

KNOWLEDGE ORGANISER

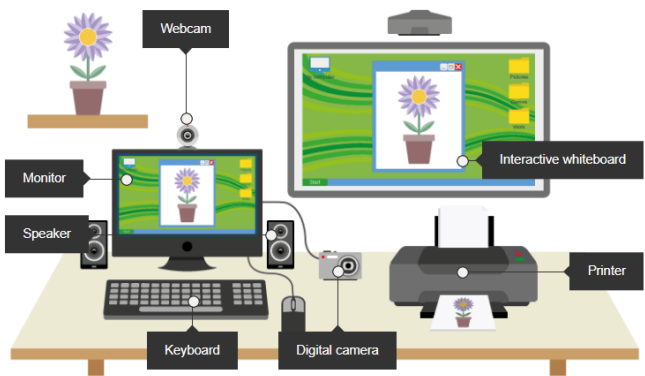
KS3 COMPUTING: Year 9 Autumn Term: Unit 1 GCSE Computer Science

Introduction: During this unit, you will learn some key concepts from GCSE Computer Science. You will learn about how computers process instructions and the role of the CPU. By the end of the unit you will be able to explain what a Binary number is and convert into Denary.

Input Device	An input device is any piece of computer hardware used to provide data to a computer system : Such as Keyboard, Mouse, Touchscreen, Microphone, ANYTHING THAT SENDS DATA INTO A PC
Output Device	An output device is any piece of computer hardware used to communicate the results of data that has been processed . Basically anything that comes OUT of the PC: Monitor, Printer, Speaker, Headphones
Central Processing Unit	The CPU is where processes such as calculating, sorting and searching take place. Whatever is done on our computers, such as checking emails, playing games and doing homework, the CPU has processed the data we use. THE BRAIN OF A PC!
Von Neumann Architecture	Von Neumann architecture is the design upon which many general purpose computers are based
Binary	Binary describes a numbering scheme in which there are only two possible values for each digit -- 0 or 1 -- and is the basis for all binary code used in computing systems
ASCII Code	Character Set - Characters include numbers 0 to 9, uppercase and lowercase letters A-Z, a-z, punctuation, symbols and the space character
Unicode	Like ASCII code, but with a lot more characters. Including characters from different languages such as é
Sequence	A sequence is a series of steps which are completed one after the other, often to solve a problem.
Selection	Selection is the ability to choose different paths through a program. Also known as an IF statement. The different path chosen depends on the outcome of a condition
Iteration	Iteration means repeating a part of a program

Key Learning that will take place in this unit

Understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits

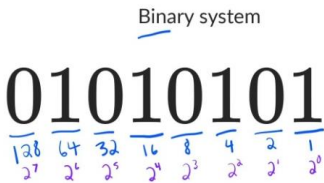


An **input** device is any piece of computer **hardware used to provide data to a computer system**. An **output** device is any piece of computer hardware **used to communicate the results of data that has been processed**.



Central Processing Unit

The CPU is where processes such as calculating, sorting and searching take place. Whatever is done on our computers, such as checking emails, playing games and doing homework, the CPU has processed the data we use. THE BRAIN OF A PC!



Binary to Denary

Look at the picture below. At GCSE you will learn about Binary to Denary and Denary to Binary conversion. The example below shows Binary to Denary

This Binary number is 01010101. To convert to Denary you would add up all the values that are 'on' with a 1.

64+16+4+1 = 85 as Denary

TEST YOURSELF

- 1 What does FDE stand for?
- 2 How many processes/steps are there for the FDE Cycle?
- 3 What is the symbol for a decision (Flowchart)?
- 4 Why do databases store data in different tables rather than in one larger table?
- 5 List as many input devices as you can
- 6 List as many output devices as you can
- 7 What is 0001 0101 as a Denary number?
- 8 What is 0001 0001 as a Denary number?
- 10 Convert Denary 32 to a Binary Number?
- 11 How many characters can be stored in ASCII

AT HOME. (Parents/carers may be able to help with this.)

Try to discuss at home all the items at home that may have a processor in it and discuss how they work.

Read through the 6 steps for the processes of the Fetch Decode Execute Cycle and try to remember them off by heart.

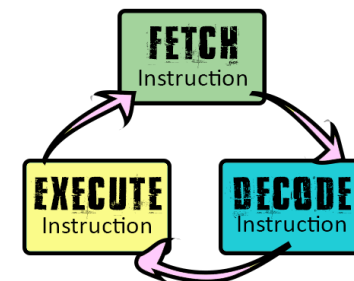
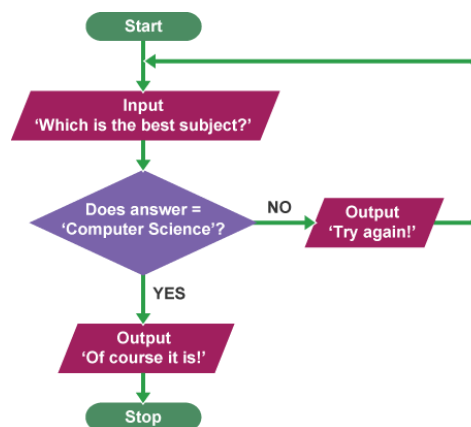
Von Neumann Architecture: In most computer systems, the **CPU** receives **instructions** and **data** from an **input** or **memory**. The instructions and data are processed by the CPU and the results are either sent to an **output** or transferred to **secondary storage**. 'Architecture' is the design that enables the instructions and data to reach and be processed by the CPU.

