

The image shows a screenshot of the Turbo C++ (TC) IDE. The top window is the source code editor, titled 'TC', with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a status bar (Line 13, Col 28, Insert, Indent, Tab, Fill, Unindent, * E:9AM.C). The code is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a=32768;
clrscr();
printf("a=%d\n",a); /* -32768 */
a=32770;
printf("a=%d\n",a); /*-32766 */
a=-32770;
printf("a=%d\n",a); /* 32766 */
a=65540;
printf("a=%d\n",a); /* 4 */
getch();
}
```

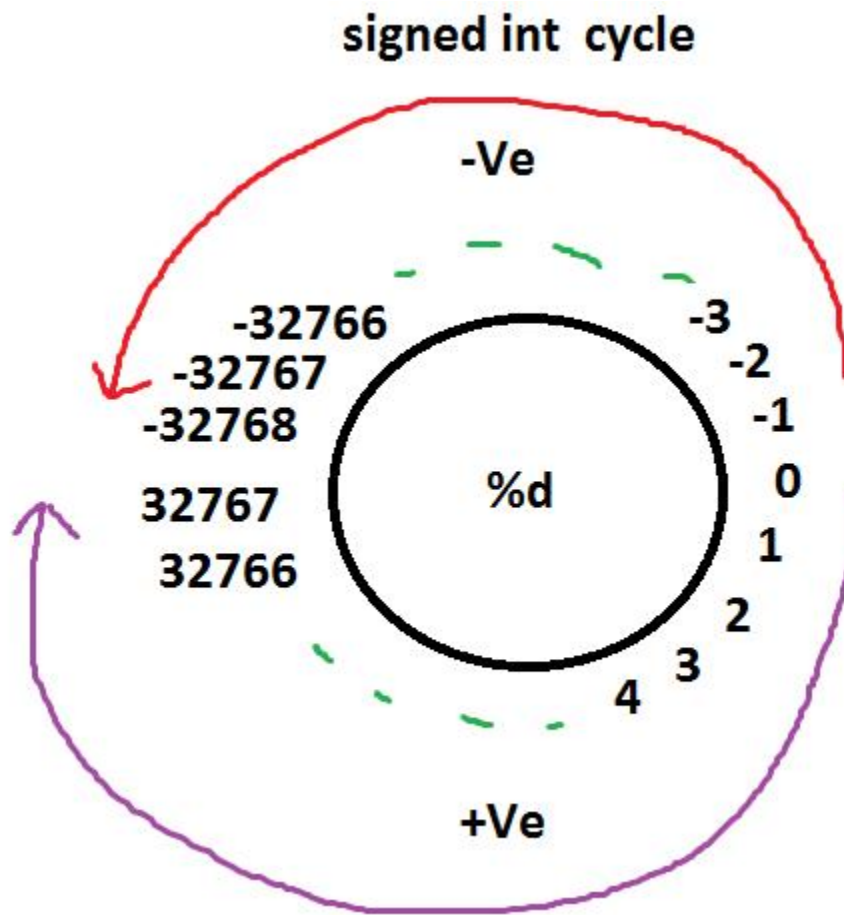
The bottom window is the output console, also titled 'TC', displaying the results of the program's execution:

