If – else programs :

1. Input a character and check it's a digit or alphabet or other character.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    char  ch;
    clrscr();
    printf("Enter a character :");
    scanf("%c", &ch );
    if( ch>='0' && ch<='9')
    {
        printf("It is a Digit");
    }
    else if( ch>='a' && ch<='z' || ch>='A' && ch<='Z' )
    {
        printf("It is an Alphabet");
    }
    else
    {
        printf("It is Not a Digit or Alphabet");
    }
    getch();
}
```

Example Outputs :
1.
Enter a character : m
It is an Alphabet

2
Enter a character : *
It is Not a Digit or Alphabet

2. Input a number and check whether it's a leap year or not.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int no;
    clrscr();
    printf("Enter a number :");
    scanf("%d", &no );
    if( no % 400 == 0 )
    {
        printf("It is a leap year");
    }
    else if( no%4 == 0 && no%100 != 0 )
    {
        printf("It is  a leap year");
    }
    else
    {
        printf("NOT a leap year");
    }
    getch();
}
// OR
void main()
{
    int no;
    clrscr();
    printf("Enter a number :");
```

Example Outputs :
1.
Enter a number :2015
NOT a leap year

2.
Enter a number : 2016
It is a leap year

```
    scanf("%d", &no );
    if( (no % 400 == 0) ||  ( no%4 == 0 && no%100 != 0) )
    {
        printf("Its a leap year");
    }
    else
    {
        printf("NOT a leap year");
    }
    getch();
}
```

3. Input a character and check whether it's a digit or Vowel or consonant or other character.

```
#include<stdio.h>
#include<conio.h>
#include<ctype.h>
void main()
{
    char  ch;
    clrscr();
    printf("Enter a character :");
    scanf("%c", &ch );
    ch = tolower(ch); // convert char. to lowercase
    if( ch>='0' && ch<='9')
    {
        printf("It is a Digit");
    }
    else if( ch>='a' && ch<='z')
    {
        if( ch=='a' || ch=='e' || ch=='i' || ch=='o' || ch=='u' )
            printf("It is  a Vowel");
        else
            printf("It is a Consonant");
    }
    else
    {
        printf("It is Not a Digit or Alphabet");
    }
    getch();
}
```


Example Outputs :

1.
Enter a character :e
It is a Vowel

2.
Enter a character :3
It is a Digit

4. Input a number and check whether it is a Perfect number or not.
Perfect number is a four digit number which is perfect square, also its left two digits and right two digits represent perfect squares.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
    int no, lf, rt;
    float  r, x, y;
    clrscr();
    printf("Enter a number :");
    scanf("%d", &no );
    if( no>999 && no < 10000 )
    {
```

```
        r = sqrt( no );  // root of number

        if( r == floor(r) )
        {
            lf = no / 100; // left part
            rt = no % 100; // right part
            x = sqrt( lf );
            y = sqrt( rt );
            if( x== floor(x) && y == floor( y) )
                printf("It is a Perfect number");
            else
                printf("It is Not a perfect number");
        }
        else
        {
            printf("Not a perfect number");
        }
    }
    else
    {
        printf("It is Not a 4-Digit number");
    }
    getch();
}
```

Example Outputs :

1.
Enter a number :1234
Not a perfect number

2.
Enter a number :1681
It is a perfect number

switch – case programs :

5. Input a number and display corresponding day of week.
e.g. number 1 for Monday, 2 for Tuesday, ..., 7 for Sunday


```
#include<stdio.h>
#include<conio.h>
void main()
{
    int no;
    clrscr();
    printf("Enter a number:");
    scanf("%d", &no );
    switch( no )
    {
        case  1 : printf("Monday");
                  break;
        case  2 : printf("Tuesday");
                  break;
        case  3 : printf("Wednesday");
                  break;
        case  4 : printf("Thursday");
                  break;
        case  5 : printf("Friday");
                  break;
        case  6 : printf("Saturday");
                  break;
        case  7 : printf("Sunday");
                  break;
        default : printf("Invalid number");
    }
    getch();
}
```


Example Outputs :

1.
Enter a number :3
Wednesday

2.
Enter a number :15
Invalid number

6. Input a character and check whether it is a Vowel or not using switch-case statement.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    char  ch;
    clrscr();
    printf("Enter a character:");
    scanf("%c", &ch );
    switch( ch )
    {
        case  'a':case 'e':case 'i': case 'o':case 'u' :
        case  'A':case 'E':case 'I': case 'O':case 'U' :
            printf("It is a Vowel");
                break;
        default : printf("Not a Vowel");
    }
    getch();
}
```

Example Outputs :

