# Loops / Iterations / Repetitive statements

**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.**

**C-Language supports basically 2 types of loops.**

1. **Entry control loops.**
2. **Exit control 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**

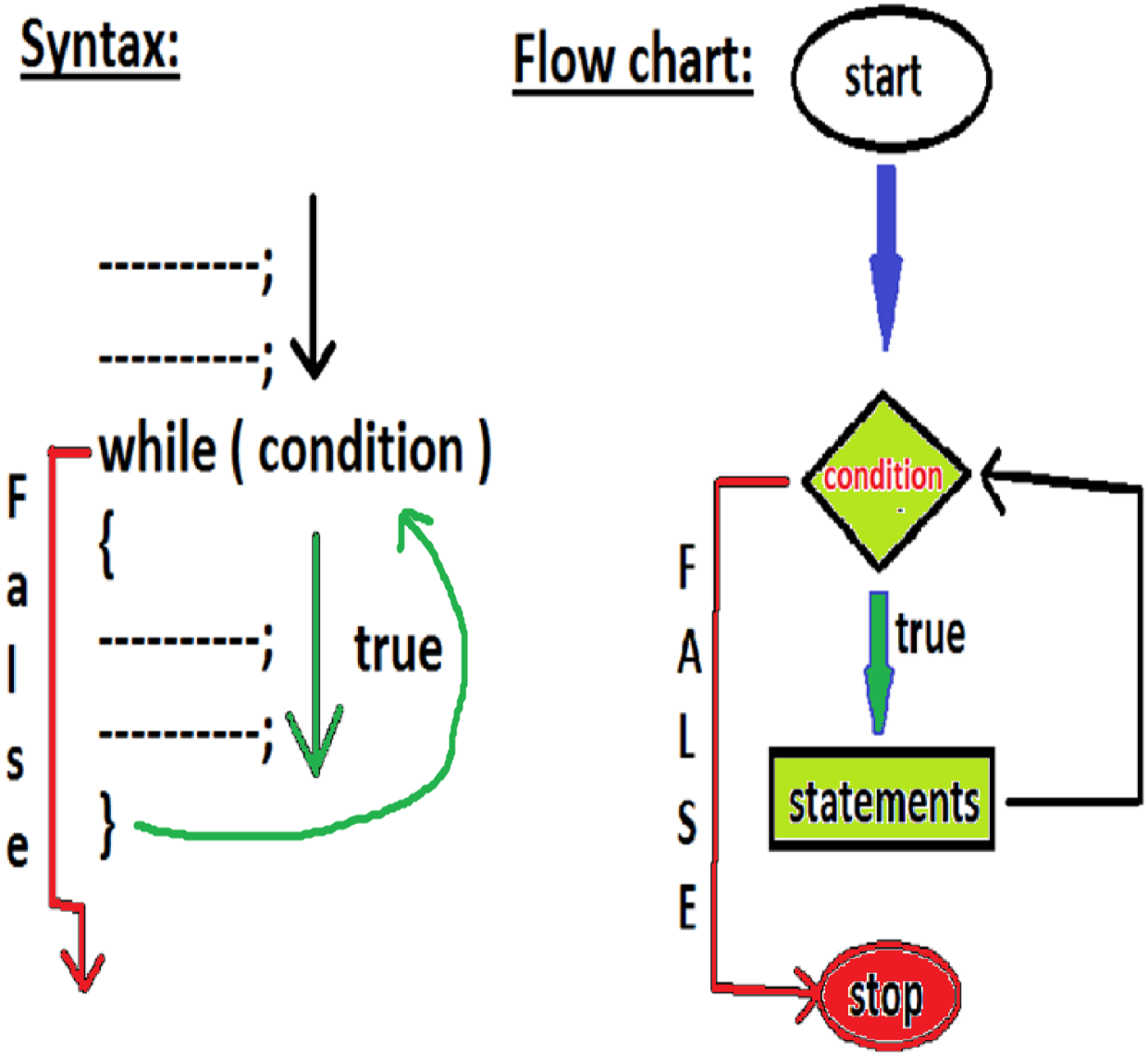
i. **do while.**

## While loop:

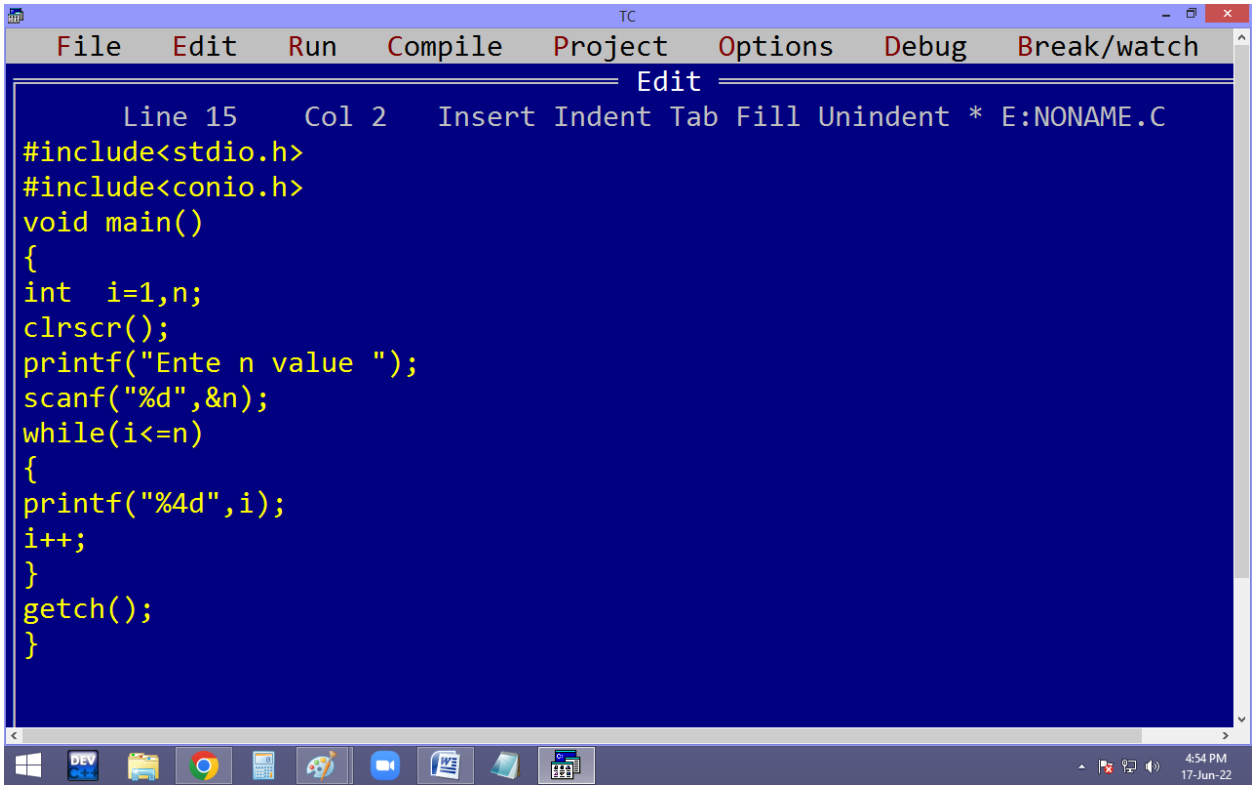
- **while is a keyword.**
- **In while loop condition is tested first and it is true then only while block statements are executed. After executing while block statements, the program execution automatically shifted/jumped to while condition at the beginning. If it is true then once again the while block**

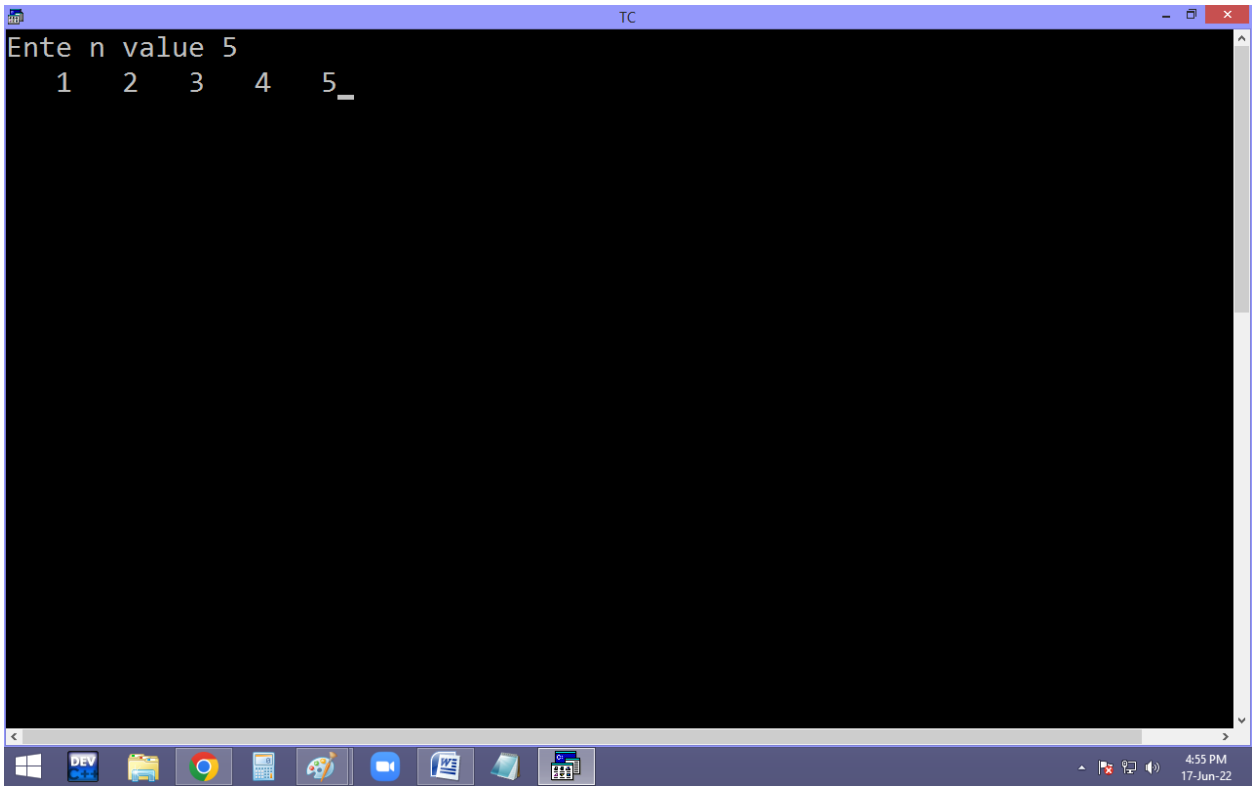
**statements are repeated. Like this the process is continued until while condition becomes false.**

