Curriculum Intent – Computer Science

The **purpose** of our curriculum	**To ensure all pupils gain a sound understanding of key concepts in Computer Science in KS3 and that KS4 pupils continue to build on that understanding to prepare them for their GCSE exam and any future courses in Computer Science, such as A Levels or Game Design. Personal Development Codes (PDC) are shown in bold where they apply.**
How does the curriculum **demonstrate progress?**	**The sequence of the curriculum allows pupils to revisit previous ideas and embed them further by helping to retain them in long-term memory. Ideas within the curriculum are interwoven to help provide context and allow ingestion time between revisits. Focus is paid to gateway concepts that allow pupils to have good foundational concepts upon which to further build knowledge. Ensuring pupils have a good grounding in how to use the computer systems and software used throughout the course reduces cognitive load further increasing learning within the time allocated. Each lesson reflects a compact idea with clear expected outcomes to further reduce cognitive load and take into account the nature of pupils' working memory. Thinking time is allowed with all tasks and peer learning is encouraged, this is aided by actively managing seating plans. Starters are used to reflect on previous lessons' learning and homework to prepare them for upcoming concepts and to embed where these fit into the schema. Topic assessments are used to glean pupils' understanding of individual components and the results from these alongside classroom performance, behaviour and attitude is used to holistically help identify and close gaps. All pupils know that the computer room is available for use at any time I am present allowing for them to seek one to one support. Further one to one support is provided based on pupils who are identified as requiring such intervention.**

Year: 7 / 8 / 9 / 10 / 11?	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
What will be taught?	**Year 7** School System E-Safety **LT1-2** Internet & Web Browsers Searching the Web **LT2-4, BV 1** Microsoft Office **Year 8** Programming Iteration and Selection Functions Parameters Lists	**Year 7** Types of Computer Input-Process-Output Model Computer Hardware Memory and Secondary Storage Software Mobile Applications **Year 8** Networks Internet and the World Wide Web **BV 1, LT2-3** Domains and IP Email and VOIP Network Protocols Network Security **BV 1**	**Year 7** Microsoft Excel Summarising Data Charting Introduction to Databases Validation, Searching and Sorting **Year 8** Binary and Memory Representing Text and Numbers Images Sound Instructions	**Year 7** Copyright and Magazine Covers **BV 1** Adobe Illustrator Photoshop Design **Year 8** Text Based Games Using Loops Rock-Paper-Scissors Program Hangman	**Year 7** Algorithms Computational Thinking Decomposition Scratch Game Development **Year 8** Operating Systems Software Digital Footprint Appropriate Use of Software **BV 1, LT2-3, LT1-2**	**Year 7** Game Development Evaluation Performance Review **Year 8** Technology Impact **BV 1, LT2-3** Evaluation Performance Review

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	Year 9 Software Development Cycle Decomposition Algorithm Design Testing Software Programming Documentation **Year 10** Algorithms Computational Thought Abstraction Decomposition Algorithmic Thinking Flowcharts Pseudocode Assessment **Year 11** Testing Linear & Binary Searches Bubble Sorts Merge Sorts Insertion Sorts OCR Exam Language	**Year 9** Coding Well **LT1-2** Software Development Testing Evaluation Performance Review **Year 10** Architecture of the CPU Von Neumann Architecture Registers Common CPU Components CPU Performance Assessment **Year 11** Cache & Virtual Memory) Secondary Storage Optical, Magnetic & Solid State Storage Devices Memory (RAM, ROM)	**Year 9** Linux Command Line File Management Text Files Editing Files **Year 10** Units Binary Numbers Binary Arithmetic Hexadecimal Numbers Binary / Hexadecimal / Decimal conversions Characters Assessment **Year 11** ASCII / Unicode Character Sets Digital Images Digital Sound Compression (Lossy / Lossless)	**Year 9** Artificial Intelligence (A.I.) **BV 5** A.I. History Developments and Consequences of A.I. Ethics **BV 5, BV 1, BV 2** **Year 10** The Internet and Wide Area Networks **LT1-2** IP / TCP / HTTP / HTTPS / FTP / TFTP Protocols Local Area Networks Wireless Networking Assessment **Year 11** Client-Server Networks P2P Networks Standards Protocols Layers	Data Collection and Analysis **Year 9** Encryption **BV 1, LT1-2** Caesar Cipher Hashing Decoding Ciphers Ethics Public Key Cryptography **Year 10** Network Threats Malware **BV 1** Preventing Vulnerabilities Operating Systems System's Software Utility Software Assessment **Year 11** Ethics **BV 5, BV1, BV 2** Exam revision and prep	**Year 9** Fetch-Decode-Execute History of Computers **LT1-2, BV 1** Code Translators Boolean Logic Logic Puzzles Cloud Software **Year 10** Revision of first 5 half terms followed by GCSE style paper with questions around lessons taught so far **Year 11** Exam revision and prep
What key concepts/core skills/overarching themes are covered in this unit?	**Year 7** E-Safety Using the Internet responsibly	**Year 7** Computer hardware Computer functionality Programming skills Logical thought	**Year 7** Data handling Key office skills Programming Logical thought	**Year 7** Digital design Planning Design software Target audiences	**Year 7** Programming Computational thinking Software design Planning Software creation	**Year 7** Software development Computational thinking Self-evaluation Reflection