```
a=-32768
a=-32766
a=32766
a=4
```

The Windows taskbar at the bottom shows the time as 9:20 AM on 15-Jul-24, along with various system icons and application icons like DEV, zm, and a folder icon.

int - c & c++ - compiler size 16 bit $\Rightarrow 2^{16} \Rightarrow 65536$
 signed int $\Rightarrow -32768$ to $+32767$
 unsigned $\Rightarrow 0$ to 65535

int - java / .net / py / codehs / online / vs code $\Rightarrow 32 \Rightarrow 2^{32} \Rightarrow 4294967296$
 signed int
 -2147483648 to $+2147483647$
 unsigned int
 0 to 4294967295



signed int cycle

int a = 32768;

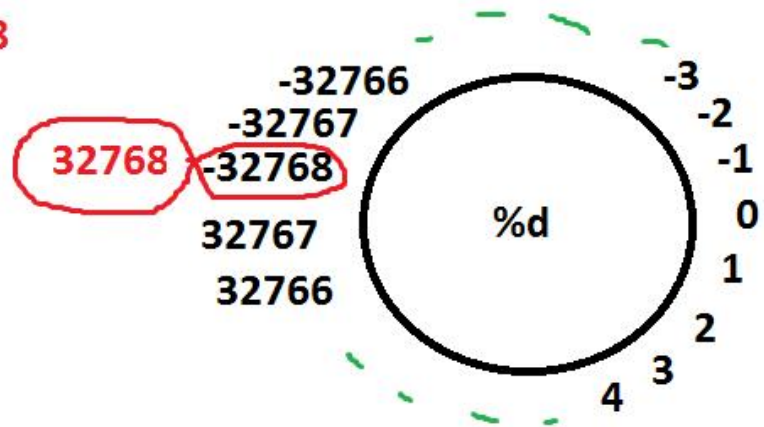
