

## Iteration, basic programming constructs and loops | Part B

So now let's look at another program. The computer will store a secret number and the user is going to guess the number. Of course we don't know how many guesses this will take the user but assuming that they choose a different number each time and if the number was 999, it would take potentially 1000 guesses! However, they could guess it correctly first time. We can't use a **count controlled** loop because we do not know how many executions of the loop will be needed so instead, we will use a **condition controlled** loop.

There are two kinds: **while** and **repeat**. The key difference between these two is whether we want the loop to always execute at least once and then check the condition has been met - this is a **repeat** loop, or to test the condition first before executing the loop - this is the **while** loop. For this program, we are going to use a while loop.

So, I have a very simple program that's going to read in a number from the user, it's going to double it and then print that number out on the screen. So, let's have a look at the program. I've only got one variable here and that's for the number that the user is going to enter. They are going to input the number and then we are going to double it and notice that I am using the **while** keyword for the loop. Don't forget the colon at the end of that line otherwise your code won't work. So, on the next line double the number and print it out, very simple. So, let's run the program. I'm going to choose the number 6 and it's going to double it for me. Now you will notice that the program just keeps on running because there is nothing to stop it. This is a condition controlled loop - I'm just asking it to double the number and that is exactly what it is doing. So to stop it I've actually got to kill the program completely otherwise it would just carry on. And this is called an infinite loop, and when these happen it's because you haven't thought about how the program is going to run when you designed it so it's really important to consider that bit first.

So now let's look at another program. I've changed the code very slightly so that we don't have the infinite loop this time. Let's have a look at it. If you look I have now added in an **if** statement that reads if number greater than 101 and the statement beneath it is **break**. What this will do is when the number goes above 101 then we will drop out of the loop and stop executing the code which is exactly what we want to happen. So, now let's run this program. Okay, so it asks me again please enter a whole number, I'm going to enter the same number as I did before which was 6 and we will run the program this time and you will notice that in fact it stops at 192 and the reason for that is we have triggered the **if** statement because the number has gone over 101 and the **break** statement has now been executed we've dropped out of the loop which is exactly what we wanted to happen.