Computer Science Curriculum Map

Year	Unit of work	Rational	Key skills
7	Introduction to computer science – Routines ESafety - Passwords, the classroom, Email, presenting to audiences, cyberbullying, who are you talking to?	Pupils in year 7 are initially taught in forms and moved into sets after the first half term. Pupils arrive with a wide range of experience in computer science, from none to extensive. This initial unit of work gives us an overview of their understanding and tackles important preparatory elements such as, e-safety, email, and classroom safety.	● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.
	System architecture – Primary hardware components and their uses, peripherals, secondary storage and units of data.	This unit of work deals with the hardware aspect of computer science, where pupils will learn about the main components that computer systems contain. It is important that pupils have an understanding of the components before learning about software and many of them are referred to in the next unit. Pupils need to understand the components that make up a computer system in order to understand how the system works.	● Recognise common uses of hardware components. ● Understand how computers process data and produce information. ● Understand what data is and how analogue data is transferred to digital data.
	System software – OS and application software	This unit of work flows on logically from system architecture. Hardware and software are the main components that make computer systems work. Pupils will understand how the software will work with the hardware components.	● Use technology purposefully to create, organise, store, manipulate and retrieve digital content. ● Recognise common uses of information technology beyond school. ● Understand the fundamental need for software and its different uses.

	Careers in the curriculum - Understand the need for Computer Science skills and how they are used in the workplace - Problem solving.	It is important to discuss careers within the curriculum and one of the main tasks that underpins computer science is problem solving. In school: Computers need specific and detailed instructions to follow to successfully complete a task. That's essentially what a computer program is. Pupils will learn how to write programs, taking those instructions and putting them into a language a computer can understand. Not everything will work the first time, so they'll have to think around the problem to solve it, often using trial and error techniques. This can be taught at any point within the curriculum once pupils have been placed in sets.	● Understand the need for problem solving skills in the real world and the workplace.
	Data representation –simple binary and basic colour	This unit of work is taught after hardware and software so pupils will understand how the computer system will see the things we see e.g. in 1's and 0's and how that makes up colours.	● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation.
	Wireless and wired networks - Topologies and network hardware	This unit of work cannot be taught without a sound understanding of systems architecture, software and data representation. From here pupils will understand how data is transferred across networks.	● Understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration.

	Careers in the curriculum - Understand the need for Computer Science skills and how they are used in the workplace - Mathematics.	It is important to discuss careers within the curriculum. When working with algorithms, mathematical equations are very important. In school: Mathematical principles are essential to computer programming. Pupils will practice binary and hexadecimal conversions and calculations to simulate how a computer processes instructions. Computer science also requires practical skills including evaluating Boolean algebra, drawing logic gates and analysing mathematical functions used to represent algorithmic efficiency. This can be taught at any point within the curriculum once pupils have been placed in sets.	● Understand the need for mathematical skills in the real world and the workplace.
	System security – Threats including malware and protection	Once pupils have an understanding of how computer network function, we believe that it is important for them to study the security issues that arise from digital content and how to prevent issues. This is the logical unit to follow computer networks.	● Understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration. ● Recognise common uses of information technology beyond school. ● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.

	Ethical, legal and cultural issues – Environmental issues and the digital divide	This unit could be taught at any point of the curriculum. However, we feel a sound understanding of four previous units is needed to fully understand this unit and the impact that technology has on the world around us.	● Use technology purposefully to create, organise, store, manipulate and retrieve digital content. ● Recognise common uses of information technology beyond school. ● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. ● Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems.
	Algorithms and Computational Thinking	Selection, sequencing and iteration are key aspects of computer science as well as resilience and problem solving. This unit is an excellent way to introduce pupils to those concepts. Pupils need to understand how computers work in order to understand how to create algorithms in order to achieve an outcome.	● Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. ● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● Analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. ● Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems;

			solve problems by decomposing them into smaller parts ● Use sequence, selection, and repetition in programs; work with variables and various forms of input and output. ● Use logical reasoning to explain how some algorithms work and to detect and correct errors in algorithms and programs.
	Programming techniques – Visual programming	Algorithmic and computational thinking skills need to be understood before attempting to program. Pupils need to understand the concepts of decomposition, abstraction and logical thinking in order to solve problems.	● Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. ● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. ● Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts ● Use sequence, selection, and repetition in programs; work with variables and various forms of input and output.

