PROGRAM 1

1. Print numbers from 1 to N

```cpp
#include <iostream>
using namespace std;

int main() {
    int n;
    cout << "Enter N: ";
    cin >> n;

    for(int i=1; i<=n; i++)
        cout << i << " ";

    return 0;
}
```

OUTPUT :

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

PROGRAM 2

2. Print even numbers up to N

```cpp
#include <iostream>
using namespace std;

int main() {
    int n;
    cout << "Enter N: ";
    cin >> n;

    for(int i=2; i<=n; i+=2)
        cout << i << " ";

    return 0;
}
```

OUTPUT :

```
Enter N: 10
2 4 6 8 10
```

PROGRAM 3

3.Print odd numbers up to N

```cpp
#include <iostream>
using namespace std;

int main() {
    int n;
    cout << "Enter N: ";
    cin >> n;

    for(int i=1; i<=n; i+=2)
        cout << i << " ";

    return 0;
}
```

OUTPUT :

```
Enter N: 10
1 3 5 7 9
```

PROGRAM 4

4. Print reverse numbers from N to 1

```cpp
#include <iostream>
using namespace std;

int main() {
    int n;
    cout << "Enter N: ";
    cin >> n;

    for(int i=n; i>=1; i--)
        cout << i << " ";

    return 0;
}
```

OUTPUT :

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

PROGRAM 5

5. Sum of first N natural numbers

```cpp
#include <iostream>
using namespace std;

int main() {
    int n, sum=0;
    cout << "Enter N: ";
    cin >> n;

    for(int i=1; i<=n; i++)
        sum += i;

    cout << "Sum = " << sum;
    return 0;
}
```

OUTPUT :

```
Enter N: 5
Sum = 15
```

PROGRAM 6

6. Sum of digits of a number

```cpp
#include <iostream>
using namespace std;

int main() {
    int n, sum=0, rem;
    cout << "Enter number: ";
    cin >> n;

    while(n>0) {
        rem = n%10;
        sum += rem;
        n /= 10;
    }

    cout << "Sum of digits = " << sum;
    return 0;
}
```

OUTPUT :

```
Enter number: 1234
Sum of digits = 10
```

PROGRAM 7

7. Reverse a number

```
#include <iostream>
using namespace std;

int main() {
    int n, rev=0, rem;
    cout << "Enter number: ";
    cin >> n;

    while(n>0) {
        rem = n%10;
        rev = rev*10 + rem;
        n /= 10;
    }

    cout << "Reverse = " << rev;
    return 0;
}
```

OUTPUT :

```
Enter number: 1234
Reverse = 4321
```

PROGRAM 8

8. Check palindrome number

```
#include <iostream>
using namespace std;

int main() {
    int n, temp, rev=0, rem;
    cout << "Enter number: ";
    cin >> n;

    temp = n;

    while(n>0) {
        rem = n%10;
        rev = rev*10 + rem;
        n /= 10;
    }
    if(temp == rev)
        cout << "Palindrome";
    else
        cout << "Not Palindrome";

    return 0;
}
```

OUTPUT :

```
Enter number: 121
Palindrome
```

PROGRAM 9

9. Count digits in a number

```
#include <iostream>
using namespace std;

int main() {
    int n, count=0;
    cout << "Enter number: ";
    cin >> n;

    while(n>0) {
        count++;
        n /= 10;
    }

    cout << "Digits = " << count;
    return 0;
}
```

OUTPUT :

```
Enter number: 5678
Digits = 4
```

PROGRAM 10

10. Factorial of a number

```cpp
#include <iostream>
using namespace std;

int main() {
    int n;
    long long fact=1;
    cout << "Enter number: ";
    cin >> n;

    for(int i=1; i<=n; i++)
        fact *= i;

    cout << "Factorial = " << fact;
    return 0;
}
```

OUTPUT :

```
Enter number: 5
Factorial = 120
```

PROGRAM 11

11. Check prime number

```
#include <iostream>
using namespace std;

int main() {
    int n, flag=0;
    cout << "Enter number: ";
    cin >> n;

    for(int i=2; i<=n/2; i++) {
        if(n%i==0) {
            flag=1;
            break;
        }
    }
    if(n==1) flag=1;

    if(flag==0)
        cout << "Prime";
    else
        cout << "Not Prime";

    return 0;
}
```

