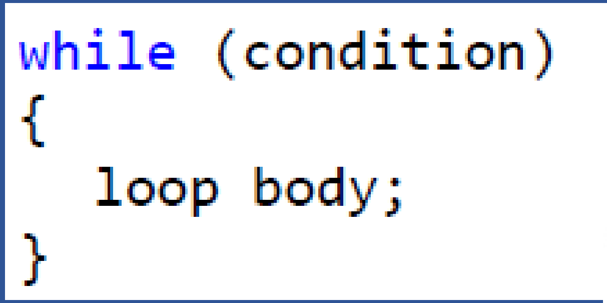
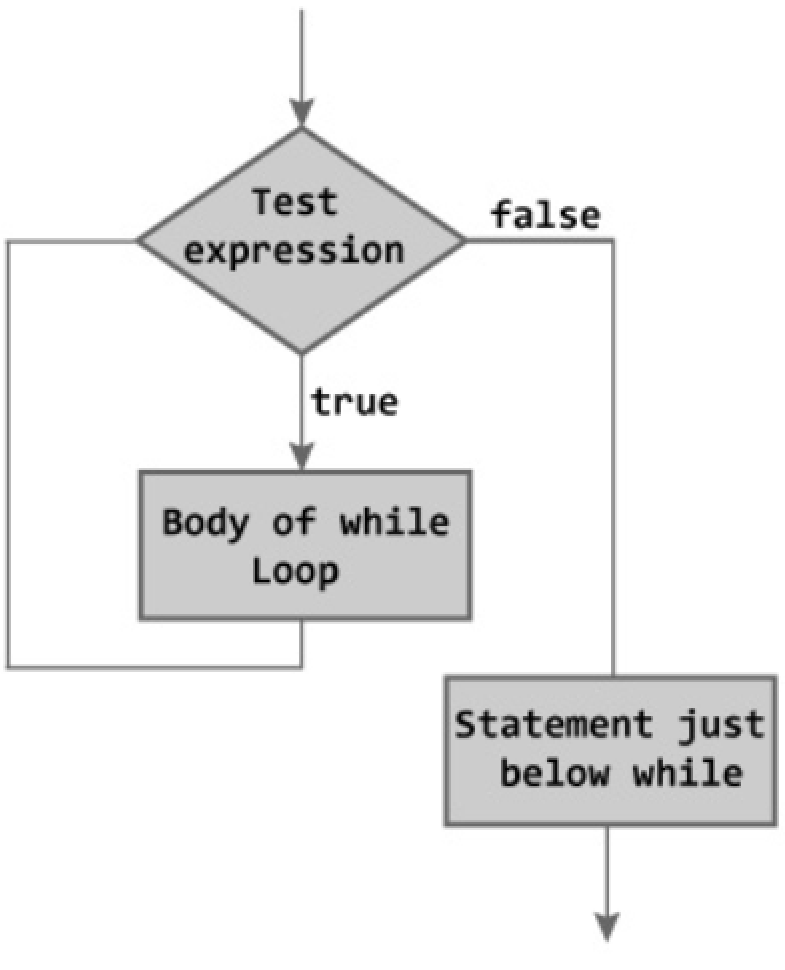
Loop

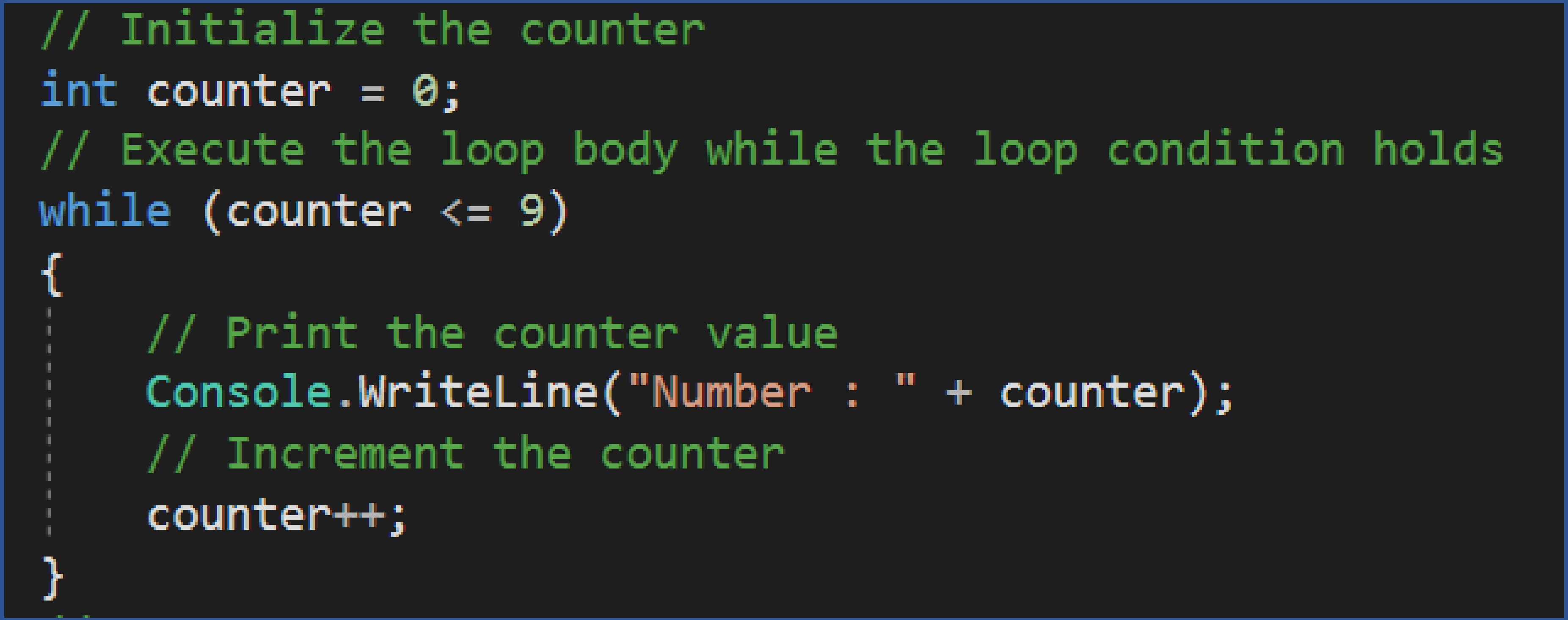
While loop



```
while (condition)
{
   loop body;
}
```