32768

$$\begin{array}{r} -32768 + 0 = -32768 \\ 0 \end{array}$$

65536

-32768

-32768



signed int cycle

int a = 32770;

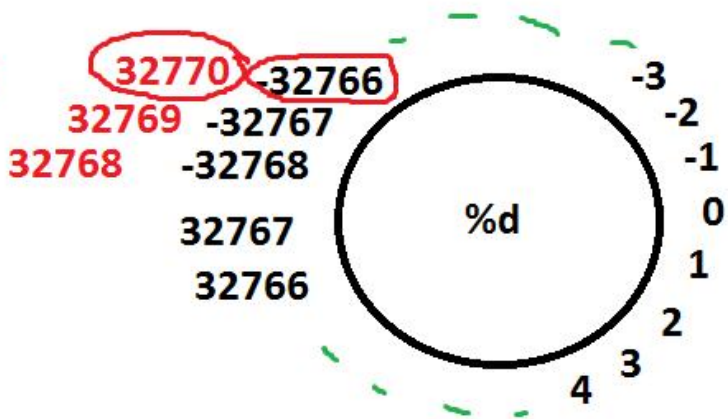
32770

$$\begin{array}{r} -32768 + 2 = -32766 \\ 2 \end{array}$$

65536

-32770

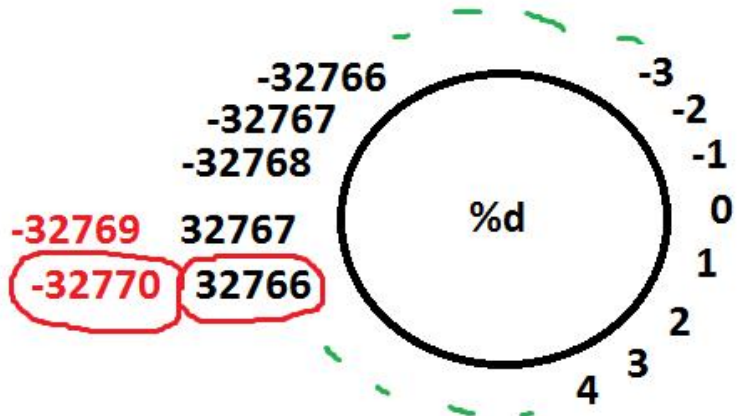
-32766



signed int cycle

int a = -32770;

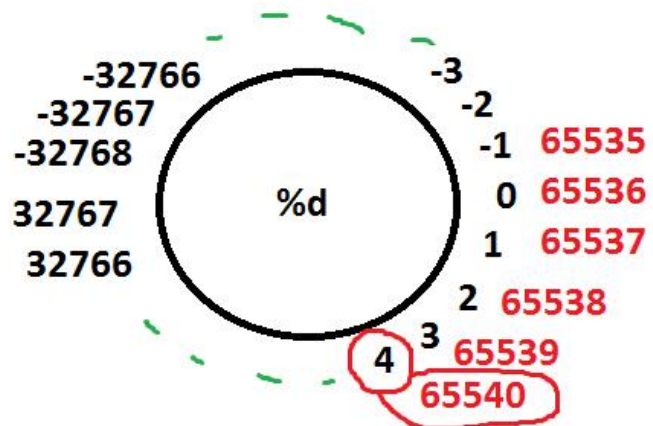
65536
-32770
32766



signed int cycle

int a = 65540;

65540
-65536
4



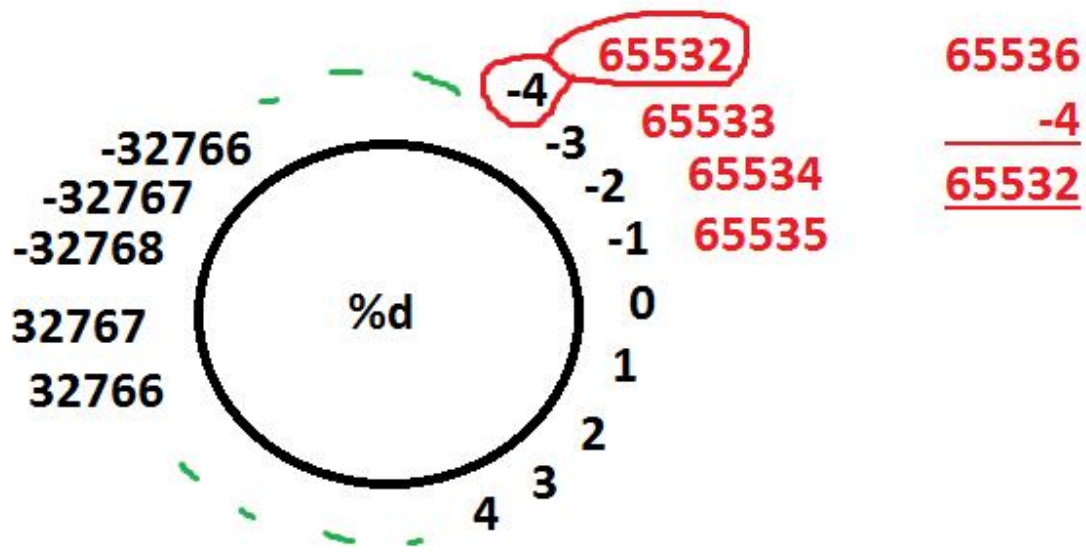
The image shows a screenshot of the Turbo C++ (TC) IDE. The top window displays a C program with the following code:

```
File Edit Run Compile Project Options Debug Break/watch
Line 7 Col 25 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
    unsigned int a=32768;
    clrscr();
    printf("a=%u\n",a); /* 32768 */
    a=32770;
    printf("a=%u\n",a); /*32770 */
    a=-4;
    printf("a=%u\n",a); /* 65532 */
    a=65540;
    printf("a=%u\n",a); /* 4 */
    getch();
}
```

The bottom window shows the output of the program:

```
a=32768
a=32770
a=65532
a=4
```

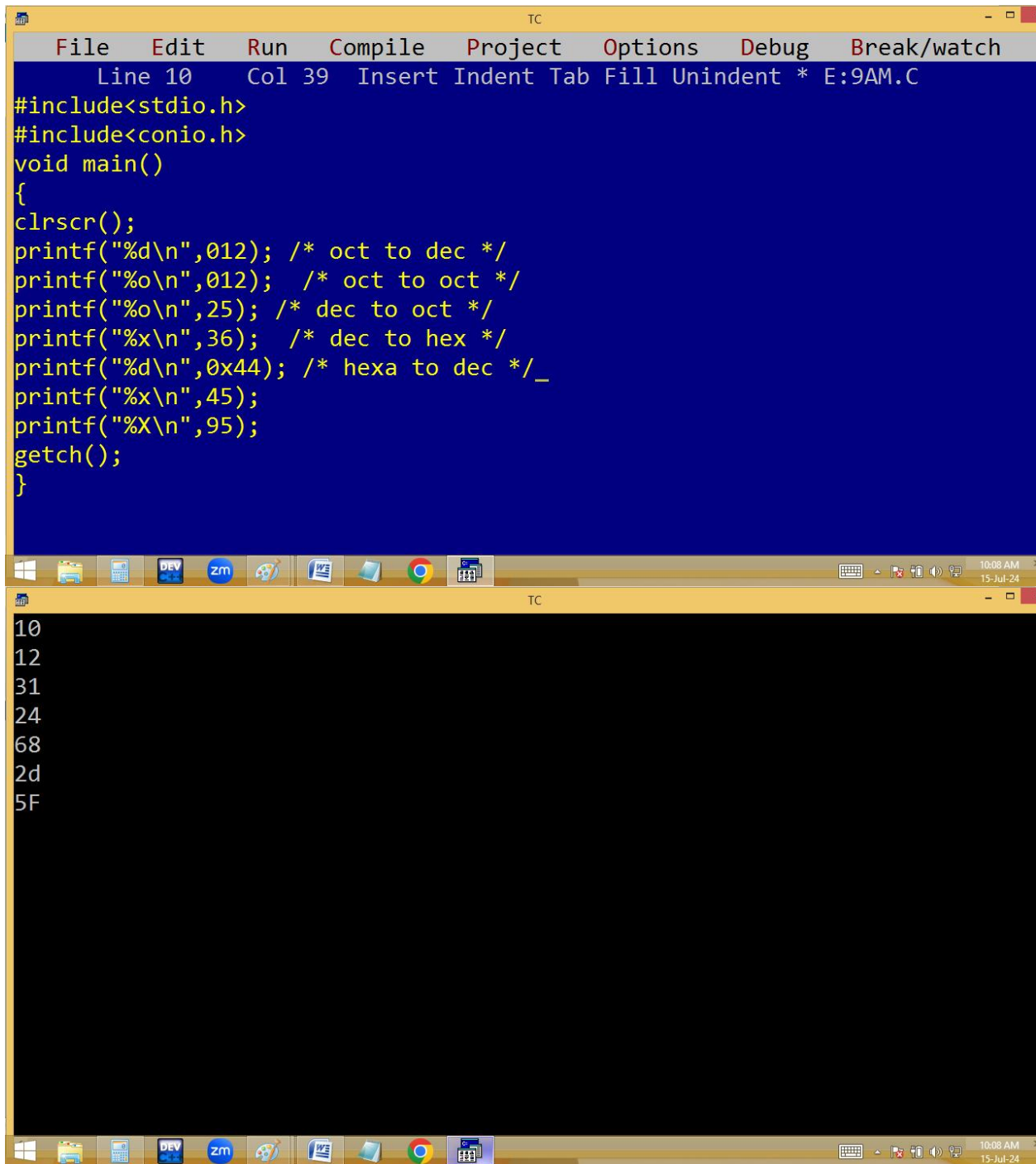
The Windows taskbar at the bottom shows the time as 9:42 AM on 15-Jul-24. The taskbar includes icons for Windows, File Explorer, Calculator, DEV C++, Zoom, Paint, Word, and Chrome.



$$\begin{array}{r}
 -260 \\
 \underline{256} \\
 -4 + 65536 = 65532 \quad \checkmark \quad \%u
 \end{array}$$

$$\begin{array}{r}
 -270 \\
 \underline{256} \\
 -14 \quad \%d
 \end{array}$$

$$\begin{array}{r}
 65536 \\
 \underline{-4} \\
 \underline{65532} \quad \%u
 \end{array}$$



The image shows two windows of the Turbo C++ (TC) IDE. The top window displays a C program that performs various base conversions. The bottom window shows the output of the program, which lists the decimal, octal, hexadecimal, and back-decoded values for the numbers 10, 12, 31, 24, 68, 2d, and 5F.

