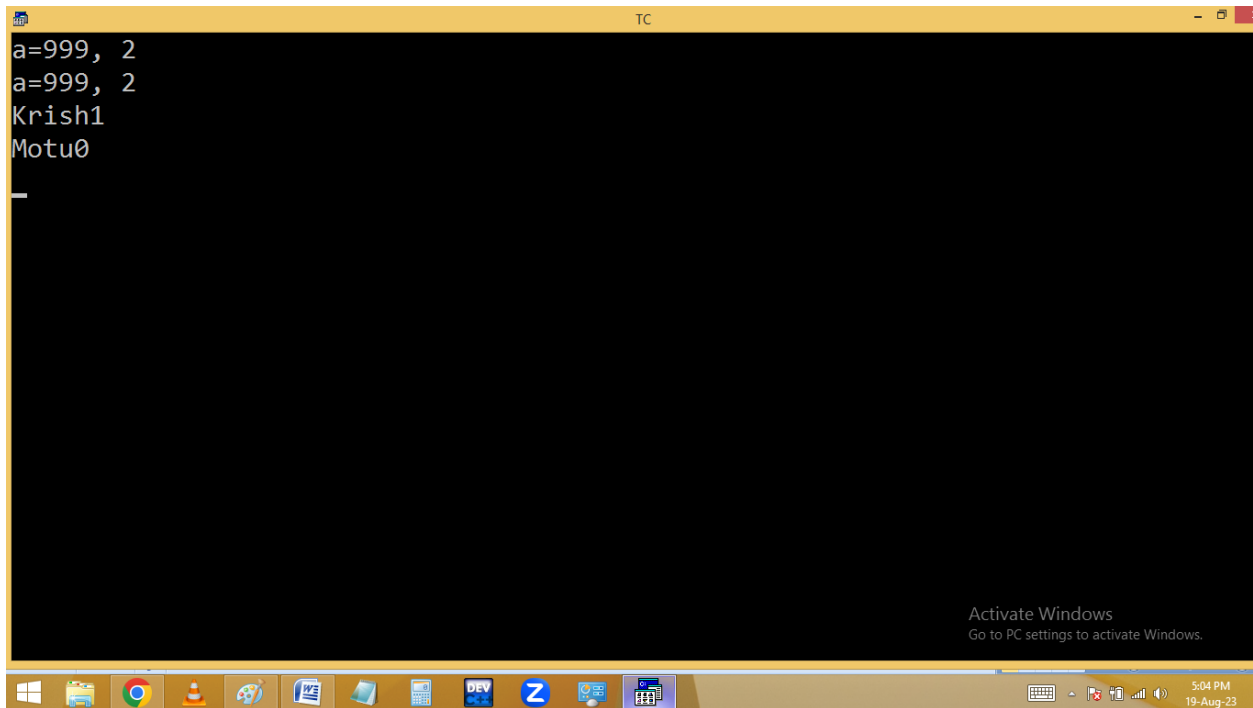
Activate Windows
Go to PC settings to activate Windows.

