

**2022-2023 Year 10 Curriculum and Assessment Plan for Computer Science**

**The curriculum and assessment of pupils at this stage of education has been carefully designed to**

Support all students to understand and apply the key principles of computer science. This includes abstraction, decomposition, logic algorithms. Students will be able to analyse problems and use practical skills to solve, such as designing, writing, and debugging programs. They will be able to think creatively, logically, and critically and understand the components that make up systems and how they communicate with each other. Students will also understand the impacts of digital technology to wider society.

<p><b>Half Term 1:</b></p> <p><b>All pupils will know:</b></p> <p><b>1.2 Memory and Storage</b> <b>1.3 Networks, Connections and Protocols</b></p> <p><b>All pupils will be assessed by:</b></p> <p>MCQ End of Unit tests</p> <p><b>Impact- Why do we teach this?</b></p> <p>Students will become familiar with data units and why data is stored in binary format. They will relate this to data storage devices and be able to calculate required storage capacity and file sizes for a variety of files including sound, image and text. This ability will help students expand their digital literacy for the devices they use every day, such as smartphones and consoles.</p> <p>They will also be able to convert denary numbers to binary and hexadecimal, including the effects of carrying out a binary shift, both left and right. They will also be able to describe how characters, sound files and colour are represented by binary code. They will be able to explain how compression is used to reduce file sizes and the different types of compression. With the growth of data in everyday life this will make them more literate with storing data.</p> <p>Students will be able to describe and understand the different characteristics of network technology, such as LANs and WANs and the factors that affect their performance. People interact with networks every day. This course will allow them to better understand networks and their workings. They will look at the inner workings of networks such as the hardware devices used, ones that they will see in their home and school.</p> <p>This unit will also enable them to better understand Domain Name Services and the concept of servers and The Cloud, describing advantages and disadvantages. This skill will help</p>	<p><b>Subject specific skills being developed:</b></p> <ul style="list-style-type: none"> <li>develop their capability, creativity, and knowledge in computer science,</li> <li>how digital systems work</li> <li>can understand and apply the fundamental principles and concepts of computer science,</li> <li>understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems</li> </ul> <p><b>Reading Skills needed for this unit:</b>  <b>Key Vocabulary: RAM, ROM, virtual memory.</b>  <b>Storage: secondary, optical, magnetic, solid state, capacity, speed, LAN, WAN, client-server, peer-to-peer, stand alone, WAP, router/switch, NIC, DNS, hosting, wi-fi, topology, MAC address, protocol, TCP/IP, HTTPS, HTTP, FTP,</b></p>	<p><b>Half Term 2:</b></p> <p><b>All pupils will know:</b></p> <p><b>1.2 Memory and Storage</b> <b>1.5 Systems Software</b></p> <p><b>All pupils will be assessed:</b></p> <p>MCQ End of Unit tests</p> <p><b>Impact - Why do we teach this?</b></p> <p>Students will become familiar with data units and why data is stored in binary format. They will relate this to data storage devices and be able to calculate required storage capacity and file sizes for a variety of files including sound, image, and text. This ability will help students expand their digital literacy for the devices they use every day, such as smartphones and consoles.</p> <p>They will also be able to convert denary numbers to binary and hexadecimal, including the effects of carrying out a binary shift, both left and right. They will also be able to describe how characters, sound files and colour are represented by binary code. They will be able to explain how compression is used to reduce file sizes and the different types of compression. With the growth of data in everyday life this will make them more literate with storing data.</p> <p>Students will become more aware of the different types of system software that they interact with on their everyday devices and their functionality, enabling them to become more confident users and also to explore careers such as desktop support or software engineers.</p> <p>They will understand how memory and peripherals are managed as well as file management and user management. They will also explore the purpose of utility software.</p>	<p><b>Subject specific skills being developed:</b></p> <ul style="list-style-type: none"> <li>can evaluate and apply information technology, including new or unfamiliar technologies,</li> <li>develop their capability, creativity and knowledge in computer science,</li> <li>can understand and apply the fundamental principles and concepts of computer science,</li> </ul> <p><b>Reading Skills needed for this unit:</b>  <b>Key Vocabulary: RAM, ROM, virtual memory.</b>  <b>Storage: secondary, optical, magnetic, solid state, capacity, speed.