OUTPUT :

```
Enter number: 7
Prime
```

PROGRAM 12

12.Find GCD

```
#include <iostream>
using namespace std;

int main() {
    int a,b;
    cout << "Enter two numbers: ";
    cin >> a >> b;

    while(a!=b) {
        if(a>b) a-=b;
        else b-=a;
    }

    cout << "GCD = " << a;
    return 0;
}
```

OUTPUT :

```
Enter two numbers: 12 18
GCD = 6
```

PROGRAM 13

13.Find LCM

```
#include <iostream>
using namespace std;

int main() {
    int a,b,tempA,tempB,gcd;

    cout << "Enter two numbers: ";
    cin >> a >> b;

    tempA=a; tempB=b;

    while(a!=b) {
        if(a>b) a-=b;
        else b-=a;
    }

    gcd=a;
    cout << "LCM = " << (tempA*tempB)/gcd;

    return 0;
}
```

OUTPUT :

```
Enter two numbers: 4 6
LCM = 12
```

PROGRAM 14

14. **Multiplication table**

```cpp
#include <iostream>
using namespace std;

int main() {
    int n;
    cout << "Enter number: ";
    cin >> n;

    for(int i=1;i<=10;i++)
        cout << n << " x " << i << " = " << n*i << endl;

    return 0;
}
```

OUTPUT :

```
Enter number: 5
5 x 1 = 5
5 x 2 = 10
5 x 3 = 15
5 x 4 = 20
5 x 5 = 25
5 x 6 = 30
5 x 7 = 35
5 x 8 = 40
5 x 9 = 45
5 x 10 = 50
```

PROGRAM 15

15.Power (a^b)

```
#include <iostream>
using namespace std;

int main() {
    int a,b,power=1;
    cout << "Enter base and exponent: ";
    cin >> a >> b;

    for(int i=1;i<=b;i++)
        power*=a;

    cout << "Power = " << power;
    return 0;
}
```

OUTPUT :

```
Enter base and exponent: 5 2
Power = 25
```

PROGRAM 16

16. Armstrong number

```
#include <iostream>
using namespace std;

int main() {
    int n,temp,rem,sum=0;
    cout << "Enter number: ";
    cin >> n;

    temp=n;

    while(n>0) {
        rem=n%10;
        sum+=rem*rem*rem;
        n/=10;
    }
    if(sum==temp)
        cout<<"Armstrong";
    else
        cout<<"Not Armstrong";


    return 0;
}
```

OUTPUT :

```
Enter number: 153
Armstrong
```

PROGRAM 17

17. Perfect number

```
#include <iostream>
using namespace std;

int main() {
    int n,sum=0;
    cout<<"Enter number: ";
    cin>>n;

    for(int i=1;i<n;i++)
        if(n%i==0) sum+=i;

    if(sum==n)
        cout<<"Perfect";
    else
        cout<<"Not Perfect";

    return 0;
}
```

OUTPUT :

```
Enter number: 28
Perfect
```

PROGRAM 18

18. Strong number

```
#include <iostream>
using namespace std;

int main() {
    int n,temp,rem,sum=0,fact;
    cout<<"Enter number: ";
    cin>>n;

    temp=n;

    while(n>0) {
        rem=n%10;
        fact=1;

        for(int i=1;i<=rem;i++)
            fact*=i;

        sum+=fact;
        n/=10;
    }
    if(sum==temp)
        cout<<"Strong";
    else
        cout<<"Not Strong";

    return 0;
}
```

OUTPUT :

```
Enter number: 123
Not Strong
```

PROGRAM 19

19. Square root (iterative method)

```
#include <iostream>
using namespace std;

int main() {
    double n,i;
    cout<<"Enter number: ";
    cin>>n;

    for(i=1; i*i<=n; i++);

    cout<<"Square root ≈ "<< i-1;
    return 0;
}
```

OUTPUT :

```
Enter number: 25
Square root ≈ 5
```

PROGRAM 20

20. Decimal to Binary

```
#include <iostream>
using namespace std;

int main() {
    int n,bin[32],i=0;
    cout<<"Enter number: ";
    cin>>n;

    while(n>0) {
        bin[i]=n%2;
        n/=2;
        i++;
    }

    cout<<"Binary = ";
    for(int j=i-1;j>=0;j--)
        cout<<bin[j];

    return 0;
}
```

OUTPUT :

```
Enter number: 7
Binary = 111
```

PROGRAM 21

21. Square of stars

```
#include <iostream>
using namespace std;

int main() {
    int n;
    cout<<"Enter size: ";
    cin>>n;

    for(int i=1;i<=n;i++) {
        for(int j=1;j<=n;j++)
            cout<<"* ";
        cout<<endl;
    }

    return 0;
}
```

