KS3 Computer Science Curriculum

"Computer Science is the subject that has altered the ways we interact with Technology."

	Hardware & Processing	Programming	Communication, Networks & IT	Data & Data Representation	Algorithms
Year 7	**Logging in and showing respect & How a computer works.**		**Excel and formulae & What are algorithms**		**Introducing python and programming**
Year 8	**Fetch, decode, execute & multimedia**		**Algorithms**		**Programming and Cultural Implications of Computing**
Year 9	**Network hardware; how the internet works and cyber security**		Images and Sound, algorithms: selection, iteration and functions		**Programming in python**

How will you be assessed?

- **Knowledge** of programming and ability to decompose problems
- **Understanding** how code can be written to utilise logic whilst maximising efficiency and understanding.
- **Application** of knowledge and understanding to interpret, analyse and evaluate programming problems providing effective solutions .
- **Computes science skills**, such as writing code based on an brief, online assessments and reviews of your project work over the term

Intent By the end of KS3 students are able to…		What new knowledge/content do we introduce?			How does this curriculum incorporate the National Curriculum and go beyond? How does going beyond the NC ensure challenge?
		Year 7	Year 8	Year 9	
• Are able to effectively carry out work in Microsoft Windows utilising a wide range of skills to organise their work as well as utilise a variety of different Office products • Have an excellent ability in being able to decompose a given problem into specific stages • Are able to use different programming languages using the programming fundamentals of sequence, selection and iteration	**Autumn**	**e-Safety** How do we need to be secure when setting up our login	**How the computer works:** We continue the learning journey by introducing the Fetch decode and execute cycle. The central and fundamental concept in computer operations.	**Networks** Network hardware. This year students will begin learning about computer networks and the internet, an incredibly important part of computing. Initially we learn about the basic computer hardware that computers use to connect to each other. Student then learn about the different protocols used on the internet. Students begin the learning journey to answer **"How does the internet work?"** **The dangers of the internet.** Students will being to learn about malware and also laws that make malware and hacking illegal.	Within these topics we ensure that students are given the chance to understand the key concepts of how computers work, how data is stored, how digital images are used and how to program computers effectively, but through the use of interesting and exciting applications
		How a computer works: The basics of components of the computer	**Search engines** We learn about how to expertly use search engines. Multimedia: We use powerpoint, sound images and videos to build a multimedia information product for a music festival.	**Images and Sounds** Students learn how images and sounds are recorded and represented on computers in terms of pixels, samples and binary **Computational Thinking** Students learn what "computational thinking" the central philosophy of the engineering of computer systems and programs. Students learn about abstraction, decomposition, pattern recognition and algorithmic thinking. These ideas are also relevant to other engineering disciplines.	
	Spring	**Excel work** Introduction to excel and formulae. **Algorithms** We introduce algorithm using flow charts using a program called Flowol which allows students a drag and drop way of controlling simulated devices, such as traffic crossings to rollercoasters.	**Data representation:** Students will learn binary, the language of computing and the different units used for data, such as kilobyte and megabyte. **Algorithms:** Students will extend their knowledge of algorithms how to create sequence, selection and iteration using a program that allows active processing of algorithms using flowcharts (Logarithm). This will build conceptual framework for further programming.	**Algorithms** Students learn more detail on iteration from a algorithmic perspective and also the use of subprograms. This is learnt using the executing flowcharts that is the flowgorithm programming environment.	
	Summer	**Introduction to Python Programming** We introduce python via a drag and drop environment called edublocks. This looks like scratch but is actually python. We then instroduce, from this, text based python programming	**Programming in python.** We continue to build on last years introduction to python programming by learning to code the algorithms we learnt in the previous term in flowcharts and flowgorithm in actual python by building various programs,	**Python Programming** Students will build on the algorithm concepts by learning how to implement them in python through mixture of teacher led live coding and completing a series of engaging programming challengers	

	Rationale for this sequence	Students arrive in Year 7 with varied experience in programming and digital literacy. To ensure that they are able to effectively work with the computer and the core applications that we will use throughout KS3 and KS4, students are given the necessary knowledge to navigate Windows as well use all of the major applications within the Microsoft Office suite. The students utilise the applications whilst carrying out a research project, with data developed from Microsoft Forms. This is analysed with Excel, presented with PowerPoint and written up with Word. Students go to learn the basic components of a computer, to begin the journey of understanding "how a computer works". A learning journey could eventually end in year 13 in understanding the details of the logic gates of adding machines and the maths used in the design of circuits. Programming remains an highly employable skill and we begin moving from drag and drop based programming to "real" text based python	Year 8 begins with building on previous years work with more about the hardware and processing aspects of computers. Students learn some important life skills in some advanced techniques when using google's search. Students begin learning about the mathematical underpinning of computers by learning how to count in binary and also the data units used in computer science. Student are introduced the three most important programming constructs, sequence, selection and iteration first as algorithm in flowcharts (that actually run and execute) and then similar but in python programming .	Year 9 begins with introduction of some more advanced topics including computer networks and beginning the learning journey to answer "How does the internet work?" This prepares students for the world and also GCSE computer science. Students will also begin learning the underlying philosophy of the engineering of computing by learning the principles of computational thinking. This would also serve them well if they follow other engineering disciplines later in life. Students will continue to develop their programming skills preparing them for the modern world and GCSE and A-level computer science .	
	How does the KS3 Curriculum build on previous learning at KS2?	We take skills the students would have typically used in KS2, such as programming with Scratch and use a variety of different techniques to ensure that they are supported in their first programming with the text based languages that we teach. For example, we utilise different integrated development environments that work with our chosen languages that automatically demonstrate the differences in words might have different meanings to the language. We support their maths understanding by using tasks that are graphically represented based on the code they enter. Finally, we support their English ability by the interaction with various Office applications as well as the creative writing skills within different Topics.			