Page: 2 of 2 Words: 0



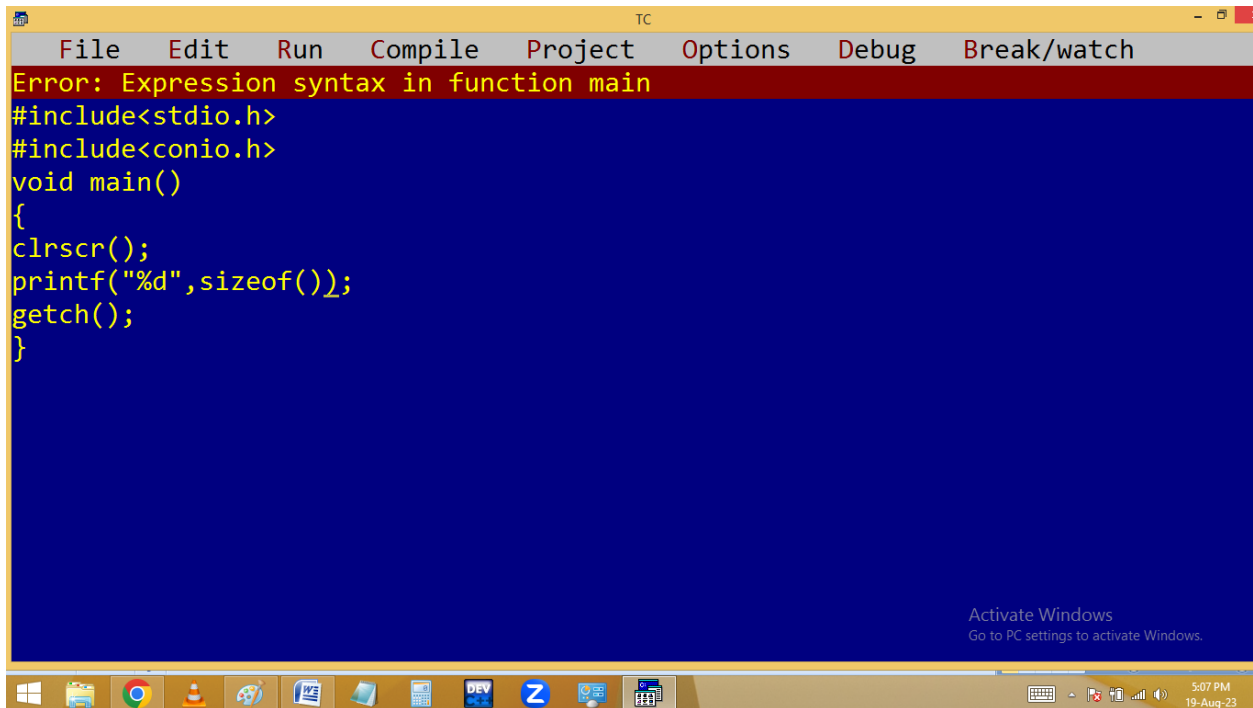
```
File Edit Run Compile Project Options Debug Break/watch
Line 11 Col 1 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a=999;
clrscr();
printf("a=%d, %d\\n",a, sizeof(++a));
printf("a=%d, %d\\n",a, sizeof(a=10000));
printf("%d\\n", sizeof("Krish") > printf("Krish"));
printf("%d\\n", sizeof(printf("Chotu")) >= printf("Motu"));
getch();
}
/* sizeof never evaluates the expressions */

Activate Windows
Go to PC settings to activate Windows.
```



```
TC
a=999, 2
a=999, 2
Krish1
Motu0

Activate Windows
Go to PC settings to activate Windows.
```

