**Computer Science A-Level**

# The questions and activities below are to be completed before the start of the course. There are several sections to complete forming an introduction to a range of the topics that will be covered in the first year:

# Section A: Operating Systems

# Section B: Data Representation

# Section C: Miscellaneous

# Section D: Learning to Program C#

# Section E: Programming Exercises in C#

#

# All of the information in these sections is either explained or can be researched online. There is therefore no requirement for you to have completed the GCSE in Computer Science beforehand, although some of the concepts will be more familiar if you have.

The programming tasks will be the most challenging, particularly if you have not done any programming before. C# is different to Python. The concepts will be similar but the syntax needs to be mastered. Please try and give this section a go as it will greatly benefit you when these programming concepts are taught at the beginning of the year. 50% of the A-Level Computer Science course is programming related and so you need to make sure that this is something you enjoy doing before you start.

**Section A: Operating Systems**

1. Why do computers require operating systems?

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1. Write about a paragraph on each of these operating systems, describing their history, the systems on which they run and their key features.
	* MS-DOS

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* + UNIX

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* + Windows

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* + MAC OS

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* + Android

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* + iOS

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**Section B: Data Representation**

1. Describe the following types of numbers by completing the table below

|  |  |  |
| --- | --- | --- |
| **Type** | **Symbol** | **Description** |
| Natural Numbers | ℕ |  |
| Integers | ℤ |  |
| Real Numbers | ℝ |  |
| Rational Numbers | ℚ |  |

**Bits and Bytes**

* A bit is the fundamental unit of information.
* Each bit can represent two values, 0 or 1
* The number of values that can be represented by n bits is $2^{n}$.
For example: 3 bits can represent 8 different values (000, 001, 010, 011, 100, 101, 110, 111).
* A byte is a group of 8 bits.
* A byte can represent 256 ($2^{8}$) different values
* To represent 200 different values, you would need 8 bits as 7 would not be enough. ($2^{7}$ = 128)
1. Answer the following questions

|  |  |
| --- | --- |
| 1. How many bits are there is 6 bytes?
 |  |
|  |  |
| 1. How many different values can 5 bits represent?
 |  |
|  |  |
| 1. How many different values can 3 bytes represent?
 |  |
|  |  |
| 1. How many bits would you need to represent 64 different values?
 |  |
|  |  |
| 1. How many bits would you need to represent 800 different values?
 |  |
|  |  |
| 1. How many bytes would you need to represent 60000 different values?
 |  |

1. There are names used to represent different multiples of bytes. For example, a kilobyte is 1000 bytes and a kibibyte is 1024 bytes.

Put the following multiples of bytes in order, from the smallest to the largest:

|  |  |  |
| --- | --- | --- |
| **Alphabetical Order** |  | **Size Order** |
| Exabyte |  |  |
| Exbibyte |  |  |
| Gibibyte |  |  |
| Gigabyte |  |  |
| Kibibyte |  |  |
| Kilobyte |  |  |
| Mebibyte |  |  |
| Megabyte |  |  |
| Pebibyte |  |  |
| PetaByte |  |  |
| Tebibyte |  |  |
| Terabyte |  |  |
| YobuByte |  |  |
| Yottabyta |  |  |
| Zebibyte |  |  |
| Zettabyte |  |  |

**Section C: Miscellaneous**

Complete the following questions. You many need to do some research.

1. What is the base 16 number system commonly known as?

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1. Which countess is regarded as one of the first computer programmers

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1. When was the first email sent?

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1. What does HTML stand for?

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|  |

1. The cipher text RUDQJH has been encrypted using a Caesar cipher with a shift of 3. Decrypt it.

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|  |

1. What does BIOS stand for?

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|  |

1. What is machine code?

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1. What is Boolean algebra?

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1. What is an ISP?

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| --- |
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1. What does Dijkstra’s algorithm do?

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|  |

1. Name 6 computer programming languages

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1. What is the World Wide Web?

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1. What is the difference between an interpreter and a compiler?

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1. How is data transmitted between the processor and other components?

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**Section D: Learning to Program in C#**

Use the following C# tutorial to familiarise yourself with the fundamentals of C#: <https://www.w3schools.com/cs/default.asp>.

This tutorial shows you how to use Visual Studio which is the IDE you will be using for C# on the A-Level course. The Community version is free. However, if you have any difficulties downloading and running this application, then you can always use an online compiler to complete the exercises in the next section. For example:

<https://www.mycompiler.io/new/csharp>

# Section E: Programming Exercises in C#

Complete the following coding exercises. For each one, copy the code and a screen shot to show your program working. If you are using Visual Studio, then for the screen shots, narrow down the output screen and use Ctrl, Alt Print Scrn to copy the output.

Code Example:

|  |
| --- |
|  class Program { static void Main(string[] args) { string name; Console.Write("What is your name? "); name = Console.ReadLine(); Console.WriteLine("Hello " + name); Console.ReadLine(); } } |

 Output Example:



**Programming Exercises:**

# Write a program to ask for the day of the week and display it.

# Write a program to request two numbers and display them as part of an addition sum.

# For Example, if the numbers entered are 7 and 5, the output is:

#  7 + 5

# Write a program to request a colour. If the colour name matches "purple" (or your favourite colour), then output "That is my favourite colour".

# Write a program to do the following:

# Display a maths questions

# Request the answer

# Check if the answer is correct and display "That is correct" if it is or display the correct answer if it is not.

# Write a program to display the values from 1 to 100 using a for loop

# Write a program to display the first 12 square numbers using a for loop

**Challenge Exercises:**

# Work out how to generate a random number and then update exercise 4 to display a random question.

# Write a calculator program.