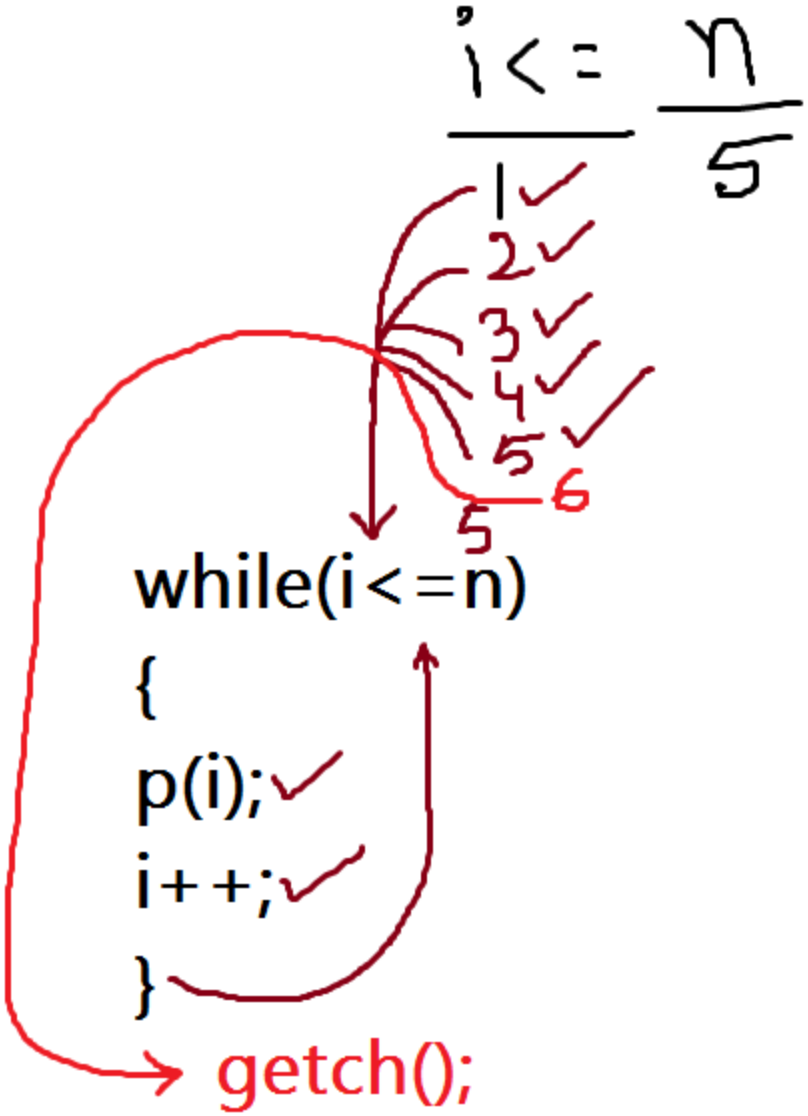
- **While is entry control loop.**

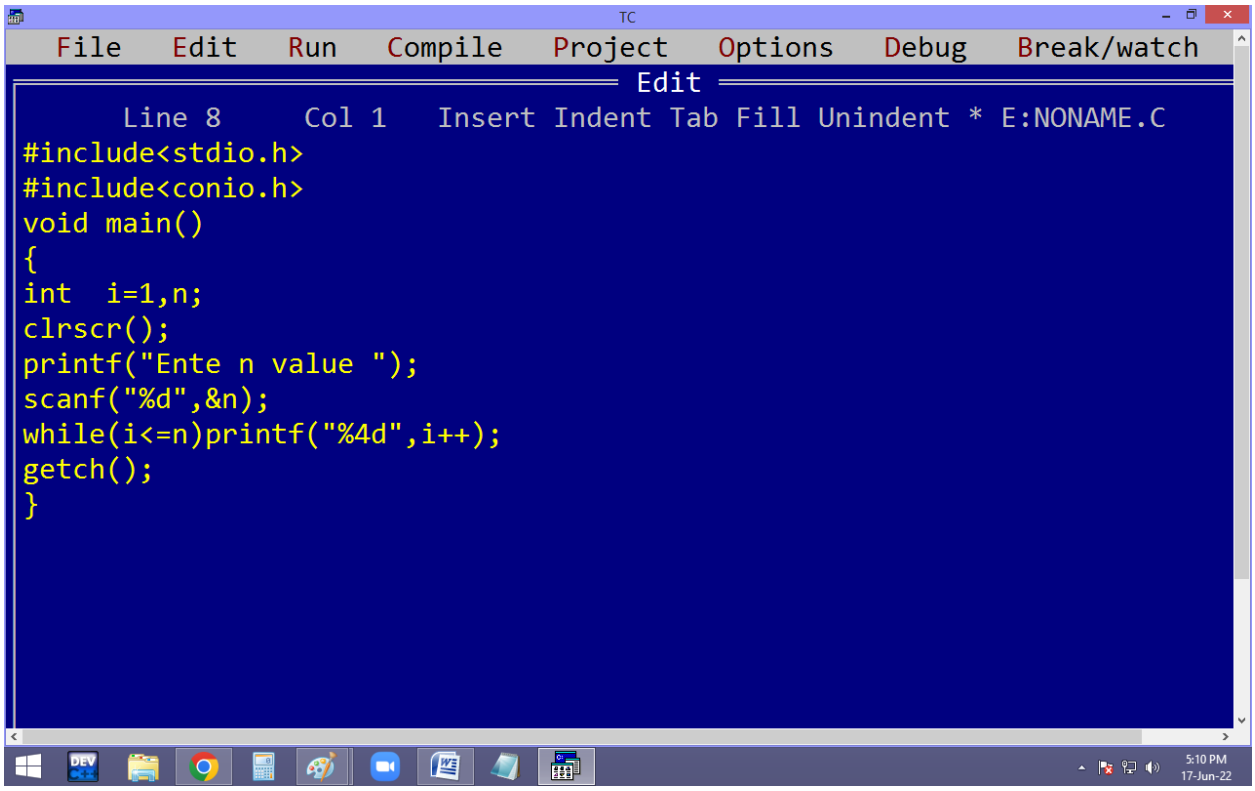


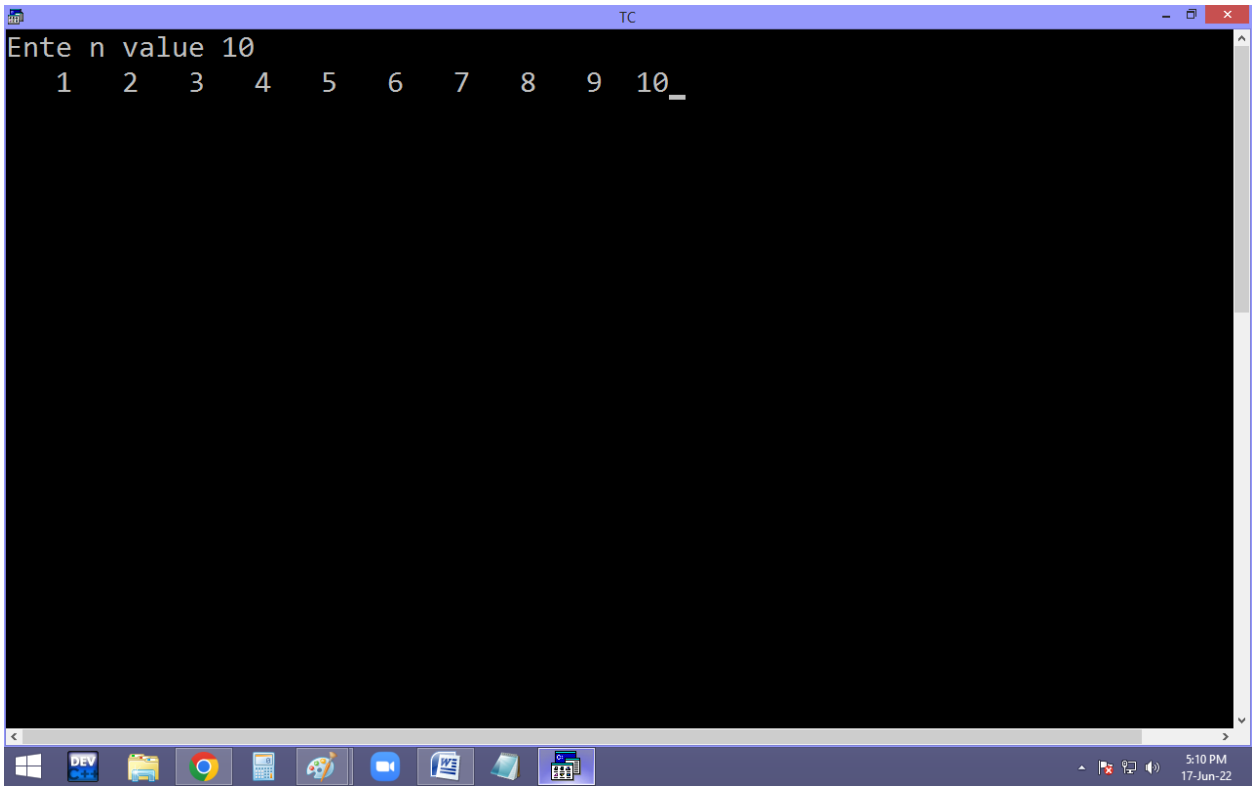
# Eg. printing 1..n numbers.