1.
Enter a character :4
Not a Vowel

2.
Enter a character :U
It is a Vowel

7. Input a three subject marks (out of hundred) find total and average. Display grade according to average using switch-case statement.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int  a, b, c, t, iavg ;
    float avg;
    clrscr();
    printf("Enter three marks:");
    scanf("%d%d%d", &a, &b, &c );
    t = a+b+c;
    printf("Total = %d\n", t );
    avg = t/3.0;
    iavg = (int) avg/10;   // gets a single digit integer
    switch( iavg )
    {
        case  7: case 8 : case 9 : case 10 :
                printf("Grade A+");
                break;
        case  6 : printf("Grade A");
                break;
        case  5 : printf("Grade B");
                break;
        case  4 : printf("Grade C");
                break;

        default : printf("Fails");
    }
    getch();
}
```


Example Output :

Enter three marks: 50 70 65
Total = 185
Grade A

8. Input two numbers and perform arithmetic operation on the numbers according user's choice. Assume basic operations like +, -, * , /.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    float a, b;
    int  opt;
    clrscr();
    printf("Enter two numbers:");
    scanf("%f%f", &a, &b );
    printf("1-Add\n2-Sutract\n3-Multiply\n4-Divide\n");
    printf("Enter option :");
    scanf("%d", &opt );
    switch( opt )
    {
        case 1 : printf("Sum = %f\n" , (a+b) );
                 break;
        case 2 : printf("Subtract = %f\n", (a-b) );
                 break;
        case 3 : printf("Mulitiply = %f", (a*b) );
                 break;
        case 4 : printf("Divide = %f", (a/b) );
                 break;
        default : printf("Invalid option");
    }
    getch();
}
```

Example Output :

```
Enter two numbers : 10  4
1-Add
2-Subtract
3-Multiply
4-Divide
Enter  option : 3
Multiply = 40
```


while statement Programs :

9. Display first n natural numbers. Input n.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n, i ;
    clrscr();
    printf("Enter n :");
    scanf("%d", &n);
    n = 1;
    while( i <= n )
    {
        printf("%d\n", i );
        i++;   // next natural number
    }
    getch();
}
```

Example Output :

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

10. Display series 1 2 4 8 16 ... 256.

```
#include<stdio.h>
#include<conio.h>
void main()
{
```

```
    int i ;
    clrscr();
    i = 1;
    while( i <= 256 )
    {
        printf("%d\t", i );
        i= i*2;   // next number in series
    }
    getch();
}
```


11. Find sum of first n (1 to n) natural numbers.

```
#include<stdio.h>
#include<conio.h>
void  main()
{
    int i=1, s=0, n;
    clrscr();
    printf("Enter n:");
    scanf("%d", &n );
    while( i<= n)
    {
        s = s + i;
        i++;
    }
    printf("Sum=%d", s);
    getch();
}
```

Example Output :

```
Enter n: 4
Sum = 10
```


12. Add n numbers input from user. Input n.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int i, n, no , sum = 0 ;
    clrscr();
    printf("Enter count of numbers to add :");
    scanf("%d", &n );
    i = 1;
    printf("Enter  %d  numbers \n" , n);

    while( i <= n ) // repeat till counter exceeds n
    {
        scanf("%d", &no );  // input and add the number
        sum += no;
        i++; // incr. count
    }
    printf("Sum = %d" , sum );
    getch();
}
```

Example Output :

```
Enter count of numbers to add : 4
Enter  4  numbers
3
10
6
20
Sum = 39
```

13. Display first 5 numbers that are multiples of 3 and 5 both.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, count =0 ;
   clrscr();
   printf("Multiples of three and five \n");
   n = 1;
   while( count < 5 )
   {
      if( n%3 == 0 && n%5 == 0 ) // if multiple of 3 and 5
      {
         printf("%d\n", n );    // print the number
         count++;               // count it
      }
      n++; // next number
   }
   getch();
}
```

Example Output :

```
Multiples of three and five
15
30
45
60
75
```

14. Input an integer and Find sum of its digits.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int no, sum=0 , d;
   clrscr();
   printf("Enter a number :");
   scanf("%d", &no );
   while( no != 0 )
   {
      d = no % 10;
      sum = sum + d;
      no = no / 10;
   }
   printf("Sum of Digits= %d", sum );
   getch();
}
```


Example Output :

```
Enter a number : 673
Sum of digits= 16
```

15. Input an integer and display its digits in reverse order.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int no, d;
   clrscr();
   printf("Enter a number :");
   scanf("%d", &no );
   printf("Digits in reverse order : ");
```

