


<b>Year 9 Computer Science</b>	<b>Curriculum Intent:</b> In year 9 the curriculum will develop students' understanding and application of the fundamental principles and concepts of Computer Science, including abstraction, decomposition, logic, algorithms, and data representation. Students will be taught to analyse problems in computational terms through practical experience of solving such problems, including designing, writing and debugging programs. They will also be encouraged to think creatively, innovatively, analytically, logically and critically. Students will also understand the components that make up digital systems, and how they communicate with one another and with other systems, the impacts of digital technology to the individual and to wider society and develop the ability to apply mathematical skills relevant to Computer Science.			
<b>Computer Science Year 9:</b>	<b>Term 1:</b>	<b>Term 2:</b>	<b>Term 3</b>	
<b>Topic Titles (in order of delivery)</b>	<ul style="list-style-type: none"> <li>• 2.4 Boolean Logic</li> <li>• 1.2 Data Storage (Numbers)</li> <li>• 1.2 Data Storage (Units)</li> <li>• 2.1 Designing, creating and refining algorithms</li> <li>• 2.2 Data Types</li> <li>• 2.1 Programming Fundamentals</li> </ul>	<ul style="list-style-type: none"> <li>• 2d Additional Programming Techniques</li> <li>• 1.2 Practical Programming Skills</li> <li>• 1.2 Data Storage (Images)</li> <li>• 1.2 Data Storage (Sound)</li> <li>• 1.2 Data Storage (Character)</li> <li>• 1.1 Architecture of the CPU</li> <li>• 1.2 Compression</li> </ul>	<ul style="list-style-type: none"> <li>• 1.1 Embedded Systems</li> <li>• 1.2 Primary Storage (Memory)</li> <li>• 1.2 Secondary Storage</li> <li>• 1.3 Networks &amp; Topologies</li> <li>• 1.3 Wired and Wireless Networks, Protocols &amp; Layers</li> <li>• 1.2 Practical Programming Skills</li> </ul>	
<b>Key knowledge / Retrieval topics</b>	<ul style="list-style-type: none"> <li>• Simple logic diagrams using the operators AND, OR and NOT</li> <li>• Truth tables</li> <li>• Combining Boolean operators using AND, OR and NOT Applying logical operators in truth tables to solve problems</li> <li>• How to convert positive denary whole numbers to binary numbers (up to and including 8 bits) and vice versa</li> <li>• How to add two binary integers together (up to and including 8 bits) and 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</li> <li>• Binary shifts</li> <li>• Identify the inputs, processes, and outputs for a problem</li> </ul>	<ul style="list-style-type: none"> <li>• The use of basic string manipulation</li> <li>• The use of basic file handling operations:               <ul style="list-style-type: none"> <li>- Open, Read, Write, Close</li> </ul> </li> <li>• The use of records to store data</li> <li>• The use of SQL to search for data</li> <li>• The use of arrays (or equivalent) when solving problems, including both one-dimensional (1D) and two-dimensional arrays (2D)</li> <li>• How to use sub programs (functions and procedures) to produce structured code</li> <li>• Random number generation</li> <li>• The programming task(s) must allow them to develop skills within the following areas when programming:               <ul style="list-style-type: none"> <li>• Design</li> <li>• Write</li> <li>• Test</li> <li>• Refine</li> </ul> </li> <li>• <u>Images</u> <ul style="list-style-type: none"> <li>• How an image is represented as a series of pixels, represented in binary</li> <li>• Metadata</li> <li>• The effect of colour depth and resolution on:</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• The purpose and characteristics of embedded systems</li> <li>• Examples of embedded systems</li> <li>• The need for primary storage</li> <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>• Virtual memory</li> <li>• The need for secondary storage</li> <li>• Common types of storage:               <ul style="list-style-type: none"> <li>• Optical, Magnetic, Solid state</li> </ul> </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:               <ul style="list-style-type: none"> <li>• Capacity, Speed, Portability, Durability, Reliability, Cost</li> </ul> </li> <li>• Types of network:               <ul style="list-style-type: none"> <li>o LAN (Local Area Network)</li> <li>o WAN (Wide Area Network)</li> </ul> </li> </ul>	

	<ul style="list-style-type: none"> <li>• Structure diagrams</li> <li>• Create, interpret, correct, complete, and refine algorithms using: <ul style="list-style-type: none"> <li>o Pseudocode</li> <li>o Flowcharts</li> <li>o Reference language/high-level programming language</li> </ul> </li> <li>• Identify common errors</li> <li>• Trace tables</li> <li>• The units of data storage: <ul style="list-style-type: none"> <li>o Bit</li> <li>o Nibble (4 bits)</li> <li>o Byte (8 bits)</li> <li>o Kilobyte (1,000 bytes or 1 KB)</li> <li>o Megabyte (1,000 KB)</li> <li>o Gigabyte (1,000 MB) o Terabyte (1,000 GB)</li> <li>o Petabyte (1,000 TB)</li> </ul> </li> <li>• 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> </ul>	<ul style="list-style-type: none"> <li>• The quality of the image</li> <li>• The size of an image file</li> </ul> <p><u>Sound</u></p> <ul style="list-style-type: none"> <li>• How sound can be sampled and stored in digital form</li> <li>• The effect of sample rate, duration and bit depth on: <ul style="list-style-type: none"> <li>- The playback quality</li> <li>- The size of a sound file</li> </ul> </li> </ul> <p><u>Compression</u></p> <ul style="list-style-type: none"> <li>• The need for compression</li> <li>• Types of compression: <ul style="list-style-type: none"> <li>- Lossy</li> <li>- Lossless</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• 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: <ul style="list-style-type: none"> <li>o Wireless access points</li> <li>o Routers</li> <li>o Switches</li> <li>o NIC (Network Interface Controller/Card)</li> <li>o Transmission media</li> </ul> </li> <li>• The Internet as a worldwide collection of computer networks: <ul style="list-style-type: none"> <li>o DNS (Domain Name Server)</li> <li>o Hosting</li> <li>o The Cloud</li> <li>o Web servers and clients</li> </ul> </li> <li>• Star and Mesh network topologies</li> <li>• Modes of connection: <ul style="list-style-type: none"> <li>o Wired <ul style="list-style-type: none"> <li>- Ethernet</li> </ul> </li> <li>o Wireless <ul style="list-style-type: none"> <li>- Wi-Fi</li> </ul> </li> </ul> </li> <li>• Bluetooth</li> <li>• Encryption</li> <li>• IP addressing and MAC addressing</li> <li>• Standards</li> <li>• Common protocols including: <ul style="list-style-type: none"> <li>o TCP/IP (Transmission Control Protocol/Internet Protocol)</li> <li>o HTTP (Hyper Text Transfer Protocol)</li> <li>o HTTPS (Hyper Text Transfer Protocol Secure)</li> <li>o FTP (File Transfer Protocol)</li> <li>o POP (Post Office Protocol)</li> <li>o IMAP (Internet Message Access Protocol)</li> <li>o SMTP (Simple Mail Transfer Protocol)</li> </ul> </li> <li>• The concept of layers</li> </ul>
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