			● Use logical reasoning to explain how some algorithms work and to detect and correct errors in algorithms and programs.
	Applying computational thinking project	Here, pupils can demonstrate the skills they have learnt through the last few units and elements of the year.	● Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users ● Create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability

Year	Unit of work	Rational	Key skills
8	E-safety – Staying safe online and online reputation	This unit could be studied at any point of the curriculum. However, we believe that the importance of the subject matter needs to be projected as early as possible in the year as the pupils may have had experiences of online issues over the summer holidays. This allows us to deal with any potential issues. The theme of this unit runs throughout the curriculum and crops up regularly in other units such as cyber security.	● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.
	System architecture – How components work together and integrate	This unit of work enhances the pupils' knowledge of the hardware aspect of computer science and pupils learn about the main components that computer systems studied in year 7 in more depth. It is	● Recognise common uses of hardware components. ● Understand how computers process data and produce information.

		important that pupils have an understanding of the components before learning about software and many of them are referred to in the next unit. Pupils will understand that there are different types of computer systems and their purposes.	● Understand what data is and how analogue data is transferred to digital data.
	System software - Operating systems and different types of software	This unit of work flows on logically from system architecture. Hardware and software are the main components that make computer systems work. Pupils learn about the functions of OS and the difference between application software and system utilities as well as the difference between open source and proprietary software.	● Use technology purposefully to create, organise, store, manipulate and retrieve digital content. ● Recognise common uses of information technology beyond school. ● Understand the fundamental need for software and its different uses.
	Data representation – binary addition, characters, images and sound	This will build on pupils' understanding of computers and how data is sent around a computer system. Pupils will develop their knowledge of binary and understand binary addition, characters as well as sound and images.	● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● Recognise common uses of information technology beyond school.
	Wireless and wired networks – topologies and LAN and WAN	This unit of work cannot be taught without a sound understanding of the two previous units. In this unit we introduce different types of topologies and dive deeper into LANs and WANs.	● Understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration.
	System security – Network attacks	Once pupils have an understanding of how computer networks function and the features of the different topologies, we believe that it is important for them to study the security issues that arise from digital	● Understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration.

		content and how to prevent issues in greater depth. This is the logical unit to follow computer networks.	● Recognise common uses of information technology beyond school. ● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.
	Ethical, legal and cultural issues - The digital divide	This unit could be taught at any point of the curriculum. However, we feel a sound understanding of systems architecture and software systems is needed to fully understand this unit as technical terms are used. Pupils need to understand what a computer system is and the ways in which it can be vulnerable to fully understand the impact this has on the issues of right vs wrong, the law and the divide that technology is having within society.	Use technology purposefully to create, organise, store, manipulate and retrieve digital content. ● Recognise common uses of information technology beyond school. ● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. ● Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems.
	Careers in the Curriculum 1 - influential people and jobs within the computing industry	It is important to discuss careers within the curriculum. Pupils should understand where people have come from and how they get to where they have so that they have the opportunity to apply it to their situations. Pupils need to be aware that there isn't just one path within the computing industry and understanding people's journeys and paths could be something that they could inspire	● Recognise that anyone can influence the computing industry.

		to be and do. Having the understanding of Computers and their systems is key to understanding the careers available to them.	
	Algorithms – Flow diagrams, sequencing and creating algorithms	Pupils will have come across flowcharts and the flowchart symbols in years 7. Pupils will now have to understand how algorithms and flowcharts are applied to the real world. Without the understanding of the previous units, pupils can start to connect their learning and strengthen their understanding. In year 8 we reinforce the key aspects of selection, sequencing and iteration as well as resilience and problem solving as early as possible.	● Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. ● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● Analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. ● Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts ● Use sequence, selection, and repetition in programs; work with variables and various forms of input and output. ● Use logical reasoning to explain how some algorithms work and to detect and correct errors in algorithms and programs.
	Careers in the Curriculum 2 - research	Building on from the previous careers lesson it is important to understand that not everyone will have the same career. Some	● Understand what is involved in different jobs that are available including salary, tasks and skills that are needed.

		pupils will want to know more about a certain job and what they would need to do to prepare for a job in that sector.	
	Programming techniques – Text based programming languages - operators, algebra, errors, data types, constants and variables, inputs, selection, nested IF, Else IF, Iteration	Programming follows on from creating algorithms as it is a natural progression. Algorithms are a step by step sequence of instructions which will allow pupils to decompose problems which can in turn be used to program solutions. Pupils will have programmed using blocks where as in year 8, pupils will use text based programming. Pupils will be able to apply their skills from year 7 to a different programming language.	● Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. ● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● Analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. ● Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts ● Use sequence, selection, and repetition in programs; work with variables and various forms of input and output. ● Use logical reasoning to explain how some algorithms work and to detect and correct errors in algorithms and programs.