```
    while( no != 0 )
    {
        d = no % 10;
        printf("%d" , d );  // display a digit
        no = no / 10;
    }
    getch();
}
```

Example Output :

Enter a number : 4035
Digits in reverse order : 5304

16. Input an integer and find Reverse of the number.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int no, d, rev = 0;
    clrscr();
    printf("Enter a number :");
    scanf("%d", &no );
    while( no != 0 )
    {
        d = no % 10;
        rev = rev *10 + d;
        no = no / 10;
    }
    printf("Reverse of no = %d" , rev );
    getch();
}
```

Example Output :

Enter a number : 284
Reverse of no = 482

17. Input an integer and check whether its a Palindrome or not.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int no, d, rev = 0, y ;
    clrscr();
    printf("Enter a number :");
    scanf("%d", &no );
    y = no;
    while( y != 0 )
    {
        d = y % 10;
        rev = rev *10 + d;
        y = y /10;
    }
    if( rev == no )
        printf("It is a Palindrome");
    else
        printf("Not a Palindrome");
    getch();
}
```

Example Outputs :

1.
Enter a number : 343
It is a Palindrome

2.
Enter a number : 175
Not a Palindrome

18. Input an integer and check whether its Armstrong number or not.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int no, d, sum=0, y ;
   clrscr();
   printf("Enter a number :");
   scanf("%d", &no );
   y = no;
   while( y != 0 )
   {
      d = y % 10;
      sum = sum + d*d*d;
      y = y /10;
   }
   if( sum == no )
      printf("Its Armstrong number");
   else
      printf("Not Armstrong number");
   getch();
}
```

Example Outputs :

1.
Enter a number : 231
Not Armstrong number

2.
Enter a number : 153
Its Armstrong number

19. Input an integer and display its Prime factors.


```
#include<stdio.h>
#include<conio.h>
void main()
{
   int no, i ;
   clrscr();
   printf("Enter a number :");
   scanf("%d", &no );
   printf("Prime factors\n");
   i = 2;
   while( no != 1 )
   {
      if( no % i == 0 )
      {
         printf("%d\t", i );
         no = no / i;
      }
      else
         i++;
   }
   getch();
}
```

Example Outputs :

Enter a number : 75
Prime factors
3 5 5

20. Input multiple numbers from user one by one. Display sum of numbers after every input. Stop the inputs when input number is 999.

```
#include<stdio.h>
#include<conio.h>
```

```
void main()
{
   int no, sum = 0; ;
   clrscr();
   printf("Enter multiple numbers( 999 to stop) :\n");
   while( 1 )
   {
      scanf("%d", &no );
      if( no == 999 )
         break;   // stop the loop if input no is 999
      else
      {
         sum = sum + no;
         printf("Sum = %d\n", sum );
      }
   }
   getch();
}
```

Example Outputs :

```
Enter multiple numbers(999 to stop):
4
Sum = 4
8
Sum = 12
5
Sum = 17
6
Sum = 23
999
```

for statement programs :

21. Display squares of 1 to n numbers. Input n from user.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int i, n;
   printf("Enter n:");
   scanf("%d", &n );
   for( i=1;  i<=n;  i++ )   // i taking values 1, 2, 3 ,… n
   {
      printf("%d\n", (i*i) );   // display each i square
   }
   getch();
}
```


Example Output :

```
Enter  n : 6
1
4
9
16
25
36
```

22. Display sum and average of squares of 1 to n numbers. Input n from user.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int i, n;
   float sum=0, avg;
   printf("Enter n:");
   scanf("%d", &n );
   for( i=1; i<=n; i++ )
   {
      sum += i*i;
   }
   printf("Sum=%f\n", sum);
   avg = sum / n;
```

Example Output :

```
Enter  n : 4
Sum = 30.0
Average = 7.5
```

```
    printf("Average=%f", avg);
    getch();
}
```

23. Display numbers 1 to n and their squares and cubes in table form. Input n from user.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int i, n, s, q;
    printf("Enter n:");
    scanf("%d", &n );
    printf("No\tSquare\tCube\n");
    printf("_____\n");
    for( i=1; i<=n; i++ )
    {
        s = i*i;
        q = i*i*i;
        printf("%d\t%6d\t%6d\n", i, s, q );
    }
    getch( );
}
```

Example Output :

```
Enter  n : 5
No      Square    Cube
_____________________
1       1         1
2       4         8
3       9         27
4       16        64
5       25        125
```

24. Find m to the power n, where m is real and n is integer. Input m, n from user.


