Materials required for course:

- Something like a plushie, plant, figure, rubber ducky
- Pencils, good pens, crayons
- Composition notebook
- Good laptop

Intro to Comp Sci - Python

xp

What is computer science?

Computer science at its core is actually the study of computers and the way computers interact with their users and **interface** their **processes** , though programming and **syntax** is a large part of that.

What is Syntax?

- Syntax is the grammar that dictates the commands that we use to interface with the computer's processes.

What is a process?

- A program is not a process, but processes are programs. Processes are programs that are in the *process* of being executed in the moment, programs can be dormant.

What is Python?

Python is an **high level, dynamic, object oriented programming language** that is widely considered to be an easy language to learn for beginners.

What is a high level language?

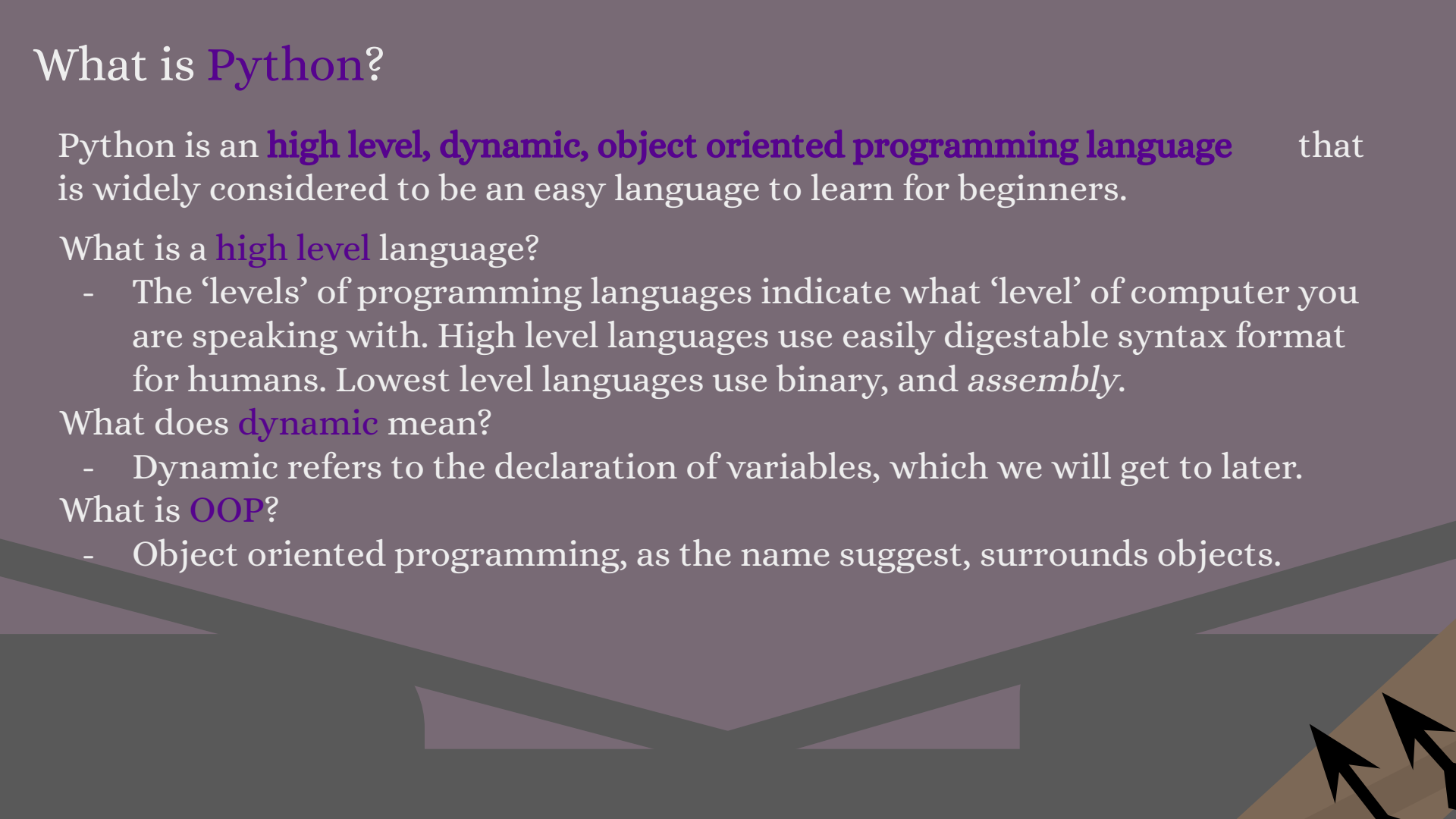
- The ‘levels’ of programming languages indicate what ‘level’ of computer you are speaking with. High level languages use easily digestable syntax format for humans. Lowest level languages use binary, and *assembly*.

