



# Getting Ready for...

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## **KS5 (A Level)**

# **Computer Science**

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# Activities

## 1. Systems architecture

Understanding the Von Neumann architecture is an important early step in A Level Computer Science.

- Can you describe the role of all the CPU registers and components during the fetch-decode-execute cycle?
- Can you describe, with use of a diagram, how each register and component is used in the command 'LOAD 5'?

## 2. Problem solving and programming

Programming is at the heart of A Level Computer Science, where you master a range of common programming techniques.

- How well are you able to code definite iteration using FOR loops?
- Can you use a FOR loop to code this shape?

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## 3. Software development

The A Level Computer Science course requires that you understand the features of assembly language and are able to write short programs using an assembly language environment such as the Little Man Computer.

- Open this LMC simulator [created by Peter Higginson]:  
<http://peterhigginson.co.uk/lmc/>
- Can you write a short program which enables a user to input three integers, and have them output in reverse order?



## 4. Algorithms

At A Level, you are encouraged to think more like a computer scientist, and model problems in terms of their most important features while removing details you believe are irrelevant.

This thinking process, known as abstraction, is common throughout Computer Science.

- Consider how a console game you have played in the last five years models reality or presents an environment to the player.
- Can you describe which features of the real-world have been removed? Can you describe which features have been kept and even amplified?

## 5. Databases

Much of the data that organisations store about us is kept on large databases.

- Can you describe how these databases ensure that there is only one record per person?
- How do they avoid duplicate records? How can they reduce the amount of data that is stored, without losing any of it?



## 6. Functions and procedures

The benefits of understanding programming are found throughout A Level Computer Science, where you not only program but engage with programming theory.

- How well are you able to code using functions and procedures? Can you describe the difference between the two, and code examples of each?
- Can you write a program that presents a user with four separate menu items, each option calling either a function or a procedure?

## 7. Data types, data structures & algorithms

In the course of A Level Computer Science you will engage with various data structures for storing data. The most commonly encountered data structure is the list, so your understanding of this must be secure.

- Can you write a program in a high-level language [e.g. Python] which stores data about films and their release year in a two-dimensional list?
- Can you code a loop that enables the user:
  - To add new data [film and release date] to this list?
  - To display the new list?



## 8. Algorithms – Bubble Sort

A Level Computer Science requires you to understand a range of sorting algorithms, one of which is the Bubble Sort.

- Can you describe how this algorithm sorts this data set: [30, 23, 10, 20, 7, 26]?
- Can you write the pseudocode for a Bubble Sort algorithm?

## 9. Legal, moral, ethical & cultural issues

As students improve at creating technology, they should maintain an eye on its impact on our lives – as it may do as much harm as good.

- Consider a desktop computer and its impact on the environment. Can you describe this impact during the following stages of its lifecycle?
  - Design
  - Development
  - Delivery
  - Use
  - Disposal
- For each stage, can you also describe measures that can be put in place to reduce the impact?



## 10. Algorithms – Binary Sort

A Level Computer Science requires you to understand a range of searching algorithms, one of which is the Binary Search.

- Can you describe how this algorithm searches for the number 27 in this data set: [5, 7, 10, 18, 20, 23, 27, 39]?
- Can you write the pseudocode for a Binary Search algorithm?