Lesson 1: Intro to Coding and Python

What is Code?

Code is like a recipe that you give to a computer to do something that you want.

Like a recipe, the steps have a certain **order.** The computer looks at your recipe (code) and knows it has to do the steps from top to bottom.

When we write code to solve a specific problem, we call that an **algorithm**. That also makes us sound smarter than we are.

In this example the "x = 0" will happen before the "x = x + 1" because it comes before.

```
'''
What even is code?

This is a BLOCK COMMENT. The computer skips everything between the 3 tick marks.
'''

# This is a comment because it started with #
# The computer sees the # and knows it doesnt have to do anything

x = 0       # x is a variable that has the value 0
print(x)    # this will output x to the screen
x = x + 1   # we can change the value of x
print(x)    # and output it again.
```

The red and green text are **comments**. The computer sees a comment and says "that's not part of the recipe" and skips it. You can write whatever you want there and the code won't behave any differently.

When the computer sees a line that isn't a comment, it knows that's **code** and it needs to do what you told it to do.

How do we write it?

We create our code in **an editor.** Sometimes that's also called **a development environment.** It's basically a fancy way of editing text files, and will usually highlight your stuff.

We'll use **Visual Studio Code** to edit our code.

In VS Code you can create a new file by right clicking on the left hand menu, selecting New File, and typing a name like myfile.py.

How do we run it?

We run it in the terminal. Hit **CTRL+`** in VS Code to open the terminal. In there type **python <your file name>** to run that code.

What is Python?

Python is a **scripting language.** That means you can write code, and there's only **1 step to run it.** Other programming languages like Java, C++, C, etc. need to be **compiled** first before they can be run.

Hello World

In programming it's a tradition to right a "hello world" program when you first start learning a new language. In Python that's literally one line, because the **print()** function will take what you give it as a parameter and output that to the console.

```
print("Hello, World!")
```

Try creating a file **hello.py** and running that code. You should see Hello, World! in the Terminal output.

Variables

In programming we use variables as a way to store some information. For example, if I want my code to ask you what your username is, I'll store your username as a variable.

Variables can have different values in Python:

```
a = 1           # an integer
b = 1.5         # a decimal number (we call these "floats")
c = 'q'         # One character
d = "a string"  # a string is a bunch of characters in one variable
```

Number Variable Operations

In code we can do different operation on variables:

```
a = a + 1
b = a + b
a = a * 2
b = a / 2
a = a - b
```

Activity: Try writing Python code to create 2 variables, name **first_number** and **second_number**.

- Set first_number to any number you'd like
- Print first_number to the console
- Create second_number and set it equal to 2 x first_number
- Print second_number
- Divide first_number by second_number and print that

String Variable Operations and input()

```
c = "My name is " + " Josh." # adding strings
c = f"A is {a} and B is {b}" # inserting values into strings
c = "BlahBlahBlah " * 10 # will be BlahBlahBlah BlahBlahBlah... 10 times
c = input("What's your name? ")
```

** The input line will ask "what's your name?" and take your answer in the terminal and save it to c!! **

Activity:

- Write a Python script/program to ask you what your first and last name is and save those to 2 different variables
- Add those variables and save it in a third variable
- Print the third variable to the screen 20 times (**we'll learn next time how to do this better**)

Changing Variable Types ("Casting")

What if you want to get some input that isn't a **string type**. For example, if you want to calculate the area of a square with side length 5, you need the side length of 5, not **"5"**. **Because "5" * "5" doesn't make sense.** If you try to do that, Python will give you this:

```
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: can't multiply sequence by non-int of type 'str'
```

In this example, we **cast the answer to the types we want** so that we can do math with them later on. We use **int()** to convert to an integer and **float()** to a decimal number.

```
# Casting
age = input("What's your age")
age = int(age) # save it as a number
pi = input("Whats pi?")
pi = float(pi) # save it as a decimal number
```

Activity:

- Write a Python script/program which asks the user what the length and width of a rectangle is, and it calculates and outputs the area and perimeter of that rectangle.