Year	Unit of work	Rational	Key skills
9	E-safety – Fake new and protecting yourself online	This unit could be studied at any point of the curriculum. However, we believe that year 9 pupils should become more aware of the issues surrounding fake news and remind pupils how they can protect themselves online after the summer holidays.	● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.
	System architecture – memory, secondary storage, Von Neumann architecture.	This unit of work looks at systems architecture in more depth than previously, including GCSE topics such as primary/secondary storage and Von Neumann architecture. Many of these components are referred to in the subsequent units, therefore it is important that pupils have a sound knowledge on how they work.	● Recognise common uses of hardware components. ● Understand how computers process data and produce information. ● Understand what data is and how analogue data is transferred to digital data.
	System software – operating systems, utility/application software and its uses.	This unit of work flows on logically from system architecture. Hardware and software are the main components that make computer systems work. Pupils in greater depth about the functions of OS and how application software and system utilities are used.	● Use technology purposefully to create, organise, store, manipulate and retrieve digital content. ● Recognise common uses of information technology beyond school. ● Understand the fundamental need for software and its different uses.
	Careers in the curriculum 1 - Skills needed within the workplace	This unit of work will allow pupils to think about what they may want to do in the future. They will have covered a lot in years 7 and 8 and will be able to apply this understanding to the workplace scenario.	● Recognise which skills are needed within the workplace. ● Understand that jobs may not have been created yet but understand the skills that are needed in the future.
	Careers in the curriculum 2 - Careers of the future		

		Pupils will look at the different skills that may be required of them and what they may need in the future.	
	Data representation – addition, hexadecimal, images, characters, audio, binary and logic.	This will build on pupils' understanding of computers and how data is sent around a computer system. Pupils will develop their knowledge of binary and understand binary addition, characters, sound, images as well as binary logic.	● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● Recognise common uses of information technology beyond school.
	Wireless and wired networks – Topologies, hardware components and the internet.	This unit of work cannot be taught without a sound understanding of the two previous units. In this unit pupils study network topologies and LAN/WAN in greater depth.	● Understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration.
	System security – Network attacks and malware	This is the logical unit to follow computer networks. Once pupils have a greater understanding of how computer networks function and the features of the different topologies. We believe that it is important for them to study in more detail about the security issues that arise from digital content and how to prevent issues.	● Understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration. ● Recognise common uses of information technology beyond school. ● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.
	Ethical, legal and cultural issues - Impact of digital technology including health and safety and the	This unit could be taught at any point of the curriculum. However, we feel a sound understanding of four previous units is needed to fully understand this unit and the	● Use technology purposefully to create, organise, store, manipulate and retrieve digital content.

	environmental issues surrounding technology	impact that technology has on the world around us.	● Recognise common uses of information technology beyond school. ● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. ● Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems.
	Computational Thinking and creating algorithms	Pupils will have come across flowcharts and the flowchart symbols in years 7 and 8. Pupils will now have to understand how algorithms and flowcharts are applied to the real world. Without the understanding of the previous units, pupils can start to connect their learning and strengthen their understanding. In year 8 we reinforce the key aspects of selection, sequencing and iteration as well as resilience and problem solving as early as possible. Pupils will have to use key skills they have learnt in years 7 and 8 and apply them to creating their own algorithms. They will need to use abstraction, decomposition and logical thinking to complete tasks. Pupils are also introduced to searching and sorting algorithms.	● Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. ● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● Analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. ● Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts

			● Use sequence, selection, and repetition in programs; work with variables and various forms of input and output. ● Use logical reasoning to explain how some algorithms work and to detect and correct errors in algorithms and programs.
	Programming techniques – Text based programming languages - operators, algebra, IDE's, data types, variables and constants, inputs and outputs, selection (including nested and elseif), loops and errors.	Programming follows on from creating algorithms as it is a natural progression. Algorithms are a step by step sequence of instructions which will allow pupils to decompose problems which can in turn be used to program solutions. Pupils will have programmed using blocks in year 7 and in year 8 pupils will use text based programming. Pupils will be able to apply their skills from years 7 and 8 to a different programming language.	● Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. ● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● Analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. ● Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts ● Use sequence, selection, and repetition in programs; work with variables and various forms of input and output. ● Use logical reasoning to explain how some algorithms work and to detect and correct errors in algorithms and programs.