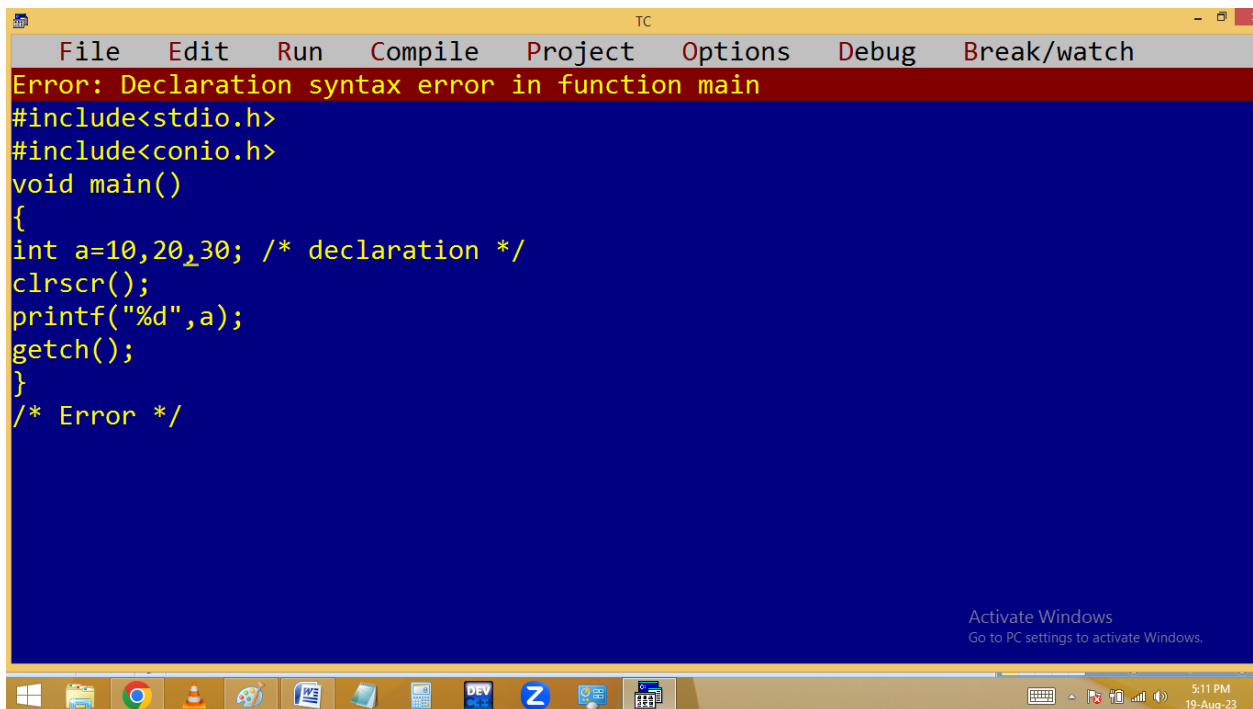


The screenshot shows the Turbo C++ (TC) IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a toolbar. The main window has a blue background with yellow text. A red error message at the top reads "Error: Expression syntax in function main". The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%d",sizeof());
getch();
}
```

An "Activate Windows" watermark is visible in the bottom right corner of the IDE window. The Windows taskbar at the bottom shows the time as 5:07 PM on 19-Aug-23.

() and , separators:



The screenshot shows the Turbo C++ (TC) IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a toolbar. The main window has a blue background with yellow text. A red error message at the top reads "Error: Declaration syntax error in function main". The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a=10,20,30; /* declaration */
clrscr();
