Repetition

One of the greatest strengths of computers is their ability (and willingness) to do the same task over and over again.

In addition, the computer will always perform the task in exactly the same way for the same input, provided the programmer (you!) has done their job correctly.

Repetition – Example

Suppose we wanted to output the numbers from 1 to 10, in order, on the screen. How could we do this? How does <u>efficiency</u> affect how we would do it?

What if we wanted to count to 100? 1000? Would that change our strategy?

Counted Loops

The simplest form of repetition is called a <u>loop</u>, and the simplest type of loop is the <u>counted loop</u>.

In a counted loop, we execute some segment of code a fixed number of times.

In English, we might say:

Do *something* 10 times

Are We Done Yet?

If we are going to perform a task a fixed number of times, we need to keep a count so we know when we're done.

Since counting involves whole numbers, we use an <u>integer variable</u> as our counter. Try to pick a meaningful name for the counter.

Sample Code – Counted Loop

```
var count : int              %create a counter

count := 1                   %set a starting value
loop
  put count
  count := count + 1         %increment the counter
  exit when count = 10       %set end value ???
end loop
```

Try this yourself. What does it do? Is there a problem? How can we make it work as expected?

Sample Code – Counted Loop

```
var count : int              %create a counter

count := 1                   %set a starting value
loop
  put count
  count := count + 1         %increment the counter
  exit when count > 10       %set end value ???
end loop
```

Try this yourself. What does it do? Is there a problem? How can we make it work as expected?

Sample Code – Counted Loop

```
var count : int              %create a counter

count := 0                   %set a starting value
loop
  count := count + 1         %increment the counter
  put count
  exit when count = 10       %set end value ???
end loop
```

Try this yourself. What does it do? Is there a problem? How can we make it work as expected?

Exercises – Counted Loops

1. Ask the user their name and output the name 5 times. Extend: Allow the user to specify the number of outputs.

2. Output the times tables (from 1 to 12) for a number of your choice. Extend: (a) Allow the user to pick the number; (b) Allow the user to specify the start and end to the table (e.g., 4 to 15); (c) Allow the user to specify the step size (e.g., by 3 is 4, 7, 10, 13).

3. Output the numbers from 1 to 10 both numerically (i.e., "1", "2", etc.) and graphically (using the character of your choice). For example, the line for 3 might read "3   ***", while 4 would be "4   ****".

4. Ask the user to enter 5 integer values between 1 and 50. Create a simple bar graph using the character of your choice. Extend: (a) Let the user specify the number of values; (b) Let the user enter any values they want, and scale your graph so it fits on the screen.