Teacher Training Notes

Session 1

Slide 1 – What is programming?

* Programming is a way to instruct the computer to perform various tasks.

Slide 2 – What is Python

* Python is a popular programming language that can be used to program computer scripts. It is easier to learn and read. Though it was created in the 90s, it is becoming more and more popular. In this course we will be using Python 3.

Slide 3 - What's it used for?

* Python is often used for software applications, data science, pages within a web browser, games and many other things.

Slide 4 - Who uses it?

* Instagram
* Spotify
* Amazon
* SurveyMonkey
* Facebook
* Uber
* Netflix
* Dropbox
* Google

Slide 5 - Racing with Python

* In the last session, we will use the Python we have learnt to program some Edison robotic cars to self-drive.

Slide 7 - Naming Python Files

* When you name your python files, make sure they always end with .py

Slide 8 - Naming Python Files

* When naming your file, try to name it with what the script actually does

Slide 9 - Naming Python Files

* Here are some examples of naming Python files, each one describes exactly what the file does.

Slide 10 - Naming Python Files

* The rules to naming your Python file is that they should always be; lowercase, use underscores instead of spaces and include no punctuation. This makes it easier when you want to run your python script.

Slide 11 - Running a Python Script

* When you have created your script, you then run it, to check that it works.

Slide 12 - Running a Python Script

* As we are using Python 3, whenever you want to run your program, in the terminal, you type python3 and then the name of your script. Here are two examples of running scripts.

Slide 13 - Running a Python Script

* So if you run the below script, it will print “Hello World”

Slide 14 - Text Editor

* A text editor is a piece of software we use to write our programs. During this course we will be using Visual Studio Code. This is accessible through the following website.

Slide 15 - .code.ihf.apps.cloud-ops.co.uk – Needs amending.

Slide 16 - Hello, world!

* Hello World is often the first program written by people learning to code.
* So let’s try this now.
* First create a new file within Visual Studio Code and save straight away as hello.py.
* Within the code type print(“Hello World”) and save again.
* Then run it, by clicking New Terminal at the top and type python hello.py.
* This should run your first program!

Slide 17 – Variables

* A variable is a container for a value.

Slide 18 – Variables

* The equals sign assigns your value to the variable you have just created.

Slide 19 – Variables

* These are all examples of variables;
* the variable name holds the value Charlie,
* the variable age holds the value 27
* the variable left\_to\_pay holds the value 29.99
* the variable has\_paid holds the value False

Slide 20 – Variables

* When creating your variable, you can:
* Use any mix of letters, numbers and some special characters
* It must start with a letter
* Keep lowercase
* Use underscore where there are spaces

Slide 21 - Data Types

* In Python, there are many data types to become familiar with.

Slide 22- Strings

* Strings are letters, numbers or phrases that are surrounded by quotes.

Slide 23 - Strings

* On the screen are all examples of strings, as they are all characters surrounded by quotes.

Slide 24 – Escaping

* Escaping is a way to use backslash and letters to manipulate the strings

Slide 25 – Escaping

* For example: putting \n next to your string will give a new line, \t will tab a line, and \" will include a double quote within your string

Slide 26 - Escaping

* These two examples show escaping in use
* The first - favourite\_food = "Pizza from \"Dough N' Sauce\"" – will include quotes around the name within the string
* The second - shopping\_list = "Apples\nBread\nMilk\nEggs" – will have each item of the shopping list ton a new line

Slide 27 – Coding Time - Section A

* Now, it’s your time to try some coding, please refer to Section A on your worksheets.
* You’ll have 20 minutes on this.

Slide 28 – Integer

* Another data type is integer or int. This is a whole number.

Slide 29 – Integer

* Here are some examples, as you can see they have no quote marks, so an integer is simply a whole number without quotes.

Slide 30 – Float

* A float is a decimal number, again without quotes.

Slide 31 - Float

* Here are some examples, as you can see like integers, they have no quote marks, so a float is any decimal number without quotes.

Slide 32 – Boolean

* A Boolean is a data type that has one of two possible values. This can be True or False.

Slide 33 - Boolean

* The syntax is important here, it is either True or False, with the first letter capitalised and no quotes.
* As these are known definitions in Python, when you type these into the text editor, they should turn blue.

