Computer Science Curriculum Map

Curriculum Vision: The curriculum at St. Cuthbert's provides ambitious educational opportunities for all members of our community. The curriculum equips our students with the knowledge, skills and personal characteristics they need to flourish as literate, articulate, global citizens, who fulfil the Catholic Mission to bring about the Common Good.

Specialisms Vision: The Specialisms at St. Cuthbert's offer an enriching experience where individual passions are discovered and nurtured within a culture of excellence.

Computer Science Curriculum Vision: It is the aim of the department to enable students to develop skills and knowledge in computer science and digital technologies to prepare them for a future in a world where the use of this technology is fully embodied. Built on enthusiasm and a love of learning, it is the aim of the department to encourage students to progress with this promising career path.

The intent is to develop problem solving skills embedded in a deeper understanding of mathematics and logic, a life skill for the future. Computational Thinking will be at the core of the curriculum and embedded within units including designing, refining, and producing algorithms which will be developed into programs through a range of programming languages. Students will be given a range of skills using ICT software and applications and will develop a practical understanding of how to operate safely online.

Further discussion and understanding will be developed surrounding the magic that happens "under the hood", and the communication of devices within a network. They will be encouraged to explore the wider issues of computing, discussing ethical, legal, and environmental issues. There will be no limitations on the programming skills that learners can develop, and they will be encouraged to undertake their own personal study and join further enrichment activity.

St. Cuthbert's RC High School
Curriculum Planning

Icons: refer to the curriculum definitions sheet and identify where the following are evident in your curriculum: **skills for life, literate and articulate, cultural capital, enrichment, careers, preparing for life in Modern Britain**. Only signpost these areas where they genuinely appear in your curriculum. Curriculum Leaders and teaching staff are expected to explain exactly where and how these are covered in their curricula (explicit and specific reference).

| Catholic Mission | Preparing for life in Modern Britain | Literate and articulate |
| Careers | Cultural Capital | Enrichment | Skills for Life |

		AUTUMN	**SPRING**	**SUMMER**
Year 7	**Theme**	**Half Term 1: ICT Skills** **Half Term 2: Exploring a Digital World**	**Half Term 3: Scratch Programming** **Half Term 4: Computer Systems**	**Half Term 5: Ethical Issues** **Half Term 6: Mathematics and Logic**

	Knowledge /Skills	Knowledge
		• **Digital Footprint**
		• **Cyberbullying**
		• **Social Networks**
		  ○ **What are they?**
		  ○ **Pros/Cons**
			Knowledge
			• **Purpose of a Computer**
			• **Inputs and Outputs**
			• **Hardware and Software**
			• **Storage Devices**
				Knowledge
				• **Human replacement by Machinery**
				• **Artificial Intelligence**
				• **Copyright Law**

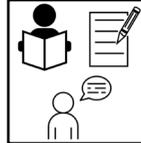|		AUTUMN	SPRING	SUMMER

		o **Influencers**
		• **Video Games**
		• **Passwords**
		Skills
		• **Computer Competency**
		  o **Email**
		  o **Keyboard Shortcuts**
		  o **Typing Skills**
		  o **File Structure**
		• **Microsoft PowerPoint**
		  o **Producing a Presentation**
		• **Microsoft Word**
		  o **Producing a document**
		• **Microsoft Excel**
		  o **Purpose of a Spreadsheet**
		  o **Formulas**
		  o **Graphs**
			Skills
			• **Variables**
			• **Iteration**
			• **Selection**
			• **Sequence**
			• **Mathematical Operators**
			• **Game Design and Execution**
				• **Environmental Issues**
				• **Computer Misuse Act**
				• **Data Protection Act**
				Skills
				• **Logical Thinking**
				• **Abstraction from a Problem**
				• **Boolean Logic**
				• **Encryption**