Processes of the Fetch Decode Execute Cycle







1. The processor checks the program counter to see which instruction to run next.
2. The program counter gives an address value in the memory of where the next instruction is.
3. The processor fetches the instruction value from this memory location.
4. Once the instruction has been fetched, it needs to be decoded and executed. For example, this could involve taking one value, putting it into the **ALU**, then taking a different value from a **register** and adding the two together.
5. Once this is complete, the processor goes back to the program counter to find the next instruction.
6. This cycle is repeated until the program ends.

Flowcharts

Flowcharts can be used to plan out **programs**. Planning a program that asks people what the best subject they take is, would look like this as a flowchart:



Flow Chart Symbols

Name	Symbol	Usage
Start or Stop		The beginning and end points in the sequence.
Process		An instruction or a command.
Decision		A decision, either yes or no.
Input or Output		An input is data received by a computer. An output is a signal or data sent from a computer.
Connector		A jump from one point in the sequence to another.
Direction of flow		Connects the symbols. The arrow shows the direction of flow of instructions.

Useful links:

Fetch Decode Execute Cycle:

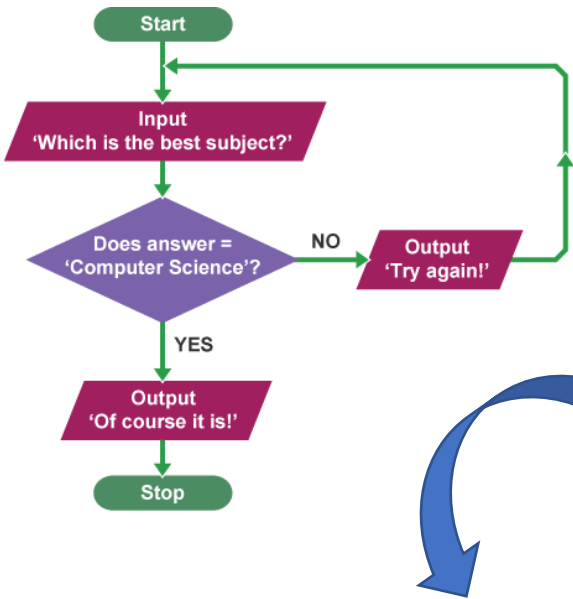
<https://www.bbc.co.uk/bitesize/guides/zws8d2p/revision/3>

ASCII Code:

<https://www.bbc.co.uk/bitesize/guides/zpfdwmn/revision/1>

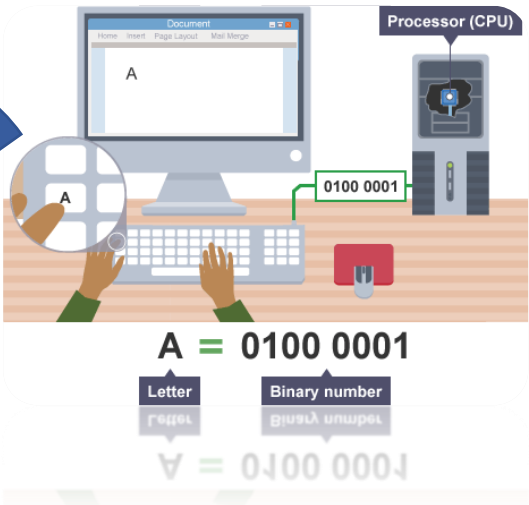
Flowchart:

<https://www.bbc.co.uk/bitesize/guides/z3bq7ty/revision/3>



ASCII Code

When any key on a keyboard is pressed, it needs to be converted into a binary number so that it can be processed by the computer and the typed character can appear on the screen.



A code where each number represents a character can be used to convert text into binary. One code we can use for this is called **ASCII**. The ASCII code takes each character on the keyboard and assigns it a binary number. For example:

- The letter 'a' has the binary number 0110 0001 (this is the denary number 97)
- The letter 'b' has the binary number 0110 0010 (this is the denary number 98)
- The letter 'c' has the binary number 0110 0011 (this is the denary number 99)

ASCII code can only store 128 characters, which is enough for most words in English but not enough for other languages. If you want to use accents in European languages or larger alphabets such as Cyrillic (the Russian alphabet) and Chinese Mandarin then more characters are needed. Therefore another code, called **Unicode**, was created. This meant that computers could be used by people using different languages.