

## **While loop:**

**Loops are used to repeat a block/group of statements continuously until the given condition becomes false.**

**Loops reduce program size and improves performance.**

**In loops beginning and ending points are same.**

**Basically 2 types of loops are available.**

- 1. Entry/pre controlled loops.**
- 2. Exit/post controlled loops.**

**In entry control loops, condition is tested first and it is true then only statements block is executed.**

**Under entry control loops we are having**

- i. While loop**
- ii. For loop**

**In exit control loop, the statements are executed first and later condition is tested.**

**Under exit control loop we are having**

- i. do while.**

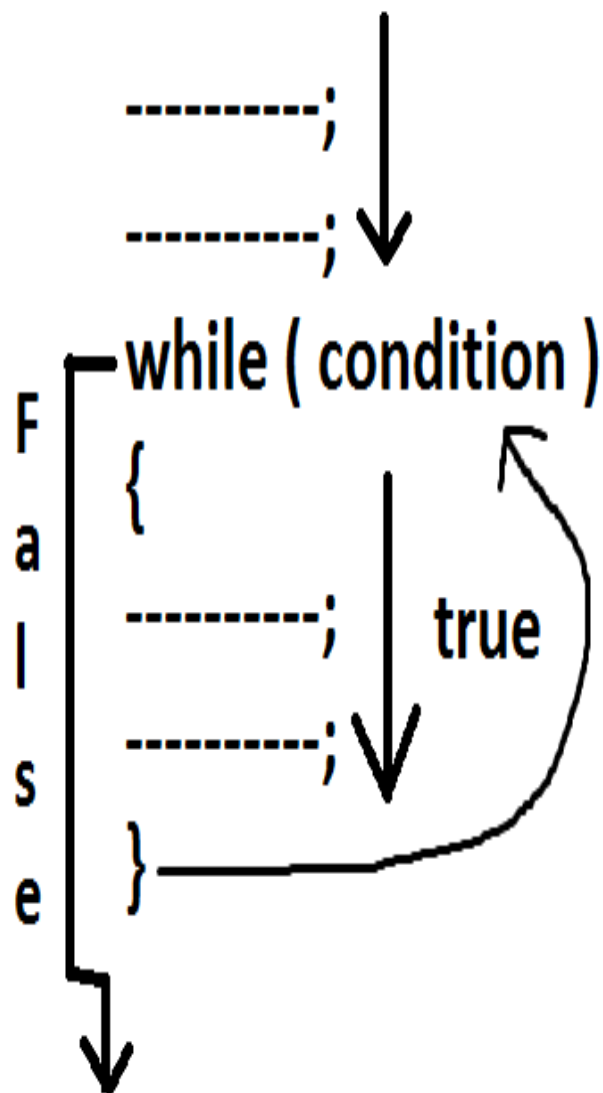
### **While loop:**

- **while is a keyword.**
- **In while loop condition is tested first and it is true then only while block statements are executed. After executing while block statements, the program execution automatically shifted/jumped to while condition at the beginning. If it is true then once again the while block statements are repeated. Like this the**

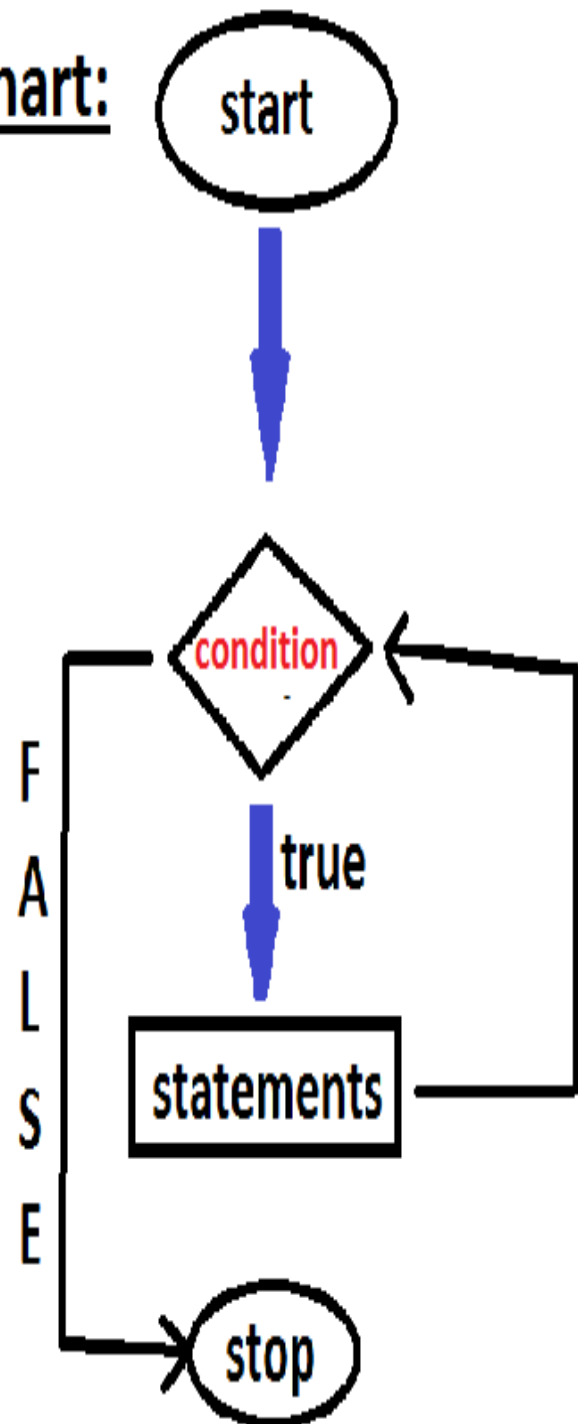
**process is continued until while condition becomes false.**

➤ **While is entry control loop.**

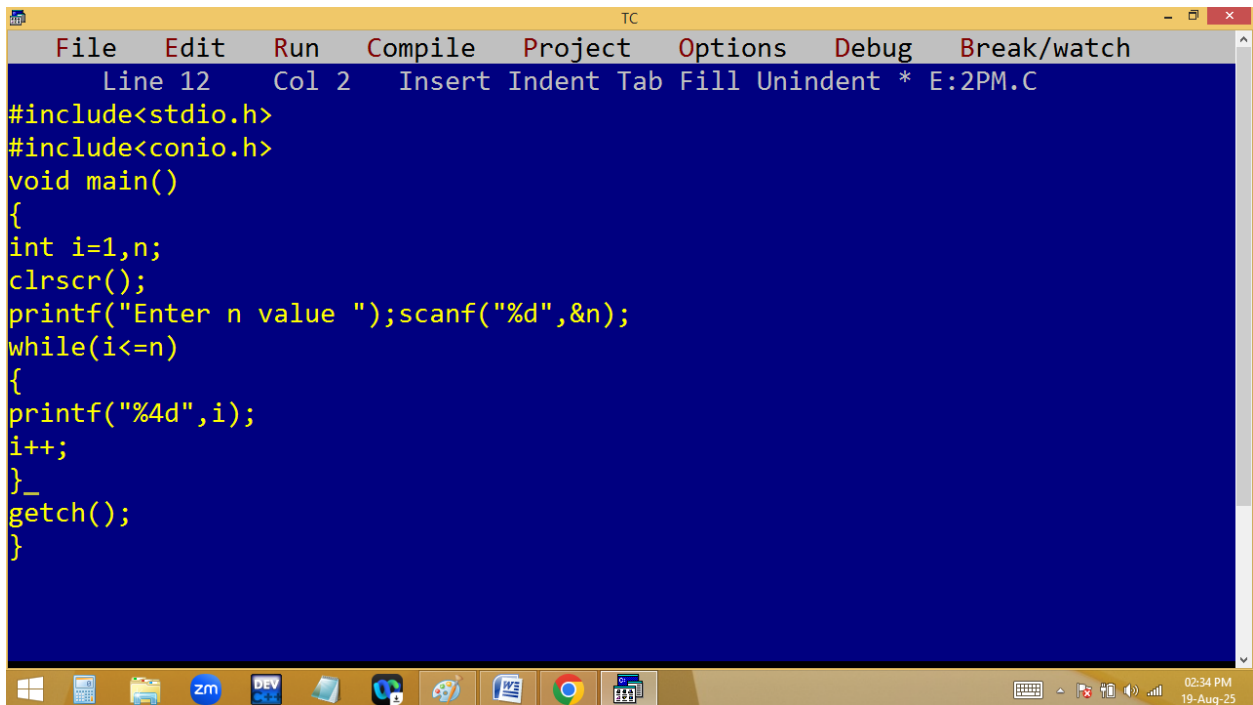
Syntax:



Flow chart:



# Printing 1..n numbers?



The screenshot shows the Turbo C++ (TC) IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a status bar (Line 12, Col 2, Insert, Indent, Tab, Fill, Unindent, \* E:2PM.C). The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int i=1,n;
    clrscr();
    printf("Enter n value ");scanf("%d",&n);
    while(i<=n)
    {
        printf("%4d",i);
        i++;
    }_
    getch();
}
```

The Windows taskbar at the bottom shows various application icons and the system clock indicating 02:34 PM on 19-Aug-25.

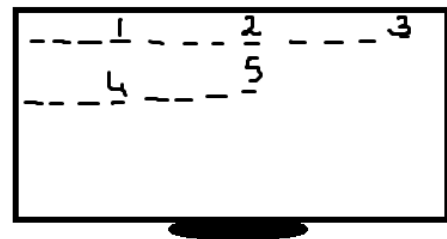
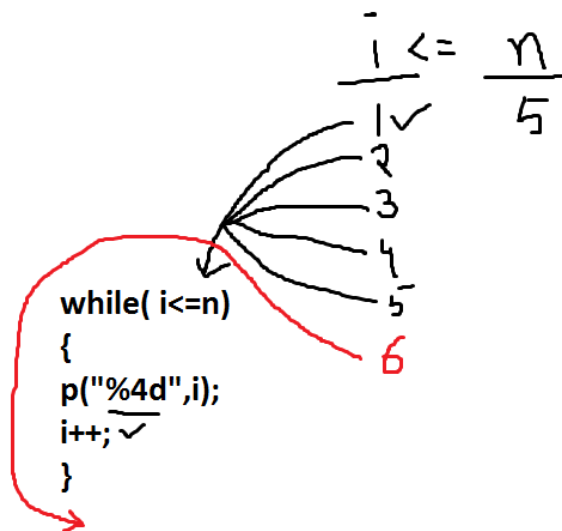


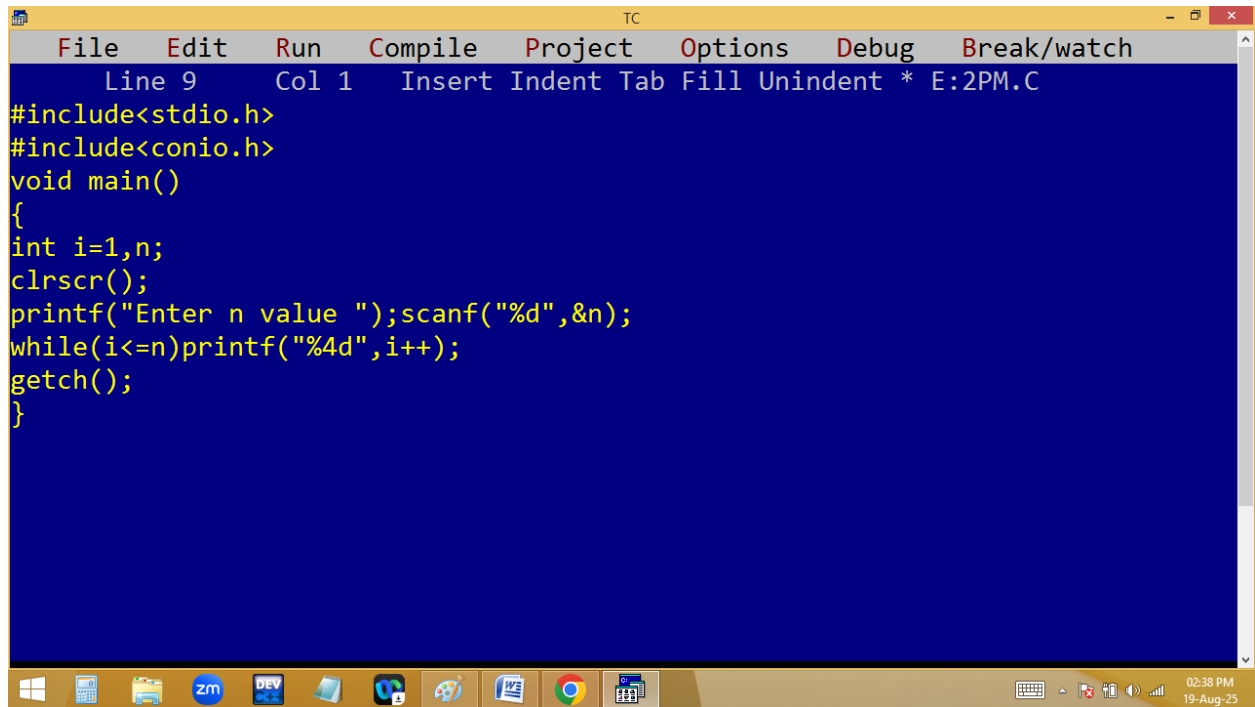
The screenshot shows the Turbo C++ (TC) IDE with the same menu bar and status bar. The output window displays the result of running the program:

```
Enter n value 5
1  2  3  4  5
```

The Windows taskbar at the bottom is identical to the previous screenshot, showing the same application icons and system clock.

