

Five year sequence: Computer Science

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
7	<p>Online Safety These include concerns about privacy, safety, copyright infringement and the laws that underpin these. Our focus is to educate and ensure that our students are safe online.</p> <p>Publishing for Purpose Students will develop their experience in the use of a range of applications. Such as: PowerPoint, Word Document and publishing softer.</p>	<p>Spreadsheets Are used throughout industry and it is imperative that our students receive a good grounding on how to read data, create new data, share and store data correctly.</p>	<p>Data Representation: Numbers and Text Students will learn how the computer perceives the world in binary. This include base 2, base 16 and base 10 number systems and how to convert between number bases</p>	<p>Data Representation: Students will learn how: Image and Sound are stored in bits, bytes, megabytes and terabytes</p>	<p>Scratch Programming: Part I control flow of input/process/output Define a variables Define expression as True or False comparison operators (>,<=) Define iteration as a group of instructions Design solutions to problems using: selection, count-controlled iteration, operators, and variables.</p>	<p>Scratch Programming: Part II Autumn 1 unit on Scratch programming. It extends the previous unit by introducing students to: subroutines and lists</p>
<p>8 This will be taught from Sept 2022</p>	<p>Introduction to Python Programming This unit introduces students to text-based programming with Python or block-based using EduBlocks. It builds upon students' knowledge of programming using the block-based Scratch language, towards using the text-based Python –</p>	<p>Python Programming Extended Project This unit has been designed to ensure that students are given sufficient time to analyse, design, implement and test a solution to a problem, using Python programming. It should enable students to work on a project for an extended time, applying</p>	<p>Hardware This unit introduces students on a tour through the different layers of computing systems: starting with inputs/outputs, and the physical components that store and execute programs –known as hardware. The aim of this unit is to provide a concise overview of how</p>	<p>Software This unit builds upon the Spring 1 unit on hardware, by enabling students to learn about what software is and examples of software and languages that can be executed on computing systems. This unit also acts as a precursor to the study of computer systems in Key Stages 4 and 5.</p>	<p>Vector Graphics Through this unit, students will be able to better understand the processes involved in creating such graphics and will be provided with the knowledge and tools to create their own using vector graphic editing software This unit is the first of two that introduces</p>	<p>3D Animation In the second of two digital media units, students learn to use professional-grade software to create 3Danimations. The knowledge gained from this unit can be applied to creating digital art, models or graphics</p>

	which can also be used at Key Stage 4	their understanding of programming concepts and the software development process.	computing systems operate, conveying the essentials and abstracting away the technical details that will be covered in the Key Stage 4 programmes of study.		students to digital media techniques. Links are made throughout to computer science, computational thinking, and the world of work. Tools and techniques learnt in this unit can be applied to vocational and media-based qualifications	for a variety of media purposes and for a range of vocational and media-based qualifications.
9 This will be taught from Sept 2022	<p>Python Programming This unit introduces students to how data can be represented and processed in sequences, such as lists and strings. The lessons cover a spectrum of operations on sequences of data, that range from accessing an individual element to manipulating the entire sequence. This unit builds upon the students' study in Year 8</p>	<p>Physical Computing (with Python) This unit applies and enhances the students' programming skills in a new engaging context: physical computing, using the BBC micro:bit. Students will get acquainted with the host of components built into the micro:bit and write simple programs that use these components to interact with the physical world. This unit builds on from the previous Python programming unit and those introducing students to Python in Year 8. This unit also includes</p>	<p>Networks This unit begins by defining a network and addressing the benefits of networking, before covering how data is transmitted across networks using protocols. The types of hardware required are explained, as is wired and wireless data transmission. Students will develop an understanding of the terms 'internet' and 'World Wide Web', and of the key services and protocols used. Practical exercises are included throughout to help strengthen understanding. This is the first unit that introduces students to</p>	<p>Cyber Security This unit takes the students on an eye-opening journey of discovery about techniques used by cybercriminals to steal data, disrupt systems, and infiltrate networks. The students will start by considering the value of their data to organisations and what they might use it for. They will then look at social engineering techniques used by cybercriminals to try to trick users into giving away their personal data. The unit will look at the more common cybercrimes such as hacking, DDoS attacks,</p>	<p>Web Development (HTML and CSS) In this unit, students will explore the technologies that make up the internet and World Wide Web. Starting with an exploration of the building blocks of the World Wide Web, HTML, and CSS, students will investigate how websites are catalogued and organised for effective retrieval using search engines. By the end of the unit, students will have a functioning website</p>	<p>Mobile App Development (JavaScript) This unit aims to take the students from designer to project manager to developer in order to create their own mobile app. Using App Lab from code.org, students will familiarise themselves with the coding environment and have an opportunity to build on the programming concepts they used in previous units</p>



