

## Learning Programme

### Fundamentals of computer organisation and architecture – AS Level

Topic/Content	Objectives/Skills	Homework	Assessment	Stretch & Challenge (Thirst for Learning)
Internal hardware components of a computer	<ul style="list-style-type: none"> <li>• Have an understanding and knowledge of the basic internal components of a computer system.</li> <li>• Understand the role of the following components and how they relate to each other:               <ul style="list-style-type: none"> <li>○ processor</li> <li>○ main memory</li> <li>○ address bus</li> <li>○ data bus</li> <li>○ control bus</li> <li>○ I/O controllers</li> </ul> </li> <li>• Understand the need for, and means of, communication between components. In particular, understand the concept of a bus and how address, data and control buses are used.</li> <li>• Be able to explain the difference between von Neumann and Harvard architectures and describe where each is typically used.</li> <li>• Understand the concept of addressable memory.</li> </ul>	Past exam paper questions	End of unit test  Homework tasks  Class Q and A's  Class worksheets  Presentations  Past exam questions	Research further into the components of a computer system and see how the different components link to one another and how they can affect each other    Further tasks on the Little man computer
The stored program concept	<ul style="list-style-type: none"> <li>• Be able to describe the stored program concept: machine code instructions stored in main memory are fetched and</li> </ul>			

	<p>executed serially by a processor that performs arithmetic and logical operations</p> <ul style="list-style-type: none"> <li>•</li> </ul>			
<p>Structure and role of the processor and its components</p>	<ul style="list-style-type: none"> <li>• Explain the role and operation of a processor and its major components: <ul style="list-style-type: none"> <li>○ arithmetic logic unit</li> <li>○ control unit</li> <li>○ clock</li> <li>○ general-purpose registers</li> </ul> </li> <li>• dedicated registers, including: <ul style="list-style-type: none"> <li>○ program counter</li> <li>○ current instruction register</li> <li>○ memory address register</li> <li>○ memory buffer register</li> <li>○ status register.</li> </ul> </li> <li>• Explain how the Fetch-Execute cycle is used to execute machine code programs, including the stages in the cycle (fetch, decode, execute) and details of registers used.</li> <li>• Understand the term 'processor instruction set' and know that an instruction set is processor specific.</li> <li>• Know that instructions consist of an opcode and one or more operands (value, memory address or register).</li> <li>• Understand and apply immediate and direct addressing modes.</li> <li>• Understand and apply the basic machine-code operations of: <ul style="list-style-type: none"> <li>○ load</li> <li>○ add</li> </ul> </li> </ul>	<p>Worksheets</p>		

	<ul style="list-style-type: none"> <li>○ subtract</li> <li>○ store</li> <li>○ branching (conditional and unconditional)</li> <li>○ compare</li> <li>○ logical bitwise operators (AND, OR, NOT, XOR)</li> <li>○ Logical - shift right / shift left</li> <li>○ halt.</li> </ul> <ul style="list-style-type: none"> <li>● Use the basic machine-code operations above when machine-code instructions are expressed in mnemonic form-assembly language, using immediate and direct addressing.</li> <li>● Describe the role of interrupts and interrupt service routines (ISRs); their effect on the Fetch Execute cycle; and the need to save the volatile environment while the interrupt is being serviced.</li> <li>● Explain the effect on processor performance of: <ul style="list-style-type: none"> <li>○ multiple cores</li> <li>○ cache memory</li> <li>○ clock speed</li> <li>○ word length</li> <li>○ address bus width</li> <li>○ data bus width.</li> </ul> </li> </ul>			
External hardware devices	<ul style="list-style-type: none"> <li>● Know the main characteristics, purposes and suitability of the devices and understand their principles of operation.</li> <li>● Explain the need for secondary storage within a computer system.</li> </ul>	Presentation on types of storage devices		

	<ul style="list-style-type: none"><li>• Know the main characteristics, purposes, suitability and understand the principles of operation of the following devices:<ul style="list-style-type: none"><li>○ hard disk</li><li>○ optical disk</li><li>○ solid-state disk (SSD).</li></ul></li><li>• Compare the capacity and speed of access of various media and make a judgement about their suitability for different applications.</li></ul>			
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