printf("%d",a);
getch();
}
/* Error */
```

An "Activate Windows" watermark is visible in the bottom right corner of the IDE window. The Windows taskbar at the bottom shows the time as 5:11 PM on 19-Aug-23.

TC

File Edit Run Compile Project Options Debug Break/watch

Line 10 Col 6 Insert Indent Tab Fill Unindent * E:4PMNET.C

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a=(10,20,30); /* declaration */
clrscr();
printf("%d",a);
getch();
}
/* 30 */
```

Activate Windows
Go to PC settings to activate Windows.

5:12 PM
19-Aug-23

TC

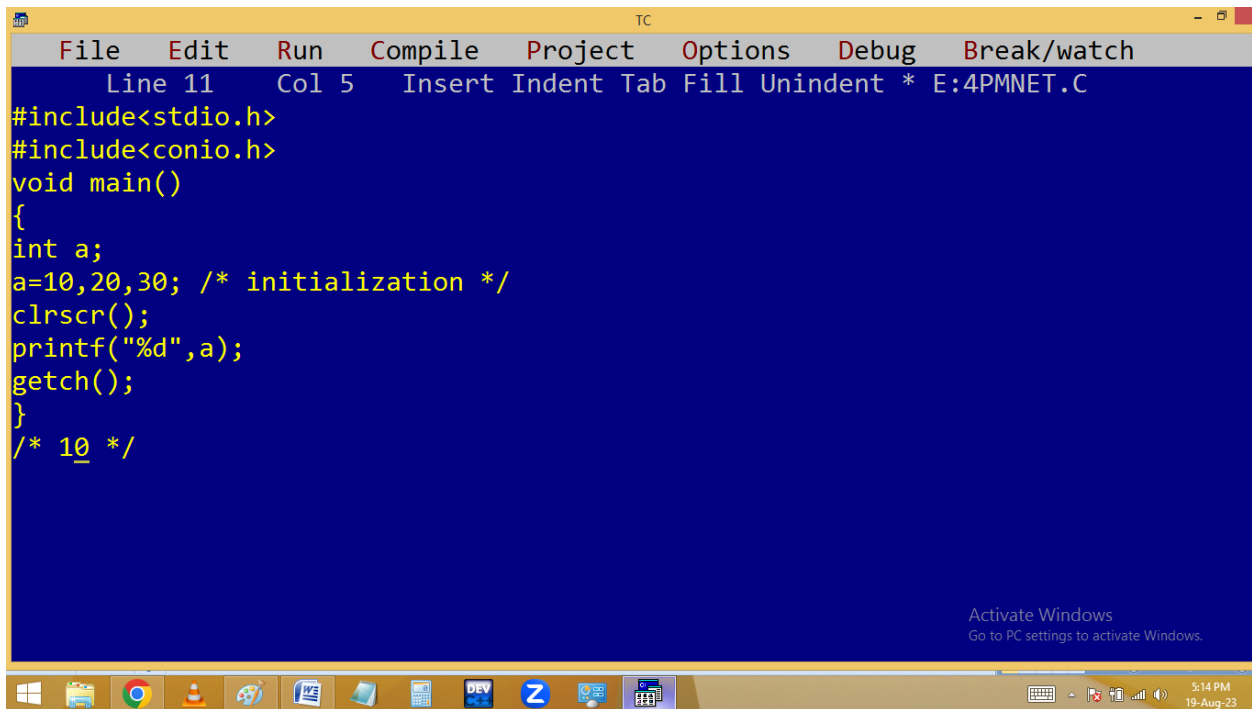
File Edit Run Compile Project Options Debug Break/watch

Line 12 Col 28 Insert Indent Tab Fill Unindent * E:4PMNET.C

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a;
a=(10,20,30); /* initialization */
clrscr();
printf("%d",a);
getch();
}
/* 30 */
```


Activate Windows
Go to PC settings to activate Windows.