```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 10 Col 39 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%d\n",012); /* oct to dec */
printf("%o\n",012); /* oct to oct */
printf("%o\n",25); /* dec to oct */
printf("%x\n",36); /* dec to hex */
printf("%d\n",0x44); /* hexa to dec */_
printf("%x\n",45);
printf("%X\n",95);
getch();
}
```

TC

```
10
12
31
24
68
2d
5F
```


oct to decimal

$$\begin{array}{r} 0 \quad 1 \quad 2 \\ \quad / \quad \backslash \\ 8^1 \times 1 + 8^0 \times 2 \\ \hline 8 + 2 = 10 \checkmark \end{array}$$

dec to octal

$$\begin{array}{r} 8 \overline{) 25} \\ 3 - 1 \checkmark \end{array}$$

dec to hexa

$$\begin{array}{r} 16 \overline{) 36} \\ 2 - 4 \checkmark \end{array}$$

hex to dec

$$\begin{array}{r} 0 \times 4 \quad 4 \\ \quad / \quad \backslash \\ 16^1 \times 4 \quad 16^0 \times 4 \\ \hline 64 + 4 = 68 \end{array}$$

dec to hexa

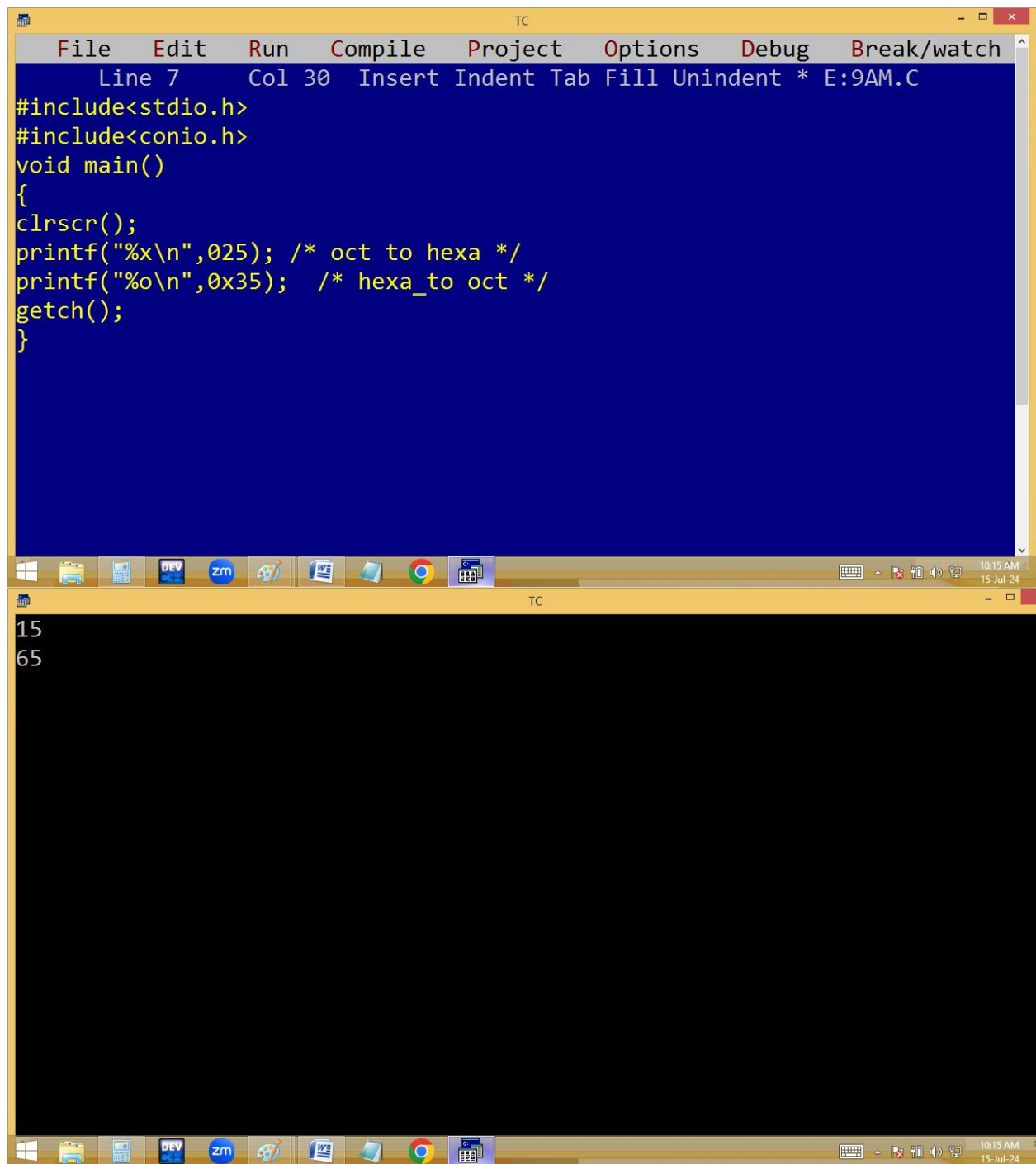
$$\begin{array}{r} 16 \overline{) 45} \\ 2 - 13 \end{array}$$

2

dec to hexa

$$\begin{array}{r} 16 \overline{) 95} \\ 5 - 15 \\ \quad \quad \quad F \end{array}$$

0 to 9 10-a 11-b 12-c 13-d 14-e 15-f



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 7 Col 30 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%x\n",025); /* oct to hexa */
printf("%o\n",0x35); /* hexa_to oct */
getch();
}
```