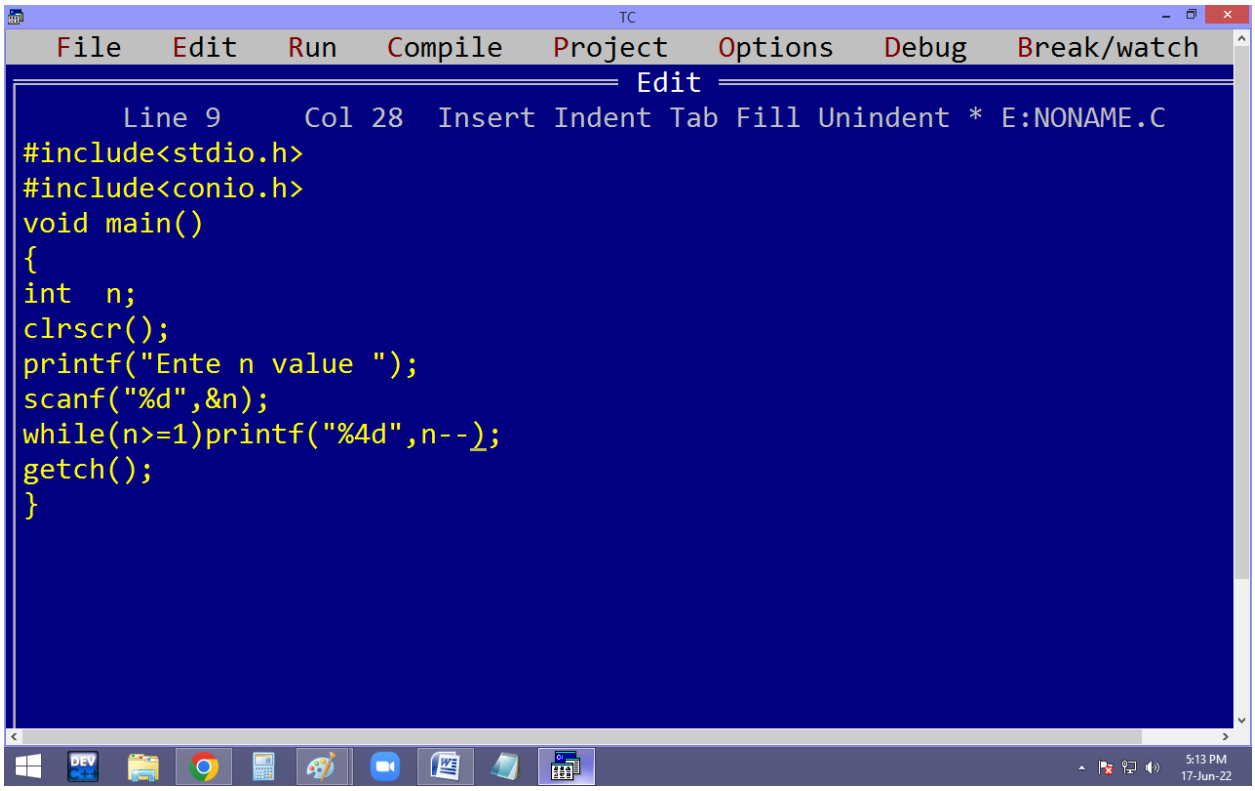

TC
Ente n value 5
1 2 3 4 5
4:55 PM
17-Jun-22

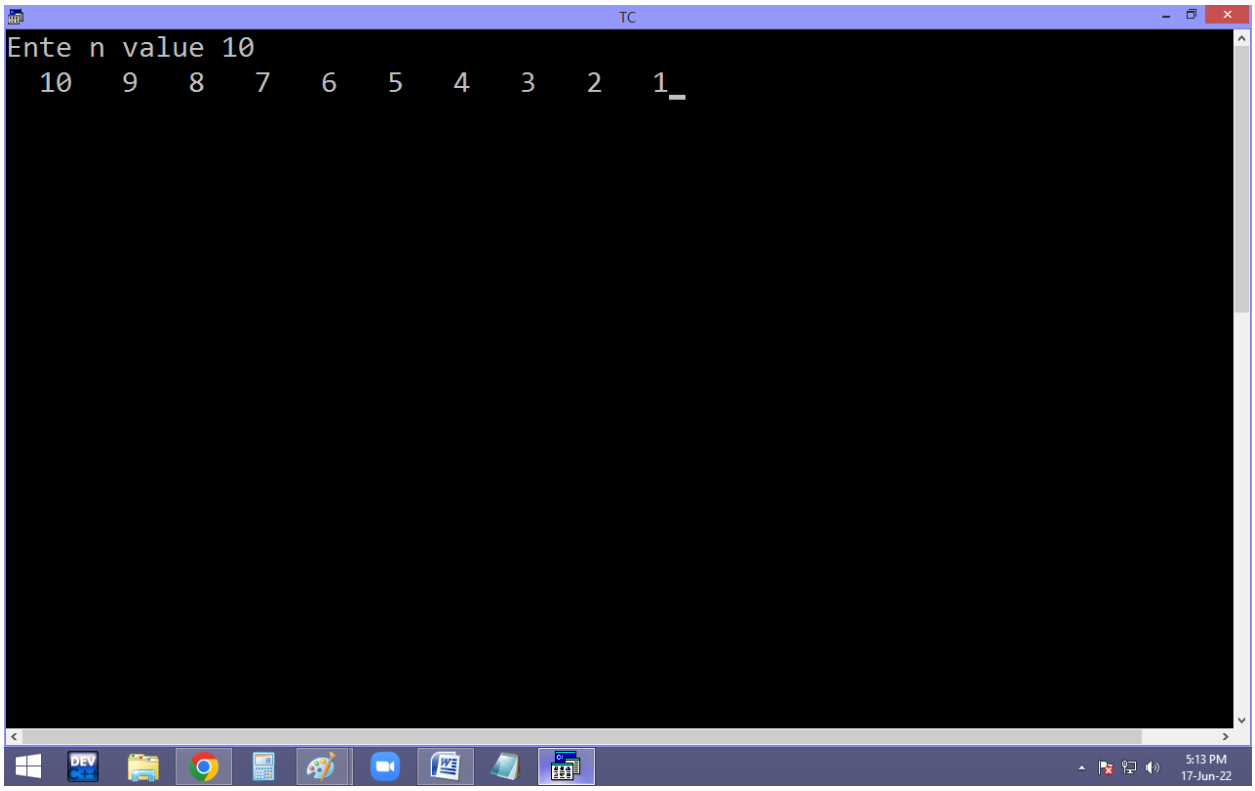

i<=n
1
2
3
4
5
6
5
while(i<=n)
{
p(i);
i++;
}
getch();

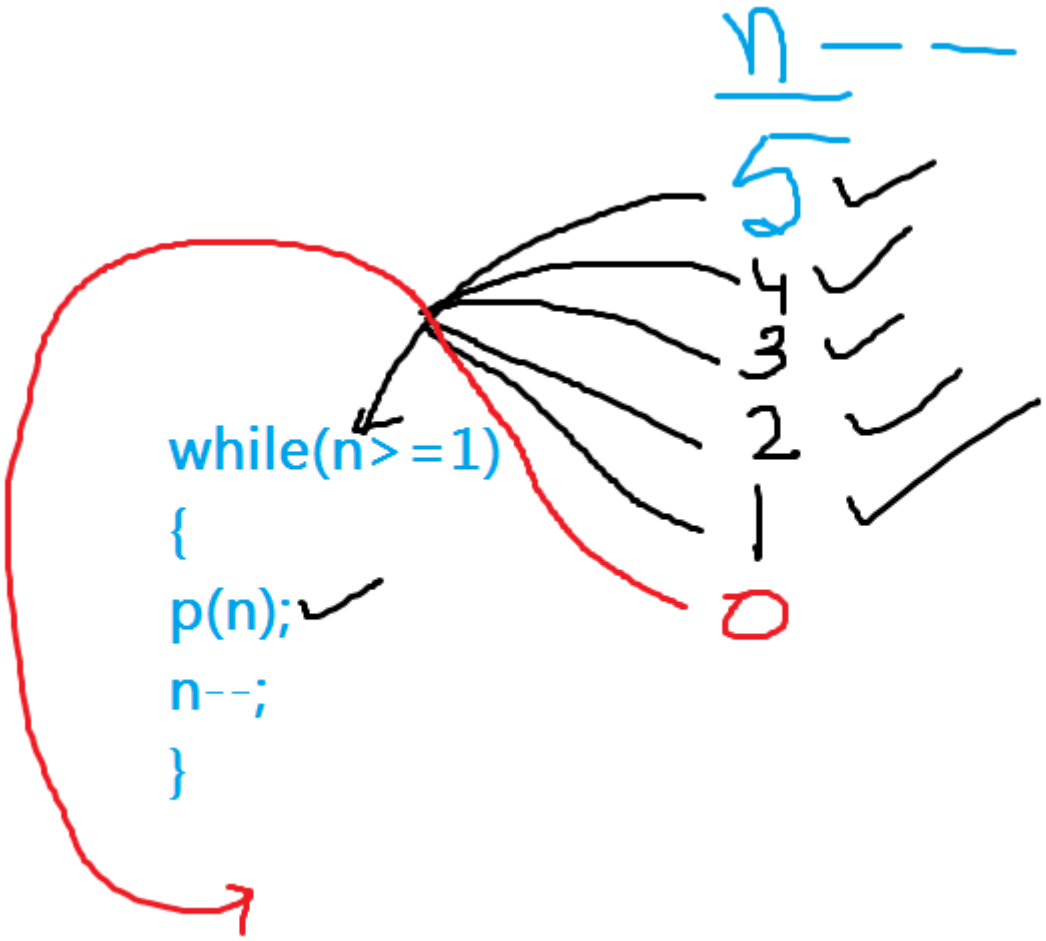

TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 8 Col 1 Insert Indent Tab Fill Unindent * E:NONAME.C
#include<stdio.h>
#include<conio.h>
void main()
{
int i=1,n;
clrscr();
printf("Ente n value ");
scanf("%d",&n);
while(i<=n)printf("%4d",i++);
getch();
}
5:10 PM
17-Jun-22


TC
Ente n value 10
1 2 3 4 5 6 7 8 9 10
5:10 PM
17-Jun-22

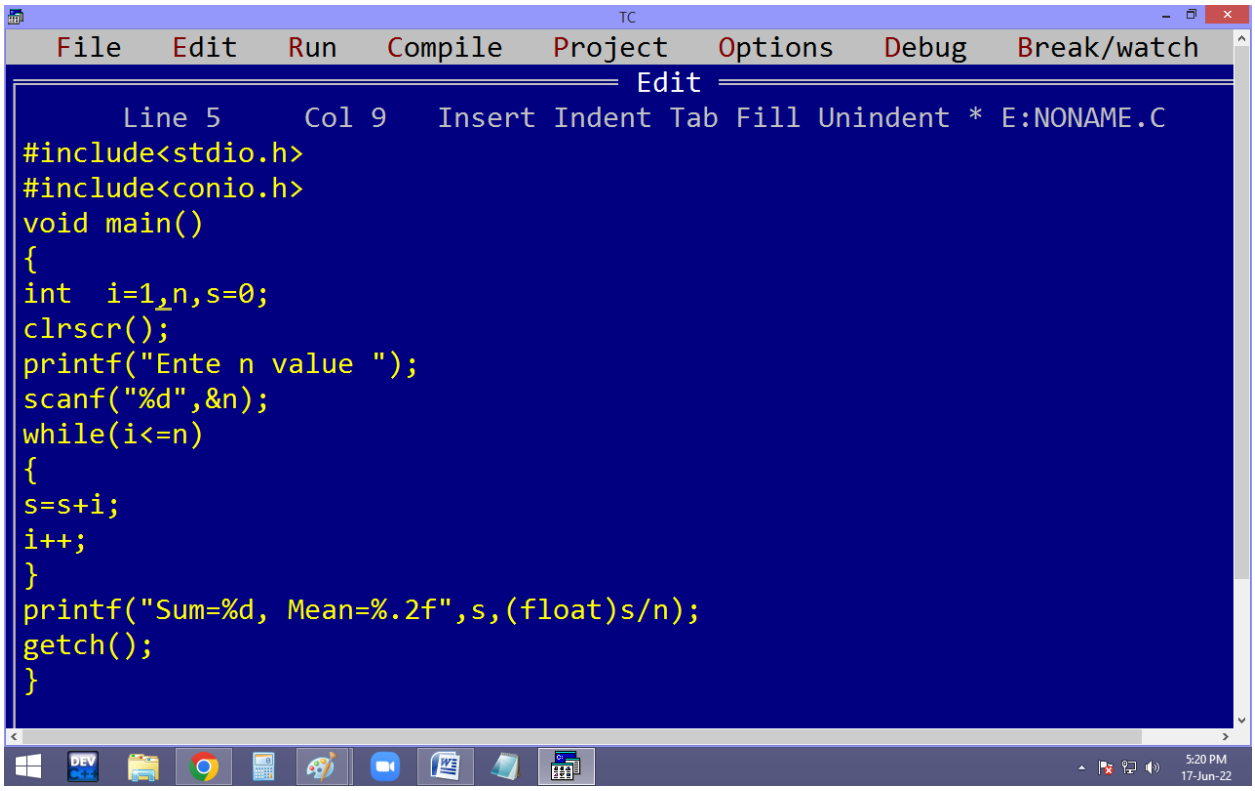
# Printing 1..n numbers in reverse order.

