

The image shows a screenshot of a Turbo C++ (TC) IDE. The top window displays a C program with the following code:

```
File Edit Run Compile Project Options Debug Break/watch
Line 9 Col 1 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%d, %d\n",sizeof(5l),sizeof(5L));
printf("%d, %d\n",sizeof((unsigned)100000),sizeof(100000u));
printf("%d, %d\n",sizeof((int)1.4),sizeof((char)100));
getch();
}
```

The bottom window shows the output of the program:

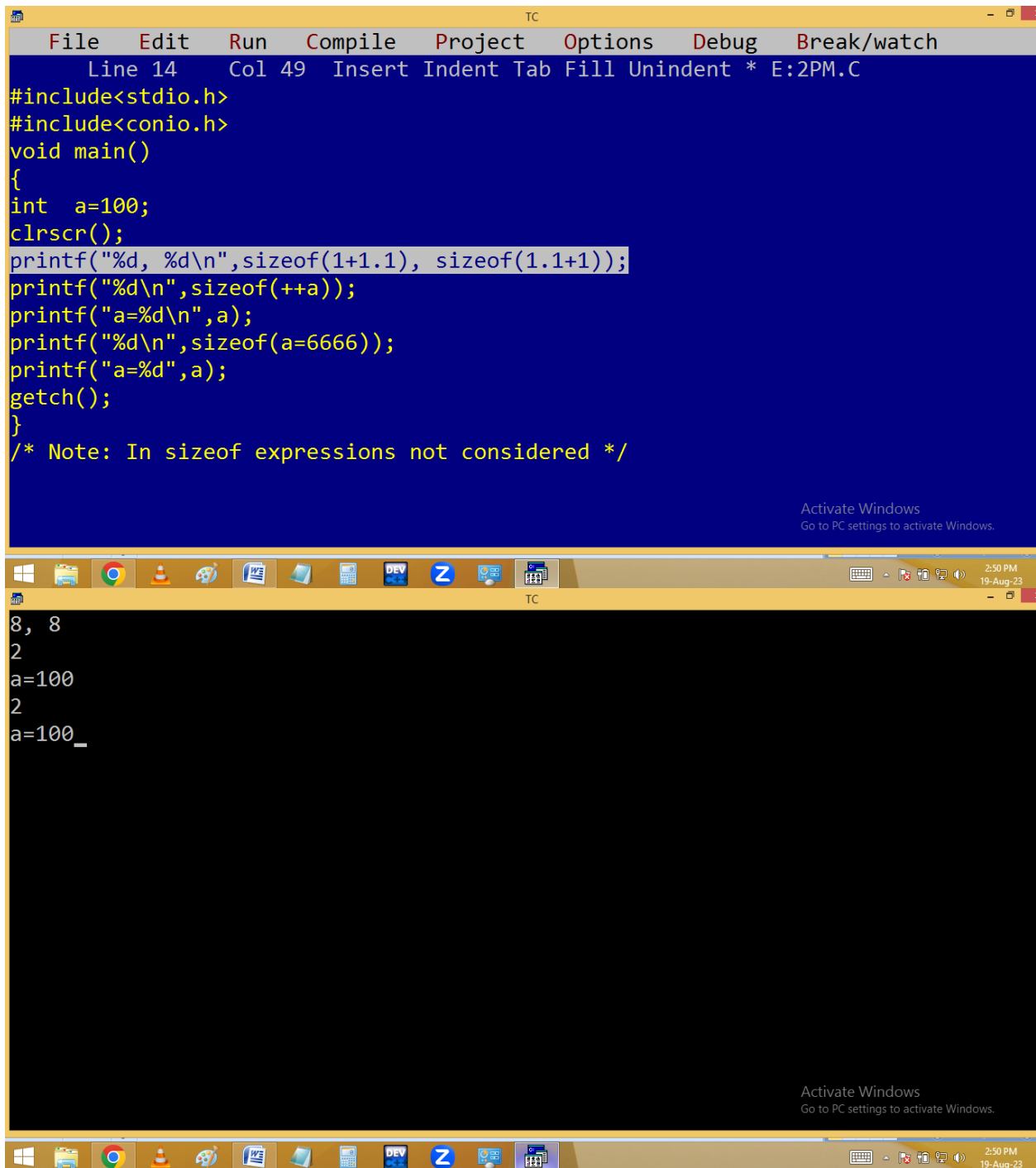
```
4, 4
2, 4
2, 1
```

Both windows include a status bar at the bottom with the text "Activate Windows Go to PC settings to activate Windows." and a taskbar at the very bottom showing various application icons and the system clock (2:27 PM, 19-Aug-23).

```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 17 Col 66 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
char a[5]="Hi", b[]="Hi";
float c=1.2;
clrscr();
printf("%d, %d, %d\n",sizeof(a),sizeof(b), sizeof("Hi"));