What does dynamic mean?

- Dynamic refers to the declaration of variables, which we will get to later.

What is OOP?

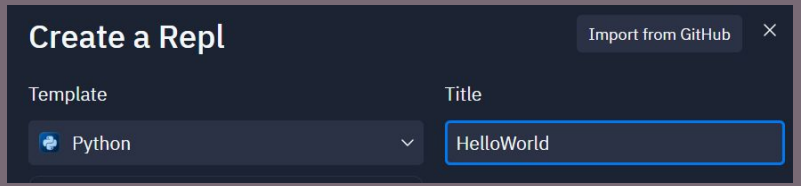
- Object oriented programming, as the name suggest, surrounds objects.



Starting off in Python.

Navigate to replit.com and create an account. This is what we will be using to program with python.

Create a new ‘repl’, select the python language
Under templates.
Name it
“HelloWorld”



New syntax:
What is a viewport?

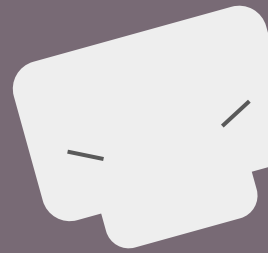
- The viewport is just the name of the main workspace your code goes in.

Your first code

In your viewport, enter in print(“Hello world!”) and compile and pray.

What do you notice about this line of code?

- The message or statement must be enclosed in quotation marks, which must also be inside double parentheses.

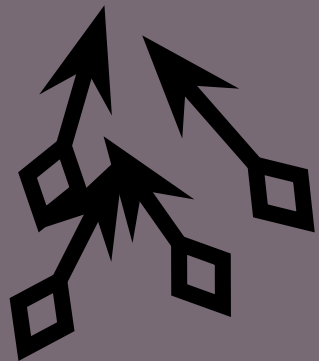


Why is this?

- The string “Hello world!” must be passed into the method’s argument.

What is a method?

- A method is in simple terms an action that can be performed on the arguments (args) passed into the parentheses.



Variables:

Python is a dynamic programming language, which means that variables do not have to be declared to be assigned to any data type.

Examples:

x = 10

y = “Zoe”

z = 1.1

a = x

Arrays:

Like variables, the data structure array also does not have to be declared during its instantiation, it can simply be created with the following syntax:

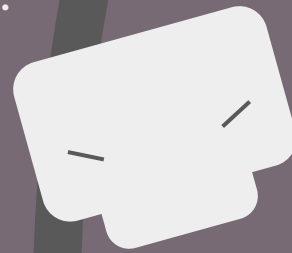
arr = [1, 2, 3, 4, 5]

You can think of arrays like an ordered set of boxes, each box has an identifiable index number that can be used to access them.

Naming conventions - camelCase :

Your variable names should reflect their purpose like this.

Examples; runSpeed, Gravity, playerName



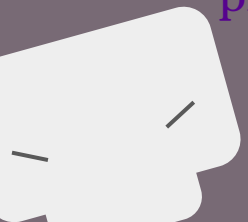
Activity :
Now, try to make a program that includes a variable named age with your age, an array called birthday with your birth date in it, and a variable called name with your name in it.

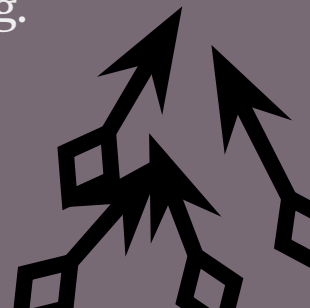
Hint : you can print variables by printing the name, commas separate your arguments.

```
print(x, y, “foo”)
```

The Rubber Ducky Method* :
The rubber ducky method is a method of problem solving where a programmer will explain his or her code to an inanimate object (rubber ducky, plush doll, figurine) in order to speak their problem out in hopes to identify their error.

*Yes, this is a very real thing.





Conditional/Branch Statements

Unlike other languages, python has extremely straight forward syntax for conditionals. Which we will break down in turn.

```
# hashtags in python indicate programmer comments.
if x == y : # this if statement evaluates if x is equal to y
        # the if statement executes the code inside if its condition is true
        doSomething( )
elif x < y : # this else if will evaluate if x is less than y
# the “else if” will only be checked if the if is passed over
        foo( ) # you can have more than one line of code in if blocks!
        bar( ) # Python likes indentation, indent to include more lines
else : # if both else if and if are skipped, else will execute its code
        if x and y : # and evaluates to true if both x and y are true
                print(“I’m inside a true statement!”)
        elif x or y : # or evaluates to true if either x or y are true
                print(“I’m in a statement that could be true!”)
```

I/O processing (Input / Output)

That was a lot of information. Let's go to something way more simple.