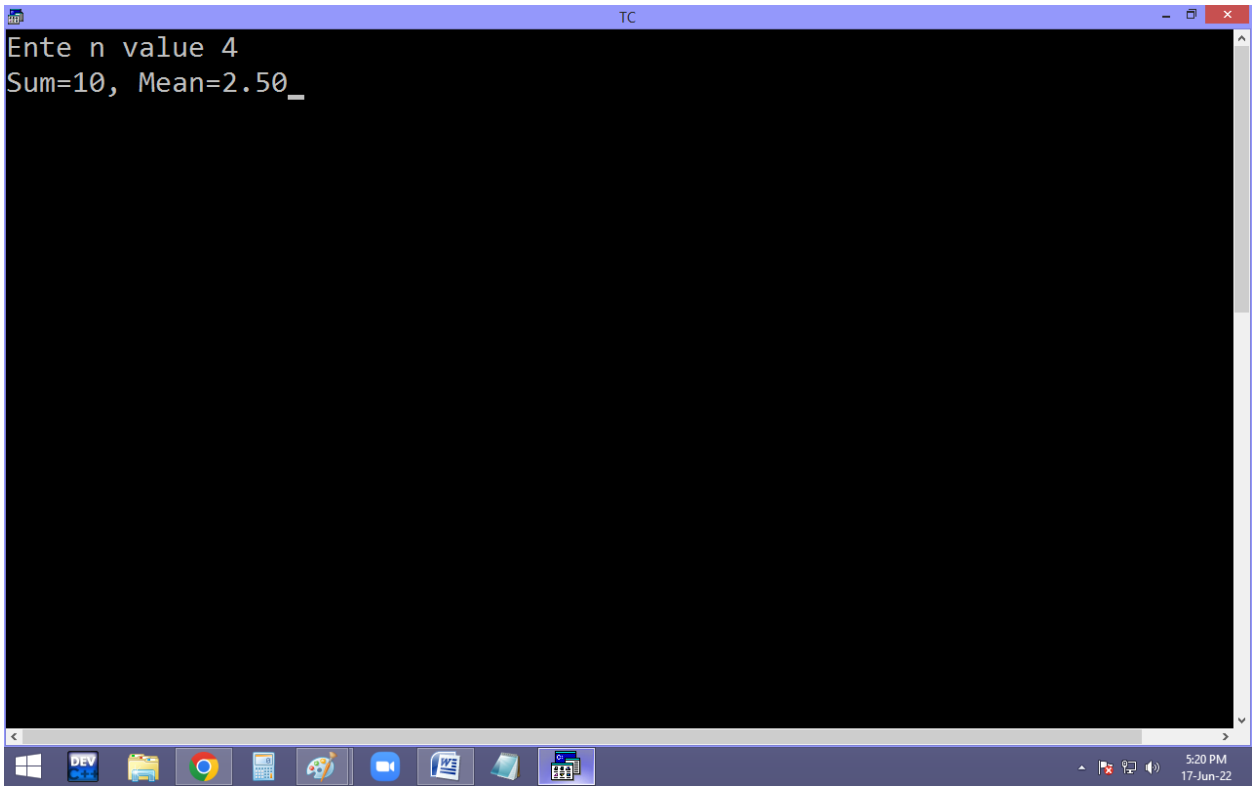

TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 9 Col 28 Insert Indent Tab Fill Unindent * E:NONAME.C
#include<stdio.h>
#include<conio.h>
void main()
{
int n;
clrscr();
printf("Ente n value ");
scanf("%d",&n);
while(n>=1)printf("%4d",n--);
getch();
}