printf("%d, %d\n",sizeof("a"), sizeof("\0"));
printf("%d, %d\n",sizeof(1,1.2), sizeof(1.2,1));
printf("%d, %d\n",sizeof(c), sizeof(1.2));
printf("%d, %d\n",sizeof(1.2f), sizeof(1.2l));
printf("%d, %d\n",sizeof("Krish")+1, sizeof("Krish")+1));
printf("Krish addr = %u\n","krish");
printf("%d, %d\n",sizeof("Kishore Naidu"), sizeof(sizeof("Krish")));
getch();
}
5, 3, 3
2, 2
8, 2
4, 8
4, 10
7, 2
Krish addr = 481
14, 2

```

Page: 2 of 2 Words: 0



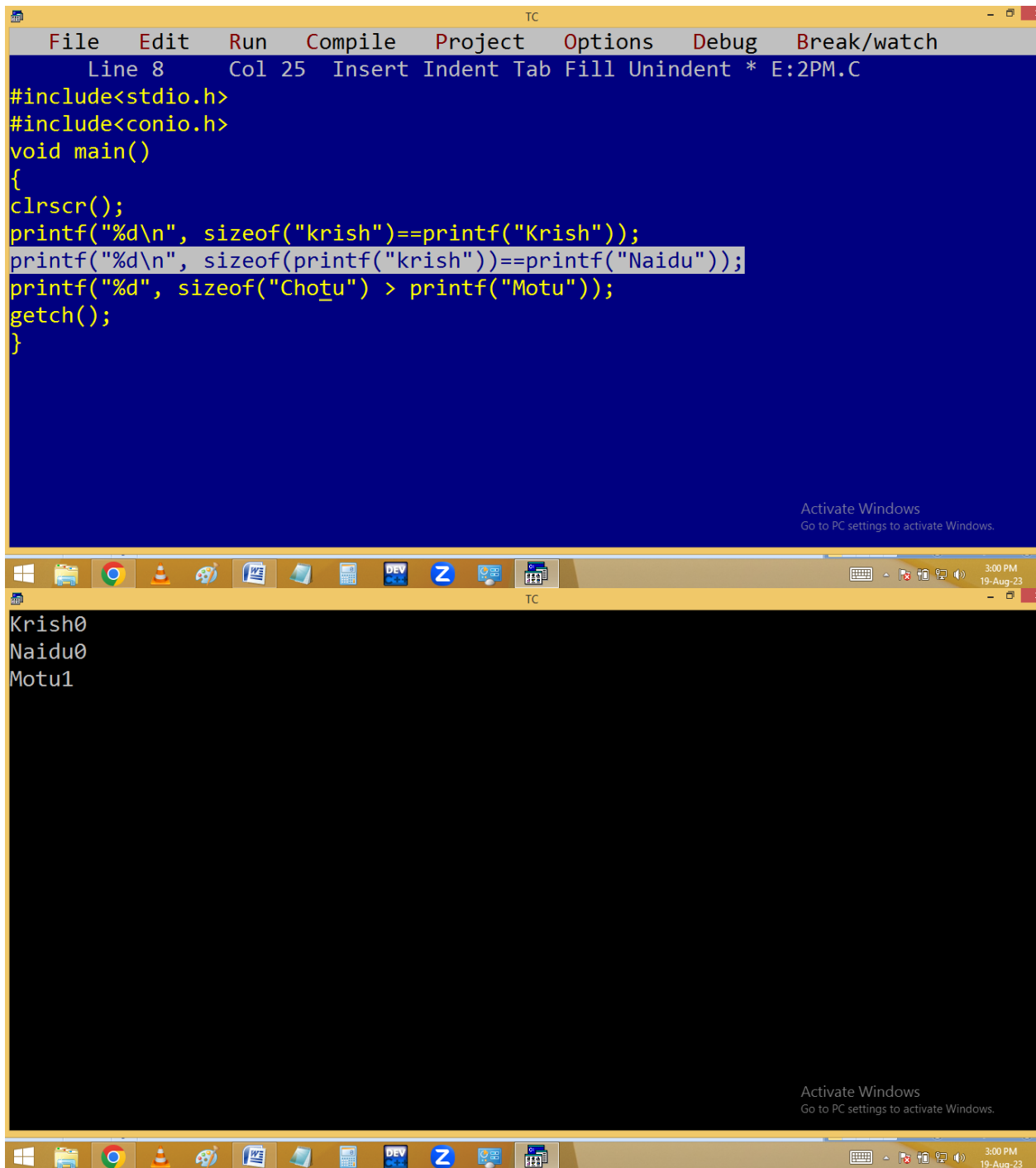
The image shows a screenshot of a Turbo C++ (TC) IDE. The top window displays a C program with the following code:

```
File Edit Run Compile Project Options Debug Break/watch
Line 14 Col 49 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a=100;
clrscr();
printf("%d, %d\n",sizeof(1+1.1), sizeof(1.1+1));
printf("%d\n",sizeof(++a));
printf("a=%d\n",a);
printf("%d\n",sizeof(a=6666));
printf("a=%d",a);
getch();
}
/* Note: In sizeof expressions not considered */
```