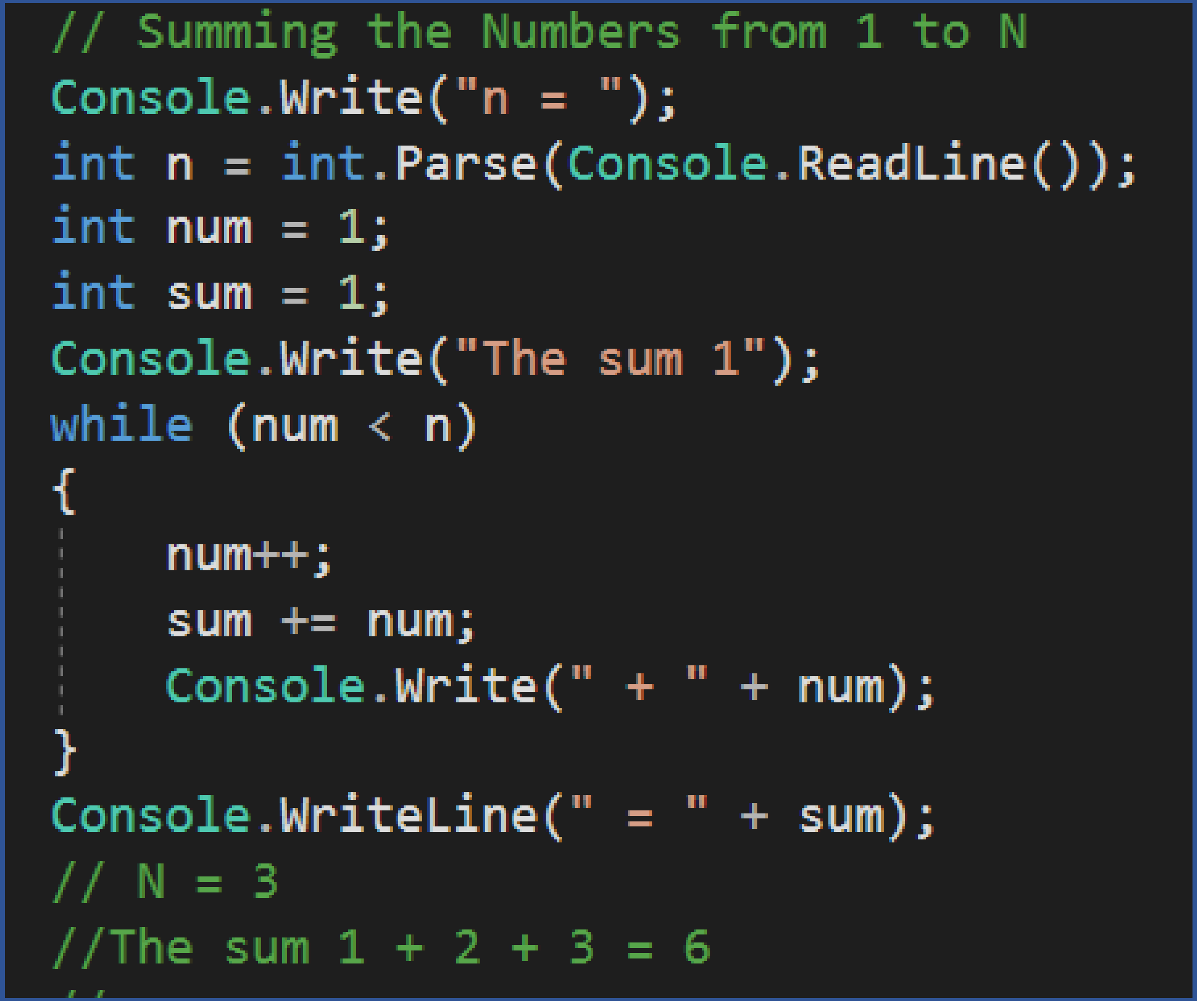


Print number from 0 to 9



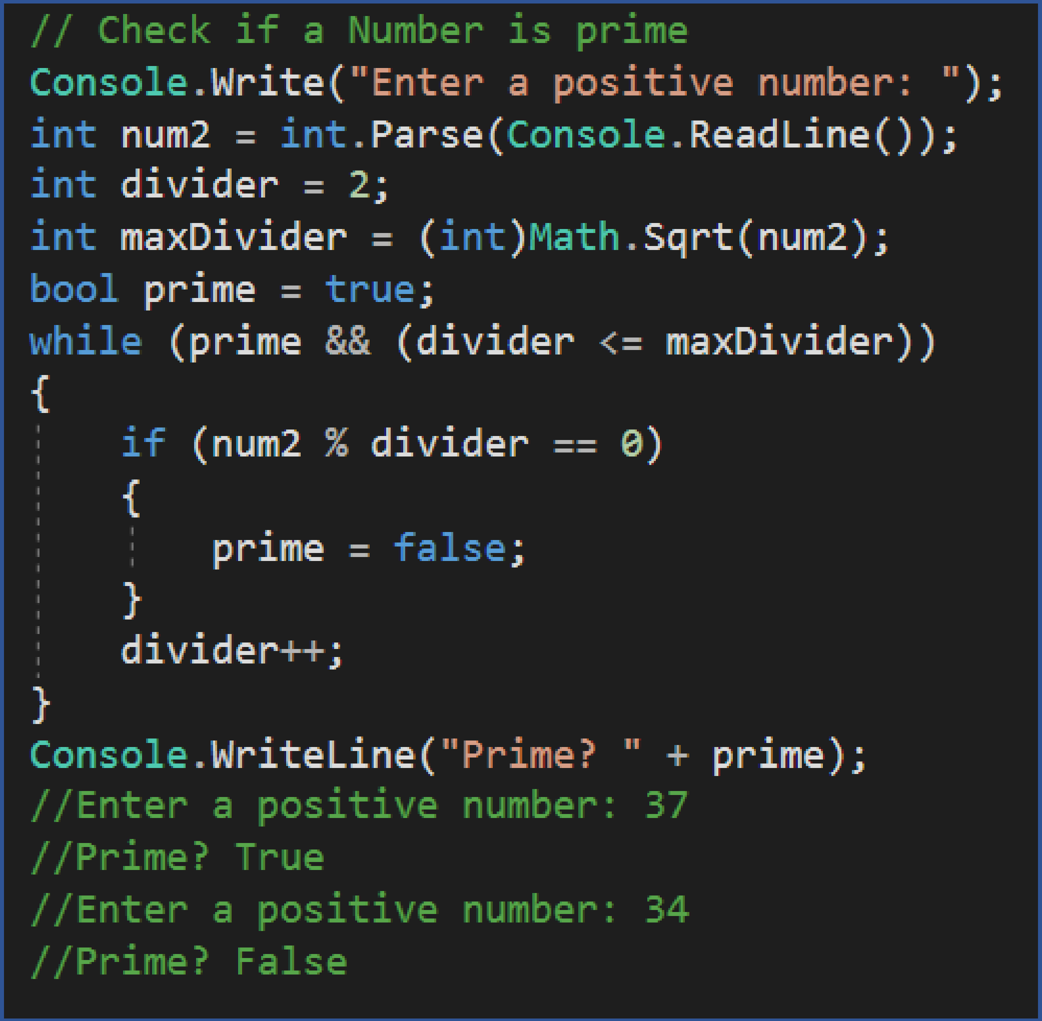
```
// Initialize the counter
int counter = 0;
// Execute the loop body while the loop condition holds
while (counter <= 9)
{
    // Print the counter value
    Console.WriteLine("Number : " + counter);
    // Increment the counter
    counter++;
}
```

Summing the Numbers from 1 to N



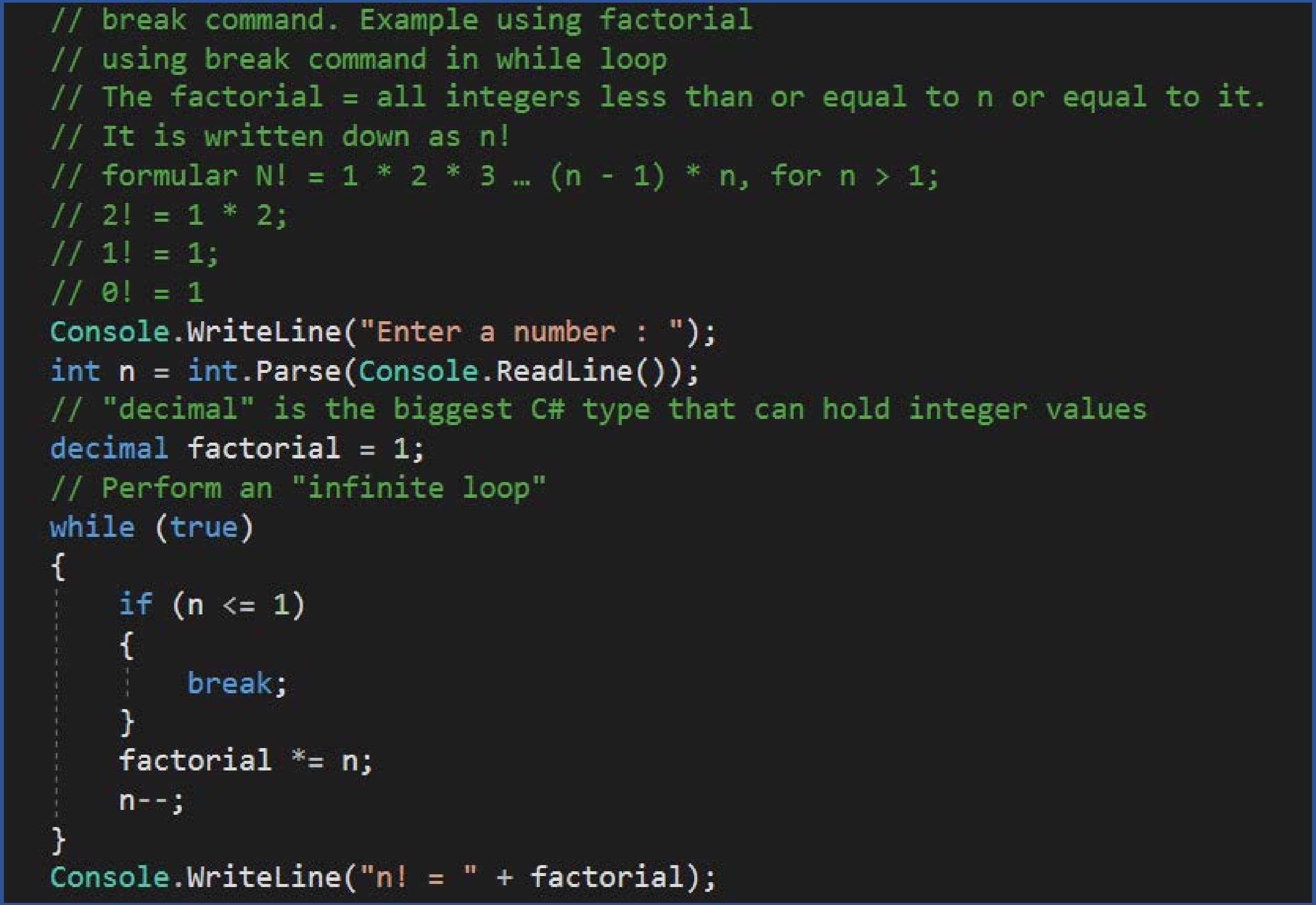
```
// Summing the Numbers from 1 to N
Console.Write("n = ");
int n = int.Parse(Console.ReadLine());
int num = 1;
int sum = 1;
Console.Write("The sum 1");
while (num < n)
{
    num++;
    sum += num;
    Console.Write(" + " + num);
}
Console.WriteLine(" = " + sum);
// N = 3
//The sum 1 + 2 + 3 = 6
```