OUTPUT :

```
Enter size: 4
* * * *
* * * *
* * * *
* * * *
```

PROGRAM 22

22. Print Pyramid of Numbers

```
#include<iostream>
using namespace std;

int main()
{
    int n;

    cout<<"Enter number of rows: ";
    cin>>n;

    for(int i=1;i<=n;i++)
    {
        for(int j=1;j<=n-i;j++)
            cout<<" ";

        for(int k=1;k<=i;k++)
            cout<<k<<" ";
            cout<<endl;
      }

      return 0;
 }
```

OUTPUT :

```
Enter number of rows: 5
    1
   1 2
  1 2 3
 1 2 3 4
1 2 3 4 5
```

PROGRAM 23

23. Floyd's Triangle

```
#include<iostream>
using namespace std;

int main()
{
    int n;

    cout<<"Enter rows: ";
    cin>>n;

    int num=1;

    for(int i=1;i<=n;i++)
    {
        for(int j=1;j<=i;j++)
        {
            cout<<num<<" ";
            num++;
        }
         cout<<endl;
    }


    return 0;
}
```

OUTPUT :

```
Enter rows: 5
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

PROGRAM 24

24. Pascal's Triangle (Basic)

```
#include<iostream>
using namespace std;

int main()
{
    int n;

    cout<<"Enter rows: ";
    cin>>n;

    for(int i=0;i<n;i++)
    {
        int num=1;

        for(int j=0;j<=i;j++)
        {
            cout<<num<<" ";
            num = num*(i-j)/(j+1);
        }
          cout<<endl;
     }


     return 0;
}
```

OUTPUT :

```
Enter rows: 5
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
```

PROGRAM 25

25. Right-Angled Triangle of Numbers

```
#include<iostream>
using namespace std;

int main()
{
    int n;

    cout<<"Enter rows: ";
    cin>>n;

    for(int i=1;i<=n;i++)
    {
        for(int j=1;j<=i;j++)
            cout<<j<<" ";

        cout<<endl;
    }

    return 0;
}
```

OUTPUT :

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

PROGRAM 26

26. **Inverted Triangle of Stars**

```
#include<iostream>
using namespace std;

int main()
{
     int n;

     cout<<"Enter rows: ";
     cin>>n;

     for(int i=n;i>=1;i--)
     {
          for(int j=1;j<=i;j++)
               cout<<"* ";

          cout<<endl;
     }

     return 0;
}
```

OUTPUT :

```
Enter rows: 5
* * * * *
* * * *
* * *
* *
*
```

PROGRAM 27

27. Diamond Pattern (Basic Logic)

```
#include<iostream>
using namespace std;

int main()
{
     int n;

     cout<<"Enter rows: ";
     cin>>n;

     for(int i=1;i<=n;i++)
     {
          for(int j=1;j<=n-i;j++)
               cout<<" ";

          for(int k=1;k<=2*i-1;k++)
               cout<<"*";
          cout<<endl;
     }

     for(int i=n-1;i>=1;i--)
     {
          for(int j=1;j<=n-i;j++)
               cout<<" ";

          for(int k=1;k<=2*i-1;k++)
               cout<<"*";

          cout<<endl;
     }

     return 0;
}
```

OUTPUT :

```
Enter rows: 3
   *
  ***
*****
  ***
   *
```

PROGRAM 28

28. Hollow Square Pattern

```
#include<iostream>
using namespace std;

int main()
{
     int n;

     cout<<"Enter size: ";
     cin>>n;

     for(int i=1;i<=n;i++)
     {
          for(int j=1;j<=n;j++)
          {
               if(i==1 || i==n || j==1 || j==n)
                    cout<<"* ";
               else
                    cout<<"  ";
          }
          cout<<endl;
     }

     return 0;
}
```

OUTPUT :

```
Enter size: 5
* * * * *
*       *
*       *
*       *
* * * * *
```

PROGRAM 29

29. Alternating 1s and 0s Pattern

```cpp
#include<iostream>
using namespace std;

int main()
{
    int n;

    cout<<"Enter rows: ";
    cin>>n;

    for(int i=1;i<=n;i++)
    {
        for(int j=1;j<=i;j++)
            cout<<j%2<<" ";

        cout<<endl;
    }

    return 0;
}
```

OUTPUT :

```
Enter rows: 5
1
1 0
1 0 1
1 0 1 0
1 0 1 0 1
```

PROGRAM 30

30. Print A to Z using while loop

