



# SIR GRAHAM BALFOUR SCHOOL



## CURRICULUM OVERVIEW – KEY STAGE 4 COMPUTING

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 10	<p><b>1.1 Systems Architecture</b></p> <ul style="list-style-type: none"> <li>The purpose of the CPU, how common characteristics of CPUs affect their performances, The function of the CPU as fetch and execute instructions stored in memory</li> <li>Von Neumann architecture: MAR, MDR, PC, Accumulator</li> <li>common CPU components and their function: ALU, CU, Cache.</li> </ul> <p><b>1.2 Memory &amp; Storage</b></p> <ul style="list-style-type: none"> <li>The difference between RAM and ROM</li> <li>The purpose of ROM in a computer system</li> <li>The purpose of RAM in a computer system</li> <li>The need for virtual memory</li> <li>Flash memory</li> </ul>	<p><b>1.2 Memory &amp; Storage cont.</b></p> <ul style="list-style-type: none"> <li>The need for secondary storage and Common types of storage</li> <li>Suitable storage devices and storage media for a given application</li> <li>The advantages and disadvantages of different storage devices and storage media relating to these characteristics:</li> <li>The units of data storage: How data needs to be converted into a binary format to be processed by a computer</li> <li>Data capacity and calculation of data capacity requirements</li> <li>How to convert positive denary whole numbers to binary numbers</li> <li>How to add two binary integers together</li> <li>explain overflow errors which may occur</li> <li>How to convert positive denary whole numbers into 2-digit hexadecimal numbers and vice versa</li> <li>How to convert binary integers to their hexadecimal equivalents and vice versa " Binary shifts</li> <li>The use of binary codes to represent characters The term 'character set</li> <li>The relationship between the number of bits per character in a character set</li> <li>ASCII, Unicode Images How an image is represented as a series of pixels, represented in binary Metadata, The effect of colour depth and resolution.</li> </ul> <p><b>Sound</b> How sound can be sampled and stored in digital form " The effect of sample rate, duration, and bit depth</p> <p><b>Compression</b> Types of compression: Lossy, Lossless</p>	<p><b>1.3 Networks and topologies</b></p> <ul style="list-style-type: none"> <li>Types of networks: LAN, WAN Factors that affect the performance of networks</li> <li>The different roles of computers in a client-server and a peer-to-peer network</li> <li>The hardware needed to connect stand-alone computers into a Local Area Network: Wireless access points, Routers, Switches, NIC. Transmission media</li> <li>The Internet as a worldwide collection of computer networks: DNS, Hosting, The Cloud, Web servers and clients Star and Mesh network topologies</li> </ul>	<p><b>1.4 Network Security</b></p> <ul style="list-style-type: none"> <li>Forms of attack</li> <li>The concept of SQL injection</li> <li>Common prevention methods</li> </ul> <p><b>1.5 System Software</b></p> <ul style="list-style-type: none"> <li>The purpose and functionality of operating systems Peripheral management and drivers</li> <li>User management</li> <li>File management</li> <li>The purpose and functionality of utility software</li> <li>Utility system software</li> </ul>	<p><b>1.6 Ethical, legal, cultural, and environmental impact</b></p> <ul style="list-style-type: none"> <li>Impacts of digital technology on wider society including Ethical issues, Legal issues, Cultural issues, Environmental issues Privacy issues.</li> <li>The Data Protection Act 2018 Computer Misuse Act 1990 Copyright Designs and Patents Act 1988</li> <li>Software licences (i.e., open source and proprietary)</li> </ul>	<p><b>2.1 Algorithms</b></p> <ul style="list-style-type: none"> <li>Principles of computational thinking: Abstraction Decomposition, Algorithmic thinking.</li> </ul>



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## CURRICULUM OVERVIEW – KEY STAGE 4 COMPUTING



