

While Loops

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Sometimes we need to perform an action more than once

- Pour a cup of coffee for each guest
- Wash the dishes until they are all clean
- Make a name card for each guest attending a party

Loop an unknown number of times

For loops allow us to execute code a fixed number of times

- So if we know there are twenty guests we can print twenty name cards

```
for steps in range(20):
```

What if we don't know how exactly how many times to repeat an event

- Wash the dishes until they are all clean
- Keep guessing until you get the right answer
- Read all the values in a file or in a database

While Loops allow you to execute until a particular condition is true

```
answer = "0"
```

You have to declare the variable before you use it in the loop

```
while answer != "4":
```

Execute the code in the loop over and over while the variable answer is not equal to 4

```
    answer = input("What is 2 + 2 ")
```

```
print ("Yes! 2 + 2 = 4")
```

Remember only the indented code is repeated, so this command only executes after you exit the loop

DEMO

While loop

Can you figure out what this code will do?

```
import turtle
counter = 0
while counter < 4:
    turtle.forward(100)
    turtle.right(90)
    counter = counter+1
```

- Yes, it will draw a square

While loops can be used instead of for loops

```
import turtle
for steps in range(4):
    turtle.forward(100)
    turtle.right(90)
```

```
import turtle
counter = 0
while counter < 4:
    turtle.forward(100)
    turtle.right(90)
    counter = counter+1
```

- Both loops have the same end result

How many lines will this loop draw?

```
import turtle
counter = 0
while counter <= 4:
    turtle.forward(100)
    turtle.right(90)
    counter = counter+1
```

- It will actually draw 5 lines! Not 4!

How many lines will this loop draw?

```
import turtle
counter = 1
while counter < 4:
    turtle.forward(100)
    turtle.right(90)
    counter = counter+1
```

- It will draw only 3 lines! Not 4!

Looping issues

How many lines will this loop draw?

```
import turtle
counter = 0
while counter < 3:
    turtle.forward(100)
    turtle.right(90)
```

- Trick question! It will execute forever! Because the value of counter is never updated! How can the counter ever become greater than 3? This is called an endless loop and sometimes we get one by mistake.

DEMO

How to get out of an endless loop in Visual Studio

It's easier to make a mistake with a while loop than a for loop

- Use for loops whenever possible

Don't fear the while loop

- You will encounter problems where a while loop is the only way to solve a problem
- They are often used when reading data (read until no more data)

Your challenge

- Create an etch a sketch program
- Have the user enter a pen color, a line length, and an angle
- Use turtle to draw a line based on their specifications
- Let them specify new lines over and over until they enter a line length of 0.
- When the user specifies a line length of 0 stop drawing.

Congratulations

- You can manage problems which require repeating the same task and end when a specific condition occurs





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