```
#include<iostream>
using namespace std;

int main()
{
    char ch='A';

    while(ch<='Z')
    {
        cout<<ch<<" ";
        ch++;
    }

    return 0;
}
```

OUTPUT :

```
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
```

PROGRAM 31

31. ASCII Values of Characters

```
#include <iostream>
using namespace std;

int main() {
    for(char ch='A'; ch<='Z'; ch++){
        cout<<ch<<" = "<<int(ch)<<endl;
    }
}
```

OUTPUT :

```
A = 65
B = 66
C = 67
D = 68
E = 69
F = 70
G = 71
H = 72
I = 73
J = 74
K = 75
L = 76
M = 77
N = 78
O = 79
P = 80
Q = 81
R = 82
S = 83
T = 84
U = 85
V = 86
W = 87
X = 88
Y = 89
Z = 90
```

PROGRAM 32

32. Fibonacci Series up to N Terms

```
#include<iostream>
using namespace std;

int main()
{
    int n;

    cout<<"Enter terms: ";
    cin>>n;

    int a=0,b=1,c;

    cout<<a<<" "<<b<<" ";

    for(int i=3;i<=n;i++)
    {
        c=a+b;
        cout<<c<<" ";
        a=b;
        b=c;
    }

    return 0;
}
```

OUTPUT :

```
Enter terms: 10
0 1 1 2 3 5 8 13 21 34
```

PROGRAM 33

33. Arithmetic Progression

```
#include<iostream>
using namespace std;

int main()
{
    int a,d,n;

    cout<<"Enter first term: ";
    cin>>a;

    cout<<"Enter common difference: ";
    cin>>d;

    cout<<"Enter number of terms: ";
    cin>>n;

    cout<<"AP Series: ";

    for(int i=0;i<n;i++)
    {
        cout<<a + i*d<<" ";
    }


    return 0;
}
```

OUTPUT :

```
Enter first term: 2
Enter common difference: 3
Enter number of terms: 10
AP Series: 2 5 8 11 14 17 20 23 26 29
```

PROGRAM 34

34. Geometric Progression (GP)

```
#include<iostream>
using namespace std;

int main()
{
    int a,r,n;

    cout<<"Enter first term: ";
    cin>>a;

    cout<<"Enter common ratio: ";
    cin>>r;

    cout<<"Enter number of terms: ";
    cin>>n;

    int term=a;

    cout<<"GP Series: ";
```

```
    for(int i=1;i<=n;i++)
    {
        cout<<term<<" ";
        term = term * r;
    }

    return 0;
}
```

OUTPUT :

```
Enter first term: 2
Enter common ratio: 3
Enter number of terms: 6
GP Series: 2 6 18 54 162 486
```

PROGRAM 35

35. Sum of Harmonic Series

```
#include<iostream>
using namespace std;

int main()
{
    int n;
    float sum=0;

    cout<<"Enter number of terms: ";
    cin>>n;

    for(int i=1;i<=n;i++)
    {
        sum = sum + 1.0/i;
    }

    cout<<"Sum of Harmonic Series = "<<sum;

    return 0;
}
```

OUTPUT :

```
Enter number of terms: 5
Sum of Harmonic Series = 2.28333
```

PROGRAM 36

36. Factorial Series

```
#include<iostream>
using namespace std;

int main()
{
    int n;

    cout<<"Enter number of terms: ";
    cin>>n;

    cout<<"Factorial Series: ";

    for(int i=1;i<=n;i++)
    {
        int fact=1;

        for(int j=1;j<=i;j++)
        {
            fact = fact * j;
        }
        cout<<fact<<" ";
    }

    return 0;
}
```

OUTPUT :

```
Enter number of terms: 5
Factorial Series: 1 2 6 24 120
```

PROGRAM 37

37. Menu-Driven Calculator (while loop)

```
#include<iostream>
using namespace std;

int main()
{
    int ch=0,a,b;

    while(ch!=5)
    {
cout<<"\n1.Add 2.Subtract 3.Multiply 4.Divide 5.Exit\n";
cout<<"Enter choice: ";
cin>>ch;

if(ch>=1 && ch<=4)
{
    cout<<"Enter two numbers: ";
    cin>>a>>b;
}

switch(ch)
{
            case 1: cout<<"Result = "<<a+b; break;
            case 2: cout<<"Result = "<<a-b; break;
            case 3: cout<<"Result = "<<a*b; break;
            case 4: cout<<"Result = "<<a/b; break;
        }
    }

    return 0;
}
```

OUTPUT :