	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 11	<p><b>Programming Fundamentals</b></p> <p>The use of variables, constants, operators, inputs, outputs, and assignments</p> <p>The use of the three basic programming constructs used to control the flow of a program:</p> <ul style="list-style-type: none"> <li>o Sequence</li> <li>o Selection</li> <li>o Iteration</li> </ul> <p>The common arithmetic operators</p> <p>The common Boolean operators AND, OR and NOT.</p> <p>The use of data types:</p> <ul style="list-style-type: none"> <li>o Integer</li> <li>o Real</li> <li>o Boolean</li> <li>o Character and string</li> <li>o Casting</li> </ul> <p>The use of basic string manipulation</p> <p>The use of basic file handling operations:</p> <ul style="list-style-type: none"> <li>o Open</li> <li>o Read</li> <li>o Write</li> <li>o Close</li> </ul> <p>The use of records to store data</p> <p>The use of SQL to search for data</p> <p>The use of arrays (or equivalent) when solving problems, including both one-dimensional (1D) and two-dimensional arrays (2D)</p> <p>How to use sub programs (functions and procedures) to produce structured code Random number generation</p>	<p><b>2.1 Algorithms</b></p> <p>Principles of computational thinking: Abstraction Decomposition, Algorithmic thinking.</p> <p><b>Practical Programming skills</b></p> <p>All students must be given the opportunity to undertake a programming task or tasks during their course of study. The programming task(s) must allow them to develop skills within the following areas when programming:</p> <ul style="list-style-type: none"> <li>• Design</li> <li>• Write</li> <li>• Test</li> <li>• Refine</li> </ul> <p>Each task(s) must use one or more high-level text-based programming language, either to a specification or to solve a problem (or problems). They can use any high-level text-based programming language</p> <p><b>Testing</b></p> <p>The purpose of testing</p> <p>Types of testing:</p> <ul style="list-style-type: none"> <li>• Iterative</li> <li>• Final/terminal</li> <li>• Identify syntax and logic errors</li> <li>• Selecting and using suitable test data:           <ul style="list-style-type: none"> <li>o Normal</li> <li>o Boundary</li> <li>o Invalid/Erroneous</li> <li>o Refining algorithms</li> </ul> </li> </ul>	<p><b>Defensive design considerations</b></p> <ul style="list-style-type: none"> <li>• Anticipating misuse</li> <li>• Authentication</li> <li>• Input validation</li> <li>• Maintainability:           <ul style="list-style-type: none"> <li>o Use of sub programs</li> <li>o Naming conventions</li> <li>o Indentation</li> <li>o Commenting</li> </ul> </li> </ul> <p><b>Languages</b></p> <ul style="list-style-type: none"> <li>• Characteristics and purpose of different levels of programming language:           <ul style="list-style-type: none"> <li>o High-level languages</li> <li>o Low-level languages</li> </ul> </li> <li>• The purpose of translators</li> <li>• The characteristics of a compiler and an interpreter</li> </ul> <p><b>Integrated Development environment</b></p> <ul style="list-style-type: none"> <li>• Common tools and facilities available in an Integrated Development Environment (IDE):           <ul style="list-style-type: none"> <li>o Editors</li> <li>o Error diagnostics</li> <li>o Run-time environment</li> <li>o Translators</li> </ul> </li> </ul> <p><b>Boolean logic</b></p> <ul style="list-style-type: none"> <li>o Simple logic diagrams using the operators AND, OR and NOT Truth tables</li> <li>o Combining Boolean operators using AND, OR and NOT Applying to solve problems</li> </ul>	<p><b>Revision</b></p>	<p><b>Revision</b></p>	<p><b>Programming Fundamentals</b></p> <p>The use of variables, constants, operators, inputs, outputs, and assignments</p> <p>The use of the three basic programming constructs used to control the flow of a program:</p> <ul style="list-style-type: none"> <li>o Sequence</li> <li>o Selection</li> <li>o Iteration</li> </ul> <p>The common arithmetic operators</p> <p>The common Boolean operators AND, OR and NOT.</p> <p>The use of data types:</p> <ul style="list-style-type: none"> <li>o Integer</li> <li>o Real</li> <li>o Boolean</li> <li>o Character and string</li> <li>o Casting</li> </ul> <p>The use of basic string manipulation</p> <p>The use of basic file handling operations:</p> <ul style="list-style-type: none"> <li>o Open</li> <li>o Read</li> <li>o Write</li> <li>o Close</li> </ul> <p>The use of records to store data</p> <p>The use of SQL to search for data</p> <p>The use of arrays (or equivalent) when solving problems, including both one-dimensional (1D) and two-dimensional arrays (2D)</p> <p>How to use sub programs (functions and procedures) to produce structured code Random number generation</p>