	Rationale	**Links to previous learning:** Students prior learning from KS1 and 2 will be based on Computer Programming, Logical Reasoning, Digital Product Creation and E-Safety as these are statutory requirements from the NC. Students will experience Computer Science as a discrete subject for the first time in Year 7 and will develop their knowledge in operating safely in a Digital World and skills in producing Digital Products.	**Links to previous learning:** As students have learnt how to use individual pieces of software in the Autumn Term of Year 7 they will now be able to access a broader curriculum as they progress through KS3 and 4. These skills are revisited, refined and embedded as students progress through each key stage. Computer Programming and Computer Systems are Statutory requirements in the KS1/2; this topic	**Links to previous learning:** Computer Programming in the Spring Term has given students opportunities to develop logical thinking skills, these will be embedded throughout this term. E-Safety knowledge will be given more breadth by covering how the growth in technology has affected a wider society, focusing on how actions online can cause impact.

	AUTUMN	SPRING	SUMMER
	Links to future learning: Having increased computer literacy will enable students to access their future lessons in Computer Science utilising digital equipment which is incorporated into all lessons at KS3 and KS4. Students will broaden their ICT skills as they progress through KS3 by experiencing a wider understanding of operating safely in a Digital World in Year 8. ICT skills will be transferrable to both KS4 Computer Science and ICT courses. Understanding of E-Safety will also be transferrable to KS4 ICT and will form a foundation for the Ethics Module in KS4 Computer Science. **Why**: The Computer Science curriculum meets the National Curriculum Requirements but it is also bespoke to meet the needs of learners at SCRCHS. Students need a secure foundation of ICT skills in order to access their future learning in Computer Science. This sets the expectations of working in the subject and improves their digital literacy. It is essential students have understanding of E-Safety as	allows students to build on their learning from primary school. **Links to future learning:** Having a foundation in Visual Computer Programming will allow students to gain skills in greater depth in Textual Programming in Year 8/9 and advanced Textual Programming in KS4. A secure foundation and understanding of Computer Systems will provide a platform for further learning in Year 8/9. **Why:** Students experience a broad curriculum foundation by learning about the purpose and components of a Computer Programming. This creates transferrable skills which will be applied in different contexts in the remainder of KS3 and KS4.	**Links to future learning:** Practising logical thinking skills will provide students with a platform to access further learning in Computer Programming in Year 8/9 and KS4. Students will access a broader curriculum experiencing encryption methods, and exploring further ethical/legal issues that go beyond the GCSE specification. Students will gain knowledge of ethical / legal issues which will be transferrable at KS4. **Why:** Students need to establish a secure foundation of Computational Thinking skills to access Algorithm Design and Programming which is a key strand of Computer Science and included within the KS4 GCSE course. Students need a broad understanding of issues surrounding Computing due to its growth in order to access a unit of the GCSE largely linked to Long Answered Questions. Focus on Mathematics will support the growth in attainment of Mathematics within the school.

		AUTUMN	SPRING	SUMMER
		some students may be experiencing Social Media for the first time.		
Year 8	**Theme**	**Half Term 1: Computer Systems** **Half Term 2: HTML**	**Half Term 3: Python Programming** **Half Term 4: Python Programming**	**Half Term 5: Networks** **Half Term 6: Ethical Issues**
	Knowledge / skills	**Knowledge** • **Internal Computer Parts** • **Binary Numbers** • **Digital Representation of Images** • **Digital Representation of Sound** • **Digital Representation of Text** • **Effective Web Design** **Skills** • **HTML Tags and their purpose** • **Creation of Web Pages** • **Effective Web Design**	**Knowledge** • **Definitions and Understanding of Programming Techniques** • **The difference between Visual and Textual Programming** **Skills** • **Progressing from Visual to Textual Programming** • **Use of EduBlocks** • **Programming with Variables** • **Programming with Inputs** • **Programming with Sequential Statements** • **Programming with Selection Statements** • **Programming with Iteration Statements**	**Knowledge** • **Purpose of a Network** • **Advantages and Disadvantages of a Network** • **Types of Network** ○ **LAN and WAN** • **Network Hardware** • **Spam** • **Phishing** • **Network Recovery** • **Types of Hackers** **Skills** • **Recognising Real and Fake Information**