	Design and create an IT product for Careers and BAME	Pupils will create IT products about those who are pioneers in technology, including BAME pioneers, and careers within Computing.	● Create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability

J277 (2022 exams onwards)

Year	Unit of work	Rational	Key skills
KS4	Exploration and inspiration for career skills and how they relate to the workplace.	It is important to discuss careers within the curriculum. Pupils will identify and learn how the computer science curriculum can be applied in a career. This lesson will be used to identify five key skill areas that are developed in computer science and pupils should appreciate that the skills used in the classroom are directly relevant to the workplace.	● Develop their capability, creativity and knowledge in computer science, digital media and information technology ● Develop and apply their analytic, problem-solving, design, and computational thinking skills ● Understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.
	Components of a computer system – Hardware and software.	This unit of work looks at systems architecture in more depth than previously. Many of these components are referred to in the subsequent units, therefore it is important that pupils have a sound knowledge on how they work.	● Recognise common uses of hardware components. ● Understand how computers process data and produce information. ● Understand what data is and how analogue data is transferred to digital data. ● Use technology purposefully to create, organise, store, manipulate and retrieve digital content. ● Recognise common uses of information technology beyond school. ● Understand the fundamental need for software and its different uses.
	Data representation – Units, binary, hexadecimal, characters, images, audio, compression.	This will build on pupils' understanding of computers and how data is sent around a computer system. Pupils will develop their	● Understand and apply the fundamental principles and concepts of computer

		knowledge of binary and understand binary addition, characters, sound, images as well as binary logic.	science, including abstraction, logic, algorithms and data representation. ● Recognise common uses of information technology beyond school.
	Wireless and wired networks – Topologies, LAN/WAN, hardware, networks, protocols, the internet, system security and hardware components.	This unit of work cannot be taught without a sound understanding of the previous units.	● Understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration. ● Recognise common uses of information technology beyond school. ● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour;
	Ethical, legal and cultural issues - Impact of digital technology	This unit could be taught at any point of the curriculum. However, we feel a sound understanding of systems architecture and software systems is needed to fully understand this unit as technical terms are used.	● Use technology purposefully to create, organise, store, manipulate and retrieve digital content. ● Recognise common uses of information technology beyond school. ● Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. ● Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems.

	Algorithms – Flow diagrams, pseudocode, sorting and searching algorithms.	Pupils have covered algorithms at KS3. When programming, pupils will be introduced to some of the algorithmic elements covered in this unit, however the majority of teaching and applying these skills is taught here. The searching and sorting algorithms are less imperative and are taught in this order of the units.	● Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. ● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● Analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. ● Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts ● Use sequence, selection, and repetition in programs; work with variables and various forms of input and output. ● Use logical reasoning to explain how some algorithms work and to detect and correct errors in algorithms and programs.
	Programming techniques – Text based programming languages.	We introduce programming at the beginning of the year. We do this by setting aside one lesson a week to learn how to design and code a robust program for a given problem. This is a large and complex unit so it is	● Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.

		important that pupils understand the key concept early on in year 10. Applying these skills to an exam are covered after computational thinking and algorithms as pupils will have a stronger understanding of how these are applied.	● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● Analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. ● Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts ● Use sequence, selection, and repetition in programs; work with variables and various forms of input and output. ● Use logical reasoning to explain how some algorithms work and to detect and correct errors in algorithms and programs.
	Design, testing and IDEs	The design aspect and the use of an IDE are explained and addressed in the above two units. Testing happens when pupils develop an algorithm, code a solution and then test the program. However, formal testing is taught at this point of the curriculum and is a natural antecedent of programming. This again prepares pupils for paper 2 aspects of the course.	● Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. ● Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. ● Analyse problems in computational terms, and have repeated practical experience of

			writing computer programs in order to solve such problems. ● Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts. ● Use sequence, selection, and repetition in programs; work with variables and various forms of input and output. ● Use logical reasoning to explain how some algorithms work and to detect and correct errors in algorithms and programs.
	Careers in the curriculum 1 - Exploration and inspiration career skills and how they relate to the workplace.	At the start of KS4 to set pupils a goal as to what they could achieve, aim for. It will give pupils the motivation to work hard to achieve potential goals.	● Understand how skills in computer science are used in the real world.
	Careers in the curriculum 2 - Knowledge in Computer Science - Programming	Programming and understanding algorithms is a key part to Computer Science and pupils need to understand how these skills build into the real world. This gives pupils the opportunity to gain knowledge of the software development process, including iterative design principles. They will understand how to complete the initial concept and analysis stages, as well as design, implementation, testing routines and evaluation of the completed solution.	● Understand how skills in computer science are used in the real world.

	Careers in the curriculum 3 - Creativity	Within Computer Science, it is important that pupils understand that creativity and problem solving go hand in hand. When pupils want to develop new ideas, programs, apps etc they will need to think creatively when writing that program. It may not be obvious how to solve a particular problem.	● Understand how skills in computer science are used in the real world.
	Careers in the curriculum 4 - Careers in computer science	Visitor from outside of school to visit to discuss careers in the curriculum. This can be taught at any point within the curriculum when the speaker is confirmed.	● Understand how skills in computer science are used in the real world.