```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n , i;
    float m , y=1;
    printf("Enter base and power:");
    scanf("%f%d", &m, &n );
    // multiplying m, n times.
    for( i=1; i<=n; i++ )
    {
        y = y * m;
    }
    printf("Answer = %10.2f", y );
    getch();
}
```

Example Output :

```
Enter  base and power : 4   3
Answer =       64.00
```

25. Display and count all multiples of 3 in a given range of numbers. Enter the two numbers from user.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int x , y , i, count=0 ,t ;
    clrscr();
    printf("Enter two numbers :");
    scanf("%d%d", &x, &y );
```

```
    // interchange nos, if first number is larger than second.
    if( x > y )
    {
        t = x;
        x = y;
        y = t;
    }
    printf("Multiples of three \n");
    for( i=x; i<=y; i++ )
    {
        if( i % 3 == 0 )
        {
            printf("%d\n", i );
            count++;
        }
    }
    printf("Count = %d", count );
    getch();
}
```

Example Output :

```
Enter  two numbers : 2    9
Multiples of three
3
6
9
Count = 3
```

26. Display a number table. Input number from user.

```
#include<stdio.h>
#include<conio.h>

void main()
{
    int no, i ;
    clrscr();
    printf("Enter a number :");
    scanf("%d", &no );
    for( i=1; i<=10; i++ )
    {
        printf("%d * %d = %d\n", no, i , (no*i) );
    }
    getch();
}
```


Example Output :

```
Enter  a number : 3
3 * 1 = 3
3 * 2 = 6
3 * 3 = 9
3 * 4 = 12
…
3 * 10 = 30
```

27. Find factorial of a given integer n. Input n.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n, i ;
    float   f = 1;   // factorial is a big number, hence float type
    clrscr();
    printf("Enter a number:");
    scanf("%d", &n );
    for( i=1; i<=n; i++ )
    {
        f = f * i;
    }
```

Example Output :

```
Enter  a number : 5
Factorial =    120.0
```

```
    printf("Factorial = %10.1f", f );
    getch();
}
```

28. Find GCD(HCF) and LCM of two positive integers.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int no1 , no2, gcd, lcm ,i, x ;
    clrscr();
    printf("Enter two numbers :");
    scanf("%d%d", &no1, &no2 );
    x = no1 < no2 ? no1 : no2;   // store smaller number in x

    // finding gcd
    for( i=1; i<=x; i++ )
    {
        if( no1%i ==0 && no2%i == 0 )
        {
            gcd = i;
        }
    }
    printf("GCD = %d\n", gcd);
    lcm = no1 * no2 / gcd;   // LCM
    printf("LCM = %d", lcm );
    getch();
}
```

Example Output :

```
Enter  two numbers : 20   30
GCD = 10
LCM = 60
```


29. Find LCM of two positive integers.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int no1 , no2, lcm ,i, x ;
    clrscr();
    printf("Enter two numbers :");
    scanf("%d%d", &no1, &no2 );
    x = no1 > no2 ? no1 : no2;   // store larger number in x
    // finding LCM
    for( i = x ;  i<=no1*no2;  i+= x )
    {
        if( i % no1 ==0 && i % no2 == 0 )
        {
            lcm = i;
            break;
        }
    }
    printf("LCM = %d", lcm );
    getch();
}
```

Example Output :

```
Enter  two numbers : 8   6
LCM = 24
```

30. Display n terms of Fibonacci series. Input n from user.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int  n, f1=1, f2=1, f3, i ;
   clrscr();
   printf("Enter no. of terms :");
   scanf("%d", &n );
   printf("Fibonacci series...\n");
   for( i = 1; i<=n ; i++ )
   {
      printf("%d\t" , f1 );
      f3 = f1 + f2;
      f1 = f2;
      f2 = f3;
   }
   getch();
}
```

Example Output :

Enter no. of terms : 6
Fibonacci series…
1 1 2 3 5 8

31. Check whether a given number is a Fibonacci series number.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int  no, f1=1, f2=1, f3, i ;
   clrscr();
   printf("Enter a number :");
   scanf("%d", &no );
   while( f1<=no )  //repeat till Fib. term is below given number
   {
      if( f1 == no )
         break;
      else
      {  // generate new terms
         f3 = f1 + f2;
         f1 = f2;
         f2 = f3;
      }
   }
   if( no == f1 )
      printf("Fibonacci number");
   else
      printf("Not a Fibonacci number");
   getch();
}
```


Example Outputs :

1.
Enter a number : 8
Fibonacci number

2.
Enter a number : 6
Not a Fibonacci number

32. Print series 1 -3 5 -7 9 .. n terms. Input n from user.

```
#include<stdio.h>
#include<conio.h>
```

```
void main()
{
   int i,v, n ;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   v = 1;  // 1st no. of series
   for( i=1;  i <= n ;  i++ )
   {
      if( i % 2 == 1 )
         printf("%d\t", v);
      else
         printf("%d\t", -v );

      v += 2;  // next no. in series
   }
   getch();
}
// try : print  1 -2  3 -4  5 ... n terms
```

Example Output :

```
Enter  n : 6
1   -3    5   -7    9   -11
```

33. Find sum of series for 1 + 1/2^2 + 1/3^2 + 1/4^2 + ... 1/n^2. Input n.