Check if a Number is prime



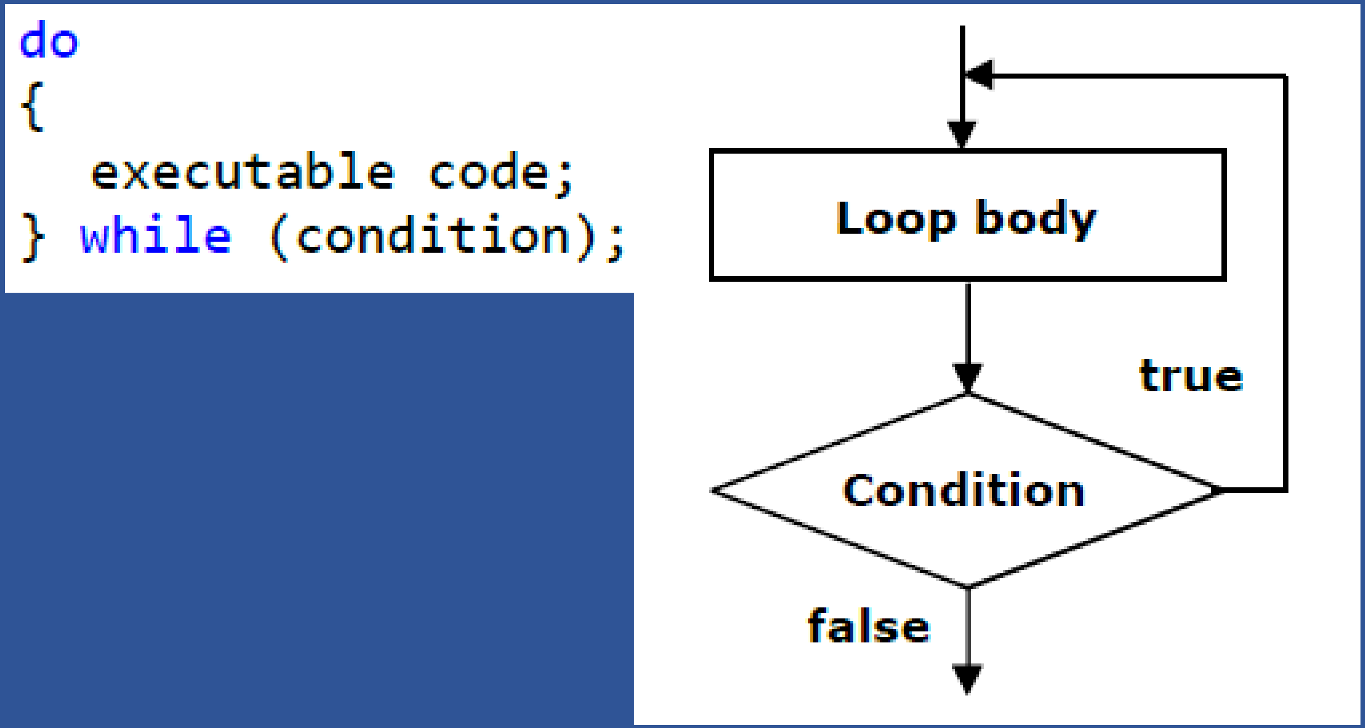
```
// Check if a Number is prime
Console.Write("Enter a positive number: ");
int num2 = int.Parse(Console.ReadLine());
int divider = 2;
int maxDivider = (int)Math.Sqrt(num2);
bool prime = true;
while (prime && (divider <= maxDivider))
{
    if (num2 % divider == 0)
    {
        prime = false;
    }
    divider++;
}
Console.WriteLine("Prime? " + prime);
//Enter a positive number: 37
//Prime? True
//Enter a positive number: 34
//Prime? False
```

Break command



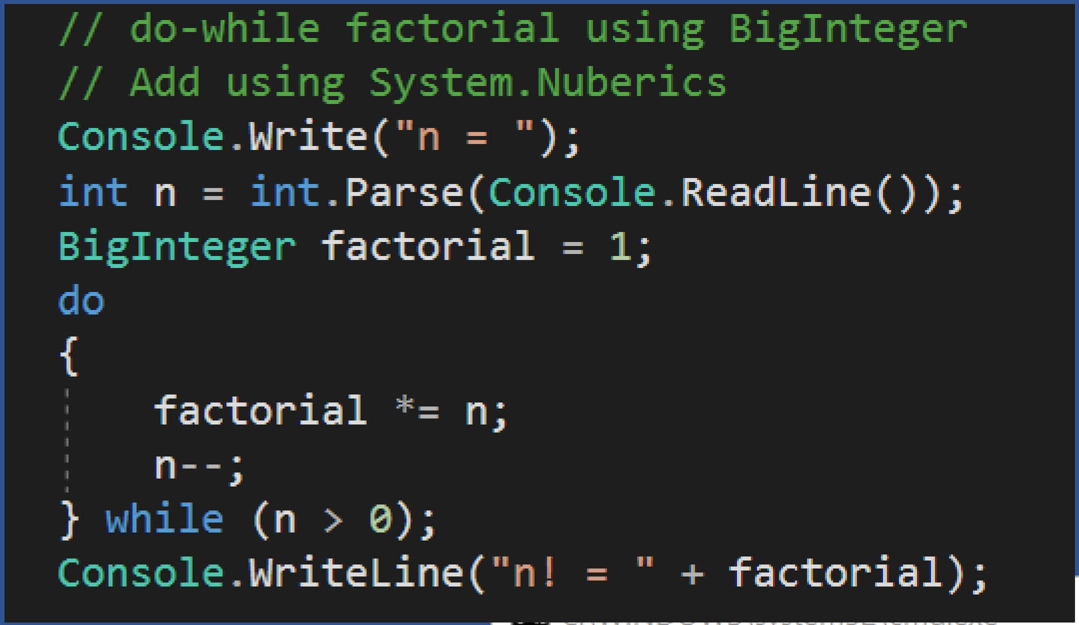
```
// break command. Example using factorial
// using break command in while loop
// The factorial = all integers less than or equal to n or equal to it.
// It is written down as n!
// formular N! = 1 * 2 * 3 … (n - 1) * n, for n > 1;
// 2! = 1 * 2;
// 1! = 1;
// 0! = 1
Console.WriteLine("Enter a number : ");
int n = int.Parse(Console.ReadLine());
// "decimal" is the biggest C# type that can hold integer values
decimal factorial = 1;
// Perform an "infinite loop"
while (true)
{
    if (n <= 1)
    {
        break;
    }
    factorial *= n;
    n--;
}
Console.WriteLine("n! = " + factorial);
```

Do-While Loops

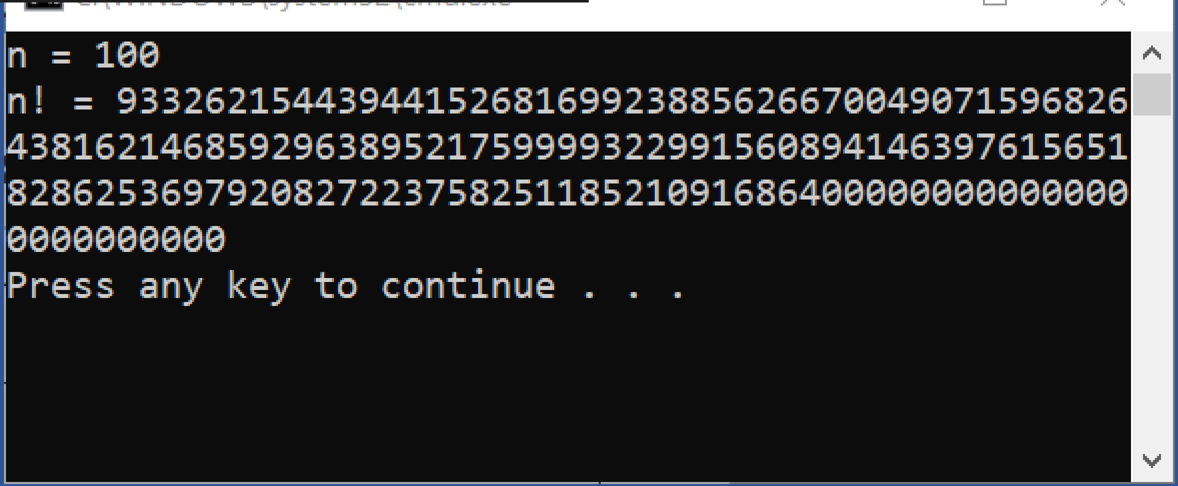


```
do
{
   executable code;
} while (condition);
```