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	Using the school's computer systems effectively **Year 8** Programming Logical thought Basic software design patterns **Year 9** Software development Testing Documentation Clarity of writing **Year 10** Algorithms Computational Thought Abstraction Decomposition Algorithmic Thinking Flowcharts Pseudocode **Year 11** OCR Exam Language Testing	**Year 8** Networking The Internet LANs and WANs IP and MAC addressing **Year 9** Logical thought Coding Integrated Development Environments Self-evaluation **Year 10** Architecture of the CPU Von Neumann Architecture Registers Common CPU Components CPU Performance **Year 11** Memory (RAM, ROM, Cache & Virtual Memory) Secondary Storage	Basic software design tenets **Year 8** Binary Computer storage and retrieval Sound and Image creation and usage **Year 9** Operating systems Hardware/Software interactions Editing files Suitable file choice **Year 10** Units Binary Numbers Binary Arithmetic Hexadecimal Numbers Binary / Hexadecimal / Decimal conversions Characters **Year 11** ASCII / Unicode Character Sets Digital Images Digital Sound	**Year 8** Game Design Software development Game theory Logical thought Programming **Year 9** Ethics A.I. and its impacts History Exploration of own morals **Year 10** The Internet and Wide Area Networks IP / TCP / HTTP / HTTPS / FTP / TFTP Protocols Local Area Networks Wireless Networking **Year 11** Client-Server Networks P2P Networks Standards Protocols Layers	IDEs **Year 8** Ethics Operating Systems Data handling **Year 9** Encryption Logical thought E-Safety Modern threats **Year 10** Network Threats Malware Preventing Vulnerabilities Operating Systems System's Software Utility Software Assessment **Year 11** Revision Exam skills Planning Research.	**Year 8** Impacts of technology Environmental factors Analytic thinking Self-evaluation Reflection **Year 9** Logical thought Analytical thought Problem solving Problem analysis CPU functionality **Year 10** Revision of first 5 half terms followed by GCSE style paper with questions around lessons taught so far **Year 11** Revision Exam skills Planning Research.

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	Linear & Binary Searches Bubble Sorts Merge Sorts Insertion Sorts Assessment	Optical, Magnetic & Solid State Storage Devices Assessment	Compression (Lossy / Lossless) Assessment	Assessment		
Why is this important? What comes before or follows that make this so? What makes this a necessary unit to support learning in your subject?	**Year 7** Introducing an interest and passion for the subject as well as ensuring they can use ICT responsibly and with a suitable skillset for the modern workplace. **Year 8** Continuing to develop an interest in the subject and delving deeper into how computers work and their uses in the modern world. **Year 9** Coming from year 8 into GCSE this unit delves deeper into how computers work forming a platform for the rest of the course.	**Year 7** Introducing an interest and passion for the subject as well as ensuring they can use ICT responsibly and with a suitable skillset for the modern workplace. **Year 8** Continuing to develop an interest in the subject and delving deeper into how computers work and their uses in the modern world. **Year 9** This builds on how computers work by exploring how they are interconnected and communicate. This is important as the interconnected world means all devices are	**Year 7** Introducing an interest and passion for the subject as well as ensuring they can use ICT responsibly and with a suitable skillset for the modern workplace. **Year 8** Continuing to develop an interest in the subject and delving deeper into how computers work and their uses in the modern world. **Year 9** Having explored how computers work and interconnect we now look at how we keep the data on them safe. This includes legal frameworks, physical protection and software	**Year 7** Introducing an interest and passion for the subject as well as ensuring they can use ICT responsibly and with a suitable skillset for the modern workplace. **Year 8** Continuing to develop an interest in the subject and delving deeper into how computers work and their uses in the modern world. **Year 9** Once the mechanics of protection are understood, the next step is to look at the ethics of the subject to provide a well-rounded view of the reasons we do what we do and	**Year 7** Introducing an interest and passion for the subject as well as ensuring they can use ICT responsibly and with a suitable skillset for the modern workplace. **Year 8** Continuing to develop an interest in the subject and delving deeper into how computers work and their uses in the modern world. **Year 9** Having understood our responsibilities, both legally and ethically, the next stage is to explore how we go about using computers to solve problems for us. This starts with	**Year 7** Introducing an interest and passion for the subject as well as ensuring they can use ICT responsibly and with a suitable skillset for the modern workplace. **Year 8** Continuing to develop an interest in the subject and delving deeper into how computers work and their uses in the modern world. **Year 9** Having looked at how computers store and process data, we can explore the modularity of the process by identifying problems and creating efficient solutions (algorithms).

