

Computer Science by AP Tutorial

Java `for` Loop

What is a `for` loop?

A `for` loop is a control flow statement in Java used to execute a block of code a specific number of times.

Syntax:

```
for (initialization; condition; update) {  
    // Code to be executed  
}
```

Components:

1. Initialization

- Executed once at the beginning.
- Typically used to declare and initialize a loop control variable.
- Example: `int i = 0`

2. Condition

- Checked before each iteration.
- Loop continues **while this is true**.
- Example: `i < 5`

3. Update

- Executed after each iteration of the loop body.
- Usually used to update the loop control variable.
- Example: `i++`

Order of Execution:

1. Initialization

2. Condition
3. Code Block
4. Update ...
5. Condition
6. Code Block
7. Update (Repeat from step 2 until Condition is false)

Example:

```
for (int i = 0; i < 5; i++) {  
    System.out.println("i = " + i);  
}
```

Output:

```
i = 0  
i = 1  
i = 2  
i = 3  
i = 4
```

How it works step-by-step:

1. `int i = 0` → initializes `i`.
2. Checks `i < 5` → if `true`, goes inside the loop.
3. Executes `System.out.println(...)`.
4. Executes `i++` to update `i`.
5. Repeats steps 2-4 until `i < 5` is `false`.

Infinite Loop Example:

```
for (;;) {  
    // runs forever unless there's a break statement  
}
```

Notes:

- You can use `break` to exit the loop early.
- You can use `continue` to skip the current iteration and jump to the update step.
- All three parts (`initialization`, `condition`, `update`) are optional, but the semicolons must be present.