5:13 PM
19-Aug-23



```
File Edit Run Compile Project Options Debug Break/watch
Line 11 Col 5 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a;
a=10,20,30; /* initialization */
clrscr();
printf("%d",a);
getch();
}
/* 10 */
```

int a; /* declaration */
a = 10, 20, 30; /* initialization */



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 6 Col 13 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a;
a=10,(20,30); /* initialization */
clrscr();
printf("%d",a);
getch();
}
/* 10 */
```

Activate Windows
Go to PC settings to activate Windows.

a = 10, (20, 30);

→

a = 10, 30 ;

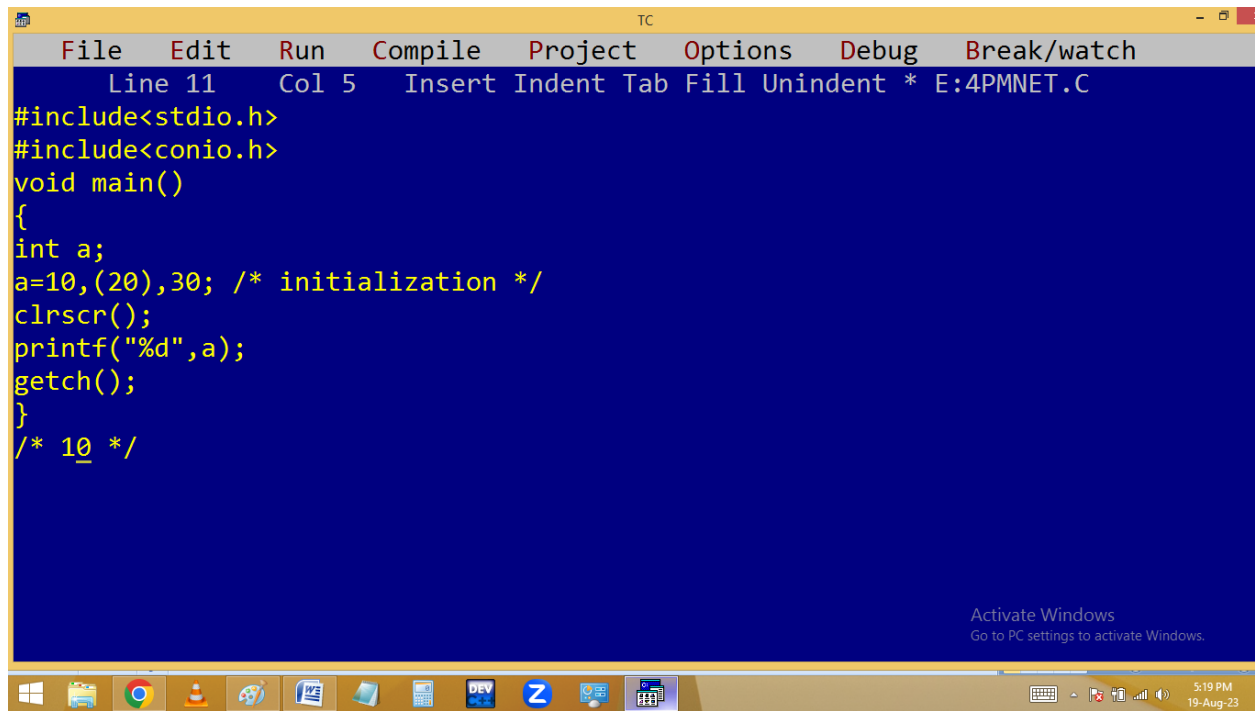
↖

```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 11 Col 5 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a;
a=(10,20),30; /* initialization */
clrscr();
printf("%d",a);
getch();
}
/* 20 */

Activate Windows
Go to PC settings to activate Windows.
```

a = (10, 20), 30;

a = 20, 30