The bottom window shows the output of the program, which consists of two lines of text:

```
15
65
```

The Windows taskbar at the bottom of the screen shows the time as 10:15 AM on 15-Jul-24. The taskbar includes icons for the Start menu, File Explorer, Calculator, DEV C++, Zoom, Paint, Word, and Google Chrome.

oct to decimal

$$\begin{array}{r} \text{025} \\ \swarrow \quad \searrow \\ 8^1 \times 2 + 8^0 \times 5 \\ \hline 16 + 5 = 16 \overline{)21} \\ \underline{16} \\ 1-5 \checkmark \end{array}$$

dec to hexa

hex to decimal

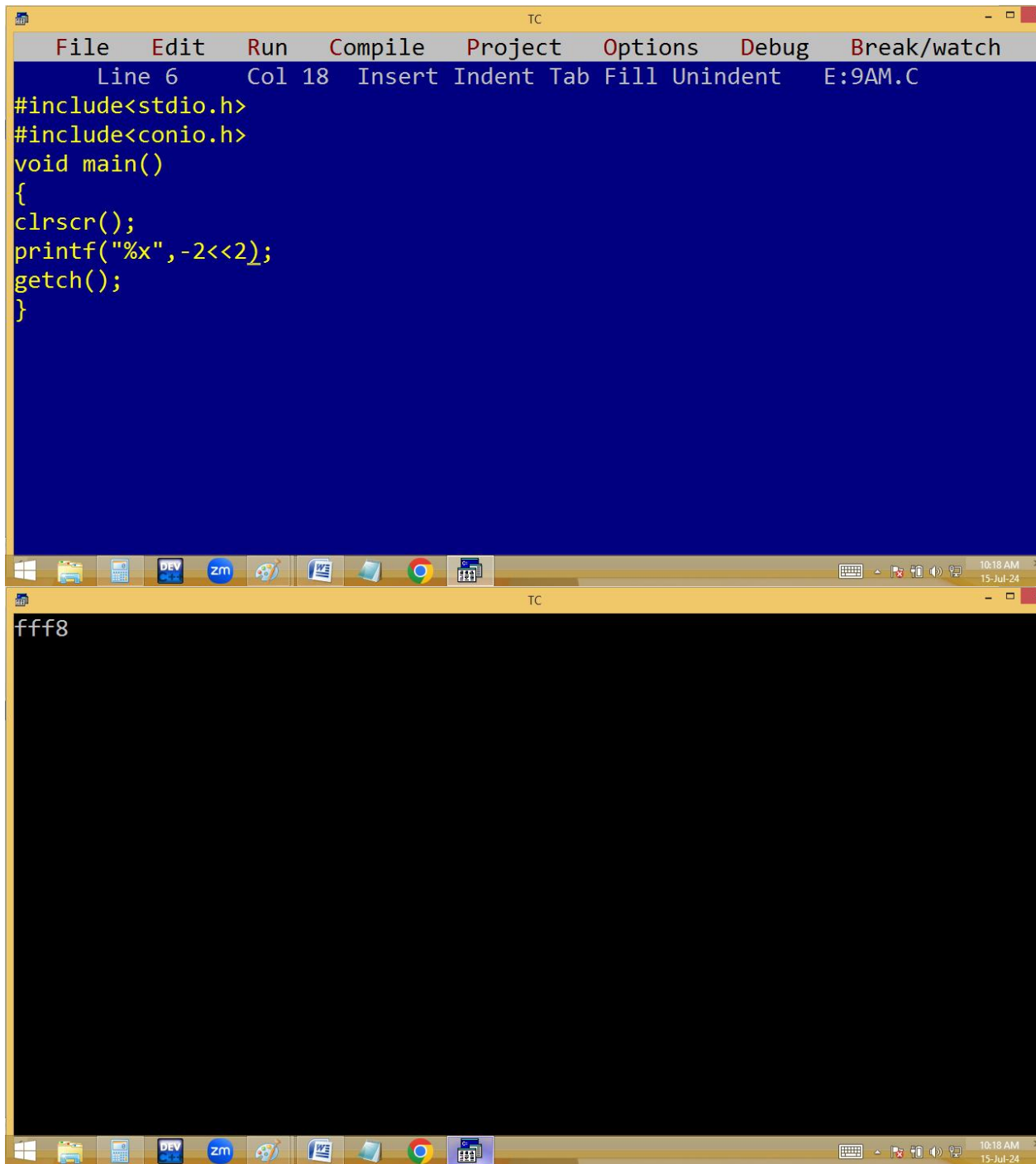
$$\begin{array}{r} \text{0x35} \\ \swarrow \quad \searrow \\ 16^1 \times 3 + 16^0 \times 5 \\ \hline 48 + 5 = 53 \end{array}$$

