The iteration (looping) statement

If with counter

Looping is the repetition of a statement or block of statements in a program.
goto (keyword)
  Transfers control
 Syntax: goto <identifier> ;
Control is unconditionally transferred to the location of a local label specified by identifier.

 Example:
 Again:
 ;
 .
 goto Again;
NOTE: Labels must be followed by a statement (;).

Q) Write a program to print number from 1..5 in ascending order

```cpp
#include <iostream.h>
#include <conio.h>
int main()
{
int i;
clrscr();
  i=1;
 lab:
    cout <<i<<" ";
    i=i+1;
    if (i<=5) goto lab;
cout << "\n\nHit any key to continue"; //i=6
getch();
return 0;
}
```

Q) Write a program to print number from 5..1 in descending order

```cpp
#include <iostream.h>
#include <conio.h>
int main()
{
int i;
clrscr();
  i=5;
 lab:
    cout <<i<<" ";
    i=i-1
    if (i>=1) goto lab;
cout << "\n\nHit any key to continue"; //i=0
getch();
return 0;
}
```

For (keyword)

For loop

 Syntax: for ([<expr1>] ; [<expr2>] ; [<expr3>]) <statement>

<statement> is executed repeatedly UNTIL the value of <expr2> is 0.

BEFORE the first iteration, <expr1> is evaluated. This is usually used to initialize variables for the loop.

AFTER each iteration of the loop, <expr3> is evaluated. This is usually used to increment a loop counter.

In C++, <expr1> can be an expression or a declaration.

The scope of any declared identifier extends to the end of the control statement only.

All the expressions are optional. If <expr2> is left out, it is assumed to be 1.

The following statement is used for infinite loop: *for (;;)*

Q) Write a program to print number from 1..5 in ascending order

```
#include <iostream.h>
#include <conio.h>
int main()
{
clrscr();
  for (int i=1;i<=5;i=i+1)
    cout <<i<<" ";

    //out the loop i=6
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

Q) Write a program to print number from 5..1 in descending order

```
#include <iostream.h>
#include <conio.h>
int main()
{
clrscr();
  for (int i=5;i>=1;i=i-1)
    cout <<i<<" ";
   //out the loop i=0
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

Q) Write a program to find the factorial of any number

```cpp
#include <iostream.h>
#include <conio.h>
int main()
{
int n;
long int f;
clrscr();
cout << "Number:=";
cin >> n;
 if (n>=1)
   {
   for (int i=1,f=1;i<=n;i=i+1)
     f=f*i;
   cout <<"Factorial number:="<<f;
   }

cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

Q) Write a program to find the factorial of 3 different numbers

```cpp
#include <iostream.h>
#include <conio.h>
int main()
{
int n;
long int f;
clrscr();
for (int j=1;j<=3;j=j+1)
{
cout << "Number:=";
cin >> n;
 if (n>=1)
   {
   for (int i=1,f=1;i<=n;i=i+1)
     f=f*i;
   cout <<"Factorial number:="<<f<<"\n\n";
   }
}
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

Q) Write a program to solve the following equation:
$$sum = 4 + \frac{7}{2} + \frac{5}{3} + \frac{3}{4}$$

```cpp
#include <iostream.h>
#include <conio.h>
int main()
{
float sum=4.0;
clrscr();
for (int i=2,j=7;i<=4;i=i+1,j=j-2)
 {
    cout <<"i="<<i<<" j="<<j<<"\n"; // for test
```

```
       sum=sum+(float )j/i;
   }
      cout<<"sum="<<sum;
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

Q) Write a program to solve the following equation:
$$sum = 4 - \frac{7}{2} + \frac{5}{3} - \frac{3}{4}$$

```
#include <iostream.h>
#include <conio.h>
int main()
{
float sum=4.0;
clrscr();
for (int i=2,j=7,s=-1;i<=4;i=i+1,j=j-2,s=-s)
 {
    cout <<"i="<<i<<" j="<<j<<" s="<<s<<"\n"; // for test
    sum=sum+s*(float )j/i;
  }
    cout<<"sum="<<sum;
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

Q) Write a program to solve the following equation:
$$sum = 3 + \frac{2!}{3} + \frac{5!}{9} + \frac{8!}{27}$$

```
#include <iostream.h>
#include <conio.h>
int main()
{
float sum=3.0;
long int f;
clrscr();
for (int n=2,j=3;n<=8;n=n+3,j=j*3)
 {
    f=1;
    cout <<"n="<<n<<" j="<<j<<"\n";
    for (int i=1;i<=n;i=i+1)
     f=f*i;
 cout<<"Number="<<n<<" Factorial number="<<f<<"\n\n"; // for test
    sum=sum+(float )f/j;
  }
    cout<<"sum="<<sum;
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

Q) Write a program to find even numbers among group of numbers

```
#include <iostream.h>
#include <conio.h>
int main()
{
int n,n1;
clrscr();
cout << "Number of numbers:=";
cin >> n;

for (int j=1;j<=n;j=j+1)
{
cout << "Number:=";
cin >> n1;
 if (!(n1%2))
  cout <<" --- Even number --- \n\n";
 }
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

Q) Write a program to find the number and summation of even numbers which accept division by 4 without remainder among group of numbers

```
#include <iostream.h>
#include <conio.h>
int main()
{
int n,n1;
clrscr();
cout << "Number of numbers:=";
cin >> n;

for (int j=1,n2=0,sum=0;j<=n;j=j+1)
{
cout << "Number:=";
cin >> n1;
 if ((!(n1%2)) && (!(n1%4)))
  {
   sum=sum+n1;
   n2=n2+1;
  }
}
cout <<"\nSum. of even numbers which accept division by 4:="<<sum;
cout<<"\nNo. of even numbers which accept division by 4:="<<n2;
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

Q) Write a program to find largest number between 5 different numbers

```cpp
#include <iostream.h>
#include <conio.h>
int main()
{
int n,large;
clrscr();
cout << "Number1:=";
cin >> n;
large=n;

for (int i=2;i<=5;i=i+1)
{
cout << "Number"<<i<<":=";
cin >> n;
 if (n>large)
    large=n;
}
cout <<"\nLargest No.:="<<large;
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

Q) Write a program to find smallest number between 5 different numbers

```cpp
#include <iostream.h>
#include <conio.h>
int main()
{
int n,small;
clrscr();
cout << "Number1:=";
cin >> n;
small =n;

for (int i=2;i<=5;i=i+1)
{
cout << "Number"<<i<<":=";
cin >> n;
 if (n < small)
    small =n;
}
cout <<"\n smallest No.:="<< small;
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```