```
File Edit Run Compile Project Options Debug Break/watch
Line 11 Col 5 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a;
a=10,(20),30; /* initialization */
clrscr();
printf("%d",a);
getch();
}
/* 10 */

Activate Windows
Go to PC settings to activate Windows.
```

```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 11 Col 5 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a;
a=(10,20),30,(40,50); /* initialization */
clrscr();
printf("%d",a);
getch();
}
/* 20 */
```

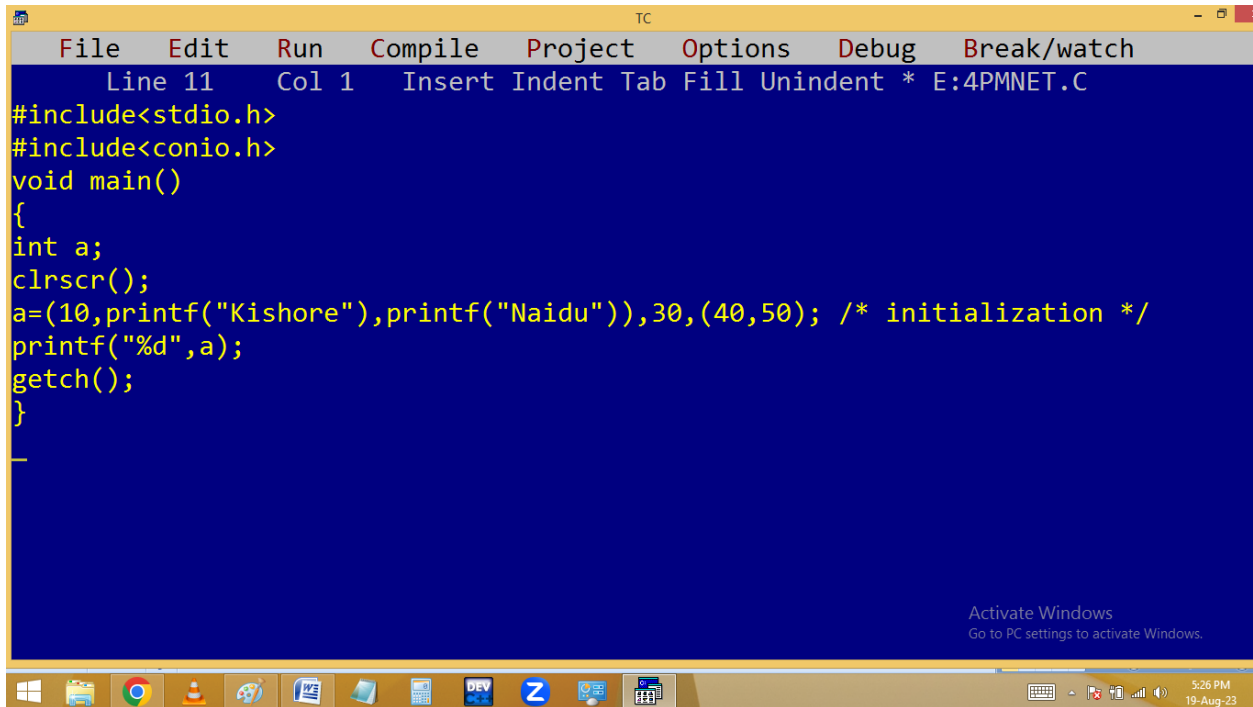
Activate Windows
Go to PC settings to activate Windows.

$a = (10, 20), 30, (40, 50);$

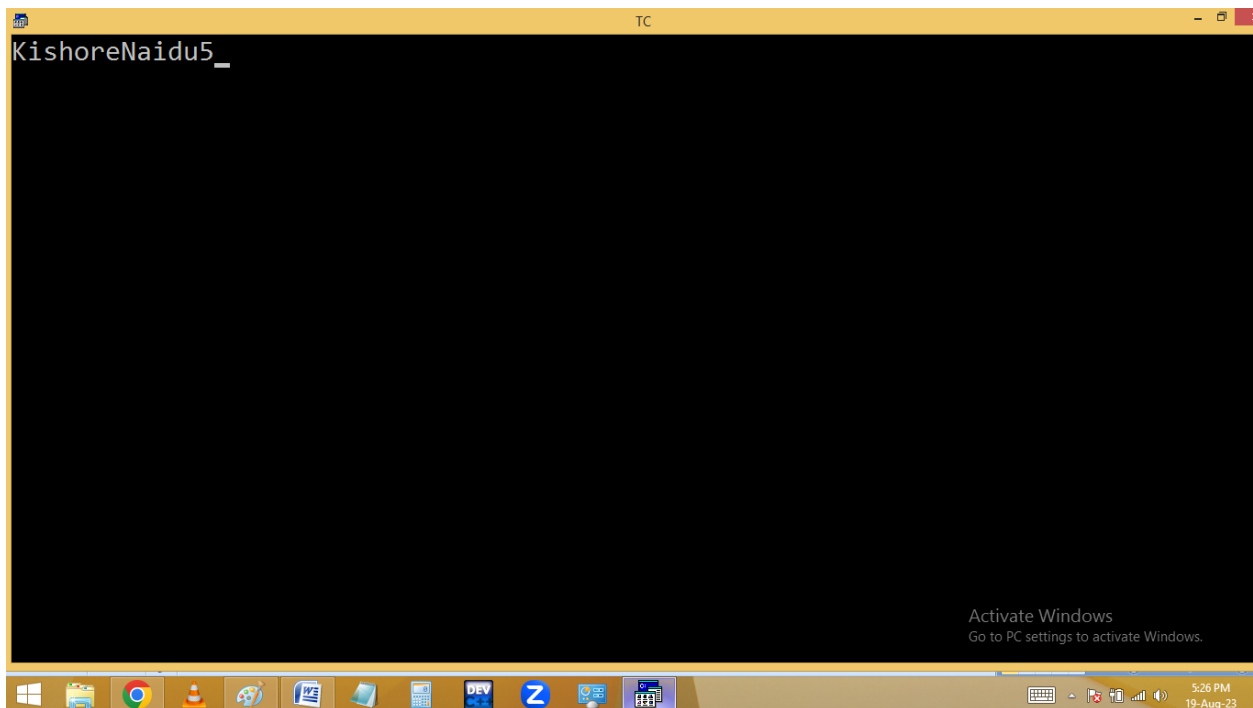
\rightarrow

$a = 20, 30, 50$

\leftarrow



