

COMPUTER SCIENCE : C++

The Fibonacci sequence is a series where the next term is the sum of previous two terms. The first two terms of the Fibonacci sequence is 0 followed by 1.

The Fibonacci sequence: 0, 1, 1, 2, 3, 5, 8, 13, 21

Fibonacci Series up to n number of terms

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

void main()
{
    int n, t1 = 0, t2 = 1, nextTerm = 0;

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

    cout << "Fibonacci Series: ";

    for (int i = 1; i <= n; ++i)
    {
        // Prints the first two terms.
        if(i == 1)
        {
            cout << " " << t1;
            continue;
        }
    }
}
```

```

    if(i == 2)
    {
        cout << t2 << " ";
        continue;
    }
    nextTerm = t1 + t2;
    t1 = t2;
    t2 = nextTerm;

    cout << nextTerm << " ";
}
return 0;
}

```

Output

```

Enter the number of terms: 10
Fibonacci Series: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34,

```

C++ Program to Find GCD

The largest integer which can perfectly divide two integers is known as GCD or HCF of those two numbers.

Find GCD using while loop

```

#include <iostream.h>
using namespace std;

void main()
{
    int n1, n2;

    cout << "Enter two numbers: ";

```

```
cin >> n1 >> n2;

while(n1 != n2)
{
    if(n1 > n2)
        n1 -= n2;
    else
        n2 -= n1;
}

cout << "HCF = " << n1;
return 0;
}
```

Output

```
Enter two numbers: 78
52
HCF = 26
```

In above program, smaller number is subtracted from larger number and that number is stored in place of larger number.

This process is continued until, two numbers become equal which will be HCF.

. Find HCF/GCD using for loop

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

void main() {
    int n1, n2, hcf;
    cout << "Enter two numbers: ";
    cin >> n1 >> n2;

    // Swapping variables n1 and n2 if n2 is greater than n1.
    if ( n2 > n1) {
        int temp = n2;
        n2 = n1;
        n1 = temp;
    }

    for (int i = 1; i <= n2; ++i) {
        if (n1 % i == 0 && n2 % i ==0) {
            hcf = i;
        }
    }

    cout << "HCF = " << hcf;
    return 0;
}
```

The logic of this program is simple.

In this program, small integer between `n1` and `n2` is stored in `n2`. Then the loop is iterated from `i = 1` to `i <= n2` and in each iteration, value of `i` is increased by 1.

If both numbers are divisible by `i` then, that number is stored in variable `hcf`. When the iteration is finished, HCF will be stored in variable `hcf`

Program to Generate Fibonacci Sequence Up to a Certain Number

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

void main()
{
    int t1 = 0, t2 = 1, nextTerm = 0, n;

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

    // displays the first two terms which is always 0 and 1
    cout << "Fibonacci Series: " << t1 << ", " << t2 << ", ";

    nextTerm = t1 + t2;

    while(nextTerm <= n)
    {
        cout << nextTerm << ", ";
        t1 = t2;
        t2 = nextTerm;
        nextTerm = t1 + t2;
    }
    return 0;
}
```

Output

```
Enter a positive integer: 100
```

Fibonacci Series: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89,