Y9 Computer Science – Autumn 1 – Algorithms and Python programming

LEES BROOK COMMUNITY SCHOOL

Section A: Key vocabulary

Decomposition	Breaking a problem down into smaller parts so that you can create a solution.
Algorithm	A list of instructions that will do something when started.
Selection	A structure in programming that enables you to do different things depending on if a condition is met or not. IF
Iteration	A structure in programming that enables you to repeat something. FOR, WHILE
Variable	A location that is given an identifier that stores data. The data can be changed.
Assignment	The process of giving data to a variable.
Python	High level programming language
Abstraction	Looking at a problem and ignoring the irrelevant information
Definite iteration	Lopping that you know will end this is usually a For loop but can be a while if it is designed with a counter to track the number of loops.
Indefinite iteration	Looping that you don't know when it will end as it is dependent on a condition to be met.
Condition	A criteria that has to be met for something to happen, used in selection and indefinite iteration. For example a = 3.
Data type	Limits what can be stored in a variable. These include: string, integer, float, Boolean

Section B: Algorithms

You will be creating codes using the language python to do this at home you will need a compiler (the software to write and run the program on). You can download the one we use in school free from:
www.python.org/downloads/windows/

You could use these web based compilers:

repl.it/site/ide

www.programiz.com/python-programming/online-compiler/

When solving a problem you will need to do the following:

Identify a problem
↓
Abstract irrelevant information
↓
Decompose the problem into chunks
↓
Decompose each chunk into smaller parts
↓
Develop a program for each part
↓
Test the parts and fix errors
↓
Test the whole program and fix errors
↓
Evaluate the program
↓
Redevelop based on evaluation

Section C: Programming Commands

Output procedure
Output a string
Output stored data
	print()
	print("hello")
	print (age)

Input procedure Data needs storing in a variable	input("instruction") inputs default to strings

Variable declaration and assignment	age = 40
	age = input("Enter age: ")

Data Types and **casting** (changing data from one type to another)	String = "hello" str()
	Integer = 78 int()
	Float = 76.5 float()
	Boolean = True or False

Selection
Indents matter
	if age < 13:
	    print("No account")
	else:
	    print("Yes account")

Iteration
Indents matter
	for loop in range(1:10):
	    print(2*loop)
	while age <13:
	    print("No account")

Useful website for more examples:
www.w3schools.com/python/

Y9 Computer Science – Autumn 2 – Python Programming Continued

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Section A: Key vocabulary

Subroutine	A section of code that is coded out of sequence that can be called at any time.
Function	A subroutine that returns data back to the global pool of variables.
Procedure	A subroutine that does not return any data to the global pool of variables.
Parameter	The data that is passed into a subroutine (both functions and procedures can have parameters).
Array	A list of data stored as a single variable. Data can be; added to it, deleted from it, sorted in order, edited and extracted.
Index	The position of data stored in a list. Indexing starts at 0.
Logical operators	Mathematical symbols used in conditions. >, <, >=, <=, ==, !=
Boolean operators	Keywords used in conditions which result in a True or False response. AND, OR, NOT
Global variable	Variables that can be accessed any where in the program and are declared at the start of a program.
Local variable	Variables that are declared in a subroutine and can only be used in that subroutine.
Return	The command that returns data from a function to a global variable.

Section B: Robust programming

Program structure

As programs may be read by different people in the development and redevelopment stages it is essential to make the program Robust. To do this you just need to follow these simple steps in order (add to these sections as you create the code keeping your code organised):

1. Import libraries/modules
2. Declare global variable
3. Create subroutines
4. Create the main program

Comments

All sections should have suitable comments using either the # for short comments or “”””for extended comments””””.

Validation

When ever data is inputted by a user this should be checked for validity to stop human error. For example if you are expecting ‘Yes’ or ‘No’ the program should only accept ‘Yes’ or ‘No’. We usually use while loops with Boolean and logical operators to complete this.

Section C: Programming Commands

Subroutine procedure	def procedureName(parameters):
	    code in the procedure
	Example:
	name = “Joe”
	def outputName (name):
	    print(name)
	
	#calling procedure
	outputName (name)

Subroutine function	def functionName(parameters):
	    code in the procedure
	    return parameter/s
	Example:
	name = 0
	firstname = “Joe”
	surname = “Bloggs”
	def Name (firstname, surname):
	    name = firstname + surname
	    return name
	
	#calling function
	name = Name (firstname, surname)

Array	letters = [“a”, “b”, “c”, “d”]
	print(letters)
	print(letters[1])
	print(letters[0:2])

Useful website for more examples:
www.w3schools.com/python/