Repetition in Java

Counted Loops
(For Loops)

Recall: Simple Selection
One Action

The simplest selection statement tests a single condition, and has a single action if the condition is true.

```
int age = In.getInt();

if (age >= 18)
{
   System.out.println("You can vote!");
}
```

Recall: While Loop
(test decision at beginning)

The WHILE loop is the general, all-purpose loop. Any looping problem can be solved with a while loop. It tests the condition at the beginning of the loop.

```
int age = In.getInt();

while (age >= 18)
{
    System.out.println("You can vote!");
    age = In.getInt();
}
```

Recall: Do Loop
(test decision at end of loop)

The DO loop is also fairly general. The key difference is that it tests the condition at the end of the loop. As a result, it will always execute the code inside the loop <u>at least once</u>.

```java
int number = -1;  // initialize to a bad value

do
{
   System.out.println("Enter a positive number");
   number = In.getInt();
} while (number < 0);
```

Counted Loops
(repeat a specific numbers of times)

With WHILE and DO loops, the loops will continue to repeat whenever the condition is TRUE.

Once the condition is FALSE, the loop ends.

There is another type of loop where we repeat a fixed number of times. Strictly speaking, it still uses TRUE and FALSE, but the overall idea is to count a specified number of times.

Counted Loops
using a WHILE statement

Since the WHILE loop can be used anywhere a loop is required, it should work fine for counting something.

```
int count = 1;

while (count <= 5)
{
    System.out.println("The count is " + count);
    count = count + 1;
}
```

Counted Loops
using a FOR statement

The FOR loop is specifically designed for counting.

Notice that the variable used for counting can be declared as part of the FOR statement (this is not done with while or do loops).

The test of the condition and incrementing the counter are also part of the single FOR statement.

```
for (int count = 1; count <= 5; count = count+1)
{
    System.out.println("The count is " + count);
}
```

Mathematical Operations and their Short Forms

Operation	Long Form	Short Form
Increment (by 1)	`x = x + 1`	`x++`
Decrement (by 1)	`x = x - 1`	`x--`
Addition	`x = x + 5`	`x += 5`
Subtraction	`x = x - 2`	`x -= 2`
Multiplication	`x = x * 5`	`x *= 5`
Division	`x = x / 10`	`x /= 10`
Modulo (remainder)	`x = x % 3`	`x %= 3`

Counted Loops
using a FOR statement

The same FOR loop using the more common form of the
<u>increment</u> operator. Either form is correct and
acceptable.

```
for (int count = 1; count <= 5; count++)
{
    System.out.println("The count is " + count);
}
```