



# Computer Science

Year 11 into year 12 summer independent work

Deadline 1st lesson in September 2023

The summer independent work is an opportunity for you to showcase your ability as a programmer, and also your ability to think ahead and plan your algorithms.

It comes in two parts, firstly you will create some programs in Python using [learnpython.com](https://learnpython.com), then you will apply the knowledge and skills you have developed to complete five programming tasks.



## 5 – String operations

[https://www.learnpython.org/en/Basic\\_String\\_Operations](https://www.learnpython.org/en/Basic_String_Operations)

Exercise:

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise on your evidence document, and label clearly

## 6 – Conditions

<https://www.learnpython.org/en/Conditions>

Exercise:

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise on your evidence document, and label clearly

## 7 - Loops

<https://www.learnpython.org/en/Loops>

Exercise:

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise on your evidence document, and label clearly

## 8 – Reusable code

<https://www.learnpython.org/en/Functions>

Exercise:

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise on your evidence document, and label clearly

Once you have completed the tutorials, you should now have the knowledge and skills to complete the following challenges.

You will need to install the [Python interpreter](#), and could use its built in IDE IDLE.

I recommend using a Python IDE like [pycharm](#), [VS code](#) or [sublime text](#) to produce the code so that you can benefit from the built in functions. You are not limited to the IDE's on this list, you can use whatever you are used to.

You can also use an online editor such as [replit](#).



# Challenge 1 - Heads or tails

## Heads or tails

Create a program that asks the user how many times they would like to simulate tossing a coin. It should then generate either a 'head' or 'tails' randomly, for the specified number of times. It should print out at the end:

1. How many coin tosses it simulated
2. How many heads in total
3. How many tails in total
4. The best head streak - best run of heads in a row without any tails
5. The best tails streak - best run of tails in a row without any heads

Below are example outputs to help you work out how to program the solution:

```
How many times would you like to simulate? 10
Result 1 : tails
Result 2 : heads
Result 3 : tails
Result 4 : heads
Result 5 : tails
Result 6 : heads
Result 7 : heads
Result 8 : heads
Result 9 : tails
Result 10 : tails
The total count of heads: 4
The best streak for heads: 3
The best streak for tails: 2
```

```
Would you like to simulate again (y/n)?
-> y
How many times would you like to simulate?
```

Paste your code for the final exercise on your evidence document, and label clearly



## Challenge 2 - Number table

### Number Table

Write a program that takes a symbol (+, -, \* or /) and a natural number (>0) and makes a table like below for the operation from 0 to n For this example the user has entered " + 4":

```
+ | 0 1 2 3 4
```

```
-----
```

```
0 | 0 1 2 3 4
```

```
1 | 1 2 3 4 5
```

```
2 | 2 3 4 5 6
```

```
3 | 3 4 5 6 7
```

```
4 | 4 5 6 7 8
```

Paste your code for the final exercise on your evidence document, and label clearly



## Challenge 3 – Logic gate

### Logic gate

Write a program that will give the students the answer to logic gate questions For example:

Enter logic gate : OR

Enter first input : 1

Enter second input : 0

Result = 1

It should work for the logic gates OR, AND, XOR, NAND and NOR

Paste your code for the final exercise on your evidence document, and label clearly





# Challenge 5



Help 1: Tech with Tim

<https://youtu.be/DEcFCn2ubSg>

This is a basic introduction to a text adventure game on YouTube - a good place to get you started.

Help 2: Invent with Python

<https://inventwithpython.com/invent4thed/chapter5.html>

This game was has a lot of similar features to Zork and will help if you read the explanation and code.

There is so much help out there - a quick search on a search engine should provide you with lots of tutorials for a text adventure in Python. I would also strongly recommend YouTube.

My email is [mark.ibbertson@nclt.ac.uk](mailto:mark.ibbertson@nclt.ac.uk) if you need to contact me.

