Sequences & Symmetric Bounds

A second idiomatic variation of the *for* loop is used to generate sequential data, such as counting from `start` to `finish`:

```
for (int var = start; var < finish; update-var)...
```

In this ***for*** loop the actions in the body are executed with the variable `var` set to each value between `start` and `finish`, **inclusive**.

Because we include both ends, we say that the bounds used in this loop are **symmetric**. Use this loop to count from `1` to `100` like this:

```
for (int i = 1; i <= 100; ++i)
```

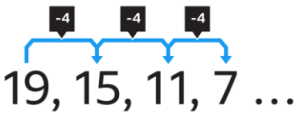
Here's another example. In this pattern, the loop variable is used to **produce a sequence of data**.

```
int factorial(int n)
{
    int result = 1;
    for (int i = 1; i <= n; ++i) { result *= i; }
    return result;
}
```

As you can see, this example uses the loop to implement the **factorial function**, the product of the integers between `1` and `n`. The ***for*** **loop variable** `i` goes from `1` to `n` (inclusive). The body of the loop updates `result` by multiplying it by `i`.

Counting Down

As the *factorial* example shows, the update update expression need only move the loop variable closer to the loop bounds. It must **advance** the loop; it doesn't need to increment. Here's and example:



Here we want to **start the loop at a large number**, and **decrease the index by four** on each iteration. In other words, we want to **count down** rather than counting up. Here's what this looks like in code:

```
for (int i = 19; i >= 0; i -= 4)
    cout << i << " ";
cout << endl;
```

> *Don't use conditions like `i != 0`, unless you are certain that the condition will be met. Because we are decrementing by four, we will never set `i` to `0` and so we would have an **infinite** or **endless** loop.*