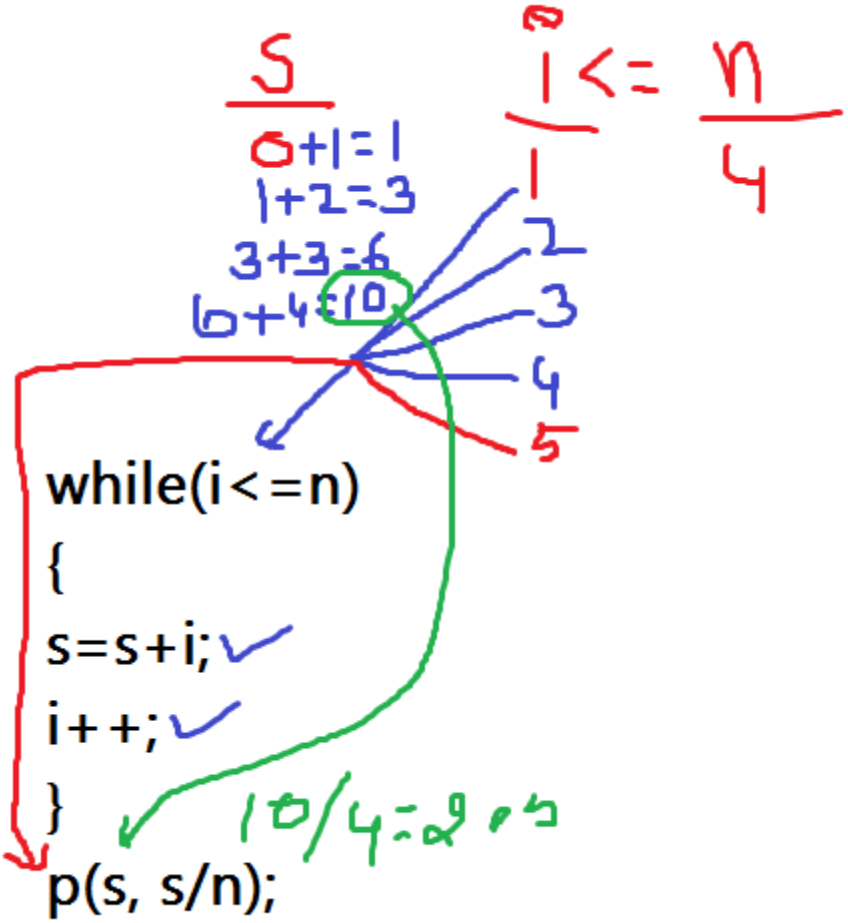

TC
Ente n value 10
10 9 8 7 6 5 4 3 2 1



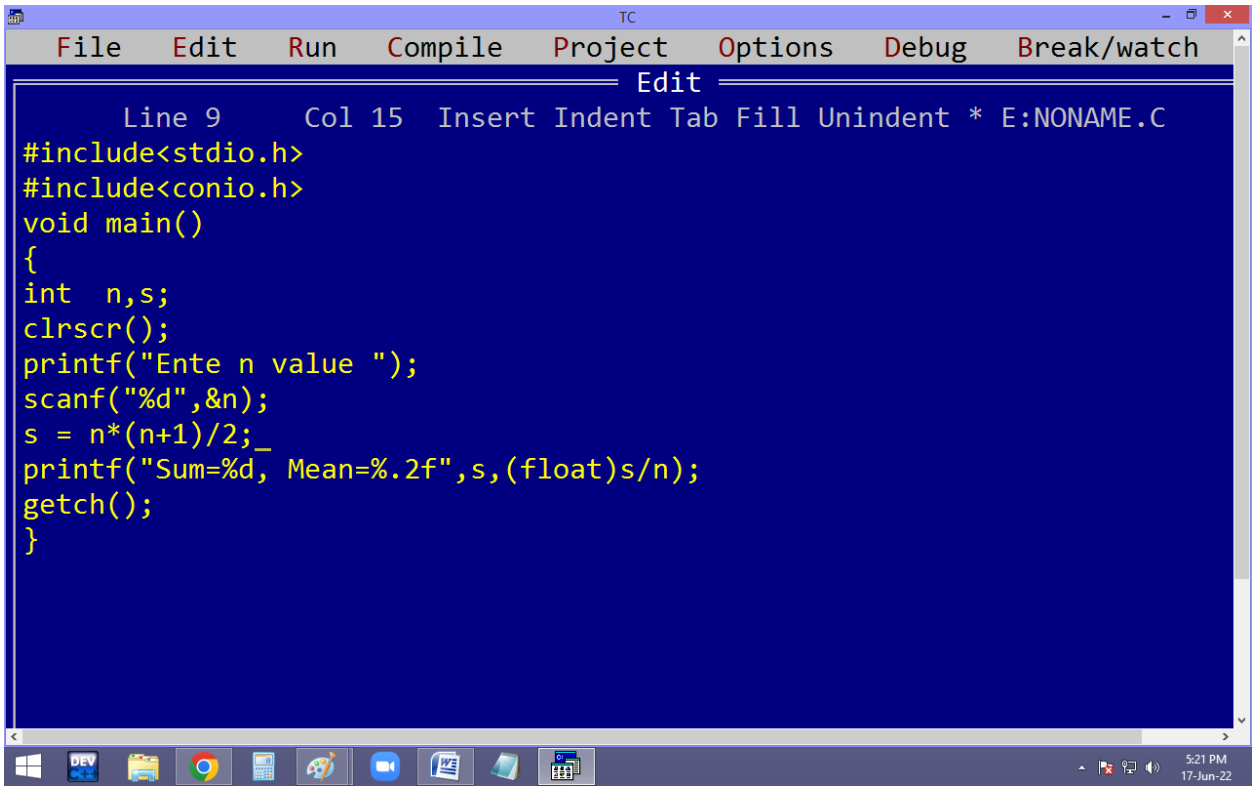

**Eg. printing 1..n numbers sum and mean[avg]:**

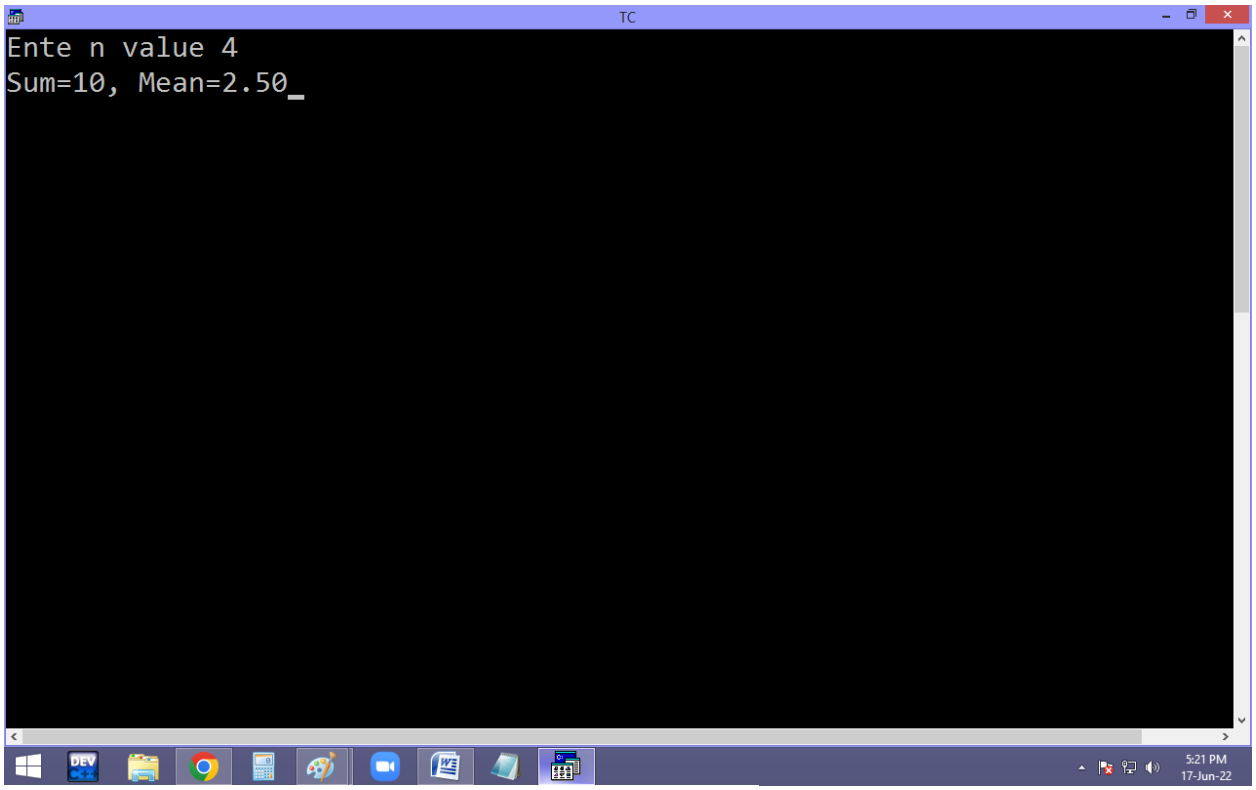

TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 5 Col 9 Insert Indent Tab Fill Unindent * E:NONAME.C
#include<stdio.h>
#include<conio.h>
void main()
{
int i=1,n,s=0;
clrscr();
printf("Ente n value ");
scanf("%d",&n);
while(i<=n)
{
s=s+i;
i++;
}
printf("Sum=%d, Mean=%.2f",s,(float)s/n);
getch();
}
5:20 PM
17-Jun-22


TC
Ente n value 4
Sum=10, Mean=2.50
5:20 PM
17-Jun-22


S
0+1=1
1+2=3
3+3=6
6+4=10
i
i<= n
1
2
3
4
5
while(i<=n)
{
s=s+i;
i++;
}
10/4=2.5
p(s, s/n);