```
#include<stdio.h>
#include<conio.h>

void main()
{
   int  n, i ;
   float  isqr , sum=0;
   clrscr();
   printf("Enter  n :");
   scanf("%d", &n );
   for( i=1 ; i<=n; i++ )
   {
      isqr = i * i;
      sum = sum + 1 / isqr;
   }
   printf("Sum of Series=%f" , sum );
   getch();
}
```


Example Output :

```
Enter  n : 5
Sum of Series = 1.4636
```

34. Find sum of series for 3/7 + 4/10 + 5/13 + 6/16 + .. for n terms. Input n.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int  n, i ;
   float x = 3, y = 7, sum=0;
   clrscr();
   printf("Enter  n :");
   scanf("%d", &n );
```

```
    for( i=1 ; i<=n; i++ )
    {
        sum = sum + x / y;
        x++;
        y+=3;
    }
    printf("Sum of Series=%f" , sum );
    getch();
}
```

Example Output :

Enter n : 4
Sum of Series = 1.588187

35. Input integer n (e.g. n=5) and output following.

```
1  5
2  4
3  3
4  2
5  1
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int  n, i, j ;
    clrscr();
    printf("Enter  n :");
    scanf("%d", &n );

    for( i=1, j=n  ; i<=n;   i++, j- - )  // for loop with two variables
    {
        printf("%d\t%d\n", i , j );
    }
    getch();
}
```

Example Output :

```
Enter  n : 4
    1      4
    2      3
    3      2
    4      1
```


36. Input a number and check whether it is a Prime number or not.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int  no, i ;
    clrscr();
    printf("Enter a number :");
    scanf("%d", &no );

    for( i=2 ; i<=no/2 ; i++ )
    {
        if( no % i == 0 )
        {
            break;
        }
    }
```

Example Outputs :

1.
Enter a number : 15
It is Not prime number

2.
Enter a number : 11
It is a Prime number

```
    if( i > no/2 )
       printf("It is a Prime number");
    else
       printf("It is Not prime number");

    getch();
}
```

37. Find sum of series : 1 + (1+2) + (1+2+3) + (1+2+3+4)+.. (1+2+3+..+n). Input n from user.

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int term=0,  sum=0, i, n ;
    clrscr();
    printf("Enter n :");
    scanf("%d", &n );
    for( i=1; i<=n ; i++ )
    {
       term = term + i;
       sum = sum + term;
    }
    printf("Sum = %d" , sum );
    getch();
}
// try : 1 + (1+3) + (1+3+5) + .. n terms
```

Example Output :

```
Enter  n : 4
Sum = 20
```


37. Display factorials of all numbers from 1 to n in tabular form. Input n.

```
#include<stdio.h>
#include<conio.h>

void main()
{
    int n, no,i ;
    float   f;
    clrscr();
    printf("Enter a number:");
    scanf("%d", &n );
    printf("No\tFactorial\n");
    for( no=1; no<=n; no++ )
    {
       f = 1;  // set  new  factorial = 1

       for( i=1; i<=no; i++ )   // find  no !
       {
          f = f * i;
       }
       printf("%d\t%8.1f\n",  no,  f );
    }
    getch();
}
```

Example Output :

```
Enter  a number : 6
No        Factorial
1           1.0
2           2.0
3           6.0
4          24.0
5         120.0
6         720.0
```

38. Display all 3-digit Armstrong numbers.

```
#include<stdio.h>
#include<conio.h>

void main()
{
   int no, sum, d, temp;
   clrscr();
   printf(" 3-Digit Armstrong numbers\n");
   for( no=100; no<=999; no++ )
   {
      temp = no;   // store no in other var. for processing
      sum = 0;     // set new sum= 0
      while( temp != 0 )
      {
         d = temp % 10;
         sum = sum + (d*d*d); //add digit cube
         temp = temp / 10;
      }
      if( sum == no )  // if the sum same as no then print the no
         printf("%d\n", no );
   }
   getch();
}
```

Example Output :

```
3-Digit Armstrong numbers
153
370
371
407
```


39. Display Prime numbers up to n. Input n.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, no, i ;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   printf("Prime numbers...\n");
   for( no=2;  no<=n;  no++ )   // for no varying from 2 to n
   {
      for( i=2; i<=no/2 ; i++ )
      {
         if( no % i == 0 )
            break;
      }
      if( i > no/2 )
         printf("%d\t" , no );
   }
   getch();
}
```

Checks for 'no' and prints it if it's a Prime number.

Example Output :

```
Enter  n : 15
Prime numbers…
2   3   5   7   11   13
```

40. Display first n Prime numbers. Input n.