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	Rationale	**Links to prior learning:** Students will revisit during the first lesson the Computer Systems Scheme of Learning from Year 7. They will then develop their knowledge of data representation. Students have experience of visual programming in Year 7 and logical thinking, these skills will be developed into their first experience of a textual programming language. **Links to future learning:** Students will experience a second textual language in the Spring Term which will be used throughout their GCSE. Students will access a broader curriculum by participating in a project to produce their own Website. Students are able to explore Computer Systems and embed the knowledge they gained in Year 7 and now Year 8 to access topics at KS4. Computer Systems will be explored again in Year 9 and at KS4. Whilst HTML specifically will not be revisited, further textual programming will be learnt both in Year 9 and KS4. **Why:** Students need an in depth understanding of Computer Systems and how data is represented in a Computer to develop their	**Links to prior learning:** Students have experienced a Visual Based Programming Language in Year 7 where they have developed the programming skills listed. They have experienced a Textual Programming Language in the Spring Term and will now seek to embed all programming skills learning to program in Python. This will enable students to progress with more advanced skills in Year 9 and GCSE. **Links to future learning:** Further Textual Programming will be learnt in Year 9 and at GCSE level. This provides students with a platform to build their Problem Solving Skills and understanding of Computational Thinking. **Why:** Students need an in depth understanding of Programming Skills in order to develop their future learning in Algorithmic Design and Computational Thinking. This is a large proportion of the GCSE Specification, and skills are transferrable across KS4**.**	**Links to prior learning:** Students have learnt how Computers work and their internal components, and will develop this learning by focusing on how Computers now communicate with other devices externally. Students will also develop on their Year 7 Scheme of Learning in E-Safety by exploring broader real-life issues. Understanding of E-Safety will also be transferrable to KS4 ICT and will form a foundation for KS4 Computer Science. **Links to future learning:** Providing students with learning of Networks will provide a platform for understanding which will be developed at KS4. Students will experience breadth in the curriculum by exploring real-life issues that may affect them personally in the future. **Why:** Students need a secure foundation of the structure and purpose of networks in order to develop their understanding in future learning about Networks at KS4. Elements discussed within the

		AUTUMN	SPRING	SUMMER
		future learning at KS4. Students should experience a breadth of learning in textual programming in order to secure transferrable skills in computational thinking. HTML provides an accessible approach to this introduction. This also raises aspirations by informing students of future careers in Web Design.	This has been placed during the Spring Term to allow students to focus on the expectations of working before selecting their initial options. There will be an option to start with Small Basic before progressing to Python if the teacher feels this appropriate for the needs of learners due to the additional support with literacy.	Ethical Unit will also be revisited and embedded at KS4. These two topics also link together, establishing the purpose of a Network then discovering risks associated with their use. Both contributing to learning at KS4.
Year 9	Theme	**Half Term 1: Logical Functions** **Half Term 2: Python Programming**	**Half Term 3: Computer Systems** **Half Term 4: Algorithm Design**	**Half Term 5: Heroes and Careers** **Half Term 6: Databases**
	Knowledge /Skills	**Knowledge** • **Rules of Logic Gates** • **Purpose of Mathematical and Comparison Operators** **Skills** • **Producing Truth Tables** • **Predicting Outputs to Logic Circuits**	**Knowledge** • **Hardware** • **Operating Systems** • **Storage** • **Online Storage** • **Primary Memory (RAM and ROM)**	**Knowledge** • **Purpose of a Database** • **Uses of Databases** • **SQL Injection** • **Parts of a Database** • **Relational vs Flat File Database** • **Computing Heroes**