# Without using loop:



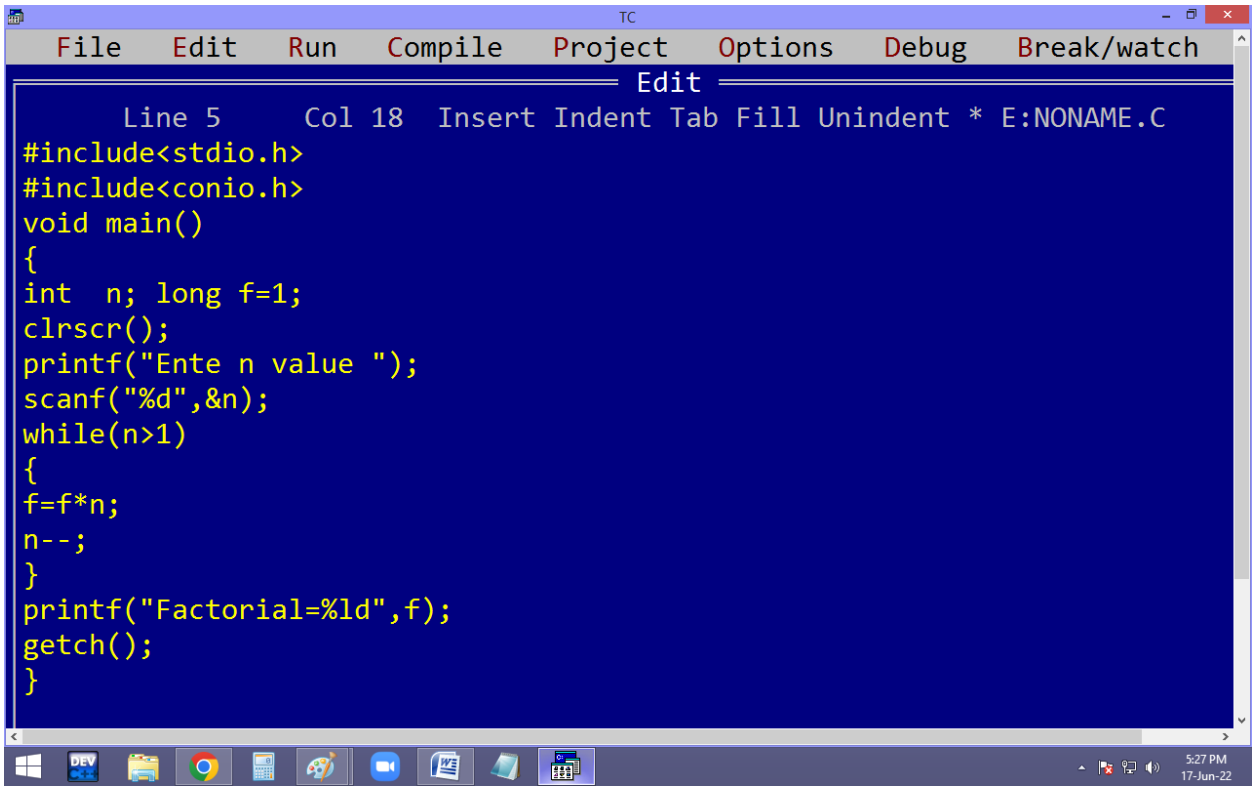


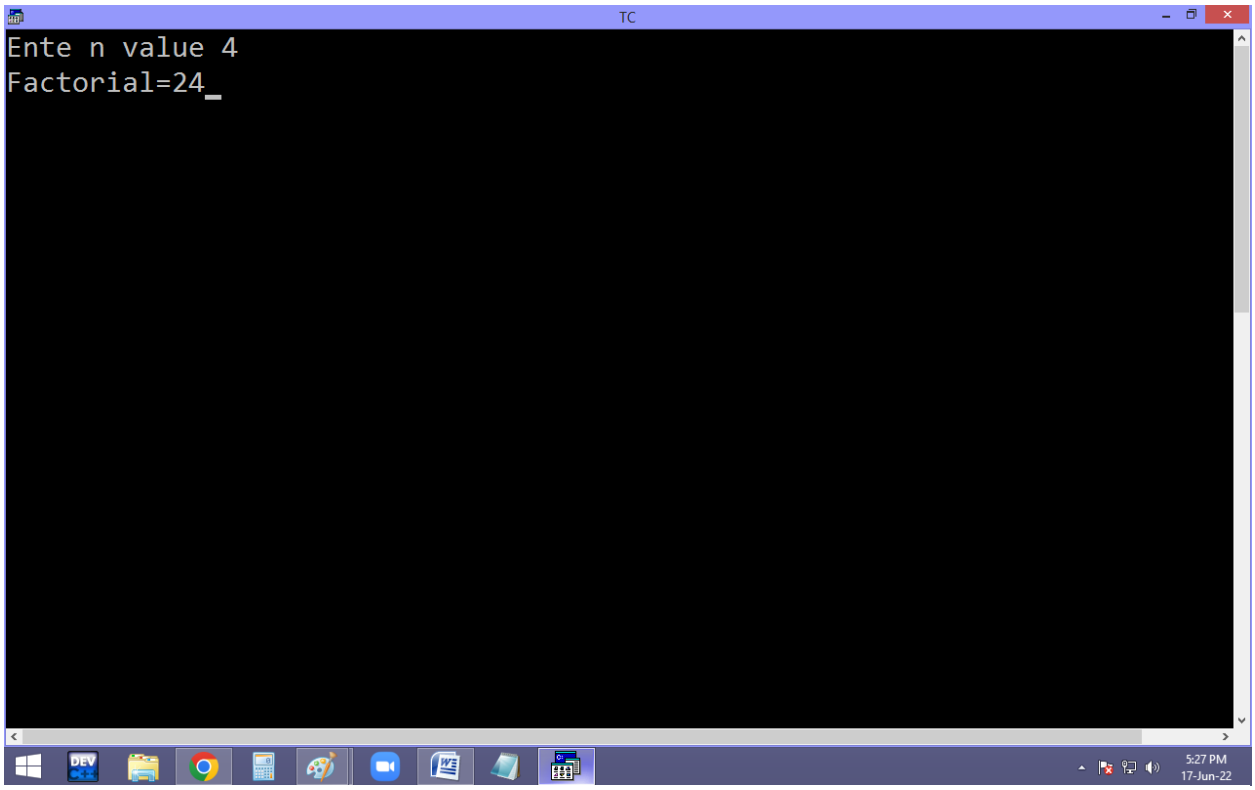

```
s = n * (n+1) / 2 ;
```

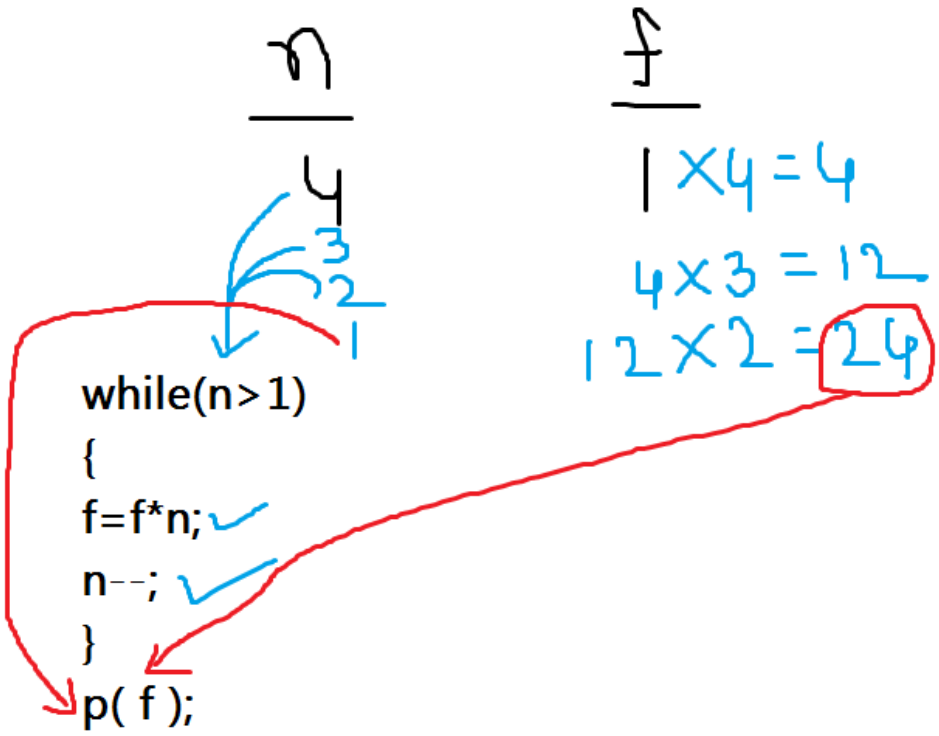
4 * 5 / 2

20/2=10

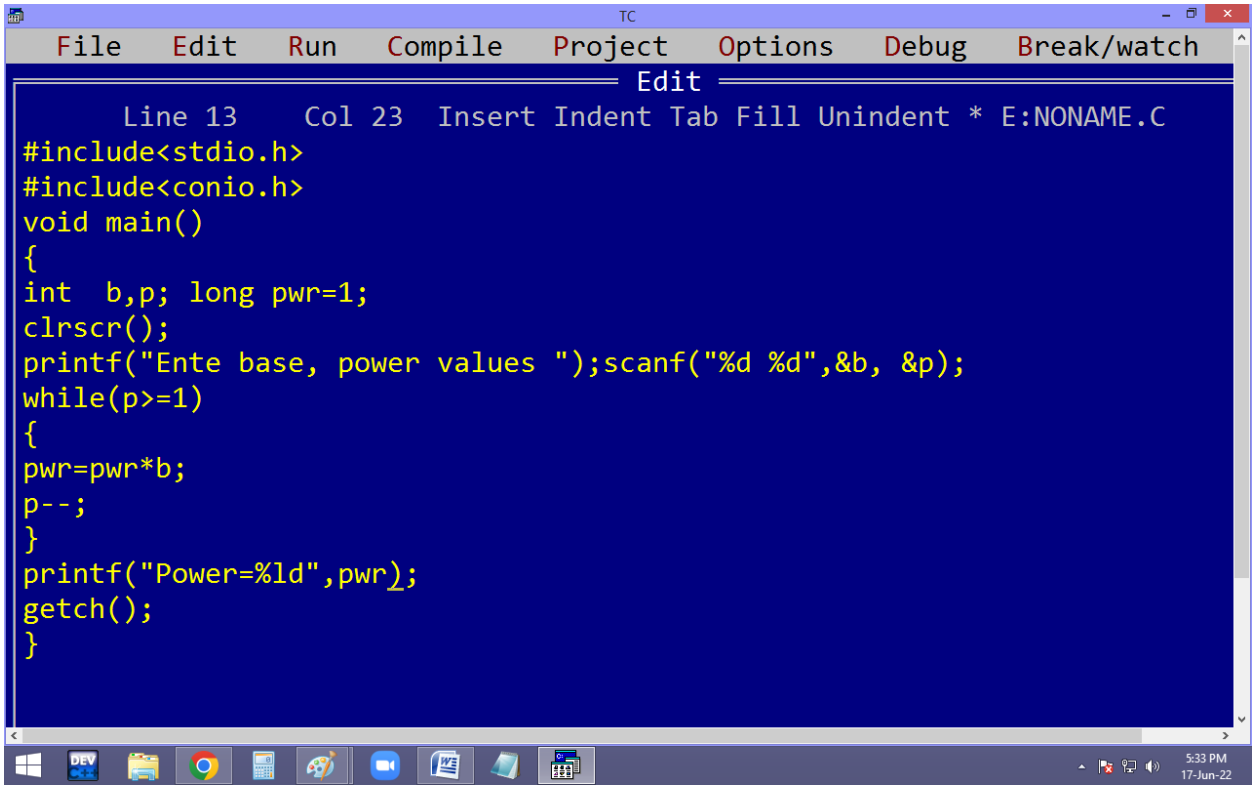
**Eg. finding factorial of given no.**

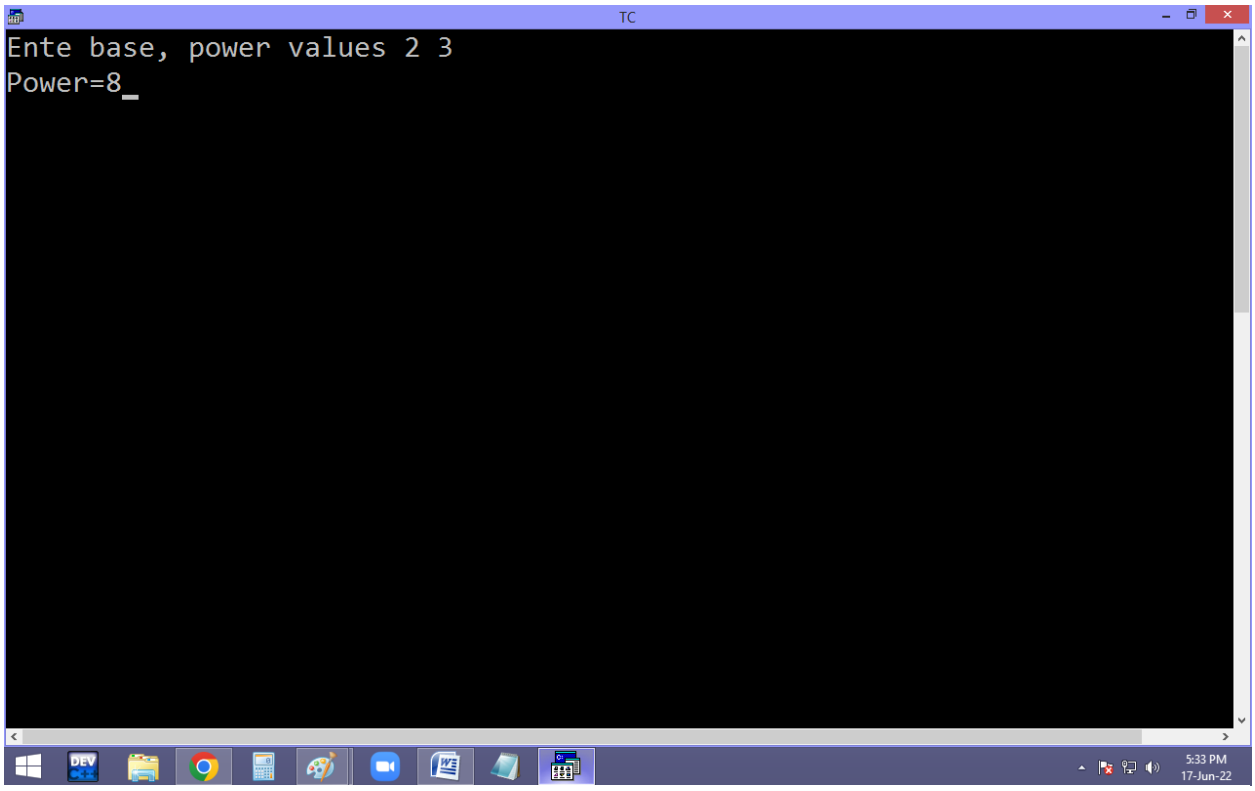

TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 5 Col 18 Insert Indent Tab Fill Unindent * E:NONAME.C
#include<stdio.h>
#include<conio.h>
void main()
{
int n; long f=1;
clrscr();
printf("Ente n value ");
scanf("%d",&n);
while(n>1)
{
f=f*n;
n--;
}
printf("Factorial=%ld",f);
getch();
}
5:27 PM
17-Jun-22