```
TC
Enter n value 100
1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
```





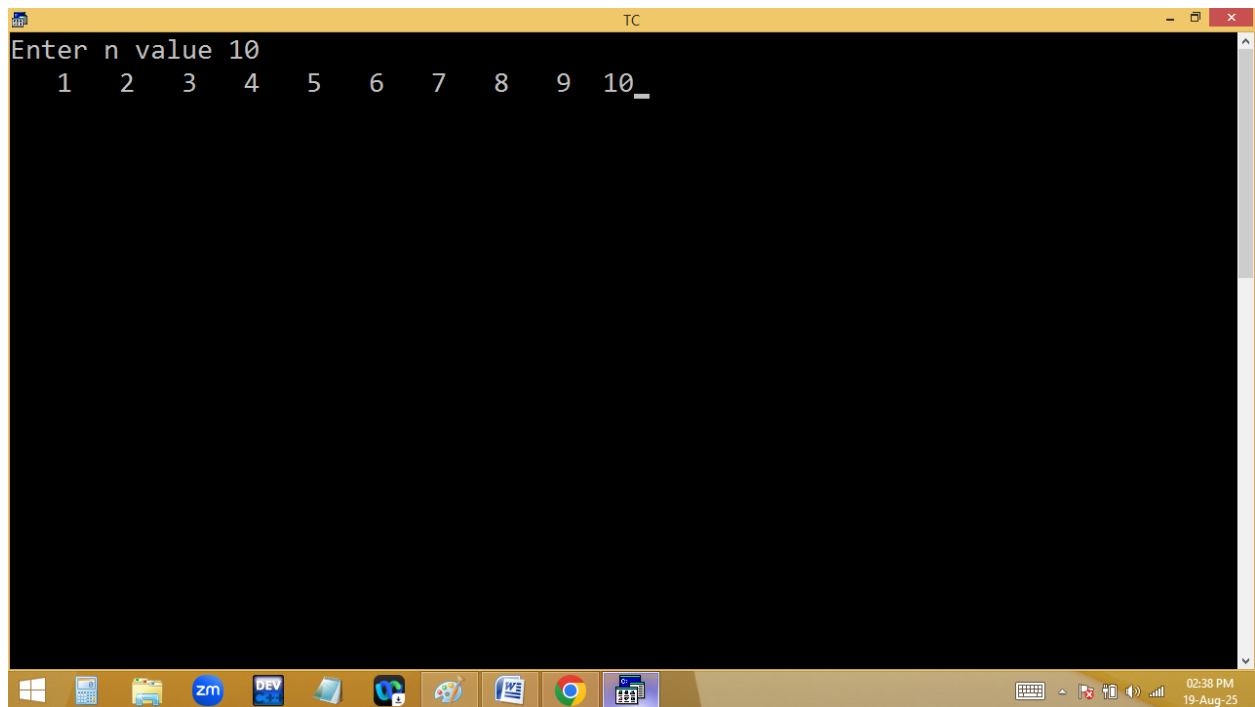
TC

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()
{
int i=1,n;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(i<=n)printf("%4d",i++);
getch();
}
```

02:38 PM 19-Aug-25



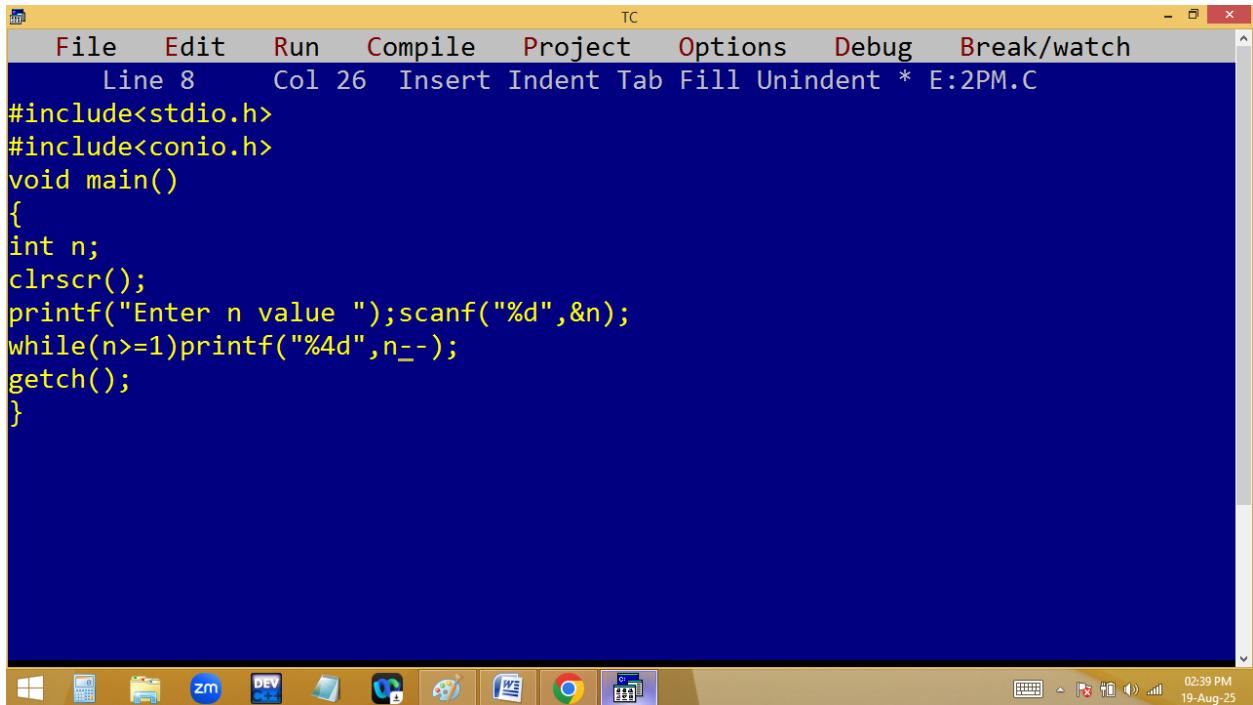
TC

Enter n value 10

1 2 3 4 5 6 7 8 9 10\_

02:38 PM 19-Aug-25

## Printing 1..n no's in reverse order:



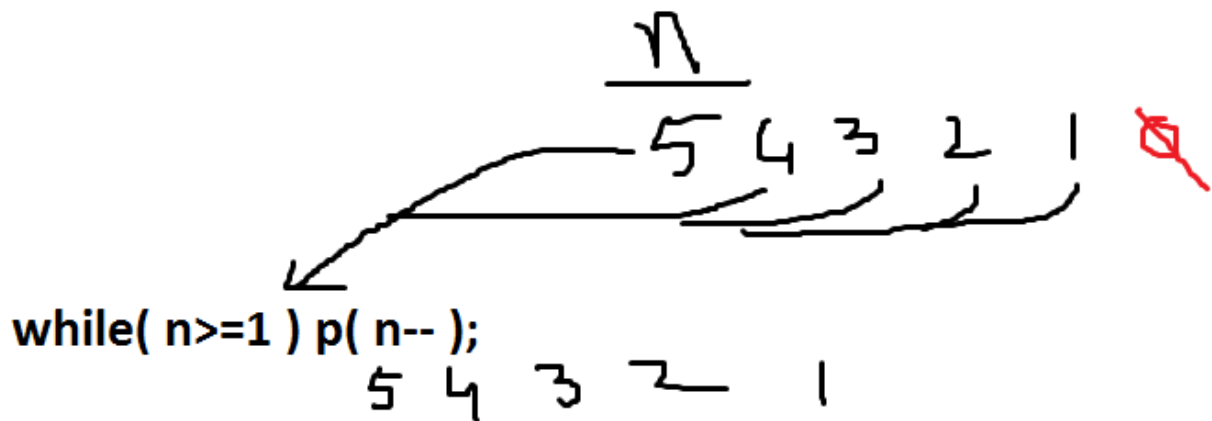
The screenshot shows a Turbo C++ (TC) IDE window. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the top indicates 'Line 8 Col 26 Insert Indent Tab Fill Unindent \* E:2PM.C'. The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n;
    clrscr();
    printf("Enter n value ");scanf("%d",&n);
    while(n>=1)printf("%4d",n--);
    getch();
}
```

The Windows taskbar at the bottom shows various icons including the Start button, task view, file explorer, Zoho Meeting (zm), DEV, and several other applications. The system clock in the bottom right corner shows 02:39 PM on 19-Aug-25.

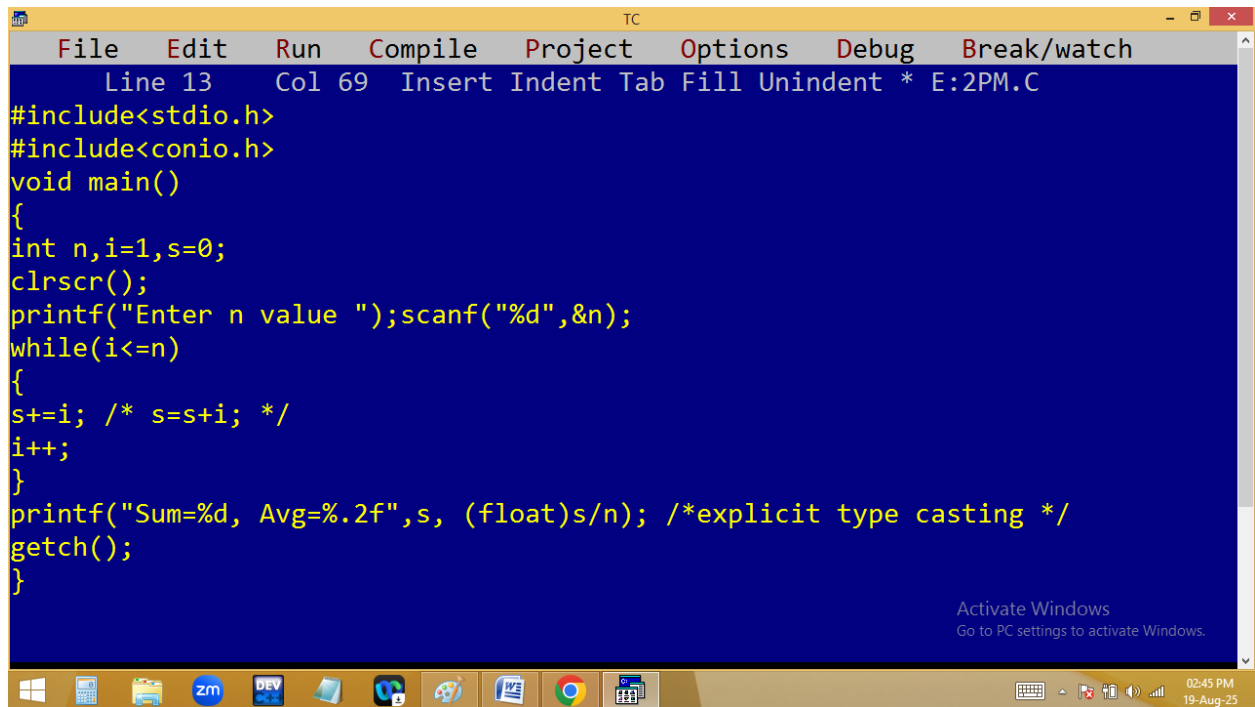


```
TC
Enter n value 10
10 9 8 7 6 5 4 3 2 1
```



```
while( n>=1 ) p( n-- );
5 4 3 2 1
```

Finding 1..n no's sum and avg?



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 13 Col 69 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int n,i=1,s=0;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(i<=n)
{
s+=i; /* s=s+i; */
i++;
}
printf("Sum=%d, Avg=%.2f",s, (float)s/n); /*explicit type casting */
getch();
}
```

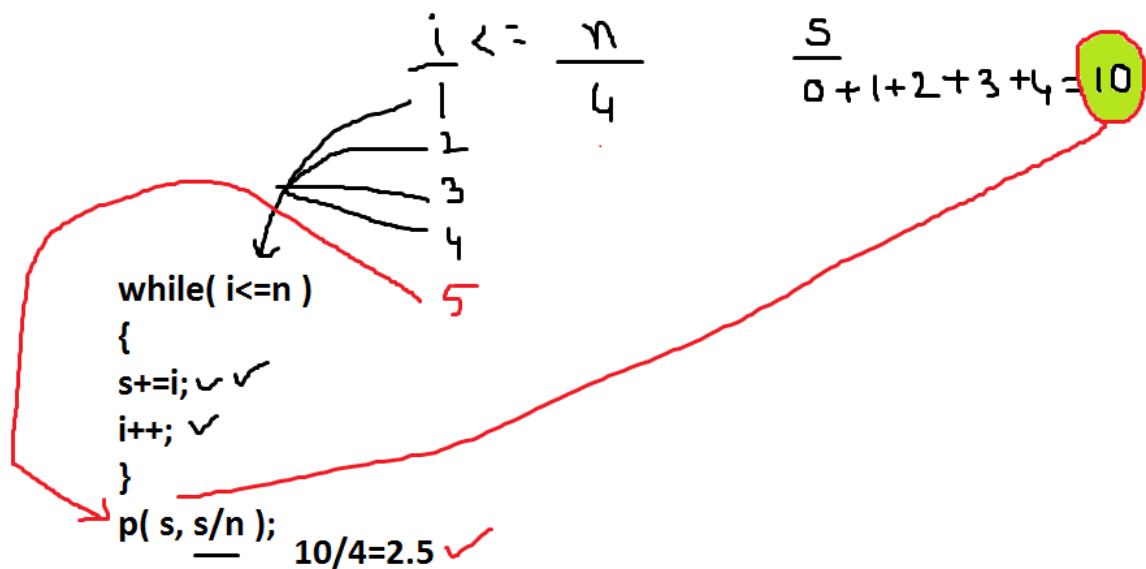
Activate Windows  
Go to PC settings to activate Windows.