```
File Edit Run Compile Project Options Debug Break/watch
Line 11 Col 1 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a;
clrscr();
a=(10,printf("Kishore"),printf("Naidu")),30,(40,50); /* initialization */
printf("%d",a);
getch();
}
```



```
KishoreNaidu5_
```

BITWISE OPERATORS

Bitwise operator's works on bits.

Turbo-c is a 16 bit compiler. Due to this bitwise operations are limited to 16 bits only [2^0 to 2^{15}].

Bitwise operators operate **integer** type values only.

We have to calculate only the **on** bits [**1**].

When the first bit[**Sign bit**] is **1** then the number is **Negative** and it is **0** then the number is **positive**.

They are very much used in system software development.

Note: Bitwise operator is low level feature.

C-Language supports following bitwise operators.

& -Bitwise and

| - Bitwise or

^ - XOR ==> Exclusive OR

~ - Compliment operator

<< - Left shift operator

>> - Right shift operator

& - Bitwise and: In this both bits are 1's then result bit is 1. Otherwise result bit is 0.

Eg: **25 & 15 = 9**

25 = 0000 0000 0001 1001
 15 = 0000 0000 0000 1111

2 | 25
 2 | 12 - 1
 2 | 6 - 0
 2 | 3 - 0
 2 | 1 - 1

2 | 15
 2 | 7 - 1
 2 | 3 - 1
 1 - 1

25 & 15 = 9

25 = 0000 0000 0001 1001
 15 = 0000 0000 0000 1111

&

0000 0000 0000 1001

↓ ↓

$2^3 + 2^0$

↓ ↓

8 + 1 = **9**

| - Bitwise or: In this both bits are 0's then result bit is 0. Otherwise result bit is 1.

Eg: 25 | 15 = 31

$$25 \cdot 15 = 31$$

25 = 0000 0000 0001 100 1

15 = 0000 0000 . 0000 1111

0000 0000 0001 1111

$2^4 + 2^3 + 2^2 + 2^1 + 2^0$

$16 + 8 + 4 + 2 + 1 = 31$

^ - XOR [Exclusive OR]: In this both bits are same then result bit is 0. Otherwise result bit is 1.

Eg: $25 \wedge 15 = 22$

$$25 \wedge 15 = 22$$

25 = 0000 0000 0001 1001

15 = 0000 0000 0000 1111