		<p>physical computing using hardware which links to an understanding gained in Year 8 on inputs and outputs in the Hardware and Software unit.</p>	<p>computer networks. It partially builds upon understanding of how data can be represented, stored and processed. After this unit, students will learn about cyber security threats and methods.</p>	<p>and malware, as well as looking at methods to protect ourselves and our networks against these attacks.</p> <p>This builds on from the previous unit on networks by allowing students to understand the potential risks involved with networking and communication. In the previous unit, students should have understood how data is transferred across networks, including the internet, so through this unit will learn about threats from malware, hackers and cyber criminals</p>	<p>This unit provides a foundation for learning how to create websites and mobile applications in the subsequent unit. The knowledge and skills developed in this unit will support students with vocational qualifications in digital media and web design</p>	<p>before undertaking their project.</p> <p>This unit builds upon student's understanding of JavaScript learned in the previous unit. This will support students in beginning to develop for the web or for mobile devices which can be applied to vocational and media-based qualifications.</p>
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<p>10</p>	<p>Data representation This unit is covered first and is a follow on from what students learnt at KS3. Rational, it is fundamentally important that students understand how the computer perceives the world in binary. High level language is used to convert Text, numbers, images and sound into binary. All units which follow on from this unit reference data representation. Students will cover:</p> <ul style="list-style-type: none"> • Storage units • binary numbers • Binary arithmetic • Hexadecimal • ASCII and Unicode • Images • Sound • Compression • Boolean logic 	<p>Now that students understand why and how a high level language is converted to machine language – binary, they can start the computation thinking and algorithm component of the course. Students will cover: Programming Fundamentals</p> <ul style="list-style-type: none"> • Designing, creating and defining algorithms • Variables and constants • Operators • Data types • Casting • Sequence • Selection • Iteration (count- and condition- controlled loops) • Boolean operators AND, OR, NOT • Additional programming techniques 	<p>Students will have learnt about the CPU at KS3 and these series of units expand further their knowledge. Rational, once students have acquired knowledge and skills associated with the fundamentals of programming they will learn how computer systems (systems architecture) fetches, decodes, executes and stores data. Students will cover:</p> <ul style="list-style-type: none"> • Architecture of the CPU • Von Neumann Architecture and the Fetch-Execute Cycle. • CPU Performance • Clock Speed, Cache Size and Number of Cores • Embedded Systems • Primary and secondary storage 	<p>This term students will further advance their knowledge and understanding of coding and will cover:</p> <ul style="list-style-type: none"> • Additional Programming Techniques • Subprograms, Arrays and Random Number Generation • Defensive Design • Considerations and Maintainability 	<p>Computer systems need to communicate with one another, and it's a good time to introduce students to how this is done. This unit will incorporate all that students have learnt and understood to date. Students will cover:</p> <ul style="list-style-type: none"> • Networks and Topologies • The Internet • Wired and Wireless Networks, Protocols and Layers • IP and MAC Addressing and Protocols • Threats to Systems and Networks • Ethical, legal, cultural and environmental impact of technology 	<p>Students would have completed the unit of work on algorithms and in this unit students will learn about the most common algorithms used in industry. Prerequisites are an understanding of algorithms. Students will cover:</p> <ul style="list-style-type: none"> • Sorting and Searching Algorithms • Defensive Design • Input Validation and Authentication • Testing • Purpose of Testing, Types of Testing, Syntax and Logical Errors and Test Data
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11	<p>In this term students will have acquired sufficient knowledge and understanding of both components and will revisit some units as well as using knowledge require so far to fully engage in the following units.</p> <p>Students will cover:</p> <ul style="list-style-type: none">• Operating System• Utility Software• Ethical, Legal, Cultural and Environmental Impact	<p>Students will further enhance their knowledge and skills after learning the units prior to this one in the previous term.</p> <p>Students will cover:</p> <ul style="list-style-type: none">• Additional Programming Techniques.• File Handling, Records and SQL.• Sorting and searching algorithms.	<p>The use of computers come with many issues which need to be overcome due to the societies in which we live and breathe in. students will have covered much of this in the previous units and this term is used to wrap everything up, giving students greater understanding of the impacts and use of computing in society.</p> <p>Students will cover:</p> <ul style="list-style-type: none">• Threats to computer systems and network• Preventing Vulnerabilities	Exam revision		



	<ul style="list-style-type: none">• Integrated development environment• Copyright, Open Source and Proprietary Software Licences• Languages High and Low-Level Languages, Interpreters and Compilers• Integrated Development Environment (IDE)		<ul style="list-style-type: none">• Ethical, Legal, Cultural and Environmental Impact Privacy, Data Protection and Misuse			
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