Slide 34 – None

* The last data type we will look at is None.
* This is the absence of a value, if you think of an excel spreadsheet, when a box is blank, it has No value rather than a zero value.

Slide 35 - None

* These can be useful if you want to know that a shopping basket is empty for example.

Slide 36 - Numerical Operators

* These are similar to the ones you may have learnt previously in maths lessons with a few new additions.

Slide 37 - Numerical Operators

* Read through the box, working out each example.
* Exponent is the same as the power to, 4\*\*2 is 4 \*4 so 16.
* Modulus gives you the remainder, so when 10 is divided by 3 the remainder is 1

Slide 38 - Numerical Operators

* You can use the numerical operators in your scripts.

Slide 39 - Numerical Operators

* You can assign integers or floats to variables and then and then use the numerical operators on them, as shown in this example.

Slide 40 – Concatenation

* Concatenation merges two strings together by using the + symbol.
* It can only merge strings together, it cannot merge an integer and string.

Slide 41 - Concatenation

* This example shows that when merging the string “Hello” and the variable first\_name, it will print Hello Bob.
* The second example shows that when merging the string “Good morning” and the variable full\_name it will print Good morning Bob Jones as the full name was concatenated earlier in the variable full\_name.

Slide 42 - Order of Operations

* When utilising the operators, there is an order in which they are used.

Slide 43 - Order of Operations

* Read out the order of operations from the slides.

Slide 44 - Order of Operations

* There are two sums here, that show the important of order of operations. In the first question , you will get the answer 14, with the brackets it changes the value to 18.

Slide 45 - Coding Time - Section B

* Now, it’s your time to try some coding, please refer to Section B on your worksheets.
* You’ll have 20 minutes on this.

Slide 46 – Comments

* Comments are useful when you want to leave notes on your code.
* This is useful for when you want to come back to your code to remember what it does.
* When multiple people are working on one bit of code, comments are also useful to understand what other people have done.

Slide 47 – Comments

* To write a comment in Python, you start the line with #, anything after this will be a comment and will not run when you run your script.
* As per the examples, you can write these before, after or on the same line as your code.

Slide 48 – Casting

* Casting is used to convert one data type to another data type.
* This is useful when concatenate two strings, as you cannot concatenate a string and a number so you may need to cast an integer to a string.
* Or when you want to add two numbers together but one is a string, you can cast the string to an integer to add them together.

Slide 49 - Casting — Integers

* To cast to an integer, as per the examples, you put int() and then the data into the brackets.

Slide 50 - Casting — Floats

* To cast to a float, as per the examples, you put float() and then the data into the brackets.

Slide 51 - Casting — Strings

* To cast to a string, as per the examples, you put string() and then the data into the brackets.

Slide 52 – Length

* To work out the length of a string, you can use the length function.

Slide 53 – Length

* You can use this on a variable or directly on a string as per the examples.

Slide 54 – Index

* The index is the position of the characters. Normally, a count begins at 1, in Python and most programming languages, the count always starts at 0.

Slide 55 – Index

* The word Hello, as shown, the first character H is 0, e is 1 and so on.

Slide 56 - Index

* By knowing the index, you can print out specific letters.
* So for word Charlie is stored in the variable name, the first print will print out ‘C’ as this has index 0 and the second print will print out ‘h’ as this has index 1.

Slide 57- Input

* To get information from the user, we can use an input. If the input is stored in a variable, whatever the user enters is stored in the variable.

Slide 58 - Input

* The first print in the example, will print Hello and whatever the name the user enters.
* The second will first get the user input for age and cast it to a integer so it can be used in the second variable age\_in\_10\_years when being added to 10.
* Lastly, it is all put together, as you are concatenating a string and the new age, the age has to be cast back into a string.

Slide 59 - Upper/Lower

* If you want to change the case of a string, you can use the upper or lower function.

Slide 60 - Upper/Lower

* You can use these either with a variable or directly on a string.

Slide 61 – Coding Time - Section C

* Now, it’s your time to try some coding, please refer to Section C on your worksheets.
* You’ll have the rest of the lesson to finish this as well as any other questions.