		AUTUMN	SPRING	SUMMER
		• **Use of Boolean Operators in Programming** • **Binary Number Conversion** • **Binary Addition** • **Programming Techniques (Y8)** • **Use of Functions in Programming (Random)** • **Use of Lists in Programming** • **Use of Files in Programming**	• **Purpose of the CPU** • **Fetch-Decode-Execute Cycle** • **Internal Parts of the Computer** **Skills** • **Predicting outputs of Flowcharts** • **Completing Trace Tables** • **Designing Flowcharts** • **Refining Flowcharts** • **Designing Programs**	• **Hackers and Careers** • **CGI and AI** • **Careers (Cyber Security, Programmers)** **Skills** • **Constructing SQL Statements** • **Finding data from SQL Statements** • **Producing Databases using MS Access** • **Presentation Skills (build using Microsoft PowerPoint)** • **Presentation and Communication Skills**
	Rationale	**Links to prior learning:** Students will have developed their understanding of Computer related Mathematics and Logic in Years 7 and 8. They will develop understanding from Year 8 HT1 focusing on Binary addition, and the production of Logic Circuits as a development of skills. Students will also revisit Textual Based Programming learnt in the Spring Term of Year 8, then develop their skills using more advanced programming techniques.	**Links to prior learning:** Students have learnt the purpose of Computer Systems and how parts of a Computer communicate internally and externally in Year 7/8. Students now develop knowledge in this unit by accessing further detail to develop their understanding of Computer Science. Students are able to embed their Logical Thinking Skills learnt in Year 7/8 and more recently in Year 9 HT1 by immersing themselves into Algorithm and Program Design.	**Links to prior learning:** Students will be given opportunities to further their ICT skills initially developed in Year 7 HT1 and embedded across the curriculum. Broadening the curriculum by introducing a new software application in addition to those learnt in Year 7 enables students to explore databases in a practical context. Students will have references to future career paths in Years 7 and 8; they will secure their knowledge here of future paths and link their strengths to a career of interest.

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		Links to future learning: Students will develop their Logical Thinking Skills learnt here during the next Term as they focus on Algorithm Design. Skills and Knowledge developed in Representation of Data including Binary Numbers, Building Logic Circuits and Textual Based Programming are all transferrable to KS4. **Why:** Students need a broad understanding of Computer Mathematic and Logical Thinking skills to access Computer Science. Providing these skills early in curriculum planning will allow them to be embedded each year and developed at KS4 to access the GCSE Course.	**Links to future learning:** Further Textual Programming will be learnt at GCSE level. Learning this now provides students with a platform to build their Problem Solving Skills and understanding of Computational Thinking. Computer Systems is an essential part of the KS4 NC and will be covered in more depth. **Why:** Students experience a broad curriculum foundation in both Computer Systems and Textual Programming. Students need an in depth understanding of Programming Skills in order to develop their future learning in Algorithmic Design and Computational Thinking. This learning acts as a foundation for the GCSE Specification, and skills are transferrable across KS4.	**Links to future learning:** By learning about potential career paths, students will gain knowledge for their own personal future and also explore themes such as Hackers which are involved within KS4. Databases are incorporated into both KS4 ICT and KS4 Computer Science, therefore this theme will provide them with a platform for future learning. **Why:** Students will experience a broad curriculum foundation on the purpose of Databases to prepare them for KS4. Students will gain transferrable skills involving SQL statements and MS Access which can be applied at KS4.
Year 10	**Theme**	**Half Term 1: 1.1 System Architecture / 1.2 Memory and Storage** **Half Term 2: 1.2 Memory and Storage / 1.3 Computer Networks**	**Half Term 3: 1.4 Network Security / 1.5 System Software** **Half Term 4: 2.1 Algorithms / 2.2 Programming Techniques**	**Half Term 5: Programming / 2.3 Producing Robust Programs** **Half Term 6: Programming**