The bottom window shows the output of the program:

```
8, 8
2
a=100
2
a=100_
```

Both windows include a taskbar at the bottom with various application icons and a system tray showing the time as 2:50 PM on 19-Aug-23. An "Activate Windows" watermark is visible in the bottom right corner of both windows.



The image shows a screenshot of the Turbo C++ (TC) IDE. The top window displays a C program with the following code:

```
File Edit Run Compile Project Options Debug Break/watch
Line 8 Col 25 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%d\n", sizeof("krish")==printf("Krish"));
printf("%d\n", sizeof(printf("krish"))==printf("Naidu"));
printf("%d", sizeof("Chotu") > printf("Motu"));
getch();
}
```

The bottom window shows the output of the program:

```
Krish0
Naidu0
Motu1
```

The Windows taskbar at the bottom indicates the time is 3:00 PM on 19-Aug-23. An "Activate Windows" watermark is visible in the bottom right corner of the output window.

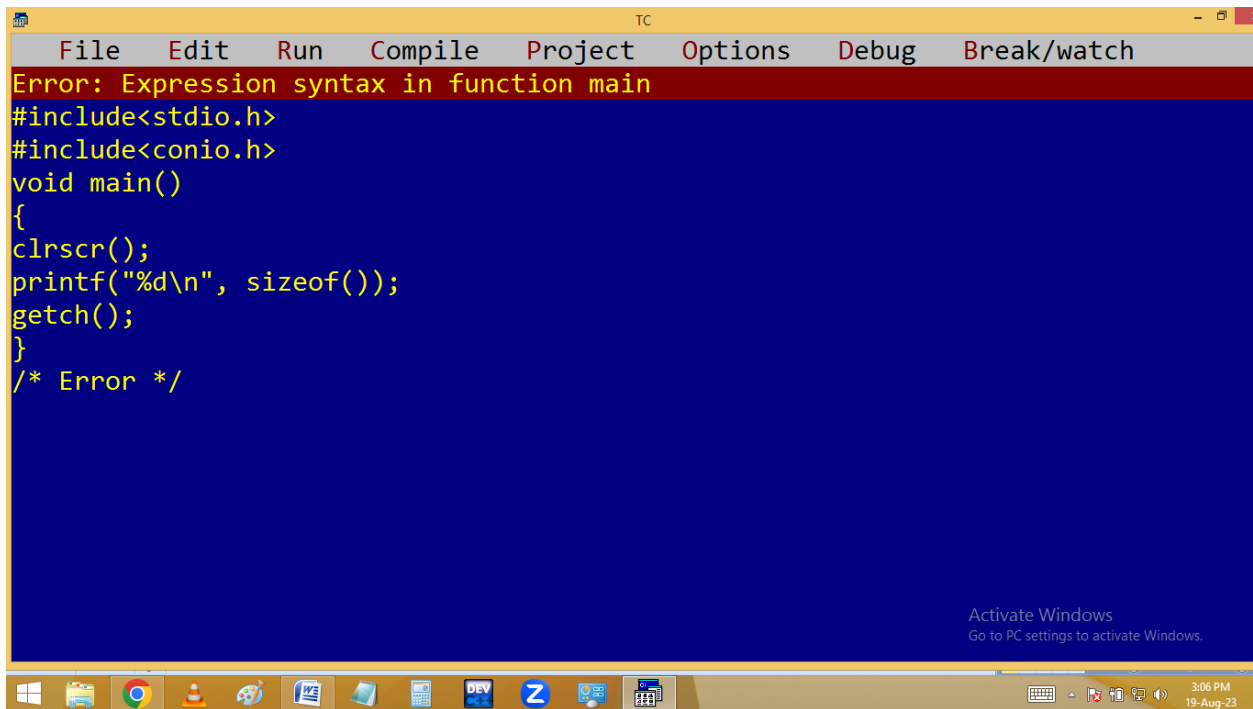
The image shows a screenshot of the Turbo C++ (TC) IDE. The top window displays a C program with the following code:

```
File Edit Run Compile Project Options Debug Break/watch
Line 9 Col 1 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%d\n", sizeof(""));
printf("%d\n", sizeof("1.23"));
printf("%d\n",sizeof( sizeof(100) + sizeof(1.2)));
getch();
}
```

The bottom window shows the output of the program, which is:

```
1
5
2
```