do-while factorial

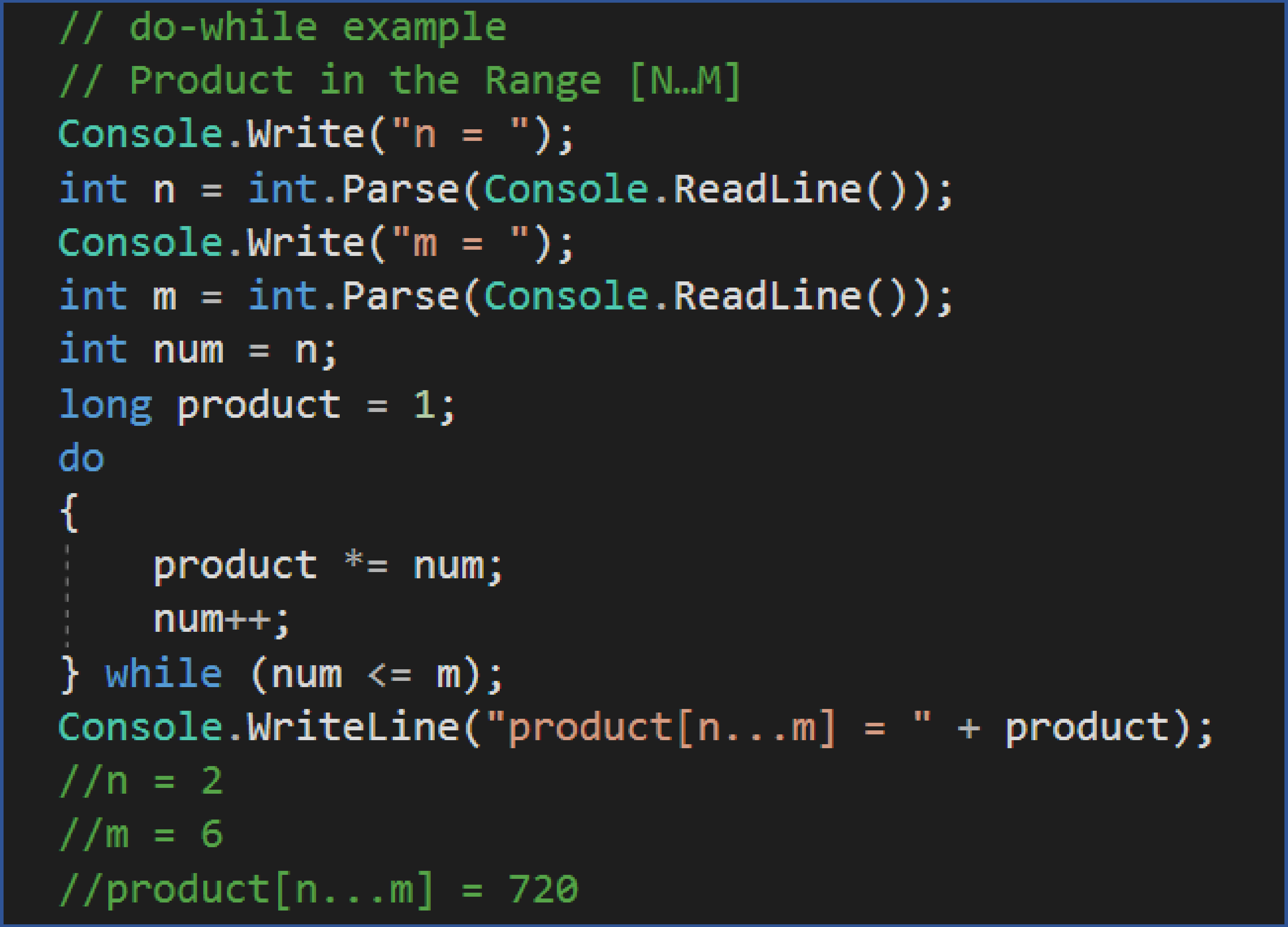


```
// do-while factorial using BigInteger
// Add using System.Nuberics
Console.Write("n = ");
int n = int.Parse(Console.ReadLine());
BigInteger factorial = 1;
do
{
    factorial *= n;
    n--;
} while (n > 0);
Console.WriteLine("n! = " + factorial);
```



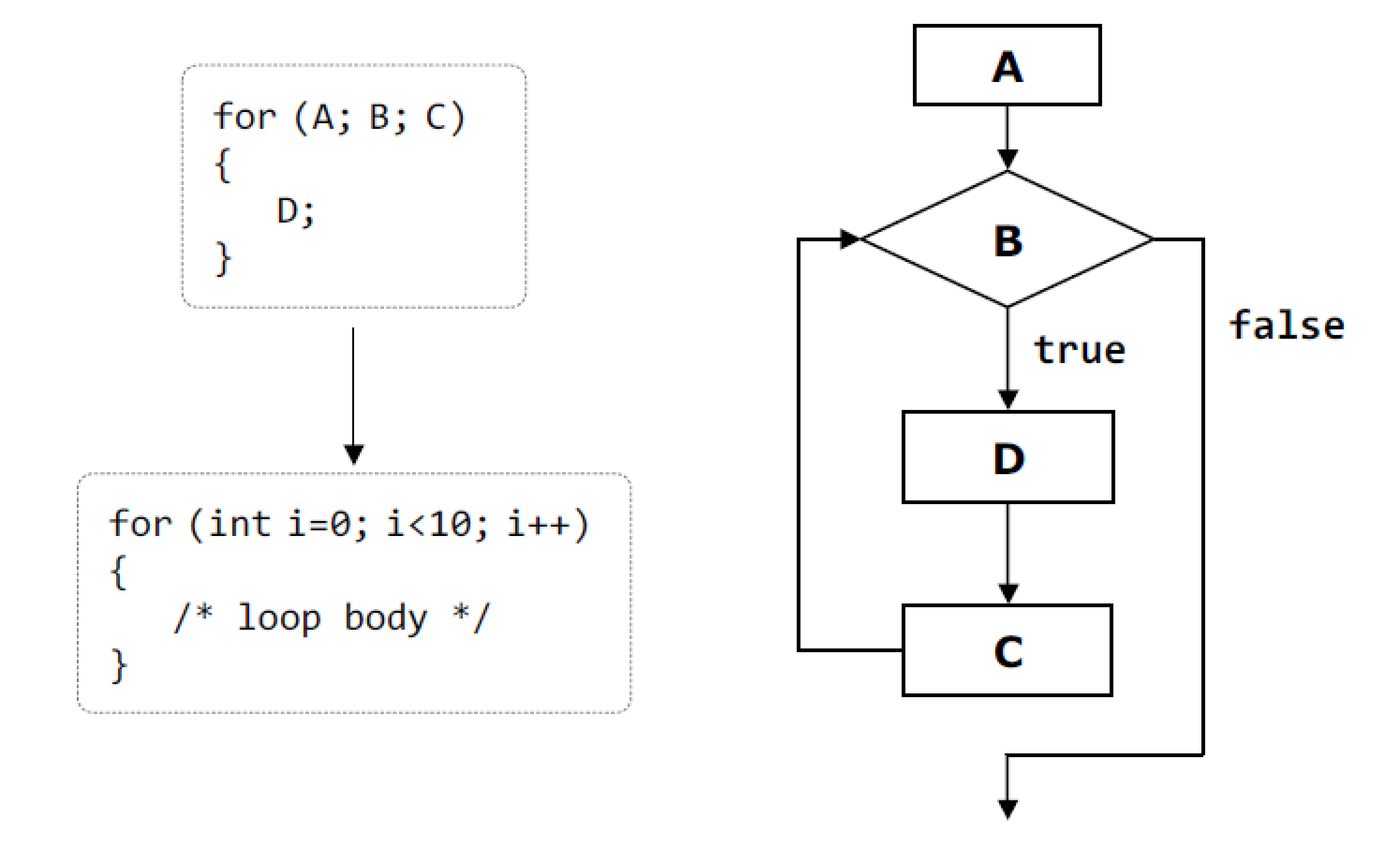
```
n = 100
n! = 9332621544394415268169923885626670049071596826
438162146859296389521759999322991560894146397615651
828625369792082722375825118521091686400000000000000
0000000000
Press any key to continue . . .
```

do-while example Product in the Range [N…M]



```
// do-while example
// Product in the Range [N…M]
Console.Write("n = ");
int n = int.Parse(Console.ReadLine());
Console.Write("m = ");
int m = int.Parse(Console.ReadLine());
int num = n;
long product = 1;
do
{
    product *= num;
    num++;
} while (num <= m);
Console.WriteLine("product[n...m] = " + product);
//n = 2
//m = 6
//product[n...m] = 720
```