02:45 PM  
19-Aug-25

```
Enter n value 4
Sum=10, Avg=2.50
```

Activate Windows  
Go to PC settings to activate Windows.

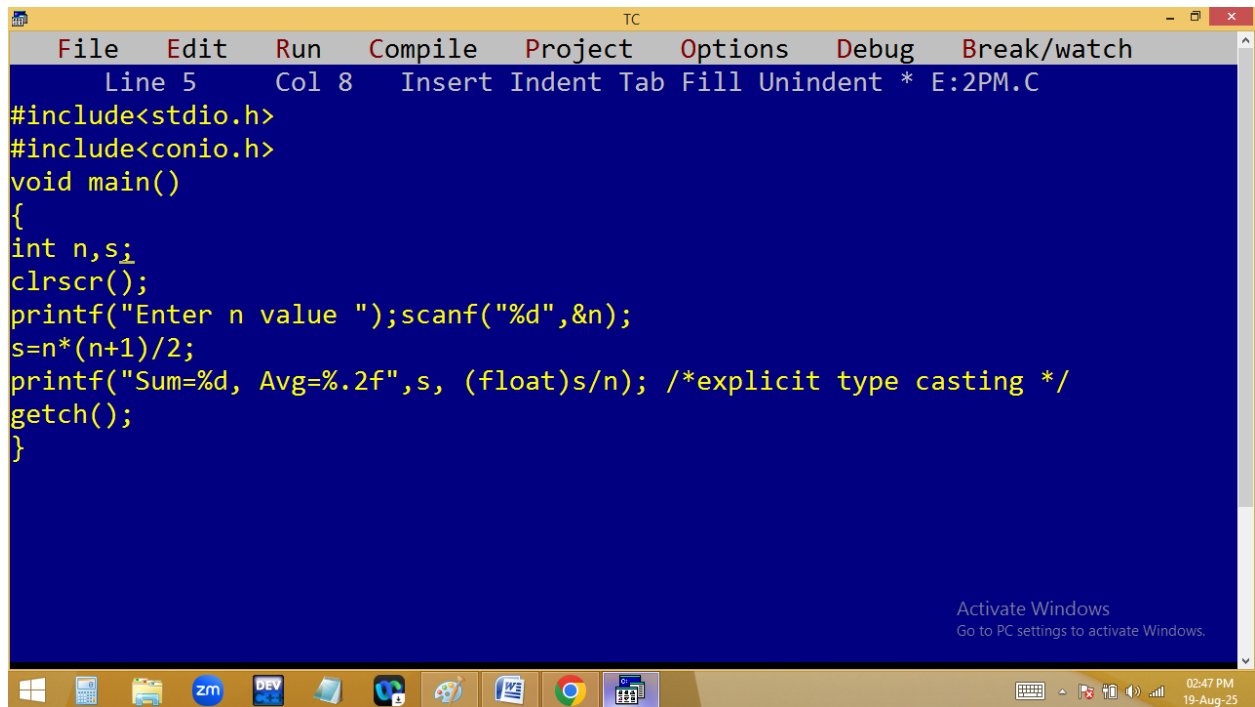
02:45 PM  
19-Aug-25



Without using loop?

$$s = n*(n+1)/2;$$

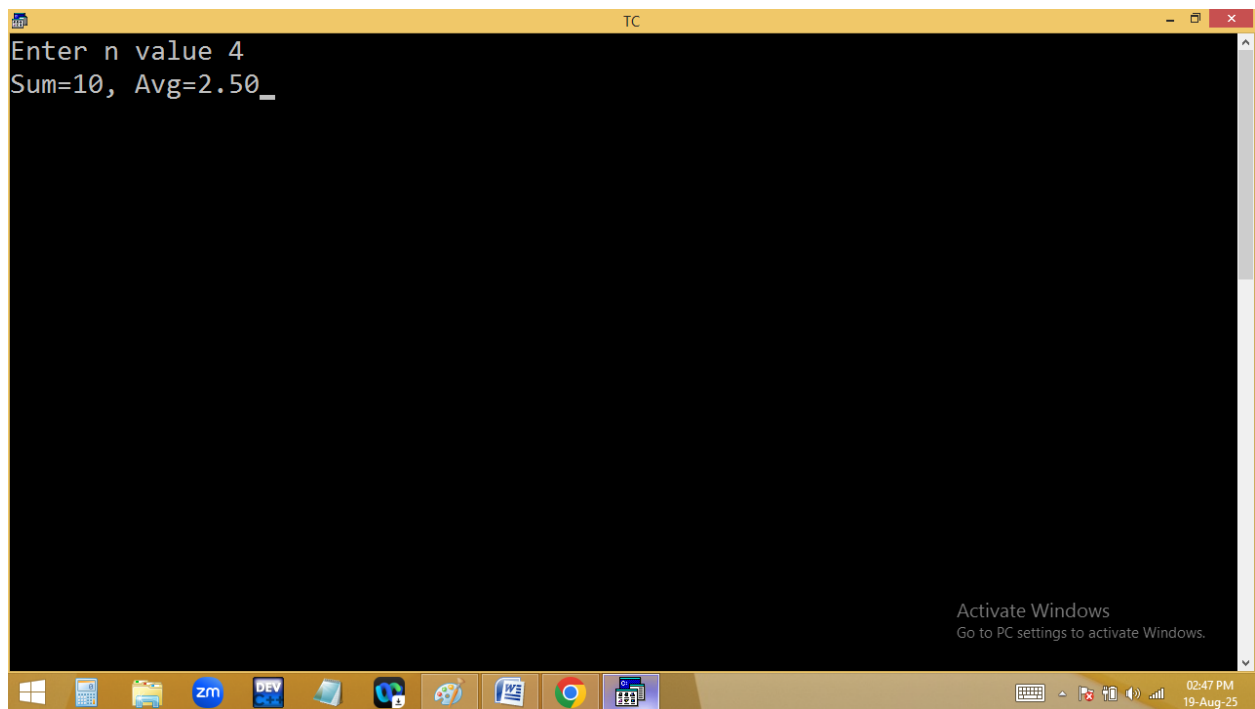
$$s = 4 * 5 / 2 = 10$$



The screenshot shows the Turbo C++ (TC) IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a status bar (Line 5, Col 8, Insert, Indent, Tab, Fill, Unindent, \* E:2PM.C). The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n,s;
    clrscr();
    printf("Enter n value ");scanf("%d",&n);
    s=n*(n+1)/2;
    printf("Sum=%d, Avg=%.2f",s, (float)s/n); /*explicit type casting */
    getch();
}
```

An "Activate Windows" watermark is visible in the bottom right corner of the IDE window.



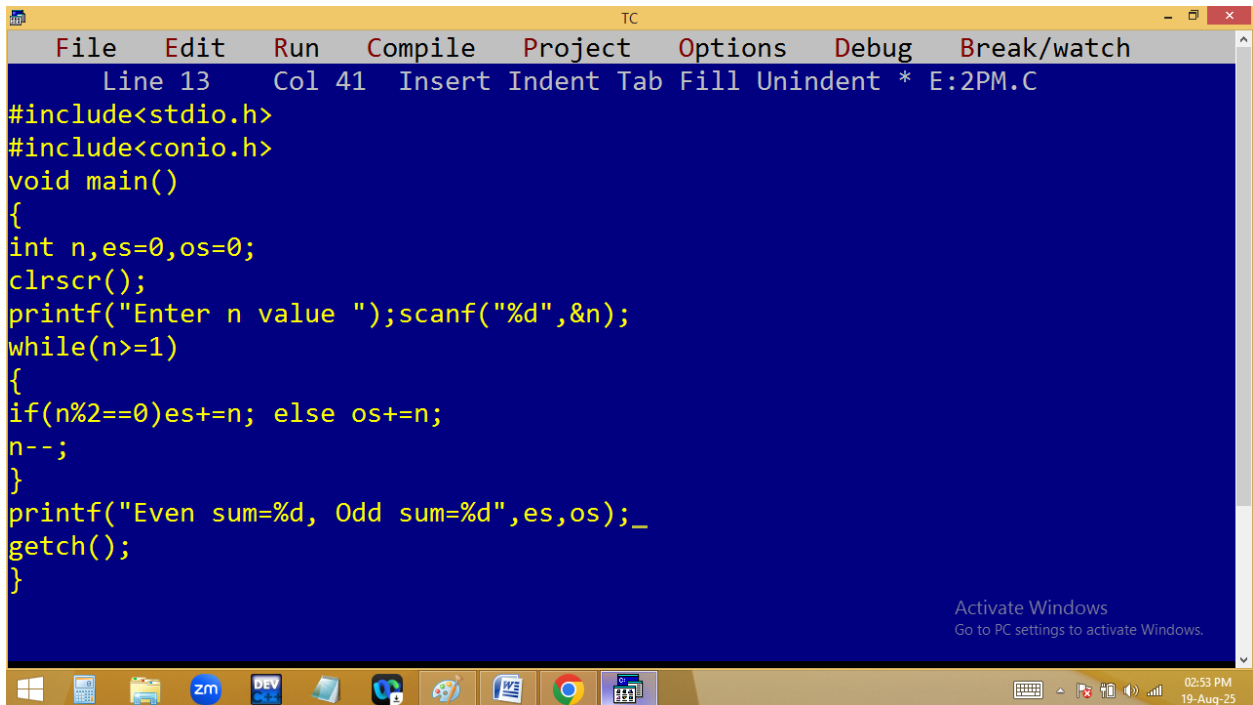
The screenshot shows the Turbo C++ (TC) IDE with the same menu bar and status bar. The output of the program is displayed in the main window:

```
Enter n value 4
Sum=10, Avg=2.50_
```

An "Activate Windows" watermark is visible in the bottom right corner of the IDE window.

Find 1..n even, odd no's sum?

$$n=5 \begin{cases} 1+3+5=9 \\ 2+4=6 \end{cases}$$



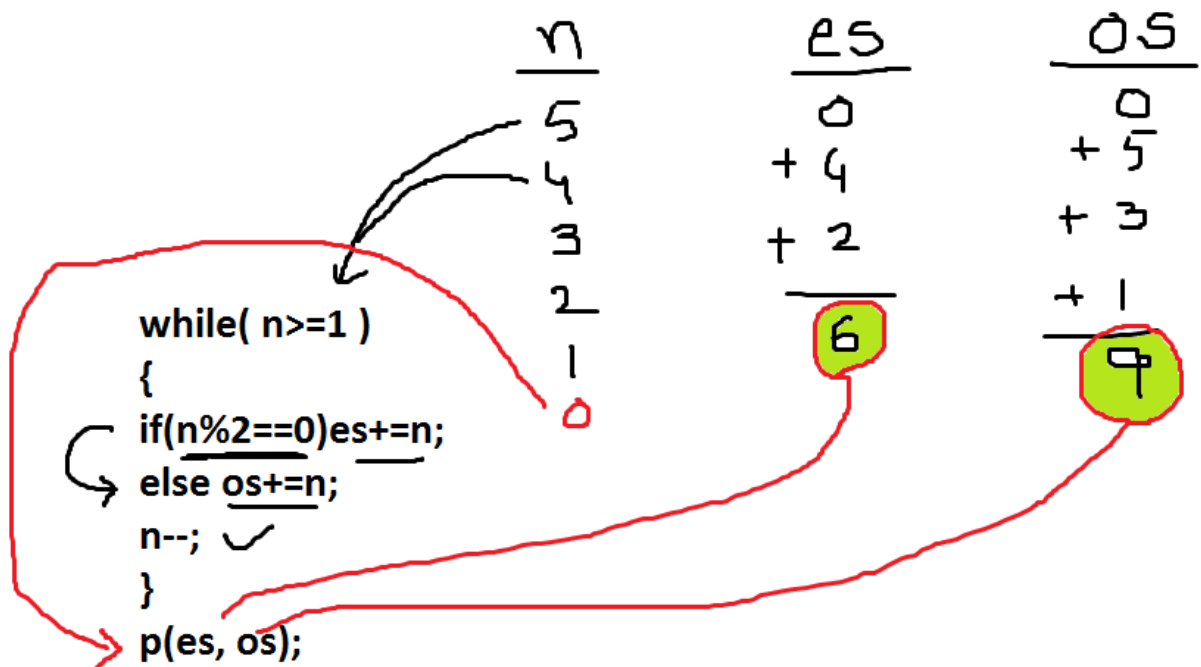
```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 13 Col 41 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int n,es=0,os=0;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(n>=1)
{
if(n%2==0)es+=n; else os+=n;
n--;
}
printf("Even sum=%d, Odd sum=%d",es,os);_
getch();
}
```

Activate Windows  
Go to PC settings to activate Windows.

02:53 PM  
19-Aug-25

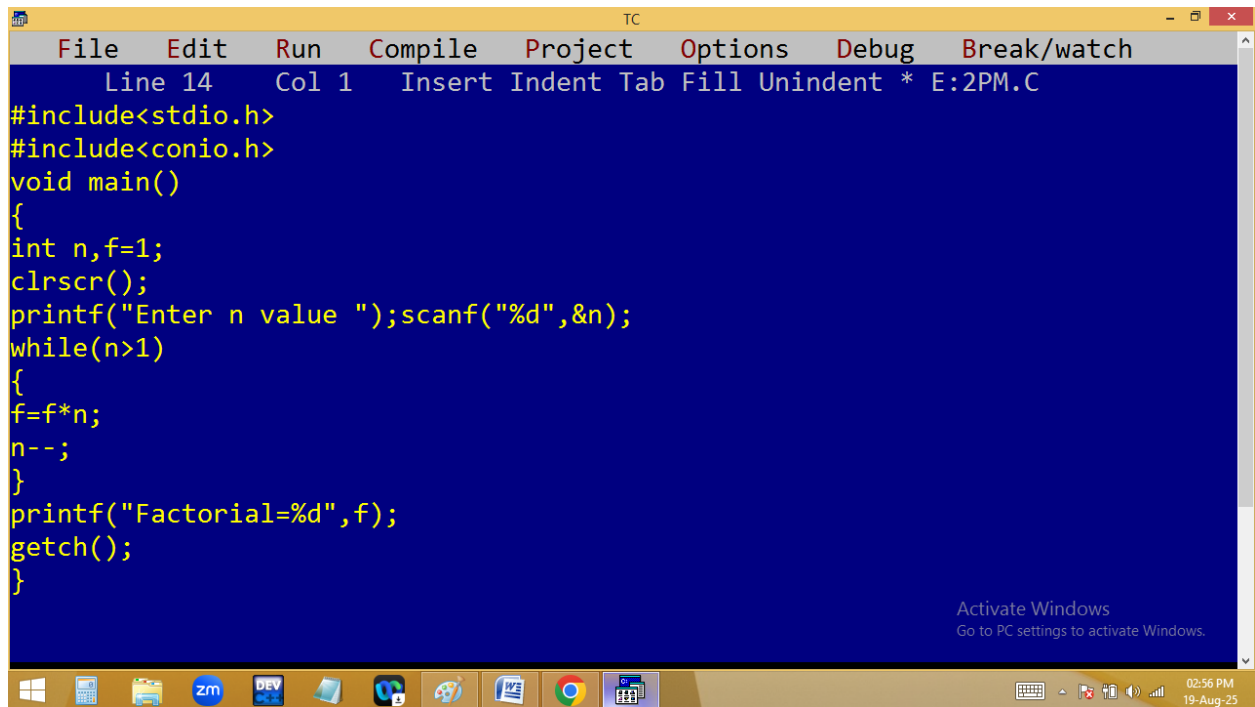
```
TC
Enter n value 5
Even sum=6, Odd sum=9
```

Activate Windows  
Go to PC settings to activate Windows.



Finding factorial of given no?

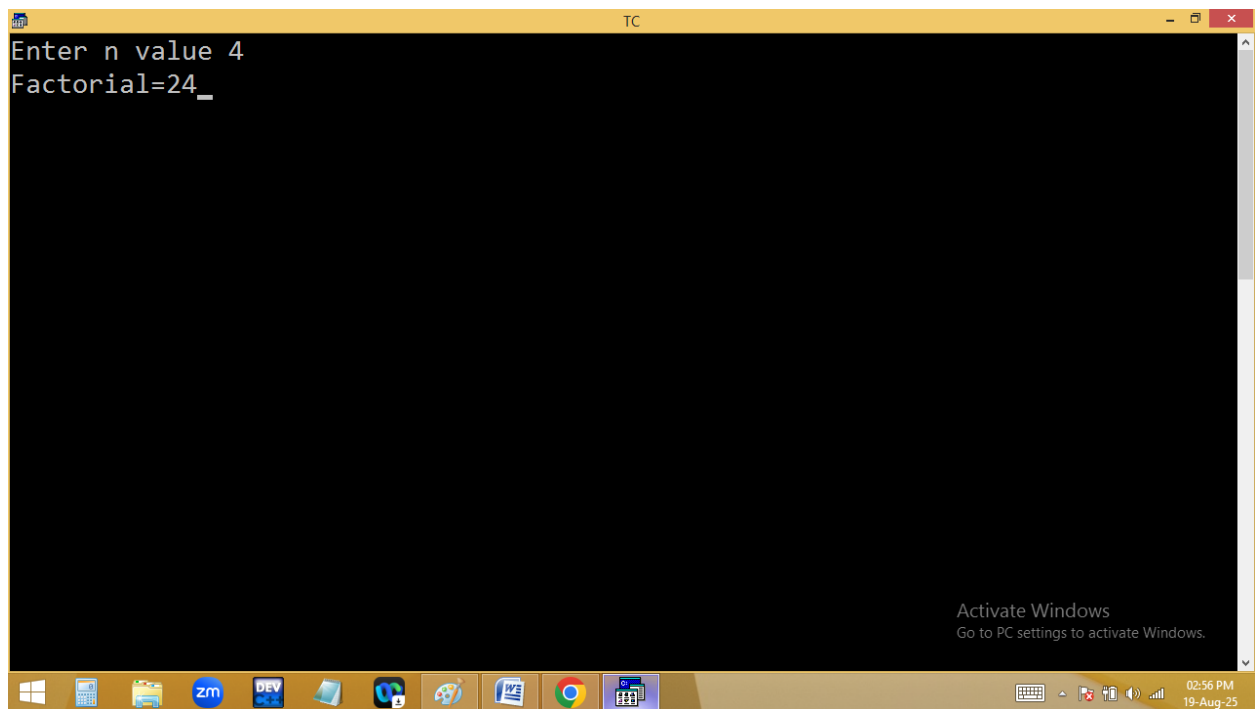
Eg: 4 → 4\*3\*2\*1=24



The screenshot shows the Turbo C++ (TC) IDE with a yellow title bar and a menu bar containing File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the top indicates 'Line 14 Col 1 Insert Indent Tab Fill Unindent \* E:2PM.C'. The main editing area has a blue background and contains the following C code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,f=1;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(n>1)
{
f=f*n;
n--;
}
printf("Factorial=%d",f);
getch();
}
```

An 'Activate Windows' watermark is visible in the bottom right corner of the editing area. The Windows taskbar at the bottom shows various application icons and the system clock indicating 02:56 PM on 19-Aug-25.



The screenshot shows the same Turbo C++ IDE window after execution. The output window, which has a black background, displays the following text:

```
Enter n value 4
Factorial=24_
```

The 'Activate Windows' watermark is also present in the bottom right corner of the output window. The Windows taskbar at the bottom remains the same, showing the system clock at 02:56 PM on 19-Aug-25.

```
TC
Enter n value 7
Factorial=5040
```

Activate Windows  
Go to PC settings to activate Windows.

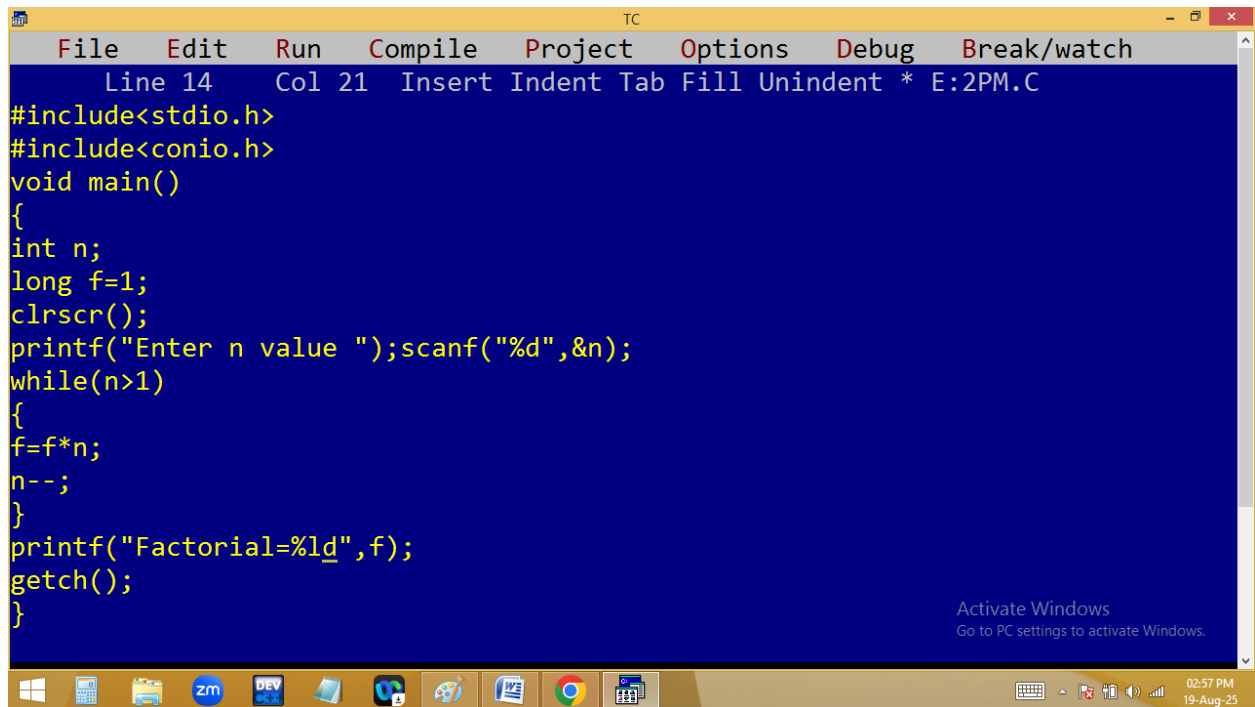
02:56 PM  
19-Aug-25

```
TC
Enter n value 8
Factorial=-25216_
```

Activate Windows  
Go to PC settings to activate Windows.