```
#include<stdio.h>
#include<conio.h>
```

```
void main()
{
   int n, no, i, count=0 ;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   printf("Prime numbers...\n");

   no = 2;   // start  from 2
   while( count < n )
   {
      for( i=2; i<=no/2 ; i++ )
      {
         if( no % i == 0 )
            break;
      }
      if( i > no/2 )  // if no is prime,  print and increment count
      {
         printf("%d\t" , no );
         count ++;
      }
      no++;  // next  number
   }
   getch();
}
```


Example Output :

```
Enter  n : 8
Prime numbers…
2   3   5   7   11   13   17   19
```


41. Find sum of Sine series given by ... $x - x^3/3! + x^5/5! - x^7/7! + ..$ for n terms
Input x (angle in radians) and n.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
   int n, i, j, k , s =1 ;  // s for changing sign
   float sum=0, x, f , p;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   printf("Enter angle x :");
   scanf("%f", &x );

   k = 1;
   for( j = 1; j<= n; j++ )  // repeat n times
   {
      p = pow( x, k );  // find  x^k
      f = 1;
      for( i=1; i<= k ; i++ )  // find k!
      {
         f = f*i;
      }
      sum = sum +  s * p / f;     // sum = sum +-  x^k/k!
```

Example Output :

```
Enter  n : 7
Enter angle x : 1.57        ← π /2
Sum = 1.00000
```

```
        s = -s;  // change sign for next term
        k += 2;  // next term
    }
    printf("Sum = %f" , sum );
    getch();
}
```

Generating different Patterns with 'Nested for loop' :

42. Display following pattern. (e.g. n = 4)

```
*
**
***
****
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n, i, j;
    clrscr();
    printf("Enter n :");
    scanf("%d", &n );
    for( i = 1; i<= n; i++ )   //for i = 1 to n
    {
        for( j=1; j<=i; j++ )      // i outputs
        {
            printf( "*" );       // ... (a)
        }
        printf("\n");         // new line
    }
    getch();
}
```

Example Output :

```
Enter  n : 7
*
**
***
****
*****
******
*******
```


Replace statement (a) with .. printf("%d" , j);
to get pattern :

```
1
12
123
1234
```

43. // Display following pattern. (e.g. n = 4)

```
****
***
**
*
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n, i, j;
    clrscr();
```

```
    printf("Enter n :");
    scanf("%d", &n );

    for( i = n; i >= 1; i-- ) //for i = n to 1
    {
        for( j=1; j<=i; j++ )    // i outputs
        {
            printf( "*" );  // ... (a)
        }
        printf("\n");   // new line
    }
    getch();
}
```

Replace statement (a) with .. printf("%d", j);
to get pattern :

```
1234
123
12
1
```

44. Display following pattern. (e.g. n = 4)

```
4321
321
21
1
```



```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n, i, j;
    clrscr();
    printf("Enter n :");
    scanf("%d", &n );
    for( i = n; i>=1; i-- ) //for i = n to 1
    {
        for( j=i; j>=1; j-- )    // i outputs ( numbers i  to  1 )
        {
            printf( "%d", j );
        }
        printf("\n");   // new line
    }
    getch();
}
```

Example Output :

```
Enter  n : 5
54321
4321
321
21
1
```

45. Display following pattern. (e.g. n = 4)

```
1
22
333
4444
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, i, j;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   for( i = 1; i<=n; i++ ) //for i = 1 to n
   {
      for( j=1; j<=i; j++ )    // i outputs
      {
         printf( "%d",  i  );
      }
      printf("\n");   // new line
   }
   getch();
}
```


46. Display following pattern. (e.g. n = 4). Assume max. n =10

```
   p
   pq
   pqr
   pqrs
```



```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, i, j;
   char  ch;   // for printing chars.
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   for( i = 1; i<=n; i++ ) //for i = 1 to n
   {
      ch = 'p' ;    // set ch to 'p'  for new line
      for( j=1; j<=i; j++ )      // i outputs
      {
         printf( "%c", ch );   // print char.
         ch++;                 // next char
      }
      printf("\n");   // new line
   }
   getch();
}
```

47. Display following pattern. (e.g. n = 4)

```
      *
     **
    ***
   ****
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, i, j;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   for( i = 1; i<=n; i++ )  //for i = 1 to n
   {
      // printing spaces before characters
      for( j=1; j<=n-i; j++ )    // repeat n-i times
      {
         printf(" ");     // print single space
      }
      for( j=1; j<=i; j++ )    // i outputs
      {
         printf( "*" );   // .. (a)
      }
      printf("\n");   // new line
   }
   getch();
}
```