deci to octal

$$8 \overline{)53} \\ \underline{64} - 5 \checkmark$$

```
TC
File Edit Run Compile Project Options Debug Break/watch
Error: Illegal octal digit in function main
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%o",038);
getch();
}
```

10:16 AM
15-Jul-24



The image shows a screenshot of the Turbo C++ (TC) IDE. The top window is the source code editor, which has a blue background and a yellow title bar labeled 'TC'. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the bottom of the editor shows 'Line 6', 'Col 18', and 'E:9AM.C'. The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%x",-2<<2);
getch();
}
```

The bottom window is the output console, which has a black background and a yellow title bar labeled 'TC'. It displays the output of the program as 'fff8'. The Windows taskbar is visible at the bottom of the screen, showing various application icons and the system clock indicating 10:18 AM on 15-Jul-24.

```
p("%x", -2<<2);
-2<<2 = -8
```

```
8 = 0000 0000 0000 1000
~ = 1111 1111 1111 0111
2~ 0000 0000 0000 0001
    111
    ---
1111 1111 1111 1000
15  15  15  2 2 2 2^0
+  +  +  8
```

```
2 | 8
  | 4 - 0
  ---
2 | 2 - 0
  ---
  | 1 - 0
```

Variables:

Variable is a container is used to store the values in our programs.

Variable is a named memory location [bytes] where we can store and manipulate [modify] the values in our programs

In C compiler we should have to declare the variables in first line of the function only. In C++ we can declare anywhere.

All the variables are stored in primary memory i.e. RAM. Due to this once the function or program

execution completed these variables are deleted automatically from memory.

Variables are case sensitive i.e. lower and upper are different.

Eg:

```
int a=10;
```

```
int A=20;
```

every variable is having 2 stages.

1. Declaration / declared

Eg: `int a;`

2. Initialization / defined

Eg: `a=100;`

Once the variable is initialized then only memory allocated.

Syntax:

`datatype variable[=value], variable[=value],...;`

eg:

```
int children=2;
```