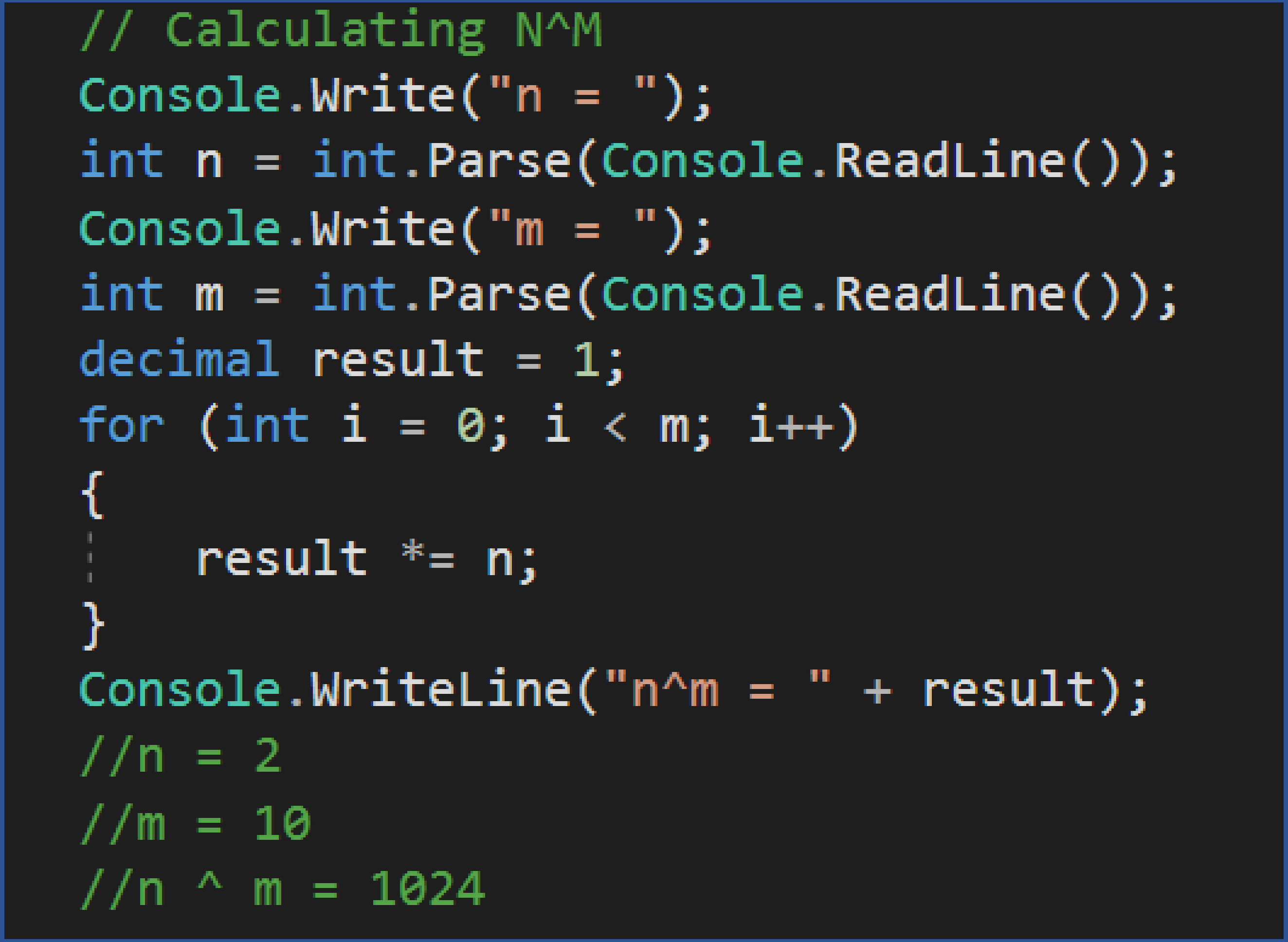
For Loops



```
for (A; B; C)
{
    D;
}
```

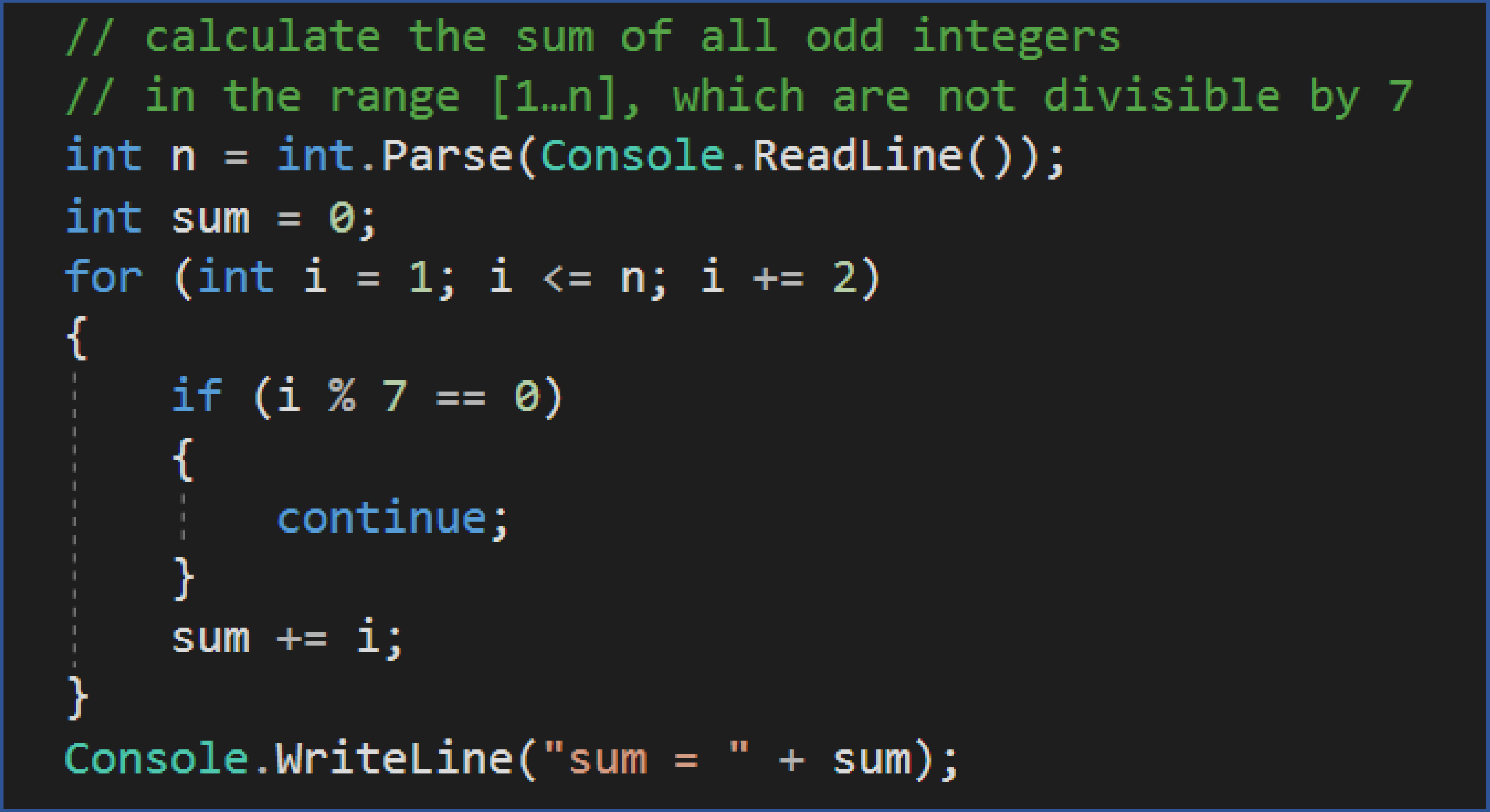
```
for (int i=0; i<10; i++)
{
    /* loop body */
}
```

Calculating N^M



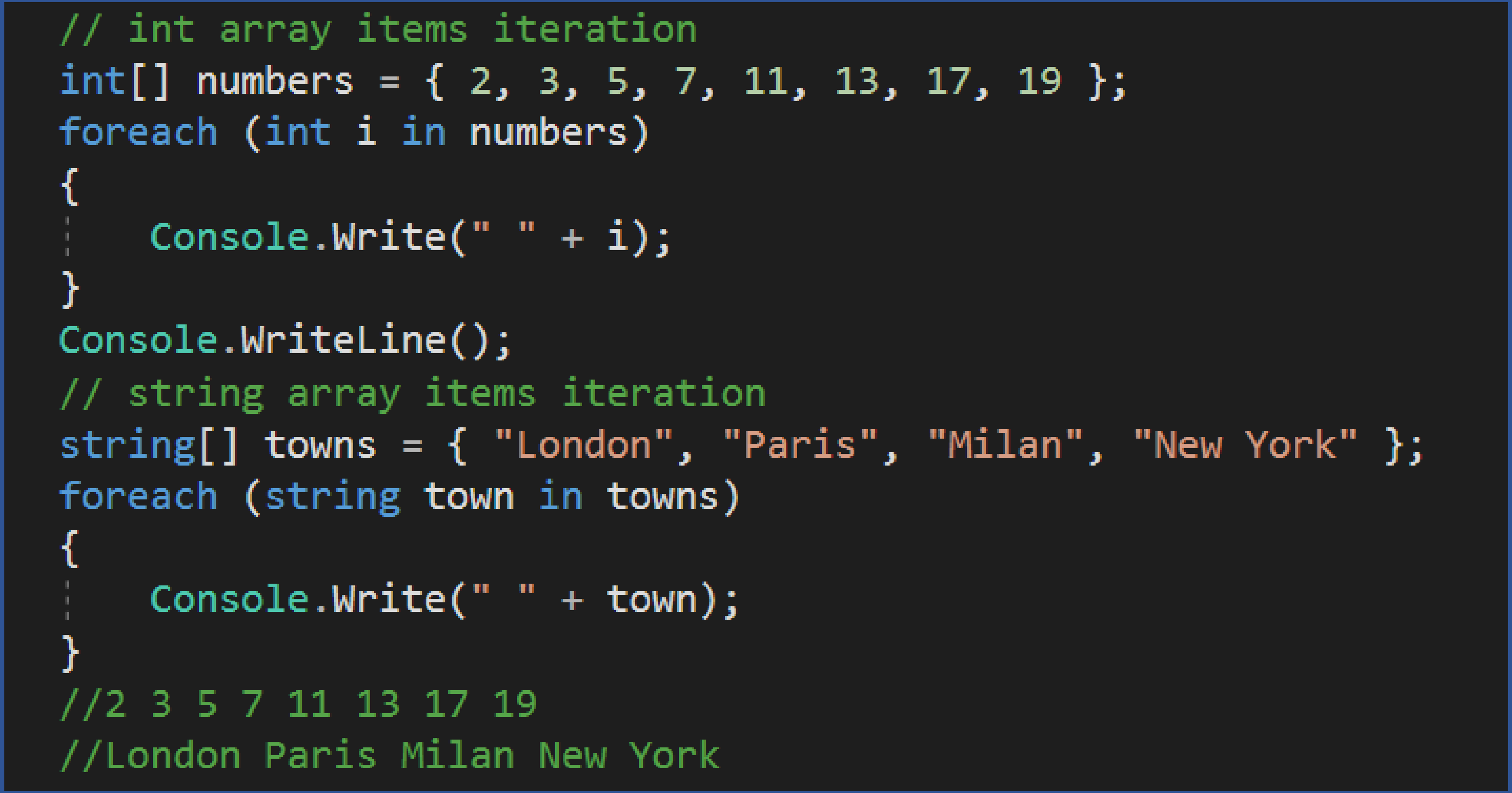
```
// Calculating N^M
Console.Write("n = ");
int n = int.Parse(Console.ReadLine());
Console.Write("m = ");
int m = int.Parse(Console.ReadLine());
decimal result = 1;
for (int i = 0; i < m; i++)
{
    result *= n;
}
Console.WriteLine("n^m = " + result);
//n = 2
//m = 10
//n ^ m = 1024
```

