Programming languages in simple terms are the languages that are used to communicate through technology and follow a different set of rules than real life languages. The contents of a programming language must be efficient and work well, this means that it should include features to improve the efficiency as well as it being compact and easy to view so that there is a lower risk of human error as well as for it to maintain a simple to view structure while maintaining its functions. A programming language must also be simple to type out and view, this is so it is not too difficult to learn and so that it is easy to understand it as well, however, it cannot compromise its efficiency for more simplicity so there needs to a sort of balance between the two.

There are a few basics to programming languages, for example, all programming languages contain a strict set of rules so that the language can function and maintain a structure with each thing performing a unique function. Not following these will result in a syntax error, which is where a piece of information that is required from that programming language is missing and therefore does not function as intended. There are two main types of programming languages, which are machine and high-level languages. Machine language is where it consists of 0’s and 1’s, this is not meant for humans to read easily as it is supposed to be used for computers to perform functions. This is also known as binary, and it is the most simple form of machine language and it is used for the controlling of the parts of a computer through true or false statements where 0’s are false and 1’s are true. A high-level language, for example python, is designed for humans to use and read, and therefore follows a similar structure and grammatical rule set to human language, abstracted though. An example of this would be how instead of the code saying, “If the variable is true then print ‘Ok’ “It would instead say “IF example\_variable == TRUE THEN PRINT ’Ok’ .“ This is so that it is faster to write out as well as being much easier to read and comprehend than 0’s and 1’s like a machine language.

There are five main principles to a programming language: these being casting data types, manipulating strings and integers, selection, iteration and data structures.

Casting data types is where you change the data type, in python, the default data type are strings. This can be changed by placing a certain data type in front of the code and if you were to have an example code for a calculation it may use “float” for example, Answer = INPUT(FLOAT(‘7\*7’)).

Manipulating strings and integers is where letters or numbers are changed or are found within a string or an integer to represent something, this can be used to make two variables or integers for example give two numbers or words. For example, two strings could be String1 and String2 and if you place them within python, they could print “Testing Test”. This is seen in this example of pseudocode:

Word1 = (“Ok”)

Word2 =(“Then”)

Finished = (Word1 + Word2)

This would print the previously mentioned words into the sentence, this can also be used with numbers in an integer with the same premise.

Selection in programming language is an area within code where a decision needs to be made, this is decided via If statements. Selection allows for there to be different responses depending on an input, for example, if there was a programme seeing if you were considered an adult or not there would be an if statement for people under 18 and above 18 where those below would not be considered adults.

Age = Input(int(“What is your age”))

IF Age == >18

THEN PRINT (“You are an adult”)

ELSE PRINT (“You are not an adult”)

Iteration is another word for a loop, this is so that a cycle can be repeated multiple times without the need of several repeating lines of code. An example of this could be if you had some code that generated a number between 1 and 100 and if it landed on 23, the loop of generating code would stop. The loop would be controlled by this line of Pseudocode:

IF RandNum = ‘23’

THEN PRINT(“You win.”)

BREAK.

This would result in the number to be randomly selected (not included within the example but it is implied) until the desired if statement is fulfilled, where the loop is then ended by the word break.

Data structures are used to organise, retrieve and store data easily so that there are no issues when doing these things. They are all made to perform one of these three things as their intended purpose. Some examples of data structures would be tuples and dictionaries. Tuples are numbers that are stored in a list, whereas dictionaries are words stored in a list. Words and numbers from both respectively can be retrieved and printed at any given time. An example of a tuple could be:

EvenNum [‘2’, ‘4’, ‘6’]

And an example of a dictionary could be:

Verbs [‘Shout’, ‘Walk’, ‘Talk’]

Data structures are important for maintaining and organising code so that it is kept clean and easy to view and read. This reduces the risk of errors occurring and it means there are less unnecessary strings, integers and other things within the code.

Within this explanation, I have referenced several sites, which will be referenced below here:

<https://anh.cs.luc.edu/python/hands-on/3.1/debugNotes/invalidSyntaxPrint.png> (example of a syntax error)

[Programming Languages: Types and Features - Chakray](https://www.chakray.com/programming-languages-types-and-features/#:~:text=A%20programming%20language%20is%20a,form%20and%20organise%20computer%20instructions.) (contents of programming language)

[Microsoft Word - OLevel\_2\_B4\_Clang\_26Mar.docx (nielit.gov.in)](https://www.nielit.gov.in/gorakhpur/sites/default/files/Gorakhpur/OLevel_2_B4_CLang_26Mar_SS.pdf) (introduction to programming language)

[String manipulation - Data types and programming techniques - OCR - GCSE Computer Science Revision - OCR - BBC Bitesize](https://www.bbc.co.uk/bitesize/guides/zb3yb82/revision/2) (Integers and String manipulation)

[9.7-Programming-Selection.pdf (rainford.org.uk)](https://rainford.org.uk/wp-content/uploads/2020/01/9.7-Programming-Selection.pdf) (Selection)

<https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.csteachingtips.org%2Ftip%2Fshow-students-multiple-examples-iteration-scratch-help-them-understand-and-recognize-more&psig=AOvVaw3irO8yzjbBRlA_ejg_6yea&ust=1705399021459000&source=images&cd=vfe&opi=89978449&ved=0CBEQjRxqFwoTCKDVycyQ34MDFQAAAAAdAAAAABAV> (Idea for an iteration example came from this image from scratch)

[What are Data Structures? - Definition from WhatIs.com (techtarget.com)](https://www.techtarget.com/searchdatamanagement/definition/data-structure#:~:text=A%20data%20structure%20is%20a,they%20need%20in%20appropriate%20ways.) (Data structure information)