Output functions are ones that output to the console, like the print function we've been working with.

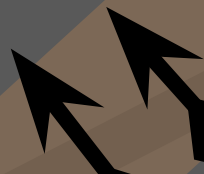
```
print(arg)
```

Input functions are similarly simple, they read input from the console that the user can type out

```
arg = input("please input something")
```

As you can see, a (in) variable will be set to the contents of the user input. The input command also prints out a message to the user*

*you may leave this blank if you do not want it to print anything



Assignment :

Prompt the user to enter their favorite character from a series (preferably one that has a set of a few possible answers, like tom and jerry for example) and ask for them to do a set of simple arithmetic equations and verify the validity of their answers.

- You will need if statements and I/O statements to accomplish this, as well as an understanding of arithmetic and variables.

Hint : if you get stuck, feel free to use the rubber ducky method to find out where you are struggling before asking for help from the teacher.

Loops

Loops are an extremely valuable function in all of programming, they loop until their condition is met, allowing for much more complexity in your programs

For loops :
A for loop will execute a set amount of times specified in its condition.

```
for x in range(10) :
        print(“<3”)
# you can iterate through arrays like this:
for x in myArray :
        print(x)
```

While loops :
A while loop will execute forever or until its condition does not evaluate to true.

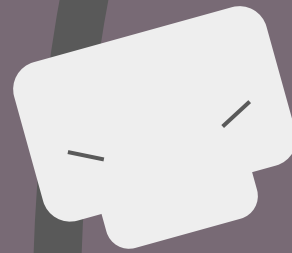
```
i = 0
while i < 10 :
        i+=1
# you can also loop infinitely like this:
while True :
        doSomething()
```

Functions

Functions are another backbone of programming, they make complex programs more manageable and easy to read. Functions allow the programmer to ‘reuse’ segments of program.

```
def getSum(x, y) # this function adds two numbers and prints them
    print(x + y)

# down here is the rest of your program
getSum(10, 1)
getSum(11, -1)
getSum(2, 2)
```



Objects

Objects in python are much different than in other languages, in python objects are represented by classes. You can manipulate the way that your object is initialized by using the __init__() function:

In objects, it is common to use either “this” or “self” to refer to the current object, though any word can be used.

```
class myObject :
    def __init__(this, size, color)
        this.size = size # initializes ‘size’ to a passed in variable
        this.color = color # initializes ‘color’ to a passed in variable
```

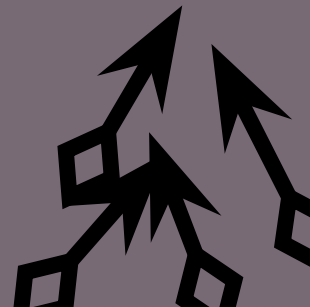
You can also define how the object you created is printed out, like how when you print an array it automatically gets formatted like so; [1, 2, 3]

```
def __str__(this)
    return f“{this.size}, {this.color}” # will print out size, color
```

Assignment :

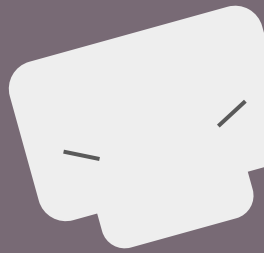
For this assignment, you will have 2 days in class to work on it.

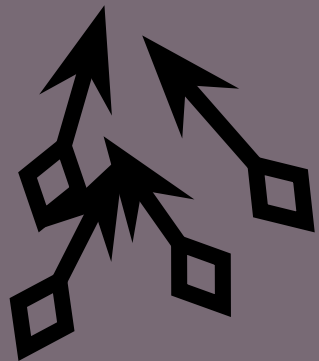
In this assignment, you will create a turn based game that you can be as creative on as you like! The only requirements are that you use what you learned in class to create a fun and interactive experience, you will not be required or expected to create a game with any visuals, you can and should create a text-based game.



Switch statements

Try/Catch





Resources for further exploring

https://stackoverflow.com/

https://www.geeksforgeeks.org/

https://docs.python.org/3/library/index.html

https://opensource.com/article/18/4/easy-2d-game-creation-python-and-arcade

https://realpython.com/platformer-python-arcade/

https://www.youtube.com/watch?v=6gLeplbqtqg

https://www.youtube.com/watch?v=Ongc4EVqRjo