		AUTUMN	SPRING	SUMMER
	Knowledge / skills	**Knowledge** • **Fetch-Decode-Execute Cycle** • **Parts of the CPU** • **Von Neumann Architecture** • **Registers in the CPU** • **Performance of the CPU** • **Embedded Systems** • **Units of Data Storage** • **Character Sets** • **Representation of Images** • **Representation of Sound** • **Compression** • **Types of Network** • **Performance of Networks** • **Network Hardware** • **Internet Services** • **Topologies** • **Encryption** • **IP and MAC addressing** • **Standards, Protocols and Layers** **Skills** • **Conversion of Number Systems** • **Binary Addition** • **Binary Shifts**	**Knowledge** • **Forms of Network Attack** • **Prevention Methods** • **Purpose and functionality of Operating Systems** • **Utility Software** • **Understanding of the purpose of Programming Techniques** **Skills** • **Principles of Computational Thinking** • **Inputs, Processes and Outputs of Programs** • **Producing Structure Diagrams** • **Writing in Pseudocode** • **Writing in Reference Language** • **Textual-Based Programming** • **Debugging** • **Completing Trace Tables** • **Performing Searching Algorithms** • **Performing Sorting Algorithms** • **Use of Variables, Constants and Operators**	**Knowledge** • **Misuse of Programs** • **Authentication** • **Validation** • **Maintainability of Code** • **Syntax and Logic Errors** **Skills** • **Choosing and applying Test Data** • **Producing Test Tables** • **Refining Algorithms** • **Practical Textual Programming**

		AUTUMN	SPRING	SUMMER
		• **Converting between Units of Data**	• **Sequence, Selection and Iteration** • **Data Types** • **String Manipulation** • **File Handling** • **SQL statements** • **Use of Arrays** • **Use of Subroutines and Libraries.**	
	Rationale	**Links to prior learning:** Students have learnt the Purpose of Parts of the Computer, including the CPU. They will now explore in further depth the internal components of the CPU and how they communicate to execute instructions. Students were given a platform of understanding in Year 8 about Networks, this will now be revisited. Students have also learnt how data is represented in Year 8 which will be developed during the Autumn Term. In addition students have also learnt two number systems and how to complete Binary Addition in Year 9, they will now develop their skills to look at additional number systems. **Links to future learning:** Students will revise and revisit all themes taught within the Autumn Term during HT1	**Links to prior learning:** Students have learnt the dangers associated with Networks and will now explore in further depth the specific attacks that can occur on a Network and their prevention methods. Students were given a platform of understanding in Textual Based Programming in Year 8 and 9 which will now be revisited from both a practical and theoretical context. Algorithm Design which was also studied during the Year 9 Spring Term will be revisited in more depth offering the addition of Searching and Sorting Algorithms. **Links to future learning:** Students will revise and revisit all themes taught within the Spring Term during HT1 of Year 11. Their understanding of	**Links to prior learning:** Students have practised Practical Programming Skills throughout KS3 and the Spring Term of Year 10. Students will apply these skills to a project and further practical based learning to show their understanding of techniques. Students have also experienced topics included within Robust Programming from a practical perspective but will now explore in depth the theoretical meanings. **Links to future learning:** Students will revise and revisit all themes taught within the first half of the Summer Term during HT1 of Year 11. Students will also continue to use practical programming as part of their revision material in preparation for their

		AUTUMN	SPRING	SUMMER
		of Year 11. Their understanding of Binary will also support their learning using Operators in Programming during the Spring and Summer Term, and will provide a foundation for their understanding when using Logic Circuits in Year 11. **Why:** Students experience a breadth of learning linked to System Architecture, Memory, Storage, Data Representation and Networks in order to secure transferrable skills which will be revisited in preparation for their Computer Science examination. This will also be developed if students choose to opt for Post 16 education in Computer Science.	Programming from both a practical and theoretical context will support them in their Practical Programming Project in the Summer Term and the Translator unit introduced in Year 11. **Why:** Students experience a breadth of learning linked to Network Security, Algorithms and Programming Techniques in order to secure transferrable skills which will be revisited in preparation for their Computer Science examination. This will also be developed if students choose to opt for Post 16 education in Computer Science.	examination. This will allow further access to the Programming Unit by having a deeper understanding and broader Computational Thinking skills. **Why:** Students experience a breadth of learning linked to Robust Programming and Practical Textual Programming in order to secure transferrable skills which will be revisited in preparation for their Computer Science examination. This will also be developed if students choose to opt for Post 16 education in Computer Science.
Year 11	Theme	**Half Term 1: Revision** **Half Term 2: 2.5 Programming Languages and IDE / 2.4 Boolean Logic / 1.6 Ethics** 	**Half Term 3: Mock Exam Preparation and Overflow** **Half Term 4: Analysis of Mocks / Examination Technique / Revision** 	**Half Term 5: Revision / Final Exam**