02:56 PM  
19-Aug-25

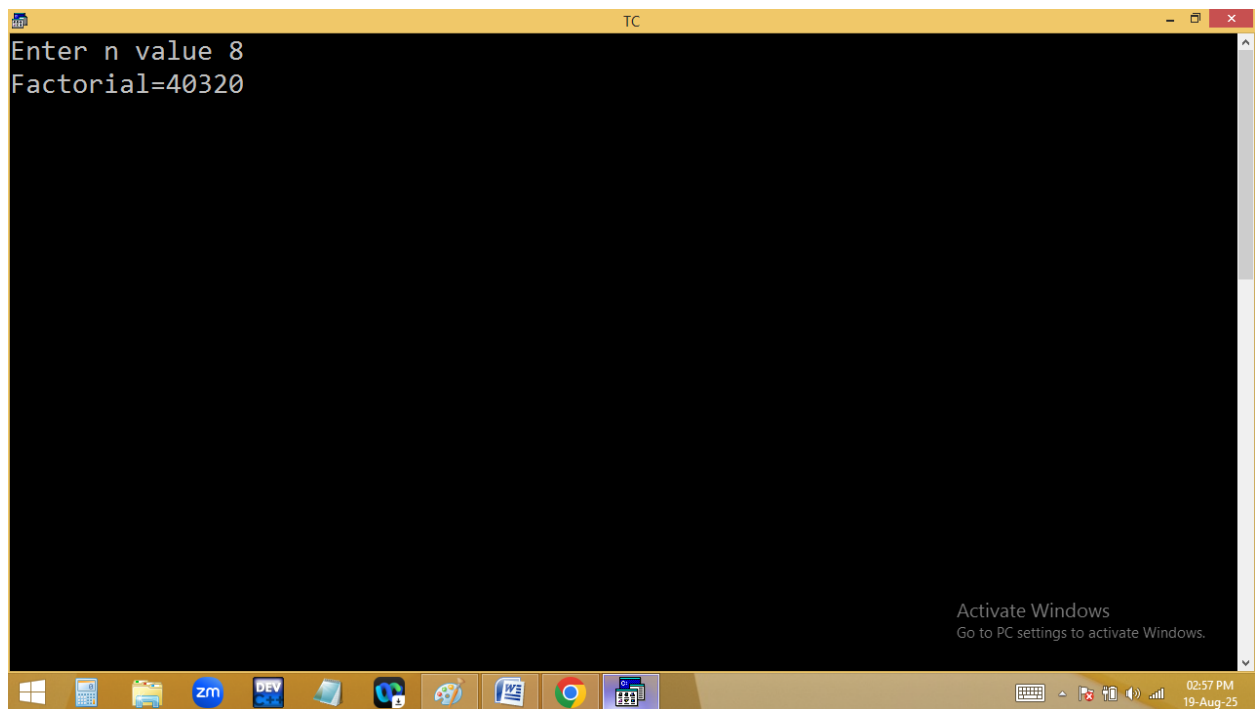




The screenshot shows the Turbo C++ (TC) editor window. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the top indicates 'Line 14 Col 21 Insert Indent Tab Fill Unindent \* E:2PM.C'. The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n;
long f=1;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(n>1)
{
f=f*n;
n--;
}
printf("Factorial=%ld",f);
getch();
}
```

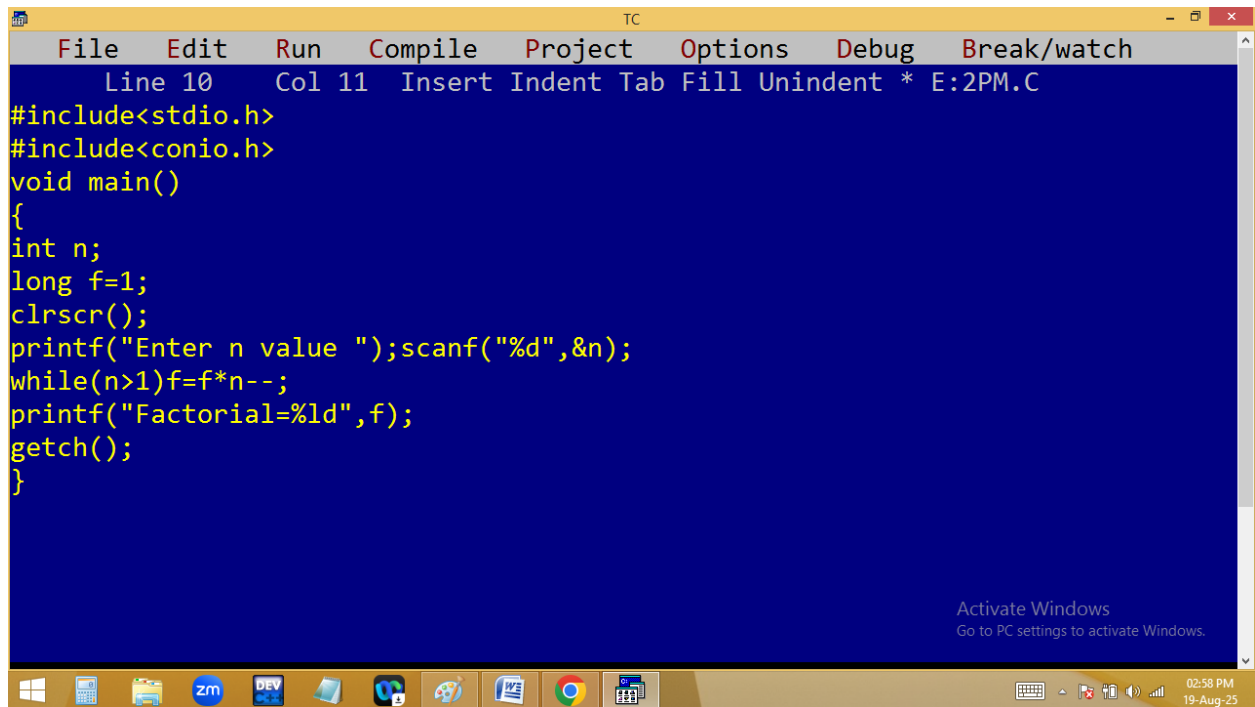
An 'Activate Windows' watermark is visible in the bottom right corner of the editor area. The Windows taskbar at the bottom shows the Start button, task view, and several application icons including a calculator, file explorer, Zoom, DEV C++, and others. The system clock in the bottom right corner displays '02:57 PM 19-Aug-25'.



This screenshot shows the same Turbo C++ editor window after execution. The code is no longer visible, and the output of the program is displayed in the editor area:

```
Enter n value 8
Factorial=40320
```

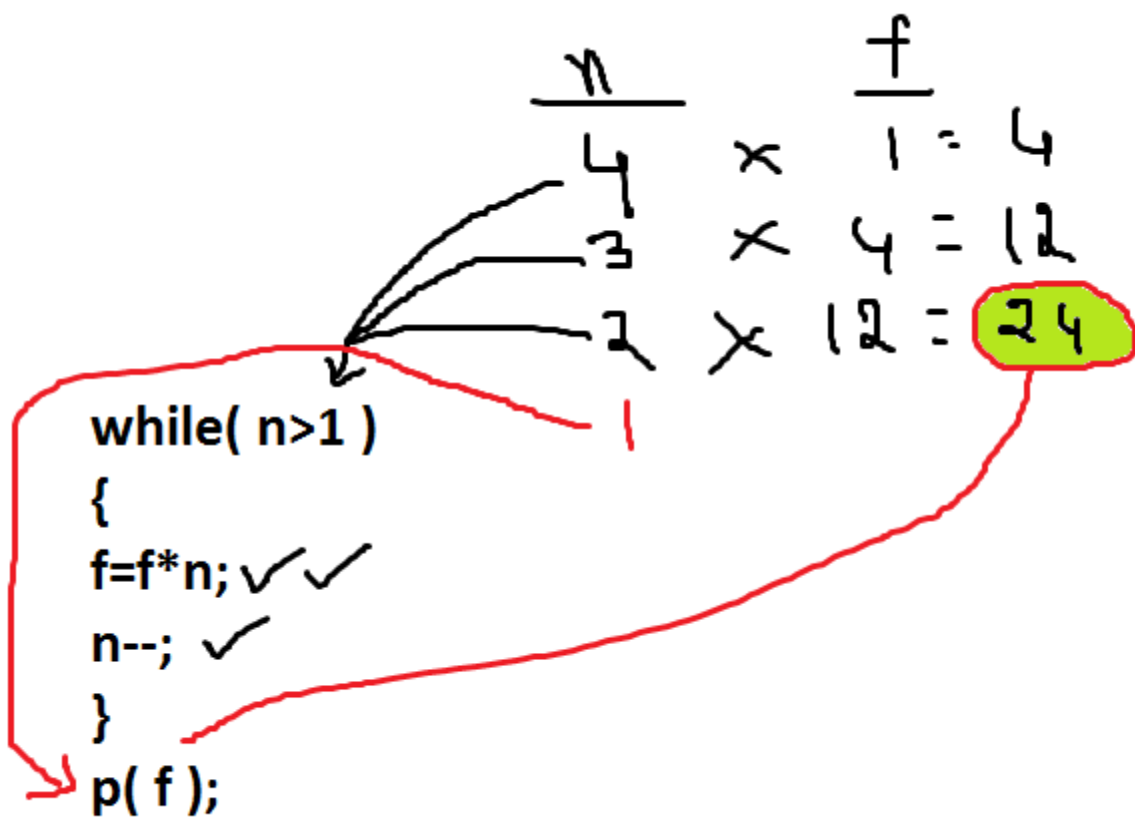
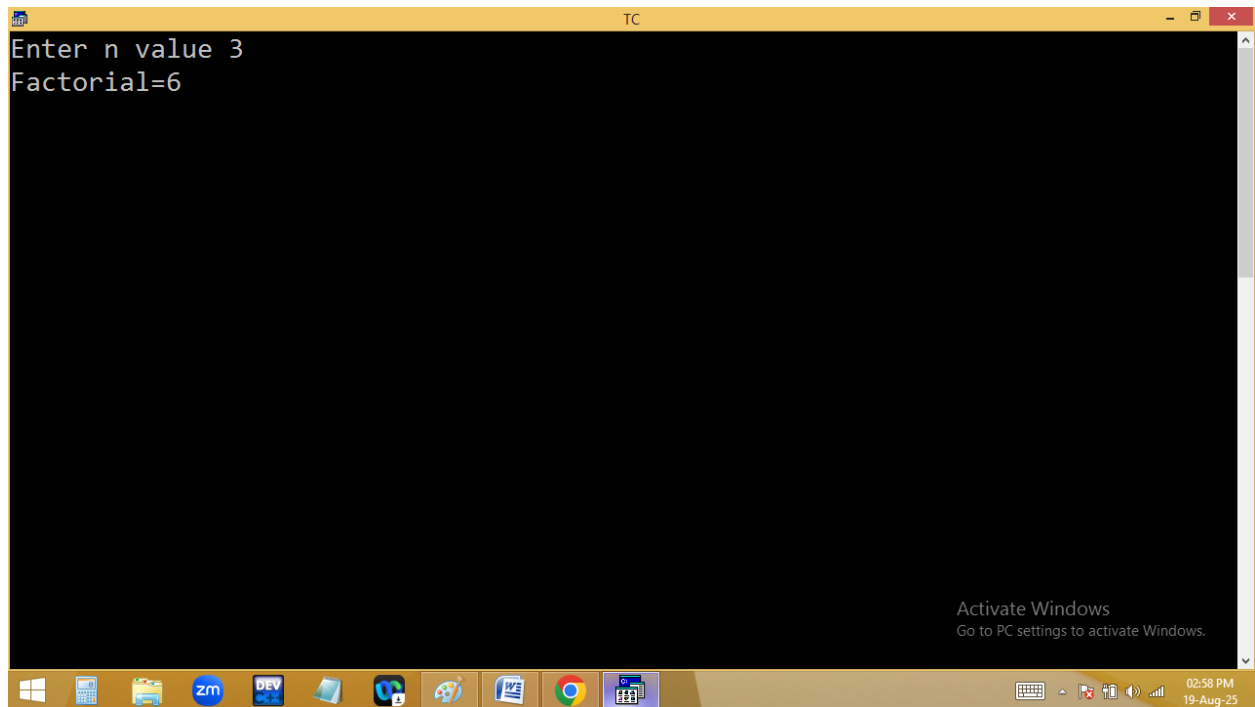
The 'Activate Windows' watermark is still present in the bottom right corner. The Windows taskbar and system clock at the bottom remain the same, showing '02:57 PM 19-Aug-25'.



The image shows a screenshot of a Turbo C++ (TC) IDE window. The title bar at the top reads "TC". Below the title bar is a menu bar with the following options: File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. Under the "Edit" menu, a status bar shows "Line 10 Col 11 Insert Indent Tab Fill Unindent \* E:2PM.C". The main editing area has a dark blue background with yellow text. The code is as follows:

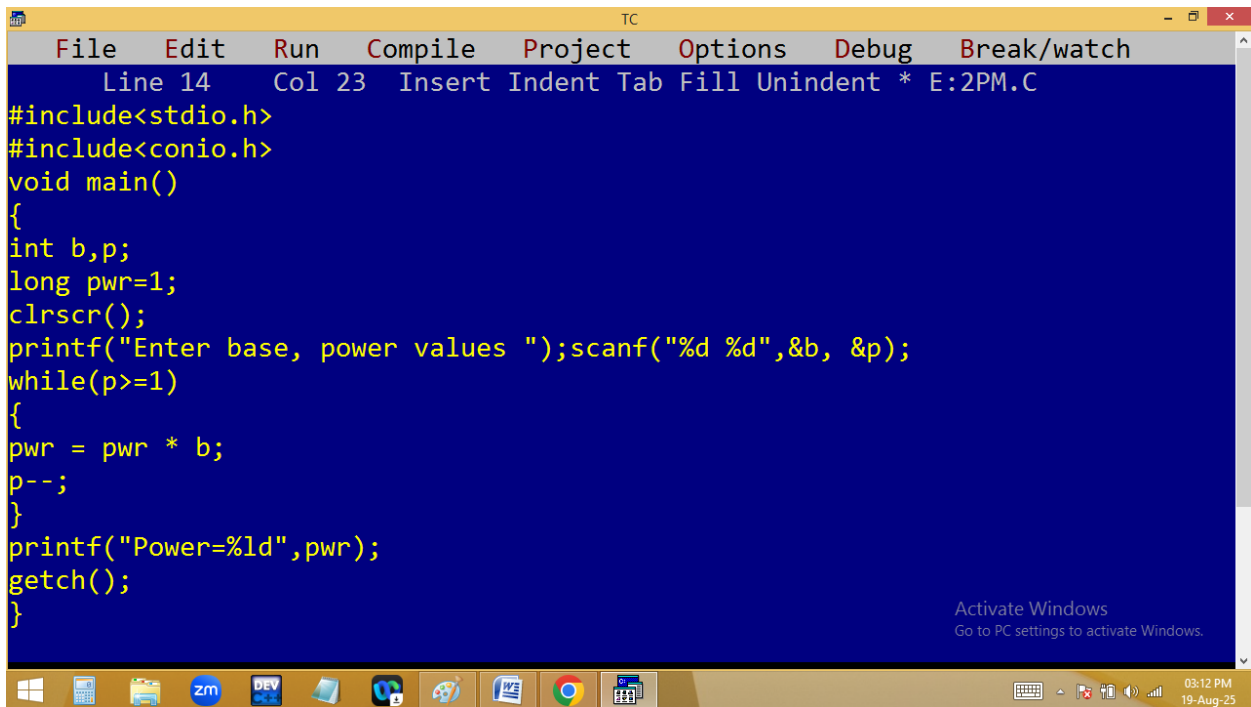
```
#include<stdio.h>
#include<conio.h>
void main()
{
int n;
long f=1;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(n>1)f=f*n--;
printf("Factorial=%ld",f);
getch();
}
```

In the bottom right corner of the IDE window, there is a message: "Activate Windows Go to PC settings to activate Windows." The Windows taskbar is visible at the bottom of the screen, showing various application icons on the left and system tray icons on the right, including the clock which displays "02:58 PM 19-Aug-25".



Find power using user defined program?

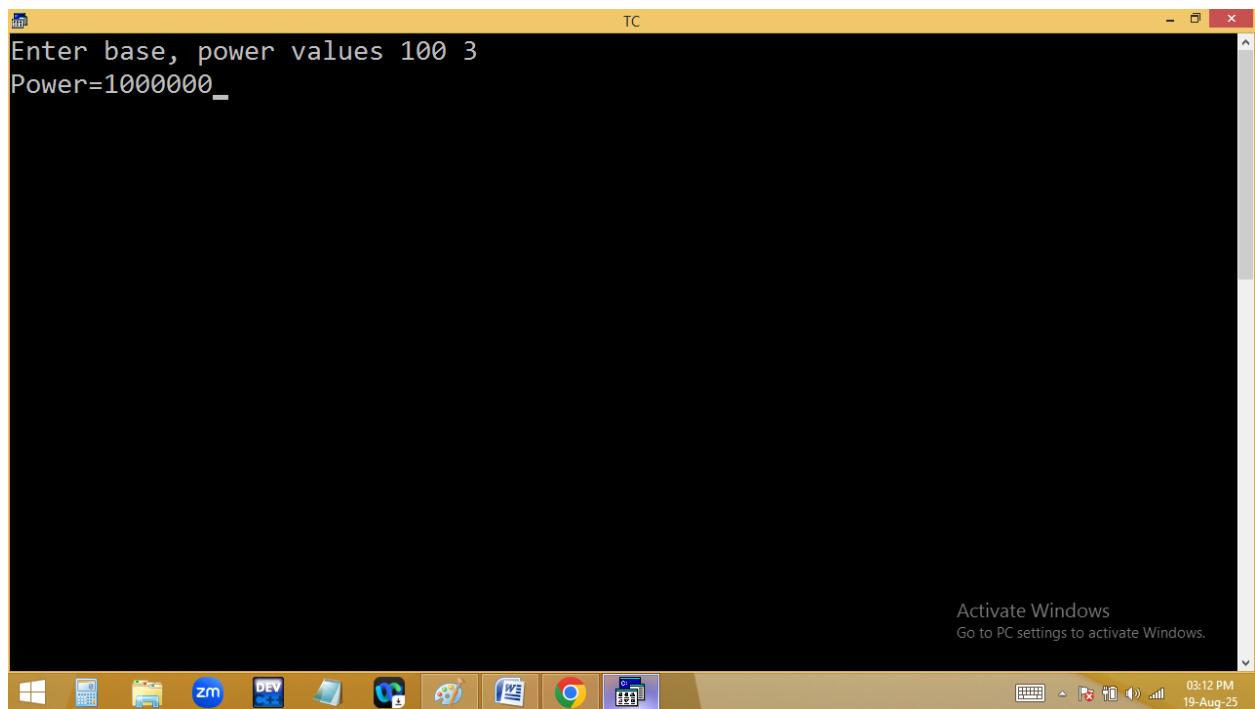
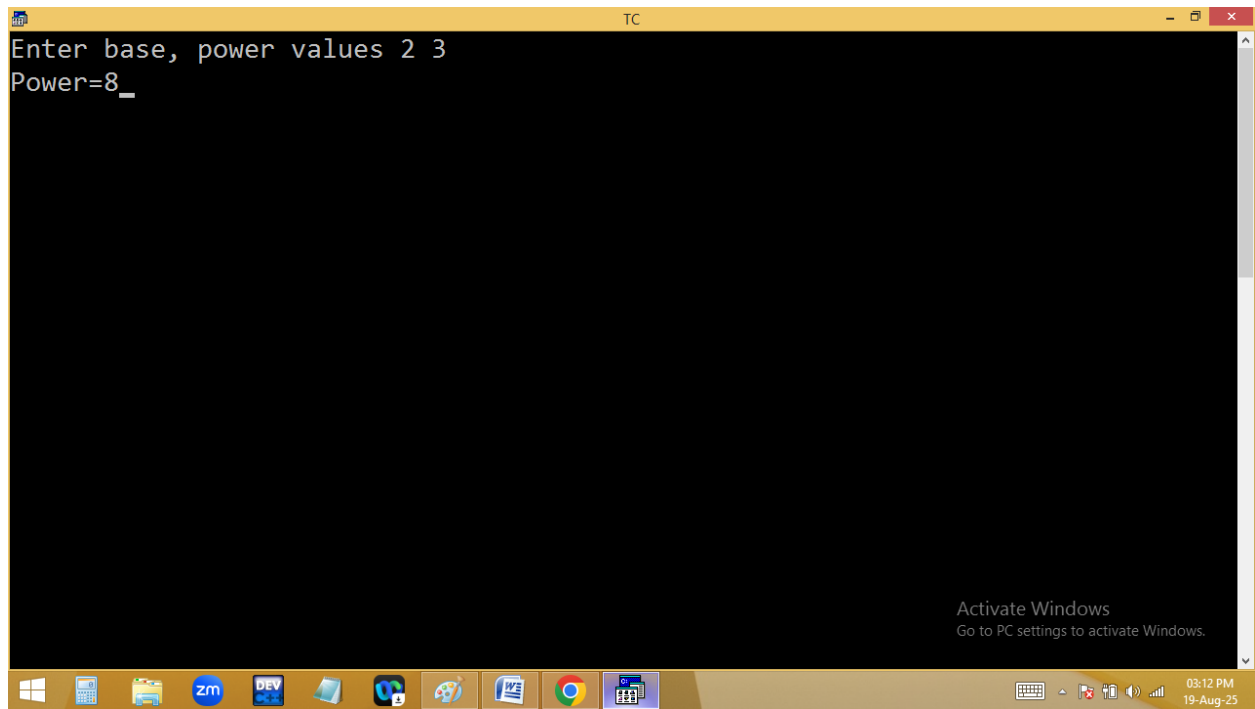
$$\begin{array}{l} b \swarrow 2^4 - P \\ 2^4 = 16 \\ 2 \times 2 \times 2 \times 2 = 16 \end{array}$$



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 14 Col 23 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
    int b,p;
    long pwr=1;
    clrscr();
    printf("Enter base, power values ");scanf("%d %d",&b, &p);
    while(p>=1)
    {
        pwr = pwr * b;
        p--;
    }
    printf("Power=%ld",pwr);
    getch();
}
```

Activate Windows  
Go to PC settings to activate Windows.

03:12 PM  
19-Aug-25



```
TC
Enter base, power values 2 5
Power=32_
```

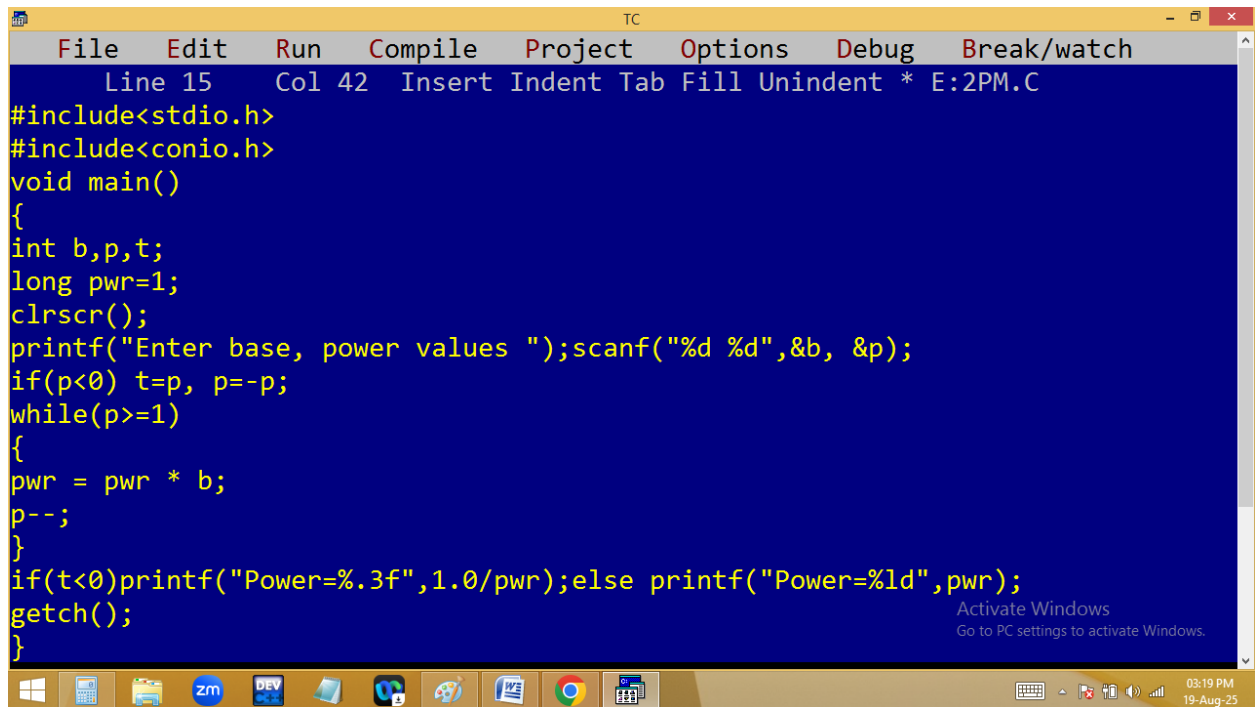
Activate Windows  
Go to PC settings to activate Windows.

03:12 PM  
19-Aug-25

```
TC
Enter base, power values 2 -3
Power=1
```

Activate Windows  
Go to PC settings to activate Windows.

