

# For Loop

## 1. For Loop

The keyword `for` is used to perform one or more statements many times and the number of times is known beforehand.

```
int i;
for (i = 1; i <= 10; i++) {
    cout << i;
    cout << " banana" << endl;
}
cout << "the END" << endl;
```

Sample output:

```
1 banana
2 banana
3 banana
4 banana
5 banana
6 banana
7 banana
8 banana
9 banana
10 banana
the END
```

Notice in the next program segment, it is just like the previous one except without the braces around the first two `cout` commands.

```
int i;
for (i = 1; i <= 10; i++)
    cout << i;
    cout << " banana" << endl;

cout << "the END" << endl;
```

The resulting output is:

```
12345678910 banana
the END
```

The reason is that the body of the for loop statement is just the next statement, which without the braces is just the first `cout` statement. However, with the braces, the body of the for loop is the entire block of statements inside the braces. To improve readability, the `cout banana` statement should line up with the `for` statement to show that it is outside of the loop like this:

```
for (i = 1; i <= 10; i++)
    cout << i;
cout << " banana" << endl;
```

## 2. **Exercises** (Problems with an asterisk are more difficult)

**You need to use the FOR loop in all of the following problems.**

1. Write a program to print out your name 10 times on one line. You have to use the for loop for this.
2. Write a program to print out your name 1000 times on separate lines. You have to use the for loop for this.
3. Write a program to print out your name, address, and phone numbers 10 times on separate lines. You have to use the for loop for this. The name, address and phone numbers are also on separate lines like this

Dr. Hwang  
4500 Riverwalk Parkway  
Riverside, CA 92515  
951-785-2054

4. Write a program to count from 1 to 100, i.e., print out the numbers from 1 to 100.
5. Write a program to print out the even numbers from 1 to 100.
6. Write a program to print out the multiples of 7 from 1 to 100.
7. Write a program to sum all the numbers from 1 to 10,000.
8. Write a program to enter one number and then print out the multiplication table from 1 to 10 for that one number. For example, if you enter 3, then print out  $1 \times 3 = 3$ ,  $2 \times 3 = 6$ , etc.
9. Write a program to input 100 numbers, and print out these 100 numbers anytime during the execution of the program.
10. \*\*\*\*\* Write a program to input 100 numbers, and then print out these 100 numbers AFTER you have entered all of the 100 numbers.

Do you see that this problem is very similar to problem 8 but much more difficult to solve? You **do not** have to do this problem for now because you cannot solve it using the commands that we have learned so far.

11. Write a program to input 100 numbers. Have the program count how many of those numbers are less than 50. Print out the count at the end.
12. Write a program to input a number into a variable  $n$ , and then print out  $n$  number of asterisks (\*). For example, if the user enters a 7, then the program will print out a row of 7 asterisks

13. \* Write a program to input a number into a variable  $n$  and a symbol, and then print out  $n$  number of that symbol For example, if the user enters a 7 and the symbol #, then the program will print out a row of 7 #s like this:

```
#####
```

14. \*\* Write a program to input two numbers into two variables named *column* and *row*. Print out a rectangle using asterisks (\*) having *column* columns and *row* rows. Hint: you need to use two FOR loops, one nested inside another. For example, if the user enters 5 for *column* and 2 for *row*, then the print out will be:

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

15. \*\*\* Enter a number and a symbol, and then print out a triangle with that number of rows using that symbol. For example, if the user enters a 6 and the symbol # then the program will print out

```
#
##
###
###
##
#
```

If the number entered is an odd number then the triangle will have one extra row in the middle like the following with 7 rows

```
#
##
###
####
###
##
#
```

Your program needs to handle even/odd rows correctly. Also, if the user enters a negative number, then the program will print out an error message. Hint: you need to use nested FOR loops for this.

16. \*\*\*\* Write a program to automatically generate the first 40 Fibonacci numbers. Look up Fibonacci numbers in Wikipedia. Hint: the best solution only needs 2 variables for generating the sequence and 1 variable for counting to 40.
17. Repeat question 16 but print out the first 100 Fibonacci numbers. What happened to the numbers? Why is that?