



**Computer Science Virtual Learning**

# **HS Computer Science A**

**May 7th, 2020**



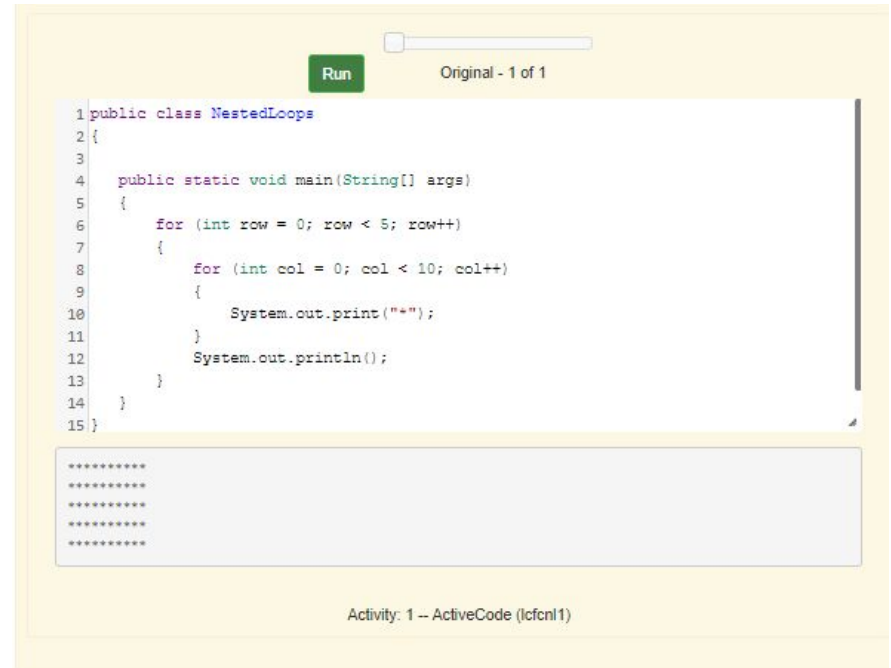
Lesson: **Nested For Loops**

**Objective/Learning Target:**

Understanding what a Nested For Loop is and the how to apply it using Java

# What is a Nested For Loop?

A **nested loop** has one loop inside of another. These are typically used for working with two dimensions such as printing stars in rows and columns as shown.




```
1 public class NestedLoops
2 {
3
4     public static void main(String[] args)
5     {
6         for (int row = 0; row < 5; row++)
7         {
8             for (int col = 0; col < 10; col++)
9             {
10                System.out.print("*");
11            }
12            System.out.println();
13        }
14    }
15 }
```

\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*

Activity: 1 -- ActiveCode (lcfcn1)

# What is a Nested For Loop?

The number of times a nested for loop body is executed is the number of times the outer loop executes times the number of times the inner loop executes. For the example above the outer loop executes  $4 - 0 + 1 = 5$  times and the inner  $9 - 0 + 1 = 10$  times so the total is  $5 * 10 = 50$ .

A screenshot of a code editor window. At the top right, there is a "Run" button and a progress indicator showing "Original - 1 of 1". The code is as follows:

```
1 public class NestedLoops
2 {
3
4     public static void main(String[] args)
5     {
6         for (int row = 0; row < 5; row++)
7         {
8             for (int col = 0; col < 10; col++)
9             {
10                System.out.print("*");
11            }
12            System.out.println();
13        }
14    }
15 }
```

Below the code editor, the output is displayed as a 5x10 grid of asterisks:

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

At the bottom of the window, it says "Activity: 1 -- ActiveCode (lcfcn1)".



## Common Mistakes

- Forgetting to change the thing you are testing in a `while` loop and ending up with an infinite loop.
- Getting the start and end conditions wrong on the `for` loop. This will often result in you getting an **out of bounds error**. An **out of bounds** error occurs when you try to access past the end of a string.
- Jumping out of a loop too early by using one or more return statements inside of the loop.



## Check Your Understanding

1. How many times does the following code print a \*?

```
for (int i = 3; i < 8; i++)
{
    for (int y = 1; y < 5; y++)
    {
        System.out.print("*");
    }
    System.out.println();
}
```

- A. 40                                      B. 20  
C. 24                                      D. 30

2. What does the following code print?

```
for (int i = 2; i < 8; i++)
{
    for (int y = 1; y <= 5; y++)
    {
        System.out.print("*");
    }
    System.out.println();
}
```

- A. A rectangle of 8 rows with 5 stars per row.  
B. A rectangle of 8 rows with 4 stars per row.  
C. A rectangle of 6 rows with 5 stars per row.  
D. A rectangle of 6 rows with 4 stars per row.

3. What does the following print?

```
for (int i = 3; i <= 9; i++)
{
    for (int j = 6; j > 0; j--)
    {
        System.out.print("*");
    }
    System.out.println();
}
```

- A. A rectangle of 9 rows and 5 stars per row.  
B. A rectangle of 6 rows and 6 stars per row.  
C. A rectangle of 7 rows and 5 stars per row.  
D. A rectangle of 7 rows and 6 stars per row.



## For More Resources and to Check Answers

Go to: <https://runestone.academy/runestone/books/published/apcsareview/LoopBasics/INested.html>