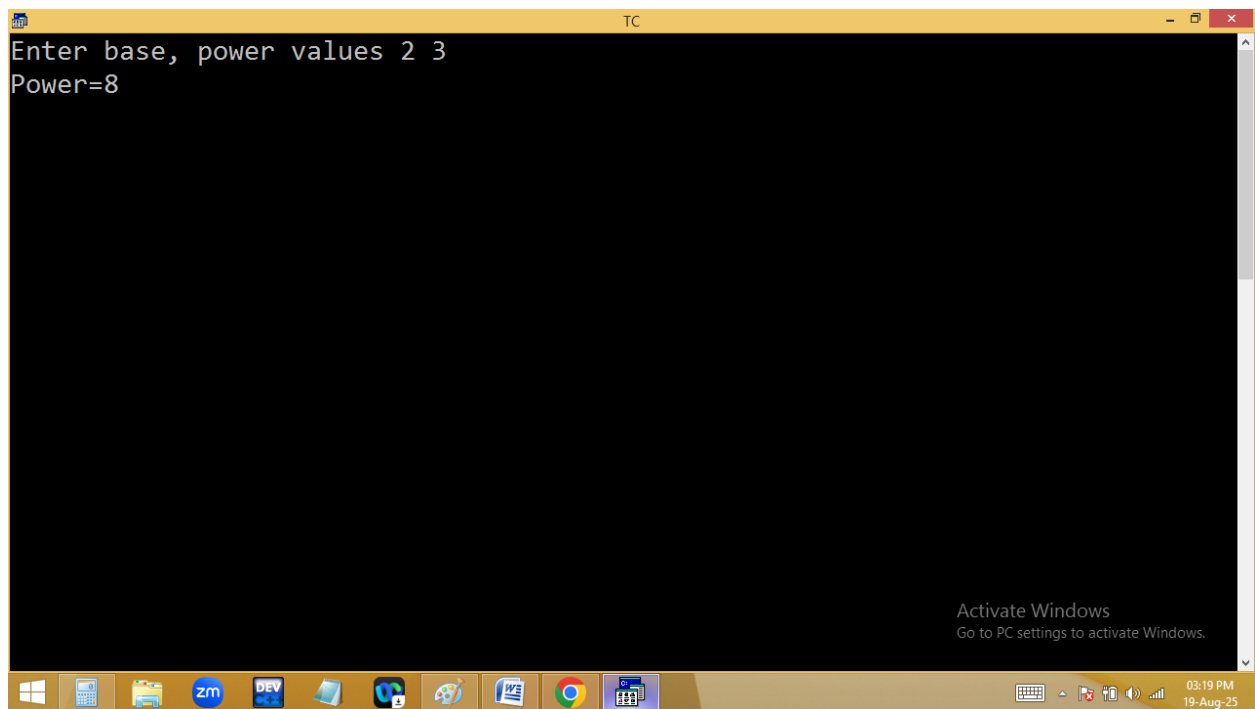
03:14 PM  
19-Aug-25



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 15 Col 42 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int b,p,t;
long pwr=1;
clrscr();
printf("Enter base, power values ");scanf("%d %d",&b, &p);
if(p<0) t=p, p=-p;
while(p>=1)
{
pwr = pwr * b;
p--;
}
if(t<0)printf("Power=%.3f",1.0/pwr);else printf("Power=%ld",pwr);
getch();
}
```

Activate Windows  
Go to PC settings to activate Windows.

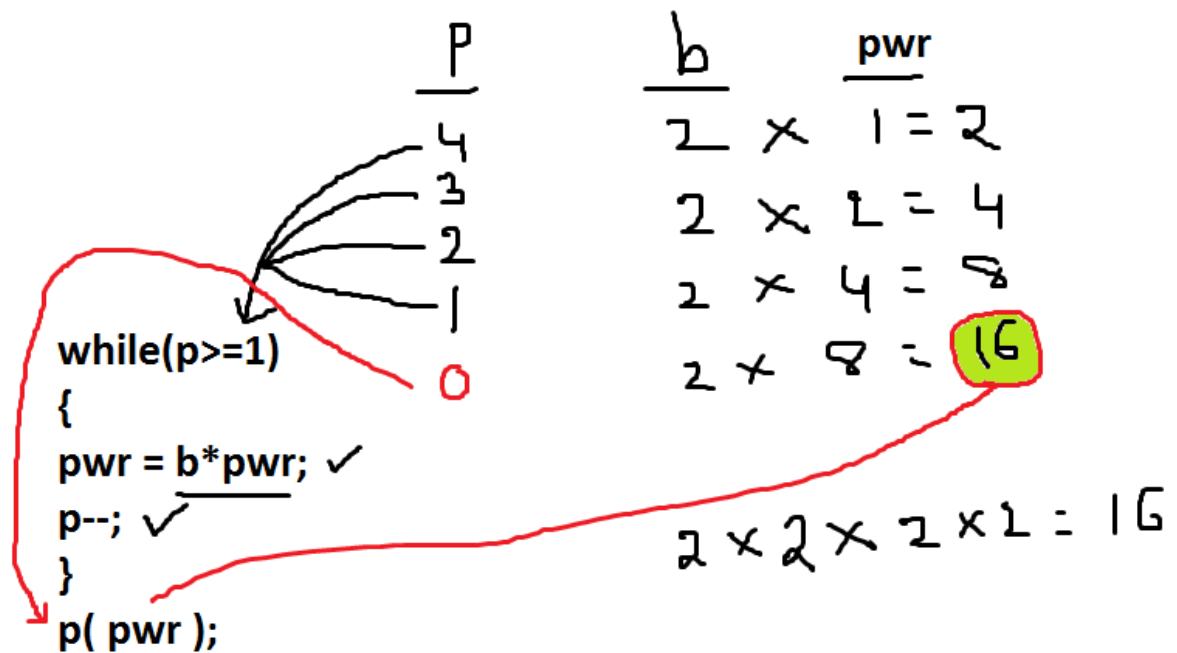
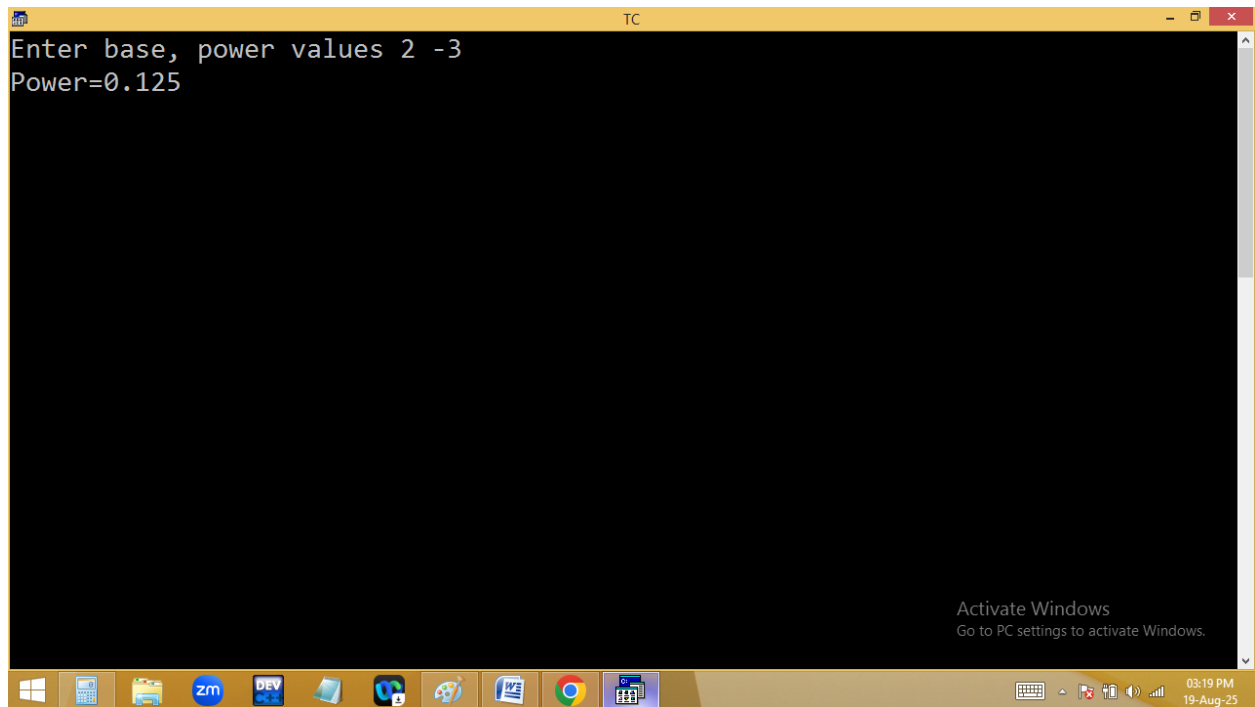
03:19 PM  
19-Aug-25



```
TC
Enter base, power values 2 3
Power=8

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

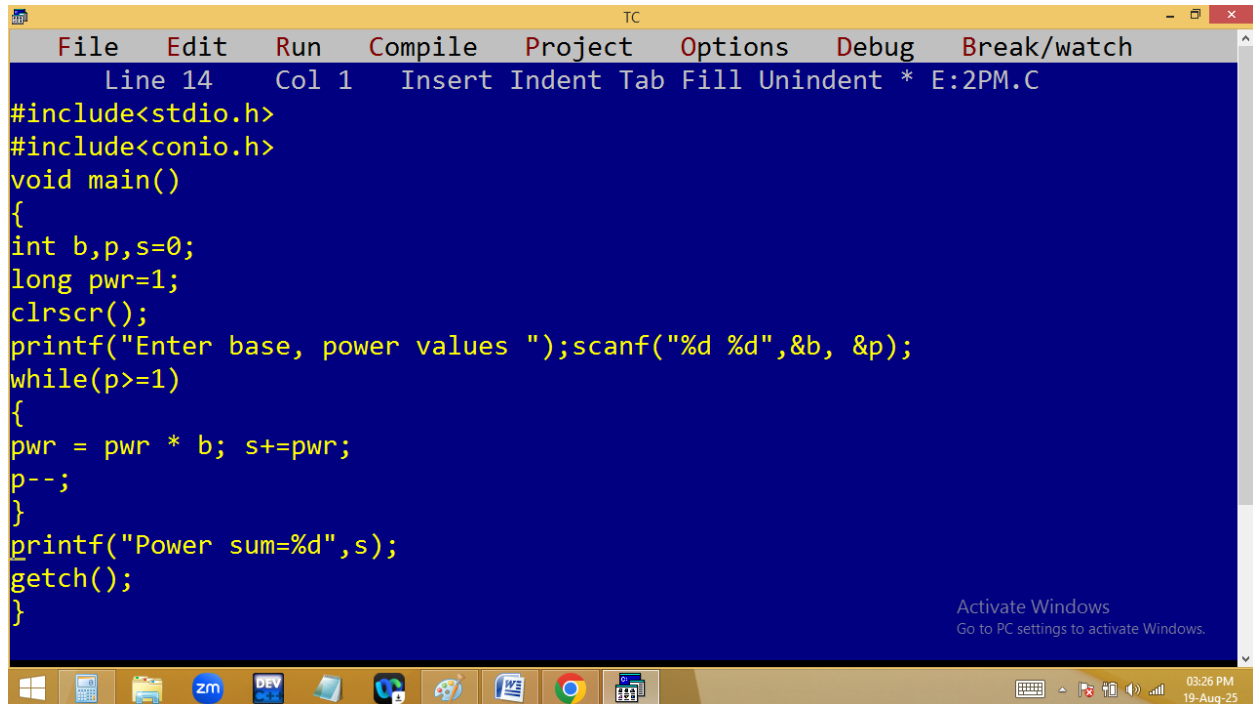
03:19 PM  
19-Aug-25





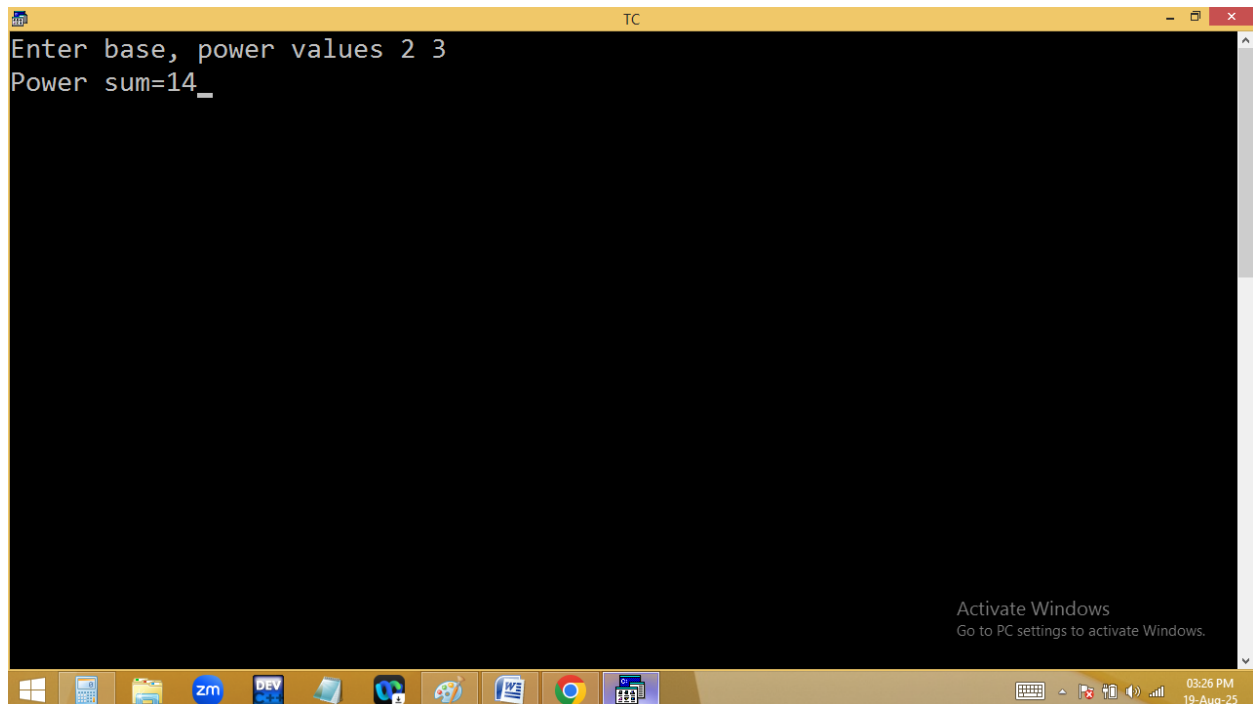
## Finding powers sum?