Operator “continue”



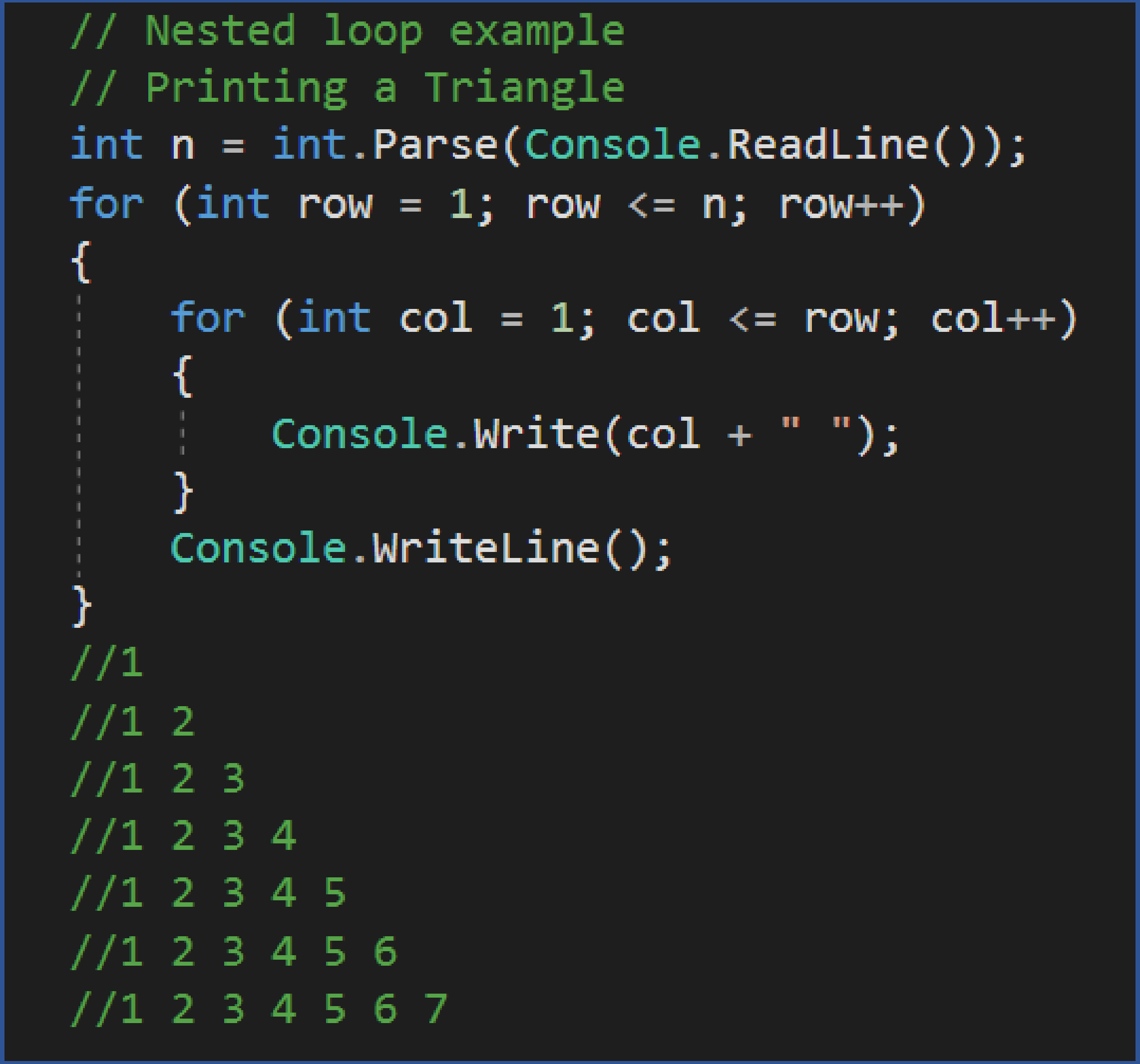
```
// calculate the sum of all odd integers
// in the range [1…n], which are not divisible by 7
int n = int.Parse(Console.ReadLine());
int sum = 0;
for (int i = 1; i <= n; i += 2)
{
    if (i % 7 == 0)
    {
        continue;
    }
    sum += i;
}
Console.WriteLine("sum = " + sum);
```

foreach



```
// int array items iteration
int[] numbers = { 2, 3, 5, 7, 11, 13, 17, 19 };
foreach (int i in numbers)
{
    Console.Write(" " + i);
}
Console.WriteLine();
// string array items iteration
string[] towns = { "London", "Paris", "Milan", "New York" };
foreach (string town in towns)
{
    Console.Write(" " + town);
}
//2 3 5 7 11 13 17 19
//London Paris Milan New York
```

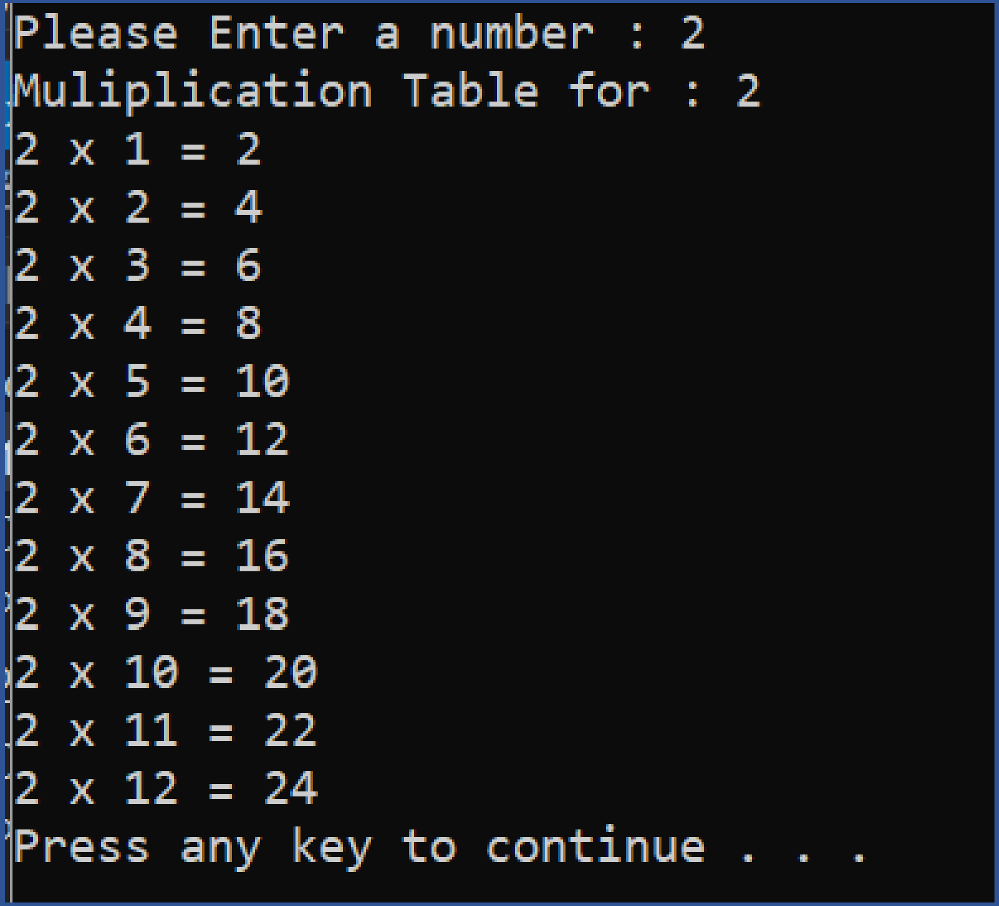
Nested Loop



```
// Nested loop example
// Printing a Triangle
int n = int.Parse(Console.ReadLine());
for (int row = 1; row <= n; row++)
{
    for (int col = 1; col <= row; col++)
    {
        Console.Write(col + " ");
    }
    Console.WriteLine();
}
//1
//1 2
//1 2 3
//1 2 3 4
//1 2 3 4 5
//1 2 3 4 5 6
//1 2 3 4 5 6 7
```