Replace statement (a) with .. printf("%d", j);
to get pattern..

```
   1
  12
 123
1234
```


48. Display following pattern. (e.g. n = 4)

```
4321
 321
  21
   1
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, i, j;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );

   for( i = n; i>=1; i-- ) //for i = n to 1
   {
      for( j=1; j<=n-i; j++ )  //  n-i  spaces
      {
         printf(" ");
      }
```

```
        for( j=i; j>=1; j-- )    // i outputs  ... (a)
        {
            printf( "%d", j );
        }
        printf("\n");   // new line
    }
    getch();
}
```

Replace statement (a) (for loop) with for(j=1; j<=i; j++)
to get pattern..

```
    1234
     123
      12
       1
```

49. Display following pattern. (e.g. n = 4)

```
    *
   * *
  * * *
* * * *
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n, i, j;
    clrscr();
    printf("Enter n :");
    scanf("%d", &n );

    for( i = 1; i<= n; i++ ) //for i = 1 to n  … (b)
    {
        for( j=1; j<=n-i; j++ )  //  n-i  spaces
        {
            printf(" ");
        }
        for( j=1; j<=i; j++ )    // i outputs
        {
            printf( "*  " );   // print * and a space  ... (a)
        }
        printf("\n");   // new line
    }
    getch();
}
```


1. Replace statement (a) with .. printf("%d ", j);
to get pattern..

```
      1
     1 2
    1 2 3
   1 2 3 4
```

2. Replace statement (b) for loop with .. for(i=n; i>=1; i--)
to get pattern..

```
* * * *
 * * *
  * *
   *
```

50. Display following pattern. (e.g. n = 4)

```
   1
  123
 12345
1234567
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, i, j;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   for( i =1; i<=n; i++ ) //for i = 1 to n
   {
      for( j=1; j<=n-i; j++ ) // n-i spaces
      {
         printf(" ");
      }

      for( j=1; j<= 2*i-1 ; j++ )   // 2i-1 outputs
      {
         printf( "%d", j );  //  ... (a)
      }
      printf("\n");  // new line
   }
   getch();
}
```

Example Output :

```
Enter n : 5
    1
   123
  12345
 1234567
123456789
```


Replace statement (a) with .. printf("*");
to get pattern..

```
   *
  ***
 *****
*******
```

51. Display following pattern. (e.g. n = 4)

```
   *
  ***
 *****
*******
 *****
  ***
   *
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, i, j;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );

   // for upper triangle of n lines
   for( i =1; i<=n; i++ ) //for i = 1 to n
   {
      for( j=1; j<=n-i; j++ )  // n-i   spaces

      {
         printf(" ");
      }
      for( j=1; j<=2*i-1 ; j++ )    // 2i-1 outputs
      {
         printf("*");
      }
      printf("\n");   // new line
   }

   // for lower triangle of n-1 lines
   for( i =n-1 ; i>=1; i-- ) //for i = n-1 to 1
   {
      for( j=1; j<=n-i; j++ )    // n-i   spaces
      {
         printf(" ");
      }
      for( j=1; j<=2*i-1 ; j++ )    // 2i-1 outputs
      {
         printf("*");
      }
      printf("\n");   // new line
   }
   getch();
}
```


52. Display following pattern. (e.g. n = 4)

```
    *
   * *
  *   *
 *     *
  *   *
   * *
    *
```

```
#include<stdio.h>
#include<conio.h>
```

```
void main()
{
   int n, i, j;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );

   // for upper triangle of n lines
   for( i =1; i<=n; i++ )   //for i = 1 to n
   {
      for( j=1; j<=n-i; j++ )     // n-i   spaces
      {
         printf(" ");
      }
      for( j=1; j<=2*i-1 ; j++ )     // 2i-1 outputs
      {
         if( j==1   ||  j== 2*i-1 )
            printf("*");
         else
            printf(" ");
      }
      printf("\n");     // new line
   }

   // for lower triangle of n-1 lines
   for( i =n-1 ; i>=1; i-- )   //for i = n-1 to 1
   {
      for( j=1; j<=n-i; j++ )   // n-i   spaces
      {
         printf(" ");
      }
      for( j=1; j<=2*i-1 ; j++ )     // 2i-1 outputs
      {
         if( j==1 ||  j== 2*i-1 )
            printf("*");
         else
            printf(" ");
      }
      printf("\n");     // new line
   }
   getch();
}
```