$$2^5 \rightarrow 2^1 + 2^2 + 2^3 + 2^4 + 2^5 = 2 + 4 + 8 + 16 + 32 = 62$$



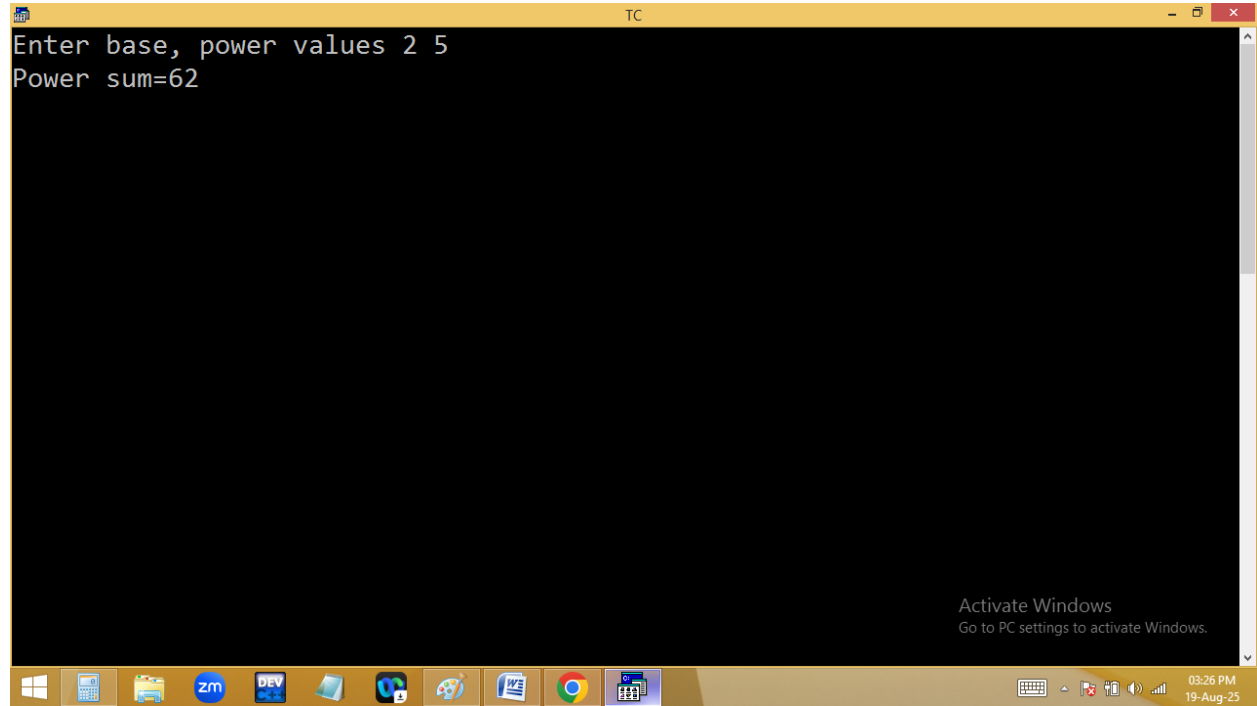
```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 14 Col 1 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int b,p,s=0;
long pwr=1;
clrscr();
printf("Enter base, power values ");scanf("%d %d",&b, &p);
while(p>=1)
{
pwr = pwr * b; s+=pwr;
p--;
}
printf("Power sum=%d",s);
getch();
}
```

Activate Windows  
Go to PC settings to activate Windows.



```
TC
Enter base, power values 2 3
Power sum=14_
```

Activate Windows  
Go to PC settings to activate Windows.

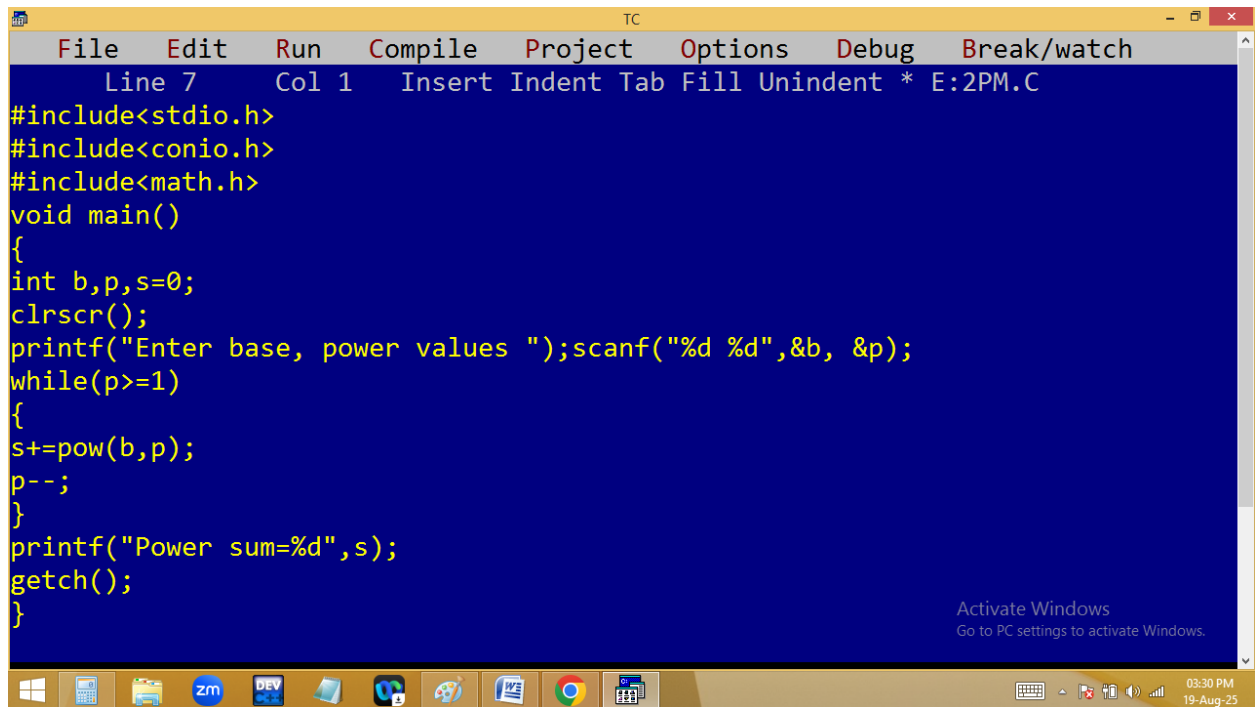


The image shows a Windows 10 desktop environment. A terminal window titled "TC" is open, displaying the output of a C program. The program prompts the user to "Enter base, power values 2 5" and then prints "Power sum=62". The Windows taskbar at the bottom contains icons for the Start menu, File Explorer, Zoho Mail, DEV, a folder, a game, a document, Google Chrome, and a task manager. The system tray on the right shows the date and time as "03:26 PM 19-Aug-25".

```
TC
Enter base, power values 2 5
Power sum=62
```

Activate Windows  
Go to PC settings to activate Windows.

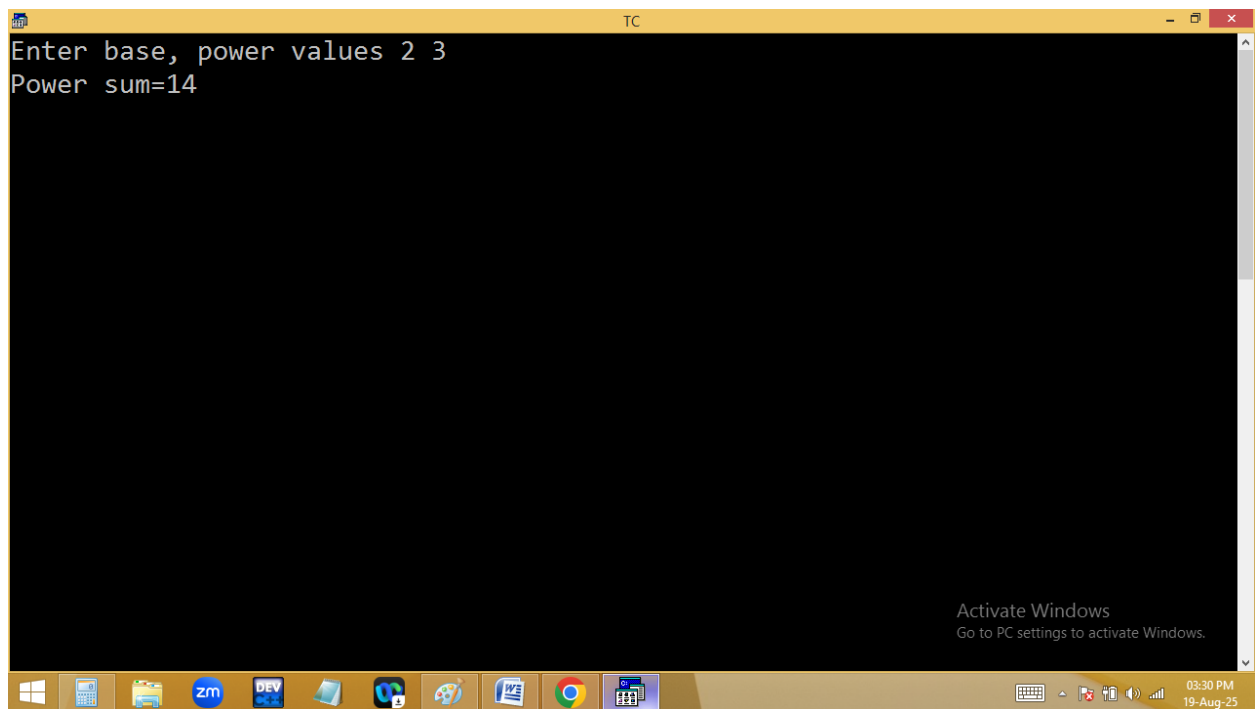
Using pow():



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 7 Col 1 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
int b,p,s=0;
clrscr();
printf("Enter base, power values ");scanf("%d %d",&b, &p);
while(p>=1)
{
s+=pow(b,p);
p--;
}
printf("Power sum=%d",s);
getch();
}
```

Activate Windows  
Go to PC settings to activate Windows.

03:30 PM  
19-Aug-25



```
TC
Enter base, power values 2 3
Power sum=14
```

Activate Windows  
Go to PC settings to activate Windows.

03:30 PM  
19-Aug-25

## Using a user defined function?

```
TC
#include<stdio.h> #include<conio.h> #include<math.h>
long power() /* fun definition */
{
    int b,p;
    long s=0;
    clrscr();
    printf("Enter base, power values ");scanf("%d %d",&b, &p);
    while(p>=1)
    {
        s+=pow(b,p);
        p--;
    }
    return s;
}
void main()
{
    printf("Power sum = %ld", power()); /* fun calling */
    getch();
}
```

Activate Windows  
Go to PC settings to activate Windows.

03:45 PM  
19-Aug-25

```
TC
Enter base, power values 2 3
Power sum = 14
```

Activate Windows  
Go to PC settings to activate Windows.

03:46 PM  
19-Aug-25

**s+=pow(b,p);**

$$\begin{array}{rcl}
 0 + & 2^3 = & 8 \\
 8 + & 2^2 = & 12 \\
 12 + & 2^1 = & 14
 \end{array}$$

$$\frac{b}{2}$$

$$\frac{p}{3 \atop 2 \atop 1}$$

$$\begin{array}{r}
 \frac{s}{0} \\
 + 8 \\
 + 4 \\
 + 2 \\
 \hline
 14
 \end{array}$$

### Home work:

Finding gcd / hcf of given two numbes.

Eg: take two numbers → 4 and 6

4 factors are 1 2 4

6 factors are 1 2 3 6

Output: 2 is hcf of 4 and 6

2. finding lcm of given two numbers.

Eg: 4 and 6 lcm is 12

$$\frac{\max}{6} \quad \frac{a}{4} = 2 \quad \frac{\max}{6} \quad \frac{b}{6}$$

$$7 \% 4 = 3$$

$$8 \% 4 = 0$$

$$9 \% 4 = 1$$

$$10 \% 4 = 2$$

$$11 \% 4 = 3$$

$$12 \% 4 = 0$$

$$8 \% 6 = 2$$

$$12 \% 6 = 0$$