\wedge

0000 0000 0001 0110

$$\begin{array}{c} 2^4 + 2^2 + 2^1 \\ 16 + 4 + 2 = 22 \end{array}$$

~ - Complement operator: In complement operation the bits are complimented. i.e. 1's become 0's and 0's become 1's. Due to this +Ve no becomes -Ve and -Ve no becomes +Ve.

eg: ~25 → -26

25 = 0000 0000 0001 1001
1111 1111 1110 0110
-128 + 64 + 32 + 4 + 2 = -26
-128 + 102 = -26

25 = 0000 0000 0001 1001

~ = 1111 1111 1110 0110

5 2 1

$$2+4+32+64+128+256+512+1024+2048+4096+8192+16384-32768=-26$$

~-25 = 0000 0000 0001 1001

1's ~ = 1111 1111 1110 0110

2's ~ = 0000 0000 0000 0001
1111 1111 1110 0111

24 2
16+8=24

1	0	0	01
0	1	0	1
1	1	0	10

**Note: When starting bit is 1 given no is –
Ve.**

Eg: ~-25 → +24

~-25 = +24

25 = 0000 0000 0001 1001
1111 1111 1110 0110

<== 1's compliment

+1

<== 2's Compliment

1111 1111 1110 0111
0000 0000 0001 1000

↓ ↓

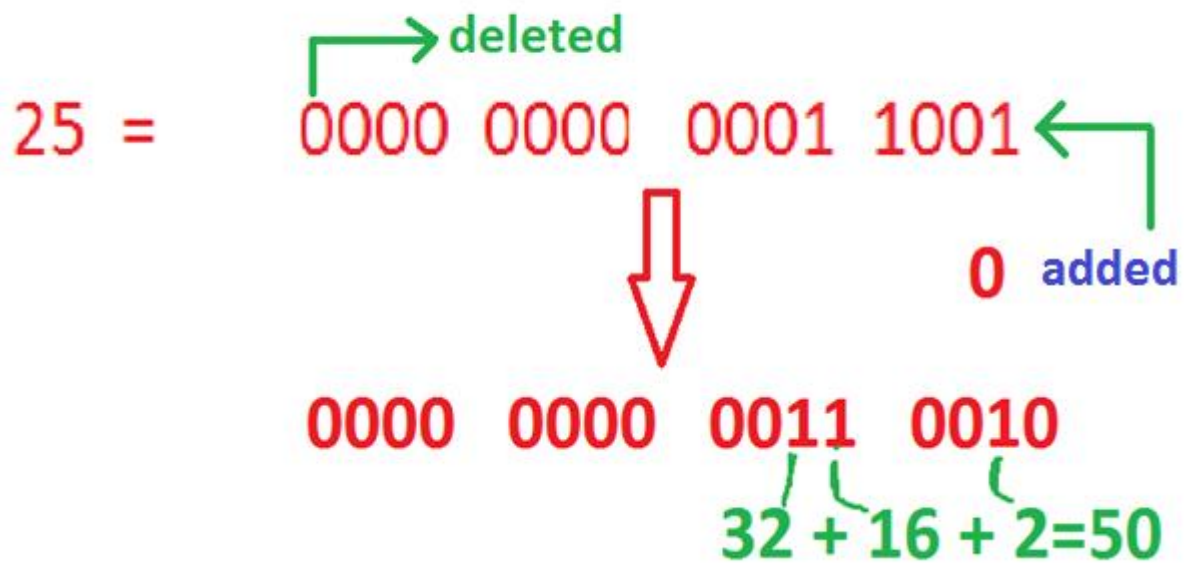
16+8=24

<< - left shift operator:

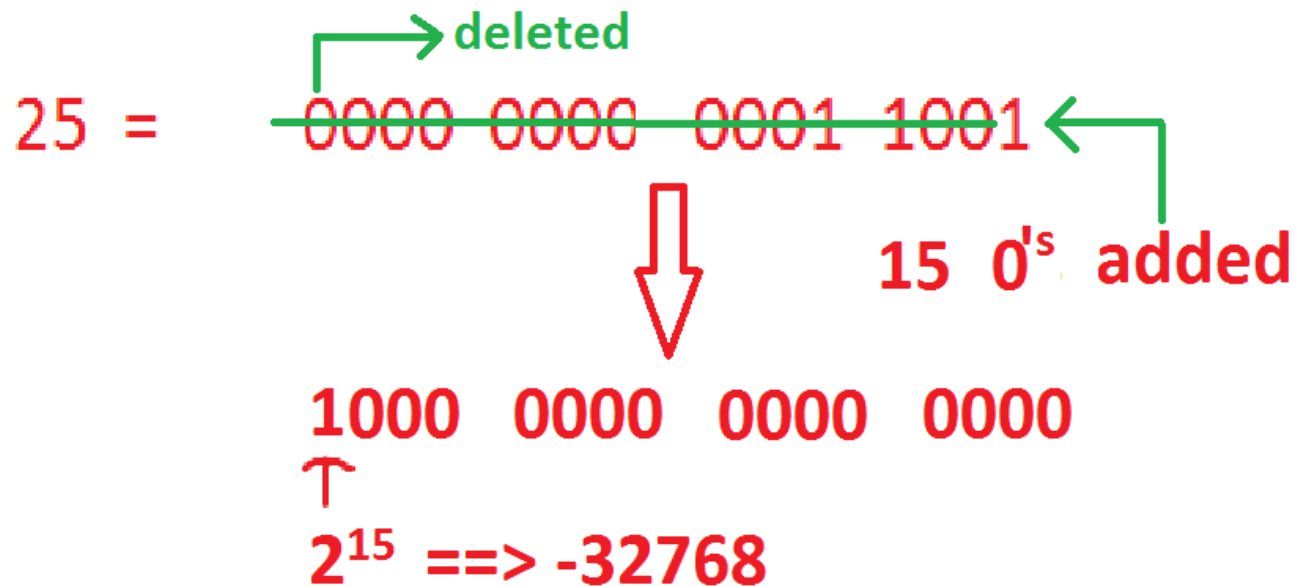
In left shift operation, the specified no of bits are deleted from left side and the same no of **zeros** added on right side. In left shift operation, most probably the value is multiplied with 2 that no of times.

Eg: $25 \ll 1 = 50$, $25 \ll 2 = 100$, $25 \ll 15 = -32768$,
 $25 \ll 16 = 0$

eg: $25 \ll 1 = 50$



eg: $25 \ll 15 = -32768$



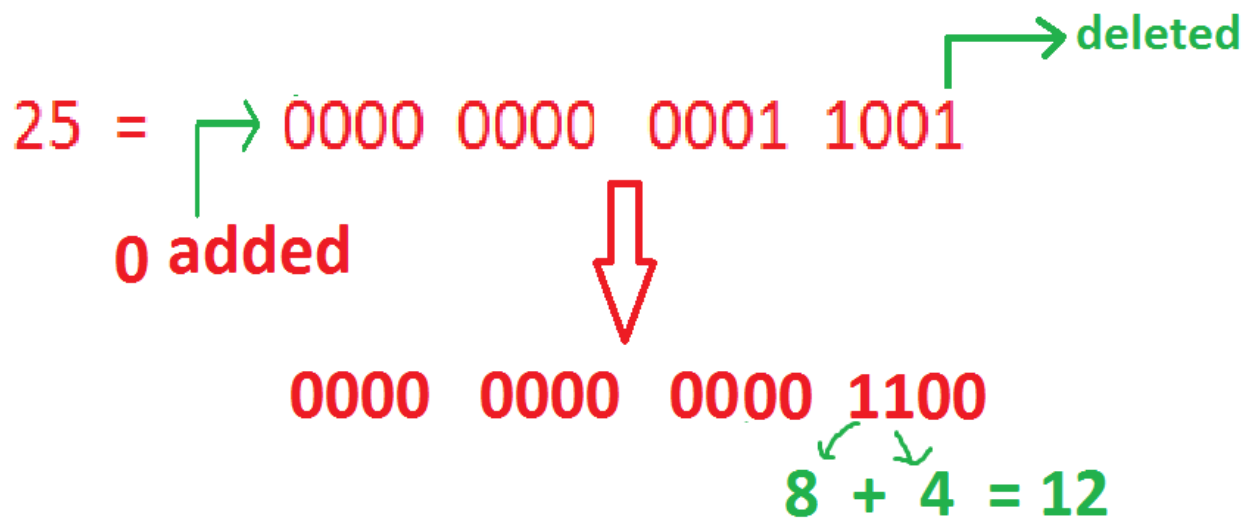
Note: When starting bit 1 no is negative.

>> - Right shift operator:

In right shift operation, the bits are moved to right side i.e. the specified no.of bits are deleted from right side and same no.of **zero's** are added left side. Due to this always the number is divided with 2 that no of times.

Eg: $25 \gg 1 = 12$, $25 \gg 2 = 6$, $25 \gg 3 = 3$, $25 \gg 4 = 1$, $25 \gg 5 = 0$

eg: $25 \gg 1 = 12$



eg: $25 \gg 5 = 0$