53. Display following pattern. (e.g. n = 4)

```
   1
  121
 12321
1234321
```

```
#include<stdio.h>
#include<conio.h>
```

```
void main()
{
   int n, i, j;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   for( i =1; i<=n; i++ )   //for i = 1 to n
   {
      for( j=1; j<=n-i; j++ )   //   n-i   spaces
      {
         printf(" ");
      }
      for( j=1; j<=i ; j++ )     // 1 to i numbers
      {
         printf( "%d", j );
      }
      for( j=i-1; j>=1; j-- )    // i-1 to 1 numbers
      {
         printf("%d", j );
      }
      printf("\n");     // new line
   }
   getch();
}
```


54. Display following pattern. (e.g. n = 4)

```
   a
  aba
 abcba
abcdcba
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, i, j;
   char  ch;    // for displaying alphabets
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   for( i =1; i<=n; i++ )   //for i = 1 to n
   {
      for( j=1; j<=n-i; j++ )  //  n-i  spaces
      {
         printf(" ");
      }
      ch = 'a';     // set ch= 'a' for new line
      for( j=1; j<=i ; j++ )    // i outputs
      {
         printf( "%c", ch );   // print and increment character
         ch++;
      }
```

```
        ch -= 2;    // adjust char. for right part of pattern

        for( j=1; j<= i-1; j++ )   // i-1  outputs
        {
            printf("%c", ch );   // print and decr. the character
            ch--;
        }
        printf("\n");     // new line
    }
    getch();
}
```

55. Display following pattern. e.g. n = 4

```
   1
  12A
 123AB
1234ABC
```

```
#include<stdio.h>
#include<conio.h>
void main( )
{
    int  n, i, j;
    char  ch; // for printing alphabets
    clrscr();
    printf("Enter n :");
    scanf("%d", &n );
    for( i =1; i<=n; i++ )  //for i = 1 to n
    {
        for( j=1; j<= n-i; j++ ) // n-i   spaces
            printf(" ");

        for( j=1; j<=i; j++)     // i outputs
            printf("%d", j );   // print digits

        ch = 'A';  // set char to A for new line
        for( j=1; j<=i-1; j++ )  // i-1 outputs
            printf("%c", ch++ );   // print and incr alpha.

        printf("\n");   // new line
    }
    getch();
}
```

56. Display following pattern. (e.g. n = 4)

```
1
23
345
4567
```

```
#include<stdio.h>
#include<conio.h>
```

```
void main()
{
   int n, i, j;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );

   for( i =1; i<=n; i++ ) //for i = 1 to n
   {
      for( j=i;  j<=2*i-1 ;  j++ )   //print nos. from i to 2i-1
      {
         printf("%d", j );
      }
      printf("\n");   // new line
   }
   getch();
}
```

57. Display following pattern. (e.g. n = 4)

```
1
23
456
78910
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, i, j;
   int  k = 1; // for printing numbers
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   for( i =1; i<=n; i++ ) //for i = 1 to n
   {
      for( j=1; j<=i ; j++ )   // i outputs
      {
         printf("%d", k );   // print k , incr. k
         k++;
      }
      printf("\n");     // new line
   }
   getch();
}
```


58. Display following pattern. (e.g. n = 4)

```
1
0 1
1 0 1
0 1 0 1
```

```
#include<stdio.h>
#include<conio.h>
```

```
void main()
{
   int n, i, j;
   int  k;   // for printing 1 / 0
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );

   for( i =1; i<=n; i++ )  //for i = 1 to n
   {
      k = i % 2;   // set k for new line
      for( j=1; j<=i ; j++ )   // i outputs
      {
         printf("%d ", k );  // print k, and alter k
         k = k == 0 ? 1 : 0 ;
      }
      printf("\n");    // new line
   }
   getch();
}
```

59. Display following pattern.

```
1
* *
1 2 3
* * * *
```



```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n, i, j;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   for( i =1; i<=n; i++ ) //for i = 1 to n
   {
      if( i %2 == 1 ) // i is odd
      {
         for( j=1; j<=i ; j++ )     // i outputs
            printf("%d ", j );     // print digits
      }
      else
      {
         for( j=1; j<=i; j++ )   // i outputs
            printf("* ");         // print  *
      }
      printf("\n");    // new line
   }
   getch();
}
```

60. Program to print following pattern:

```
    A
   CB
  FED
 JIHG
```

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int  i, j, n;
   char ch='A' , c;
   clrscr();
   printf("Enter n :");
   scanf("%d", &n );
   for( i=1; i<=n; i++ )
   {
      for( j=1; j<= n-i; j++ )
         printf(" ");

      ch = (char)(ch+i);
      c =(char) ch-1;    // 1st char for next line

      for(j=1; j<=i; j++ )  // print char in decr order
      {
         printf("%c", c );
         c--;
      }
      printf("\n");
   }
   getch();
}
```

Example Output :

```
Enter  n : 5
    A
   CB
  FED
 JIHG
ONMLK
```