Both windows include a status bar at the bottom with the text "Activate Windows Go to PC settings to activate Windows." and a taskbar at the very bottom showing various application icons and the system clock (3:05 PM, 19-Aug-23).



The screenshot shows a Turbo C++ IDE window titled 'TC'. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. A red error message bar at the top reads 'Error: Expression syntax in function main'. The code editor contains the following C code:

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

The Windows taskbar at the bottom shows various icons and the system clock indicating 3:06 PM on 19-Aug-23.

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

$$\begin{array}{r} 2 \overline{) 25} \\ 2 \overline{) 12} - 1 \\ 2 \overline{) 6} - 0 \\ 2 \overline{) 3} - 0 \\ 2 \overline{) 1} - 1 \end{array}$$

$$\begin{array}{r} 2 \overline{) 15} \\ 2 \overline{) 7 - 1} \\ 2 \overline{) 3 - 1} \\ \quad 1 - 1 \end{array}$$

25 & 15 = 9

25 = 0000 0000 0001 1001

15 = 0000 0000 0000 1111

&

0000 0000 0000 1001

$\downarrow \quad \downarrow$

$2^3 + 2^0$

$\downarrow \quad \downarrow$

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

$$25 \cdot 15 = 31$$

$$25 = 0000 \ 0000 \ 0001 \ 1001$$

$$15 = 0000 \ 0000 \ 0000 \ 1111$$

$$0000 \ 0000 \ 0001 \ 1111$$

$2^4 + 2^3 + 2^2 + 2^1 + 2^0$
 $16 + 8 + 4 + 2 + 1 = 31$

^ - 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

$$0000 \ 0000 \ 0001 \ 0110$$

$$2^4 + 2^2 + 2^1$$

$$16 + 4 + 2 = 22$$

~ - Compliment operator: In compliment operation the bits are complimented. i.e.