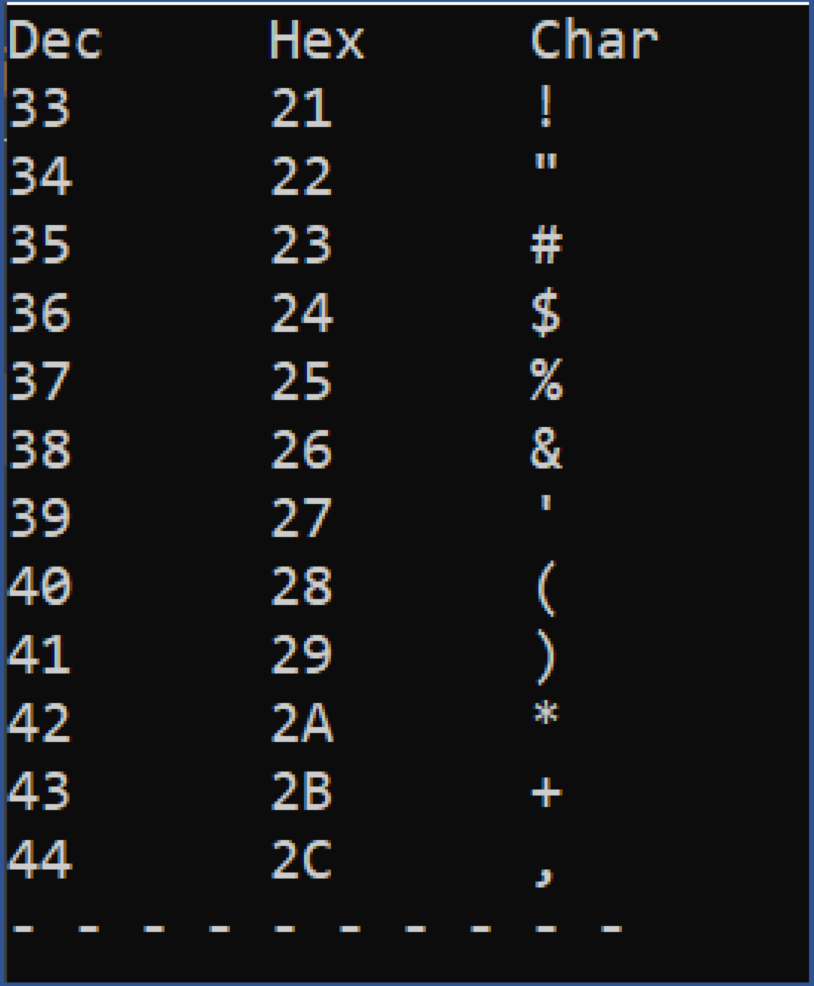
Exercise

1. Print multiplication table



```
Please Enter a number : 2
Muliplication Table for : 2
2 x 1 = 2
2 x 2 = 4
2 x 3 = 6
2 x 4 = 8
2 x 5 = 10
2 x 6 = 12
2 x 7 = 14
2 x 8 = 16
2 x 9 = 18
2 x 10 = 20
2 x 11 = 22
2 x 12 = 24
Press any key to continue . . .
```

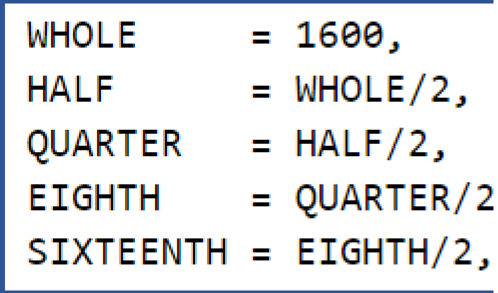
2. Print ASCII Table. Pause every 12 lines



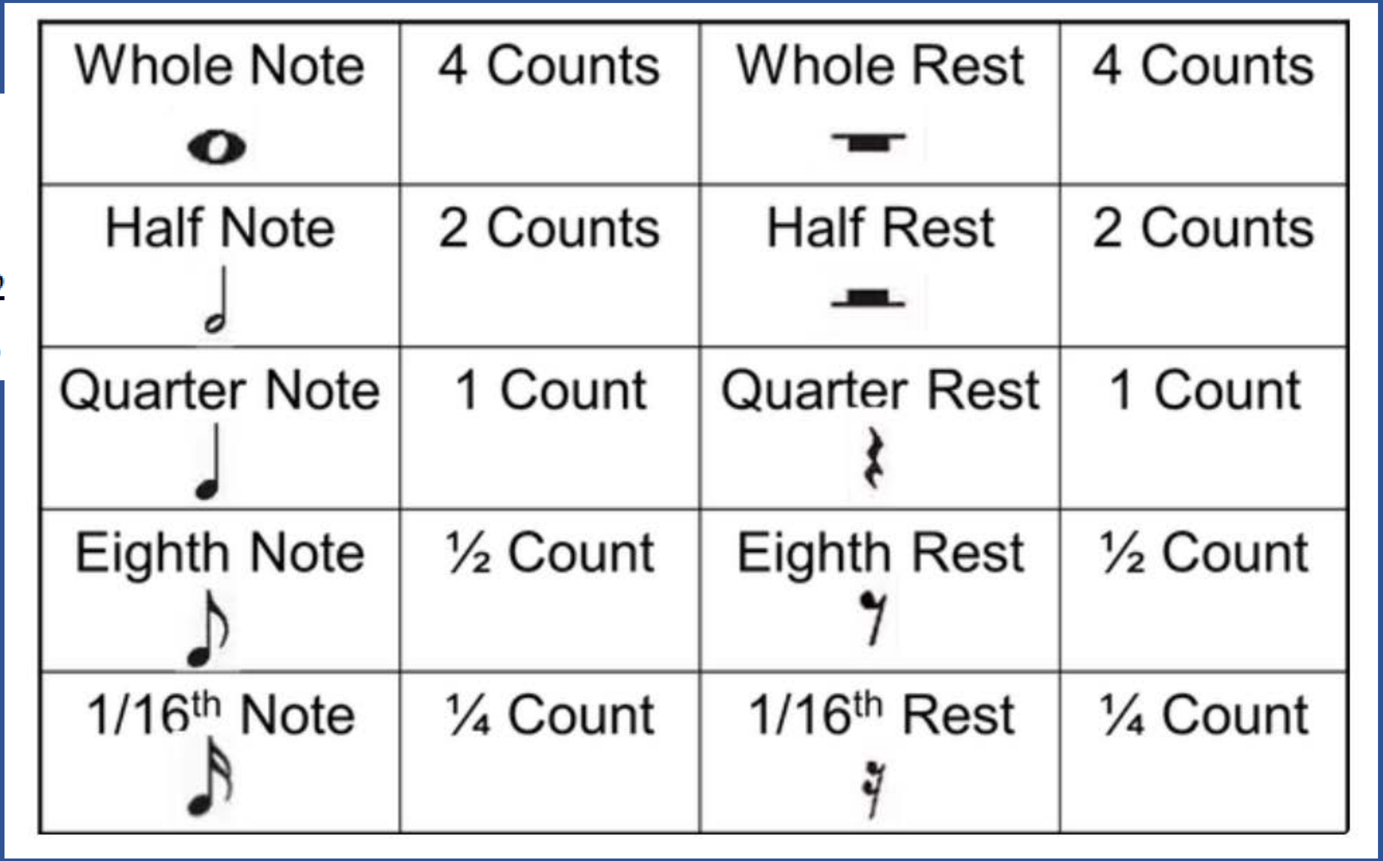
```
Dec     Hex     Char
33      21      !
34      22      "
35      23      #
36      24      $
37      25      %
38      26      &
39      27      '
40      28      (
41      29      )
42      2A      *
43      2B      +
44      2C      ,
- - - - - - - - - -
```

3. Play a song

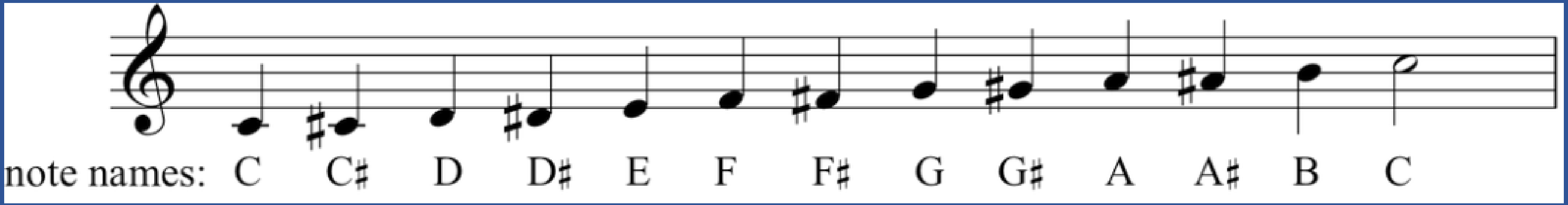
Duration

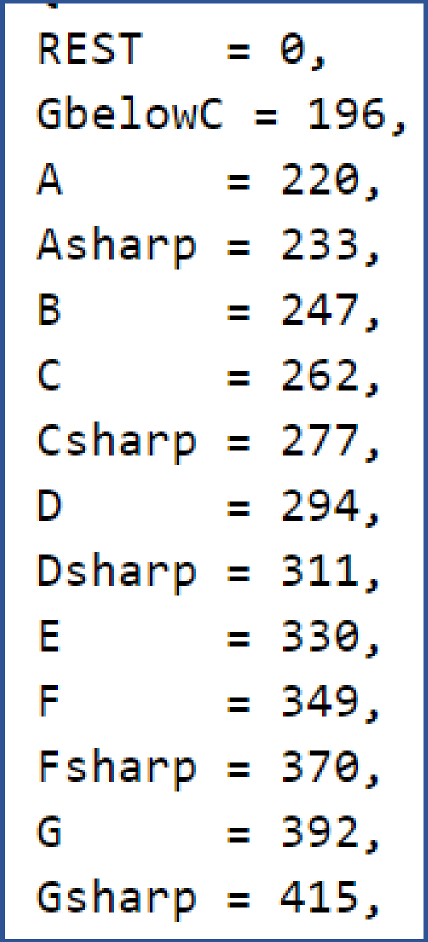


```
WHOLE     = 1600,
HALF      = WHOLE/2,
QUARTER   = HALF/2,
EIGHTH    = QUARTER/2
SIXTEENTH = EIGHTH/2,
```



