

LRGS Computer Science Bridging Work 2023

Welcome to Computer Science! Below are a series of tasks for you to attempt. I understand that you will have differing experiences of Computer Science and in particular programming. I anticipate that the majority of students will have programmed up to GCSE level. If you have not, please contact me before the summer.

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1 Install Python

Initially we will be using the Python programming language. Some of you may choose to diversify later, but for the moment this will be our language of choice.

Your first task is to install Python. Version 3.9 will be installed in school so you are advised to install this version. In reality, any version ≥ 3.4 will work without issue. You can install Python on Apple, Linux and Windows systems. Indeed some may come with a version pre-installed - just check the version.

You can download Python from <https://www.python.org/>. For some platforms, you will find it in the repository/app store. Again, just check what version you are installing.

Python is free software: you do not have to pay for it. You also do not need high end kit for it to run on. It runs well on a Raspberry Pi which costs less than £30.

Deliverable: Not required.

2 Introduction to Python - For anyone who did not complete a GCSE in Computer Science

Below is a list of mini-challenges for you to consider. This section is really only for students who have not completed a GCSE in Computer Science.

1. print the phrase "Hello World" on the screen.
2. ask the user to enter their age in years and return an approximate value in months.
3. Write a program that counts up to 100 (extension: can you do it without using for or while?)

4. Write a program that asks for a number and prints the corresponding times table. So if the user entered 7, it would print:
 - $0 \times 7 = 0$
 - $1 \times 7 = 7$
 - $2 \times 7 = 14$
 - $3 \times 7 = 21$
 - ...
5. Write a program that asks the user for a number and prints a message indicating whether the number is a prime number or not.

If you have some prior experience of programming you might wish to consider one or two the following ideas:

1. Create a higher lower guessing game. The computer selects a number between 1 and 100 and the takes guesses until they find the number. The program should prompt the user to guess higher or lower.
2. Create a hangman style game. Give the computer a list of 100 random words to pick the target word from.
3. Noughts and Crosses. Too easy? Then build a computer player to play against. Or build it so that two players can play on different machines.
4. Draughts
5. A basic platform game. Advanced. You will probably want to use the PyGame module for this. It can be downloaded for free too.
6. Anything else that takes your fancy.

Deliverable: your code. Incomplete attempts are most welcome.

3 Programming Challenge

It is anticipated that all students who have completed a GCSE in Computer Science will attempt this section. Programs are never complete: incomplete or not working attempts are most welcome and infinity better than nothing at all.

Your task is to create a word search generator. Features and ideas you may wish to consider:

- random selection of words from a file
- how to highlight that a word has been found. Hint: an easy way to do this in the Python shell is to have letters in lower case until a word is found, in which case make it upper case.
- showing how many words there are left to find.
- allowing the user to select whether reverse words or diagonal words are allowed

- making the filler letters correspond with the correct usage frequency for the English language, i.e. 'e' is used much more than 'q'.
- display it all in Pygame rather than the shell
- make it work over the network so that two people can race to complete the same wordsearch.

The above are just ideas. You can implement any of your own that you see fit and need not do any of the above.

Deliverable: your code. Incomplete attempts are most welcome.

4 Reading

It is important that you stay up to date with events in the Computing world. There is an abundance of news about security, encryption and privacy rights at present. You should also reading about emerging technologies and issues, e.g. driver-less vehicles, biometrics, mass 3D printing, cryptocurrencies/block-chain, privacy, big data and more, recently, how CS is helping with Covid.

Deliverable: A list of references of your reading.

5 Textbook

You will need to purchase a textbook. The textbook you need is AQA A level Computer Science by Bob Reeves (9781471839511), published by Hodder Education.