LRGS Computer Science Summer Work 2020

Welcome to Computer Science! Below are a series of tasks for you to attempt over the summer. I understand that you will have differing experiences of Computer Science and in particular programming. This year, I anticipate that the majority of students will have programmed up to GCSE level. If you have not, please contact me so that I can send some catchup work out to you.

Mr Hamilton.
ghamilton@lrgs.org.uk

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 3.6 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   Explore Python

Below is a list of mini-challenges for you to consider. You should attempt at least two. If you have some prior experience, you may wish to start further down the list. You may wish to access support from the 'net, books or friends/relatives, but the work should be your own.

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 x 7 = 0
   - 1 x 7 = 7
   - 2 x 7 = 14
   - 3 x 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   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.

4   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.