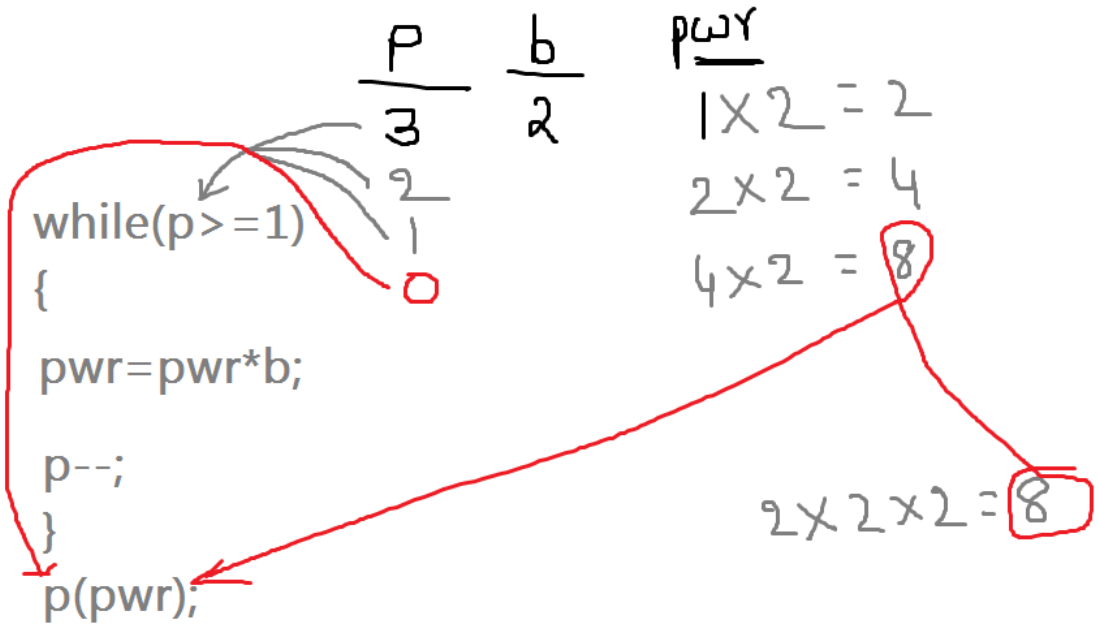

TC
Ente n value 4
Factorial=24
5:27 PM
17-Jun-22

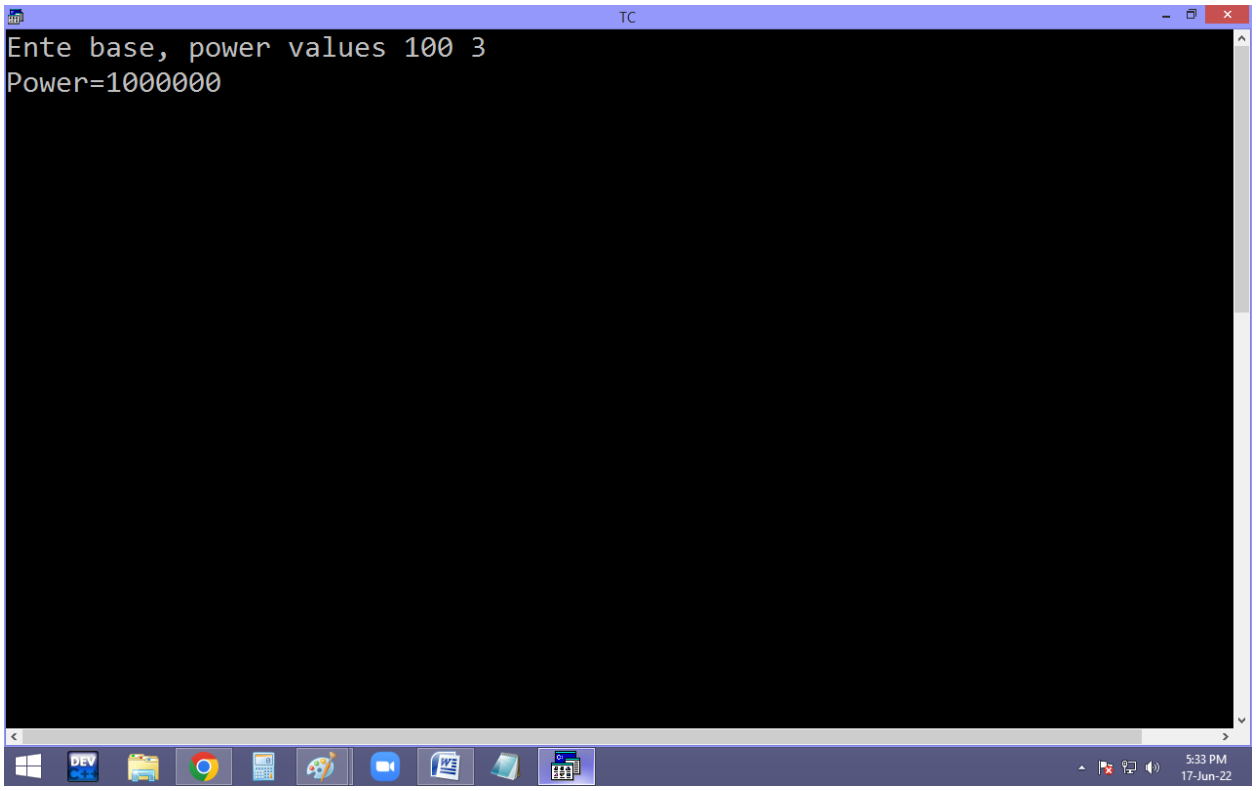

n
f
4
3
2
1
1 X 4 = 4
4 X 3 = 12
12 X 2 = 24
while(n>1)
{
f=f*n;
n--;
}
p( f );

# Finding power value using user defined program.




TC
Ente base, power values 2 3
Power=8
5:33 PM
17-Jun-22

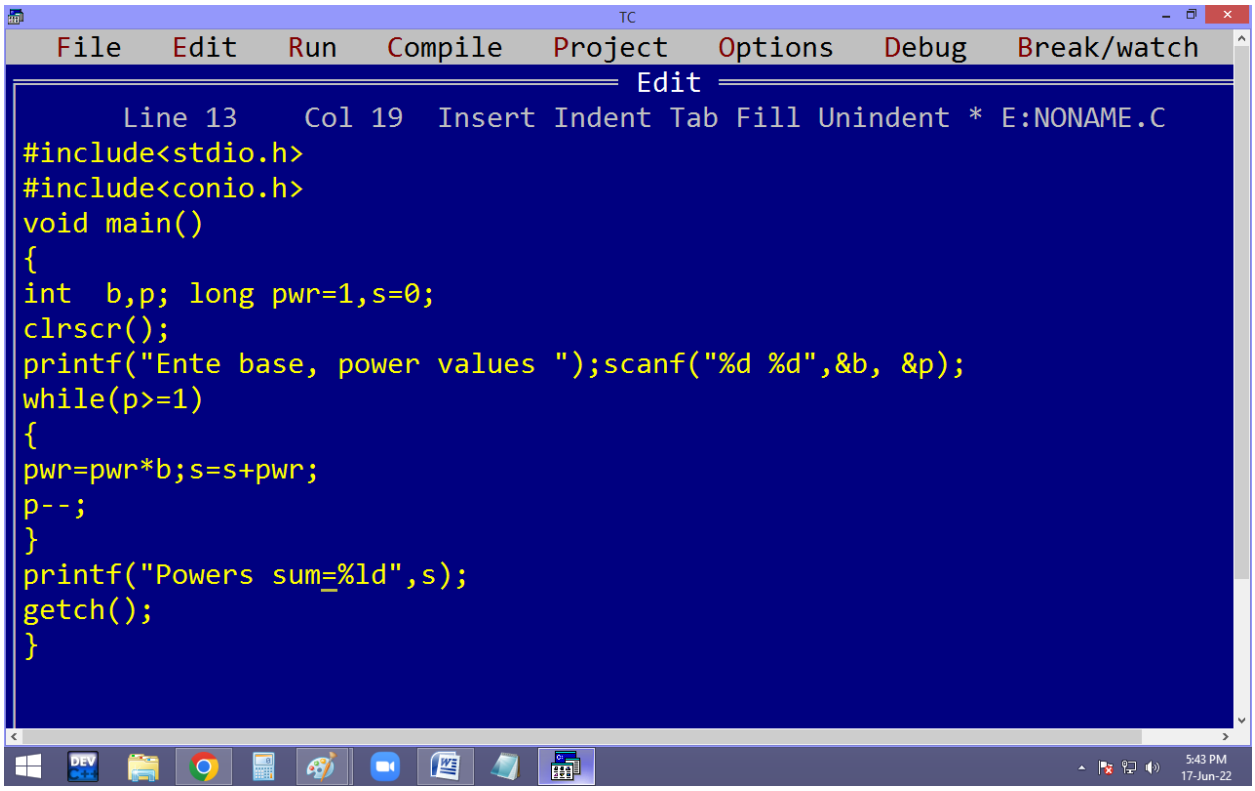

p
3
2
1
0
b
2
pwr
1X2 = 2
2X2 = 4
4X2 = 8
2X2X2 = 8
while(p>=1)
{
pwr=pwr*b;
p--;
}
p(pwr);

