

Nested For Loops

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Before we begin

- Make sure you have Java & Java JDK downloaded on your computer
 - can run **java -version** in terminal to check
- Make sure you have IntelliJ downloaded on your computer
- *Suggested:* Watch previous Java tutorials

What is a nested for loop?

A **nested loop** is created
when a loop placed inside
another loop

Vocab Alert!

outer loop: a loop with another loop inside it

inner loop: a loop that is inside of another loop

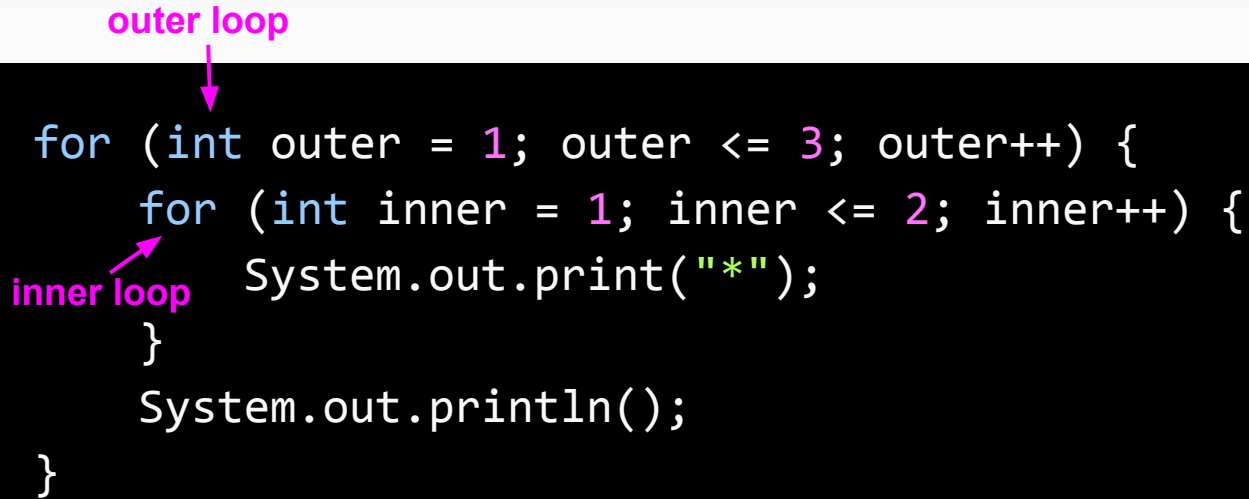
Outer and Inner Loops

- For each run of the outer loop the inner loop will run to completion
- There can be more than 2 loops included in a nested loop, you can go down as many levels as are needed to complete your goal
- The inner loop test can be dependent on the outer loop.
 - For instance, you might start the inner loop on the outer loop's loop variable or make its test based on the outer loop's loop variable

Note:

All rules that apply to a single loop apply to a nested loop. Look out for loops that never run, loops that run forever, places where you might want to break out of a loop, and fence post problems.

Example Nested Loop



```
for (int outer = 1; outer <= 3; outer++) {  
    for (int inner = 1; inner <= 2; inner++) {  
        System.out.print("*");  
    }  
    System.out.println();  
}
```

Output

**

**

**

**** outer loops runs 3 times and inner loop runs 2 times ****

Tracing a Nested Loop

Tracing a nested loop is just like tracing a single loop except you keep track of 2 loop variables instead of one. For each run of the outer loop the inner loop will need to be traced completely. Keep an eye out for code that is inside the outer loop but outside of the inner loop.

Nested Loop Exercises

How Many *s are printed? The Output?

Time Limit: 6 minutes

```
for (int outer = 1; outer <= 2; outer++) {  
    for (int inner = 1; inner <= 4; inner++) {  
        System.out.print("*");  
    }  
}
```

Answer:

8

Output:

How Many *s are printed? The Output?

Time Limit: 6 minutes

```
for (int outer = 1; outer <= 4; outer++) {  
    for (int inner = 1; inner <= outer; inner++)  
    {  
        System.out.print("*");  
    }  
    System.out.println()  
}
```

Answer:

10

Output:

*

**

Helpful Hint

When using nested loops to print figures the outer loop will always determine the height of the figure and the inner loop will always determine the width

Nested For Loop Exercise 1

Time Limit: 6 minutes

Write a method to print out the following shape:

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

**** the side length of
this figure is 4****

Make the “side length” of the figure a parameter to your method

Nested For Loop Exercise 2

Time Limit: 6 minutes

Write a method to print out the following shape:

```
+-----+  
 \       /  
 /       \  
 \       /  
 /       \  
+-----+
```

**** the height of this
figure is 2 and
Its width is 4 ****

Make the height and width of the figure parameters to your method

Nested For Loop Exercise 3

Time Limit: 6 minutes

Write a method that prints the following figure:

```
1
22
333
4444
55555
```

**** the height of this
figure is 5 ****

Make the “height” of the figure a parameter to your method

Nested For Loop Exercise 5

Time Limit: 6 minutes

Write a method that prints the following figure:

```
.+.+.
+.+.
+.+.
+.+.

```

**** the width of this
figure is 5 and its
height is 4****

Make the width and height of the figure parameters to your method.

Hint: base symbol that is printed in column off even/oddness of inner loop variable

Practice for Later: Print Tower

Write a method to print the following tower figure:

```
-----  
| -x-x-x- |  
-----  
| -x-x-x- |  
-----  
| -x-x-x- |  
-----  
| -x-x-x- |  
-----
```

**** the height of this
figure is 4 and its
width is 3****

Make the height and width of the tower parameters to your method

The End