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		connected via the Internet of Intranets.	protection. This is pivotal to understand before developing software.	ensure we are part of the solution, not the problem. This gives them further food for thought when going on to develop software.	understanding how computers represent data in order that we can explore manipulating this to achieve our goals.	This is also linked to real world problem solving, analytical thinking and logical thinking, all vital skills.
	Year 10 During this term, students look into the fundamentals of software design and computational thinking. This will combine with their practical programming requirement and give them a fundamental understanding of how computers work. This unit of work fits into the 'Algorithms' and 'Logic and Languages' strands of the Computer Science curriculum.	**Year 10** During this term, students look into how computers represent the entities they are used to manipulate on a hardware level. They will gain an understanding of how all computational functions are carried out in binary as this is the only language a CPU understands. They will also gain insight into why humans need layers of abstraction to work with the CPU as working natively in Binary is complex and error prone. This unit of work fits into the 'Data Representation' and 'Logic and Languages' strands of the Computer Science curriculum.	**Year 10** During this term students learn the Units of measurement used in Computer Science. This leads into the two most common number bases other than decimal used by computers – Binary and Hexadecimal. Exploring further, students look at how a computer both represents and store common media such as images, video and sound. With all of this information the pupils then begin to look at compression using both lossy and lossless methods and the pros and cons of both. This unit of work fits into the 'Data Representation' and 'Logic and Languages' strands of	**Year 10** During this term students learn about networking and its role in modern computing. They start by looking at The Internet and other Wide Area Networks and follow up by looking into Local Area Networks. Next are the various methods of connecting to networks and the two most common types of networking setup (Client-Server and Peer to Peer). Finally a deeper dive into the protocols and functionality of networks and network traffic are looked at. This unit of work fits into the 'Data Representation' and 'Computer Networks,	**Year 10** During this term students learn about the threats faced by both networks and individual computers and how to mitigate these risks. They then further explore the operating system concept and its associated programs such as file management. This unit of work fits into the 'Network Security and Systems Software' strand of the Computer Science curriculum.	**Year 10** During this term students learn about good revision practices and how to write exam answers. They also use the opportunity to revise all covered content so far and identify and fill any gaps in existing knowledge.

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			the Computer Science curriculum.	Connections and Protocols' strands of the Computer Science curriculum.		
	Year 11 Preparing them for their exams by building on everything they have already learnt. Placing all concepts in context with each other and revisiting self-reported and evidentially identified weak areas in more depth.	**Year 11** Preparing them for their exams by building on everything they have already learnt. Placing all concepts in context with each other and revisiting self-reported and evidentially identified weak areas in more depth.	**Year 11** Preparing them for their exams by building on everything they have already learnt. Placing all concepts in context with each other and revisiting self-reported and evidentially identified weak areas in more depth.	**Year 11** Preparing them for their exams by building on everything they have already learnt. Placing all concepts in context with each other and revisiting self-reported and evidentially identified weak areas in more depth.	**Year 11** Preparing them for their exams by building on everything they have already learnt. Placing all concepts in context with each other and revisiting self-reported and evidentially identified weak areas in more depth.	**Year 11** Preparing them for their exams by building on everything they have already learnt. Placing all concepts in context with each other and revisiting self-reported and evidentially identified weak areas in more depth.

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What units/topics/content have been considered previously or discarded in planning this curriculum, and why?	**Year 7** All the major starter concepts for Computer Science are explored to give students a clear idea of what Computer Science is about, how to stay safe on a digital world and how it all feeds into the modern world. **Year 8** Continuing to delve into Computer Science concepts but in more detail. All taught within the context of the other academic subjects they learn. **Year 9** Using the learning to date in order to begin to explore what is involved in the Computer Science GCSE and how digital skills are essential in the modern economy. **Year 10** Teaching the first part of all topics to embed working practices and introduce new concepts. **Year 11** Teaching the second parts of all topics to both refresh memory and prepare for exams.					
What common narrative or themes underpin the curriculum in this year?	**Year 7** Encouraging a love for the subject by giving them fun and relevant activities whilst educating them on safe use of computers and the Internet combined with the ethics involved in the computing industry. Providing them with real world skills that are applicable in all modern workplaces. **Year 8** Encouraging a love for the subject by giving them fun and relevant activities whilst educating them on safe use of computers and the Internet combined with the ethics involved in the computing industry. Providing them with real world skills that are applicable in all modern workplaces. Incorporate the triad of Computer Science – Decomposition, Abstraction and Algorithmic Thinking: all tools useful in school and life. **Year 9** Analytical and logical thought processes, understanding the place of Computer Science in the modern world, considering the ethics of their actions and the impact mistakes or thoughtlessness can have and upon whom. **Year 10** No teaching groups **Year 11** Core exam skills for the subject, revision skills, the importance of computers in the world of work and how this is relevant to them.					
Any other comments?	All students gain experience of Microsoft Word, PowerPoint, Excel and Access, Adobe Photoshop. Computer Science students and all year groups except 11 gain experience of Python, Visual Studio, C#. Every lesson incorporates SPaG, mathematics, science and life skills. All lesson content takes into account female students' ways of working and interests to encourage more female Computer Scientists (https://code.org/girls).					