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

Eg: $\sim -25 \rightarrow +24$

$\sim -25 = +24$

25 =	0000 0000	0001 1001	
	1111 1111	1110 0110	<== 1's compliment
		+1	<== 2's Compliment
<hr/>			
	1111 1111	1110 0111	
	0000 0000	0001 1000	
		↓ ↓	
		16+8=24	

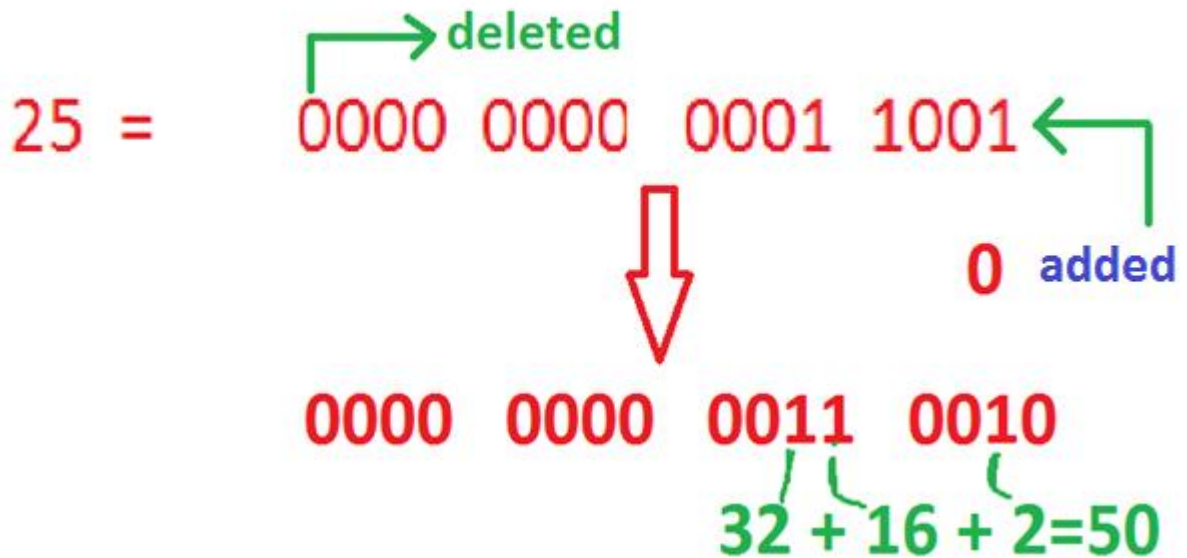
<< - left shift operator:

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

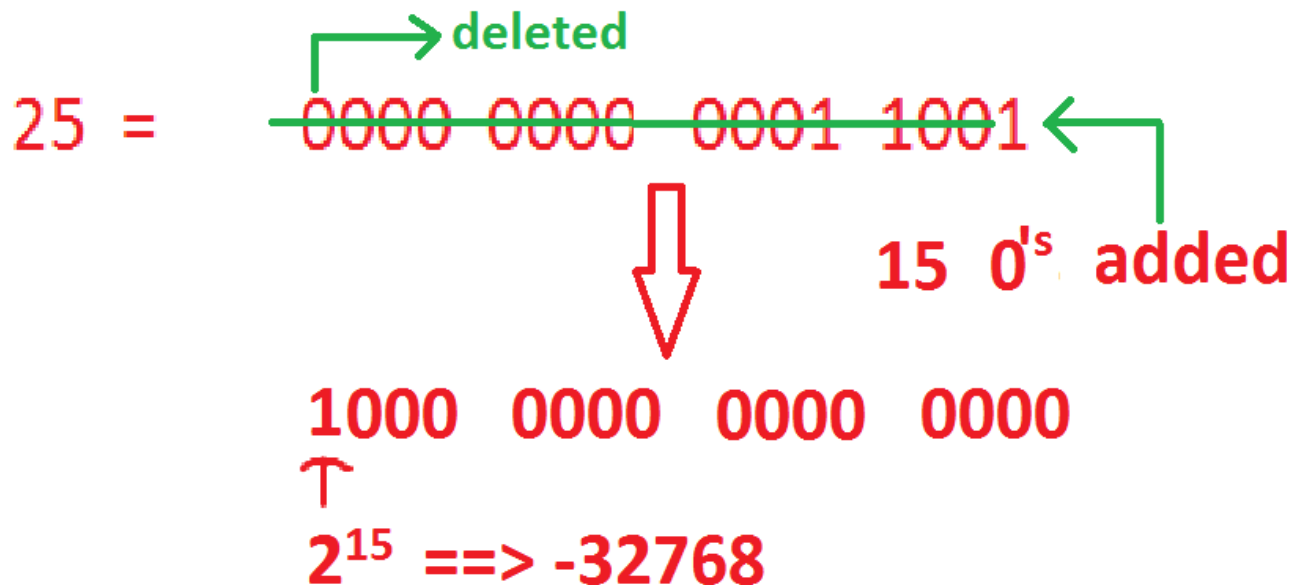
operation, most probably the value is multiplied with 2 that no of times.

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

eg: $25 \ll 1 = 50$



eg: $25 \ll 15 = -32768$



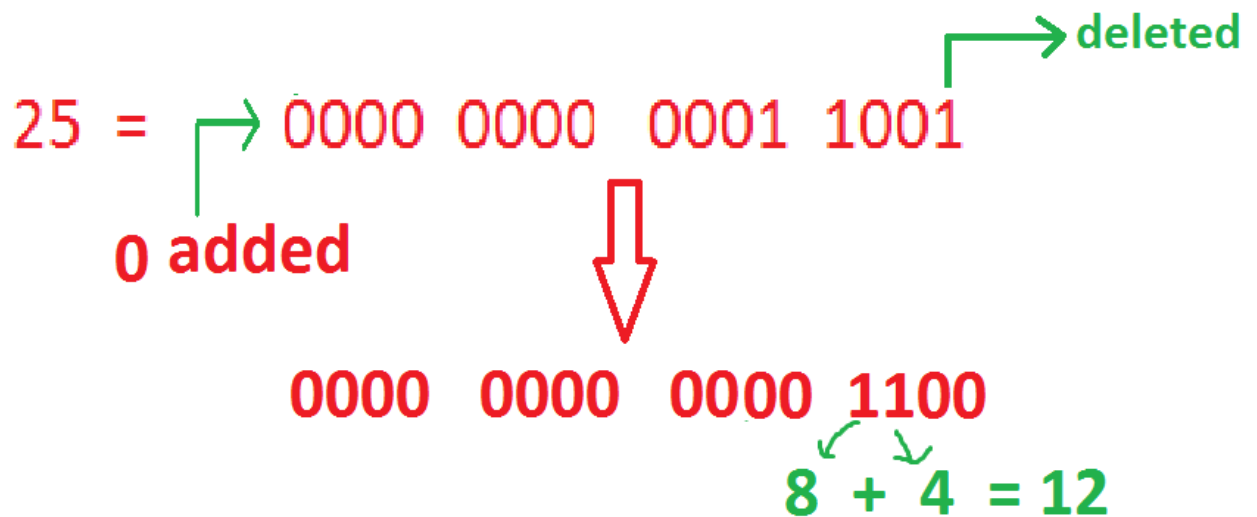
Note: When starting bit 1 no is negative.

>> - 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: $25 \gg 5 = 0$