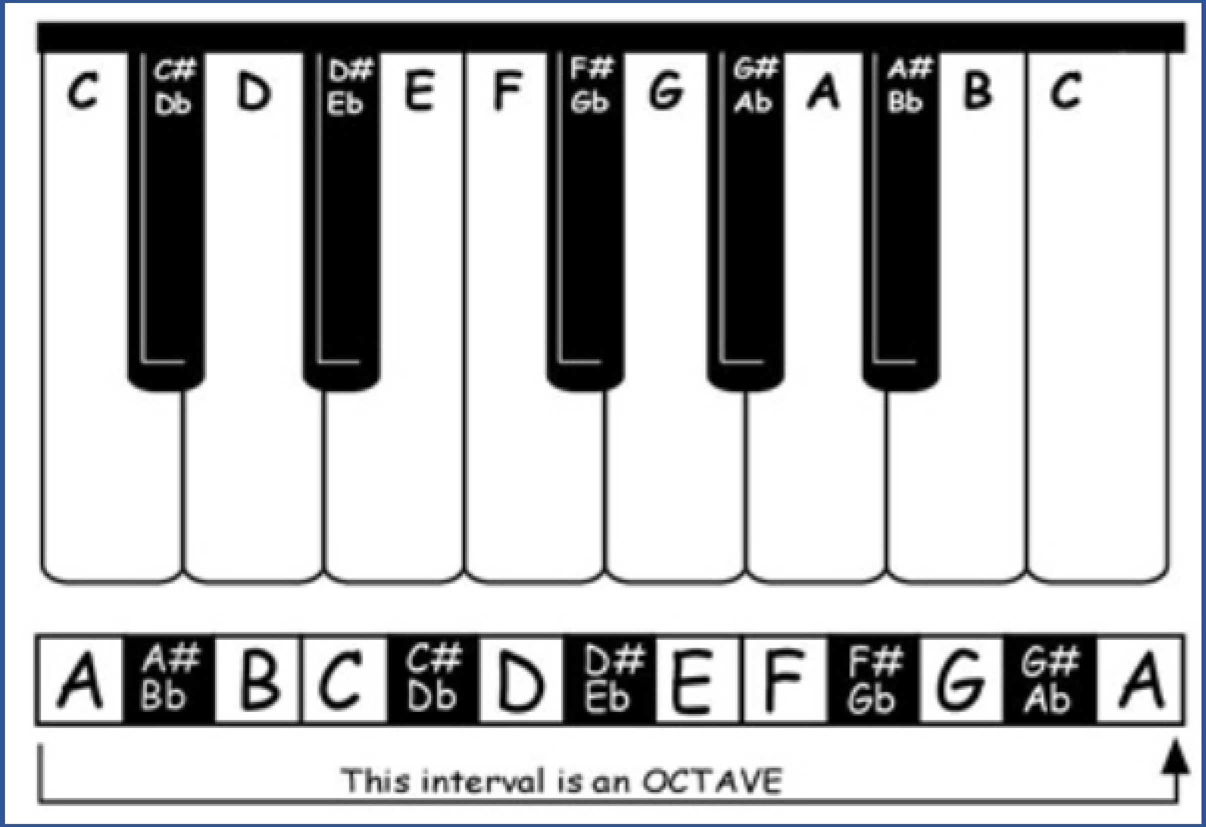
Whole Note 𝅝	4 Counts	Whole Rest 𝄻	4 Counts
Half Note 𝅗𝅥	2 Counts	Half Rest 𝄼	2 Counts
Quarter Note ♩	1 Count	Quarter Rest 𝄽	1 Count
Eighth Note ♪	½ Count	Eighth Rest 𝄾	½ Count
1/16th Note 𝅘𝅥𝅯	¼ Count	1/16th Rest 𝄿	¼ Count



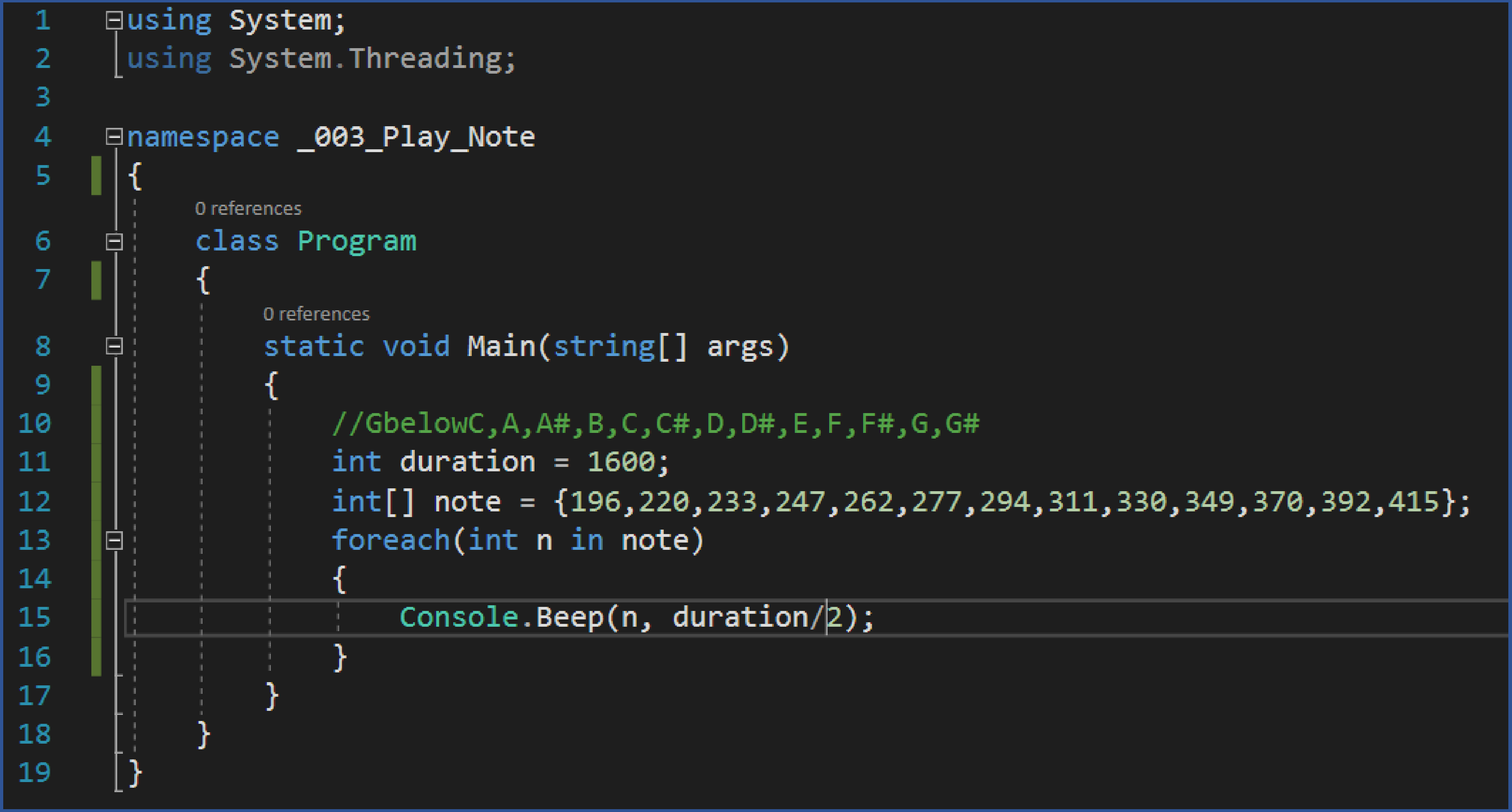


```
REST    = 0,
GbelowC = 196,
A       = 220,
Asharp = 233,
B       = 247,
C       = 262,
Csharp = 277,
D       = 294,
Dsharp = 311,
E       = 330,
F       = 349,
Fsharp = 370,
G       = 392,
Gsharp = 415,
```

musical chromatic scale



Example code to play chromatic scale



```csharp
using System;
using System.Threading;

namespace _003_Play_Note
{
    class Program
    {
        static void Main(string[] args)
        {
            //GbelowC,A,A#,B,C,C#,D,D#,E,F,F#,G,G#
            int duration = 1600;
            int[] note = {196,220,233,247,262,277,294,311,330,349,370,392,415};
            foreach(int n in note)
            {
                Console.Beep(n, duration/2);
            }
        }
    }
}
```