```
1.Add 2.Subtract 3.Multiply 4.Divide 5.Exit
Enter choice: 1
Enter two numbers: 10 5
Result = 15
```

PROGRAM 38

38. **Validate Password (while loop) Program**

```
#include<iostream>
using namespace std;

int main()
{
    string pass;

    cout<<"Set Password: ";
    cin>>pass;

    string check;

    cout<<"Enter Password: ";
    cin>>check;

    while(check!=pass)
    {
        cout<<"Wrong Password! Try again: ";
        cin>>check;
    }

    cout<<"Access Granted";


    return 0;
}
```

OUTPUT :

```
Set Password: admin123
Enter Password: 111
Wrong Password! Try again: admin123
Access Granted
```

PROGRAM 39

39. **Login Attempts (Max 3 tries) Program**

```
#include<iostream>
using namespace std;

int main()
{
    string user,pass;

    for(int i=1;i<=3;i++)
    {
        cout<<"Enter Username: ";
        cin>>user;

        cout<<"Enter Password: ";
        cin>>pass;

        if(user=="admin" && pass=="1234")
        {
            cout<<"Login Successful";
            return 0;
        }
         else
         {
             cout<<"Wrong Details\n";
         }
     }

     cout<<"Account Blocked";

     return 0;
 }
```

OUTPUT :

```
Enter Username: admin
Enter Password: 111
Wrong Details
Enter Username: admin
Enter Password: 1234
Login Successful
```

PROGRAM 40

40. Smallest Digit in a Number Program

```
#include<iostream>
using namespace std;

int main()
{
    int n,small=9;

    cout<<"Enter number: ";
    cin>>n;

    while(n>0)
    {
        int d=n%10;

        if(d<small)
            small=d;

        n=n/10;
    }
    cout<<"Smallest digit = "<<small;


    return 0;
}
```

OUTPUT :

```
Enter number: 5832
Smallest digit = 2
```

PROGRAM 41

41. **Largest Digit in a Number Program**

```
#include<iostream>
using namespace std;

int main()
{
    int n,large=0;

    cout<<"Enter number: ";
    cin>>n;

    while(n>0)
    {
        int d=n%10;

        if(d>large)
            large=d;

        n=n/10;
    }
    cout<<"Largest digit = "<<large;


    return 0;
}
```

OUTPUT :

```
Enter number: 5832
Largest digit = 8
```

PROGRAM 42

42. **Frequency of a Digit Program**

```
#include<iostream>
using namespace std;

int main()
{
    int n,target,count=0;

    cout<<"Enter number: ";
    cin>>n;

    cout<<"Enter digit to search: ";
    cin>>target;

    while(n>0)
    {
        if(n%10==target)
            count++;

        n=n/10;
    }

    cout<<"Frequency = "<<count;

    return 0;
}
```

OUTPUT :

```
Enter number: 122333
Enter digit to search: 3
Frequency = 3
```

PROGRAM 43

43. **Binary to Decimal Program**

```
#include<iostream>
using namespace std;

int main()
{
    int bin,dec=0,base=1;

    cout<<"Enter binary number: ";
    cin>>bin;

    while(bin>0)
    {
        int d=bin%10;
        dec = dec + d*base;
        base = base*2;
        bin = bin/10;
    }

    cout<<"Decimal = "<<dec;

    return 0;
}
```

OUTPUT :

```
Enter binary number: 1011
Decimal = 11
```

PROGRAM 44

44. **Decimal to Octal Program**

```
#include<iostream>
using namespace std;

int main()
{
    int n;

    cout<<"Enter decimal number: ";
    cin>>n;

    cout<<"Octal = "<<oct<<n;

    return 0;
}
```

OUTPUT :

```
Enter decimal number: 25
Octal = 31
```

PROGRAM 45

45. **Print Leap Years Between Two Numbers**

```
#include<iostream>
using namespace std;

int main()
{
    int start, end;

    // Taking input
    cout<<"Enter starting year: ";
    cin>>start;

    cout<<"Enter ending year: ";
    cin>>end;
```

```
cout<<"Leap years between "<<start<<" and "<<end<<" are:\n";

// Loop to check leap years
for(int year=start; year<=end; year++)
{
    if( (year%4==0 && year%100!=0) || (year%400==0) )
    {
        cout<<year<<" ";
    }
}
```

```
    return 0;
}
```

OUTPUT :

```
Enter starting year: 2000
Enter ending year: 2020
Leap years between 2000 and 2020 are:
2000 2004 2008 2012 2016 2020
```