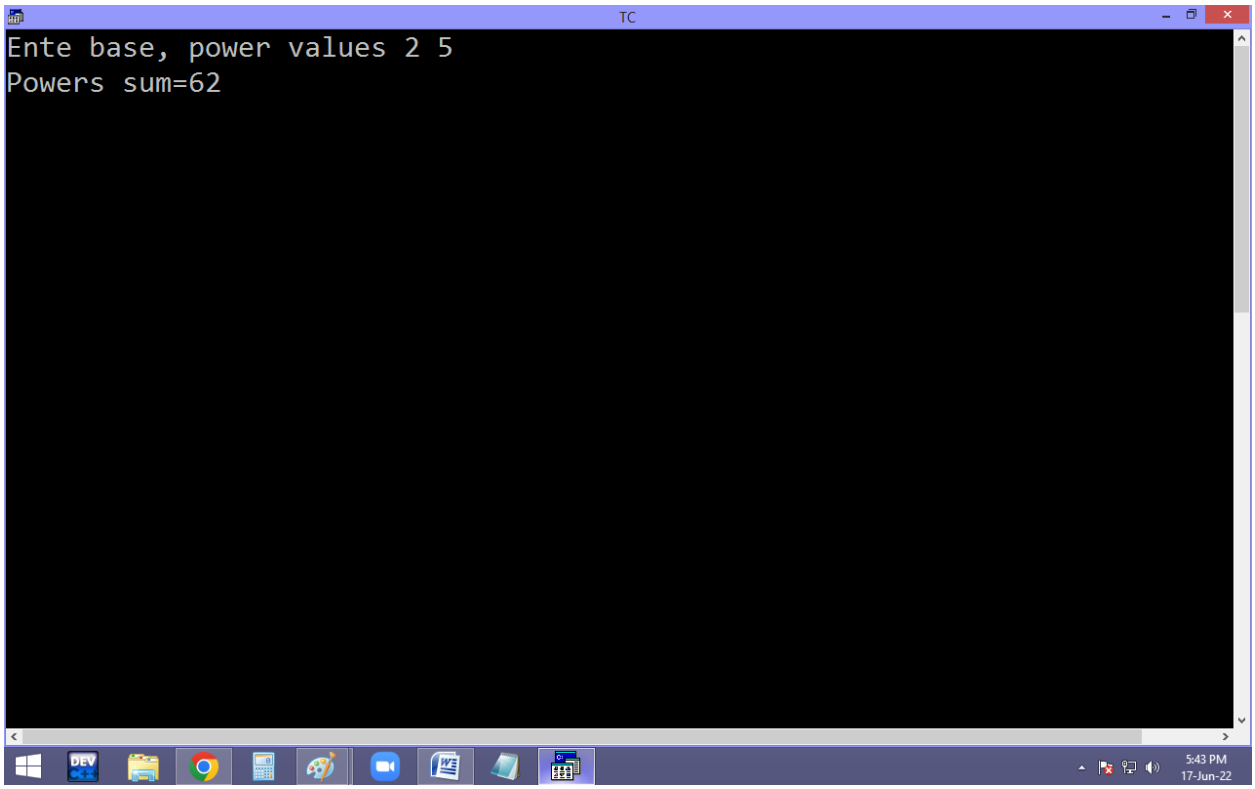


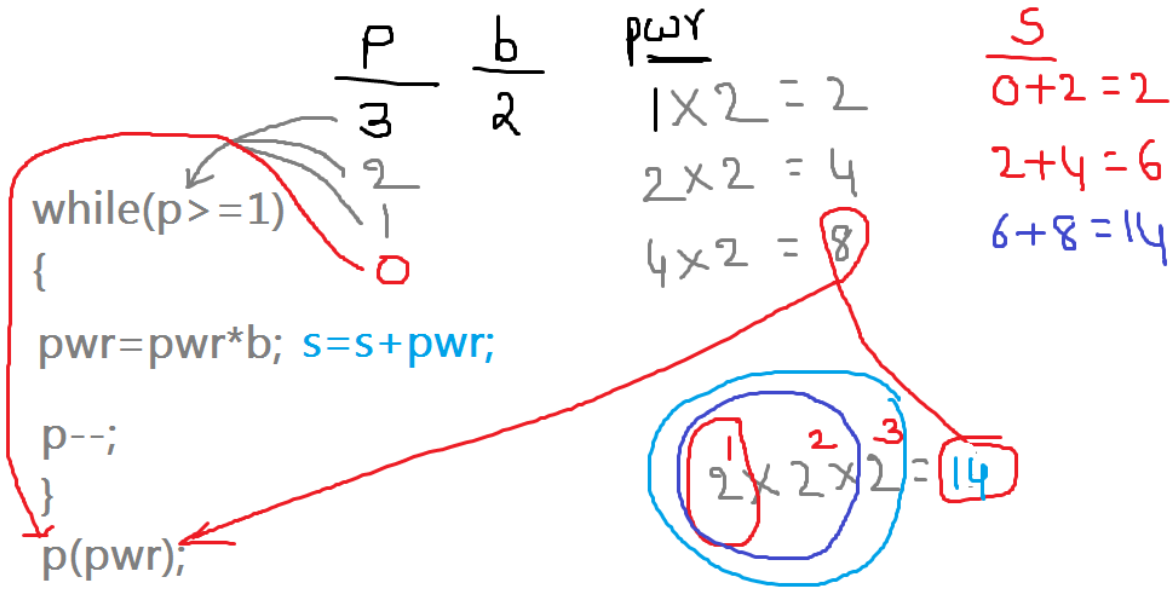

# Eg. finding powers sum

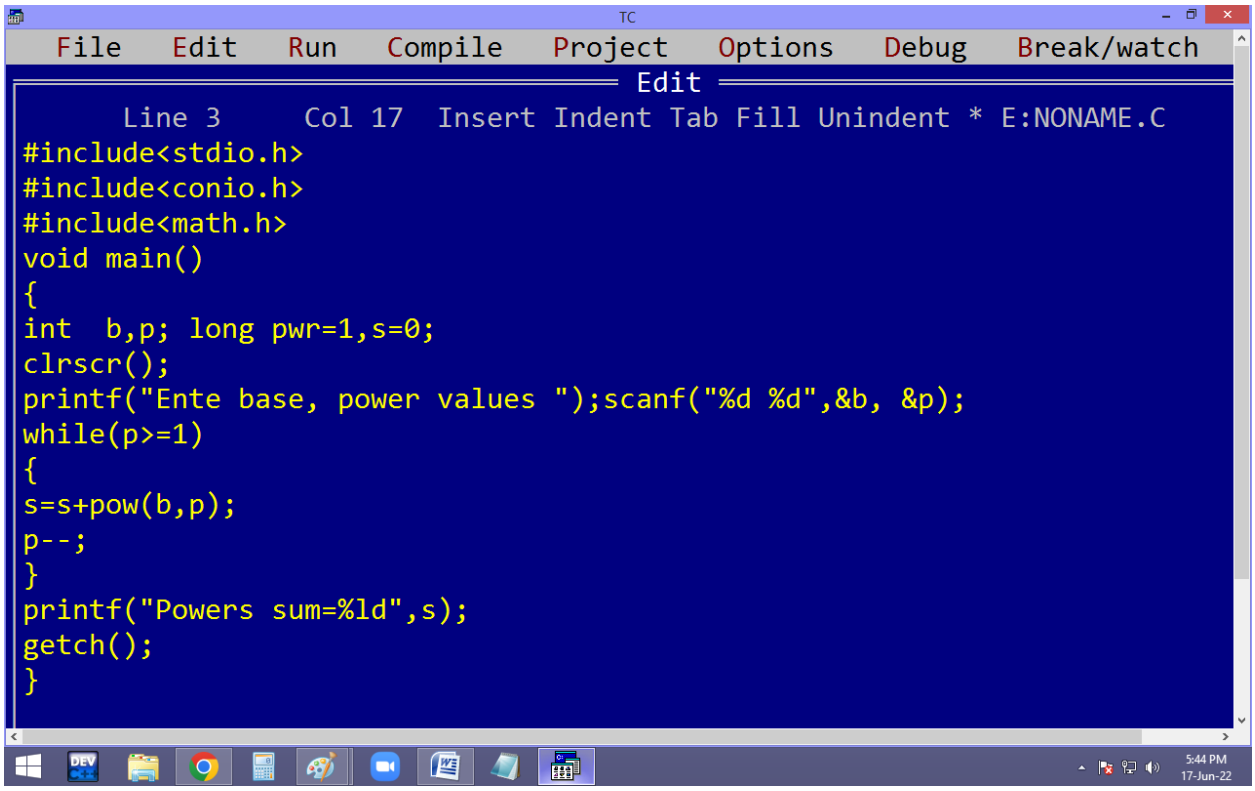
$$25 = 2^1 + 2^2 + 2^3 + 2^4 + 2^5$$

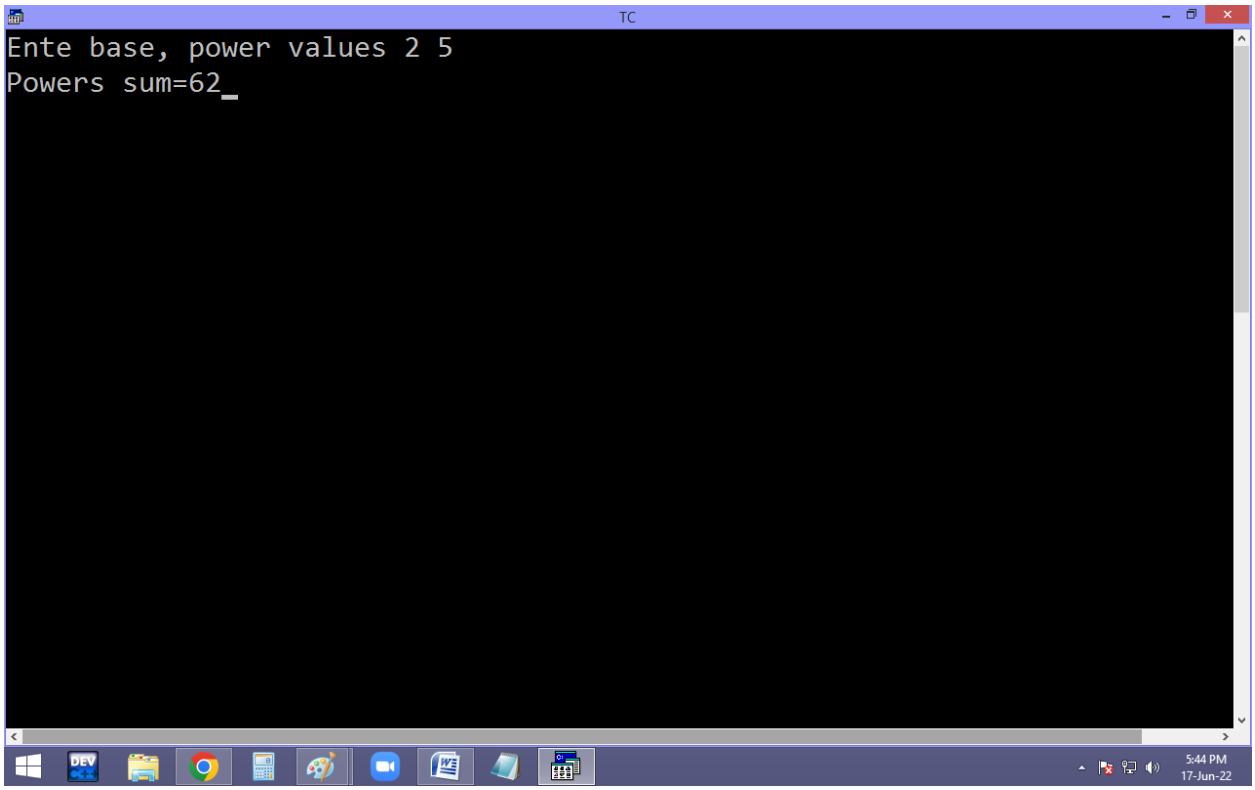
$$2 + 4 + 8 + 16 + 32 = 62$$

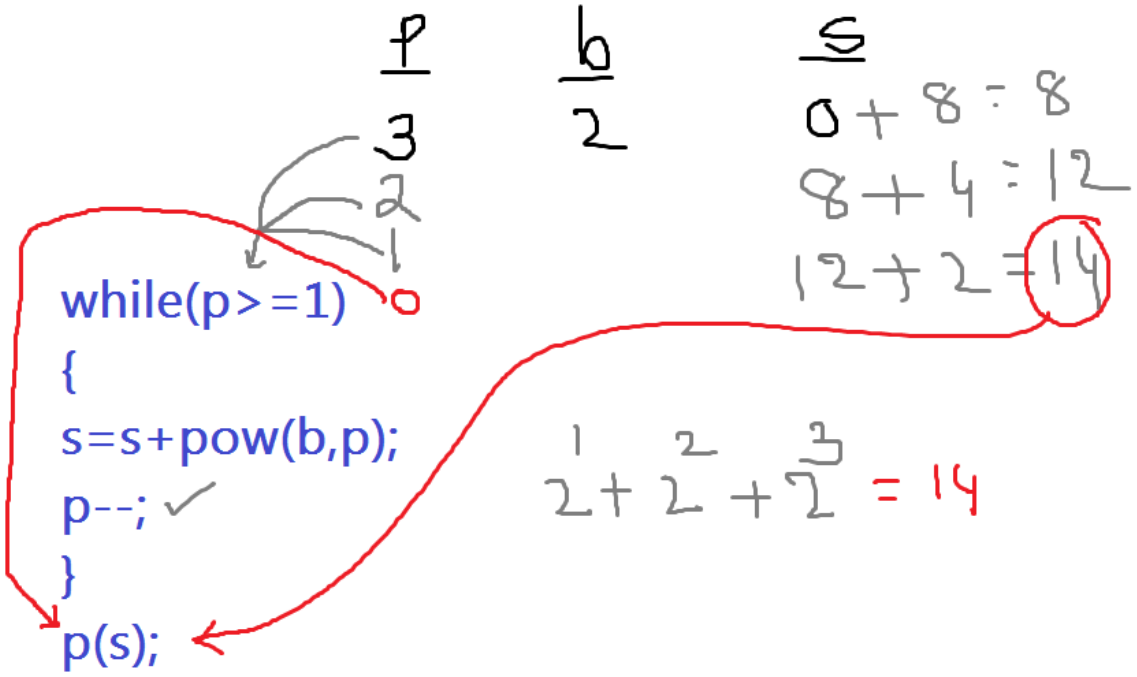

TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 13 Col 19 Insert Indent Tab Fill Unindent * E:NONAME.C
#include<stdio.h>
#include<conio.h>
void main()
{
int b,p; long pwr=1,s=0;
clrscr();
printf("Ente base, power values ");scanf("%d %d",&b, &p);
while(p>=1)
{
pwr=pwr*b;s=s+pwr;
p--;
}
printf("Powers sum=%ld",s);
getch();
}
5:43 PM
17-Jun-22


TC
Ente base, power values 2 5
Powers sum=62
5:43 PM
17-Jun-22


p
b
3
2
2
1
0
while(p>=1)
{
pwr=pwr*b; s=s+pwr;
p--;
}
p(pwr);
pwr
1X2 = 2
2X2 = 4
4X2 = 8
S
0+2 = 2
2+4 = 6
6+8 = 14
1
2
3
2X2X2 = 14


TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 3 Col 17 Insert Indent Tab Fill Unindent * E:NONAME.C
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
int b,p; long pwr=1,s=0;
clrscr();
printf("Ente base, power values ");scanf("%d %d",&b, &p);
while(p>=1)
{
s=s+pow(b,p);
p--;
}
printf("Powers sum=%ld",s);
getch();
}


TC
Ente base, power values 2 5
Powers sum=62




**Home work:**

1. **Finding no of digits in given no.**

**For example 379 is a 3 digit no**

2. **Finding digits sum**

   **For example 286 → 2+8+6=16**