		AUTUMN	SPRING	SUMMER
	Knowledge / skills	**Knowledge** • **High Level and Low Level Languages** • **Purpose of Translators** • **Compilers and Interpreters** • **Features of an IDE** • **Logic Gate Diagrams** • **Ethical / Legal / Cultural / Privacy and Environmental Issues** • **Legislation** • **Software Licenses** **Skills** • **Producing Logic Circuit Diagrams** • **Producing Truth Tables**	**Knowledge** • **Revision of KS4 Content** • **Exam Command Words** **Skills** • **Examination Technique**	**Knowledge** • **Revision of KS4 Content** • **Exam Command Words** **Skills** • **Examination Technique**
	Rationale	**Links to prior learning** During the first Half Term, students will revisit all units learnt during the first year of KS4. Students will be taught in the form of Mastery Classes covering a wide range of knowledge and skills within lessons. Students have experience with Practical Based Textual Programming but will now explore how the IDE offers support as they produce programs, and how the computer understands their program. Students have also experienced producing Logic Gates and Truth Tables within Year 9, these skills will be revisited and embedded across this Half Term and linked to an examination context.	**Links to prior learning** During the Spring Term, students will revisit all units learnt during the first year of KS4 and the Autumn Term. Students will be taught in the form of Mastery Classes covering a wide range of knowledge and skills within lessons. Students will also practise their examination technique and use of exam command words in relation to their knowledge. **Links to future learning:** Students will complete their Mock Examinations during this Term, this will	**Links to prior learning** Students will revisit all units learnt at KS4. **Links to future learning:** Students are learning a secure foundation in Computer Science knowledge and skills which can be applied to a Post 16 course in Computer Science or other related qualifications. **Why:** Revision is essential at this stage of the curriculum to provide the students with the support they require before sitting

		AUTUMN	SPRING	SUMMER
		Students have in Year 7 and 8 learnt topics related to E-Safety and explored wider ethical/ legal issues that surround Computing. This will now revisit and embed this learning exploring a wide range of issues. **Links to future learning:** Students will revise and revisit all themes taught within Year 10 and the Autumn Term of Year 11 in the Spring Term. Having secure knowledge base at this point will allow them to practise further application of this knowledge to an examination context. **Why:** Students experience a breadth of learning linked to Logic Gates, Ethical Issues and Translators in order to secure transferrable skills which will be revisited in preparation for their Computer Science examination. This will also be developed if students choose to opt for Post 16 education in Computer Science. By revisiting previous topics at the start of Year 10, time has been allocated to plug any gaps before continuing with the course.	allow planning to be made for the final stages of revision to ensure all learners receive the support required and plug the gaps in learning they may have. Having secure knowledge will allow them to continue to practise their application skills in preparation for the End of Year Exams. **Why:** Students are becoming more familiar with exam structure and exam command words to allow them to access the Computer Science written papers and illustrate their knowledge in the correct way. Students are learning transferrable skills which will continue to be revisited in the final stages of revision. These skills will also be developed if students choose to opt for Post 16 education in Computer Science.	the final examination. Students can then decide to use this GCSE in future study including A-Level Courses, vocational courses and eventually through to University Degree Level Courses.