</b>  <b>User interface, device drivers, peripheral, file management, utility system software, encryption, defragmentation, data</b></p>	<p><b>Half Term 3:</b></p> <p><b>All pupils will know:</b></p> <p><b>1.1 Systems Architecture</b> <b>2.1 Algorithms</b> <b>1.4 Network Security</b></p> <p><b>All pupils will be assessed:</b></p> <p>MCQ End of Unit tests</p> <p><b>Impact - Why do we teach this?</b></p> <p>Students will explore the role and purpose of each component of central processing units and what occurs at each stage of the fetch-execute cycle and the purpose of each stage. They will understand the characteristics and the affects of the systems performance. As well as preparing students for any future computing courses this will also allow them to understand the architecture and support them in careers such as computer engineering and systems support.</p> <p>They will also become confident in the different threats to computer systems and identifying and preventing vulnerabilities. Students will understand a variety of new terms such as the concept of SQL injection, penetration testing. Cyber-security is quickly becoming one the largest and most important areas of computing, this unit will allow students to prepare for a career in this field, as well as making them better digital citizens and use computers in a safer and more secure manner.</p> <p>During this term students will also be introduced to a selection of new algorithms such as binary search and insertion sort. This will expand their knowledge with computational thinking and the logical steps that computers use to solve problems. This will help students to better understand software development and the problem solving skills used to help them create and produce solutions.</p> <p>They will also be able to apply the principles of computational thinking to their work as well as designing skills, such as refining their own algorithms and planning to deal with errors or efficiency.</p>	<p><b>Subject specific skills being developed:</b></p> <ul style="list-style-type: none"> <li>can understand and apply the fundamental principles and concepts of computer science,</li> <li>develop and apply their analytic, problem-solving, design, and computational thinking skills</li> <li>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.</li> <li>understand several key algorithms that reflect computational thinking</li> </ul> <p><b>Reading Skills needed for this unit:</b>  <b>Key Vocabulary: CPU, MAR, MDR, accumulator, ALU, CU, FDE, clock speed, cache, cores,</b>      Abstraction, decomposition, binary/linear search, bubble/merge/insertion sort, pseudocode, flow chart, Malware, phishing, social engineering, brute force attack, SQL</p>
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<p>students with how they interact with their own devices.</p> <p>They will also be able to describe the protocols and different types of networks and encryption. This would help students gain a better understanding and help them in careers such as network engineering.</p>	<p><b>POP, IMAP, SMTP, packet switching</b></p> <p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li>Numeracy – Algorithms, number systems and units of measure in Computer Science, and network protocols.</li> </ul>		<p><b>compression, full backup, incremental backup</b></p> <p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li>Digital Literacy across all subjects – The ability to find, evaluate, utilize, share and create content using Information Technologies and the Internet.</li> <li>Numeracy – Algorithms, number systems and units of measure in Computer Science, and network protocols.</li> </ul>		<p>injection, DDOS, pen testing, access levels</p> <p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li><b>Digital Literacy across all subjects – The ability to find, evaluate, utilize, share and create content using Information Technologies and the Internet.</b></li> <li><b>Numeracy – Algorithms, number systems and units of measure in Computer Science, and network protocols.</b></li> <li><b>Literacy – The importance of checking content accuracy and proof –reading own content and utilizing the tools provided through IT. The use of appropriate language and formatting in professional documents.</b></li> </ul>
<p><b>Half Term 4:</b></p> <p><b>All pupils will know:</b></p> <p><b>1.6 Ethical, legal, cultural, and environmental</b>  <b>2.2 Programming Fundamentals</b></p> <p><b>All pupils will be assessed:</b></p> <p><b>MCQ</b>  <b>End of Unit tests</b></p>	<p><b>Subject specific skills being developed:</b></p> <ul style="list-style-type: none"> <li>understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and</li> </ul>	<p><b>Half Term 5:</b></p> <p><b>All pupils will know:</b></p> <p><b>2.2 Programming Fundamentals</b>  <b>2.4 Boolean Logic</b></p> <p><b>All pupils will be assessed:</b></p> <p><b>MCQ</b>  <b>End of Unit tests</b></p>	<p><b>Subject specific skills being developed:</b></p> <ul style="list-style-type: none"> <li>develop and apply their analytic, problem-solving, design, and computational thinking skills</li> <li>can analyse problems in computational terms, and have repeated</li> </ul>	<p><b>Half Term 6:</b></p> <p><b>All pupils will know:</b></p> <p><b>2.5 Programming languages and IDE's</b>  <b>2.3 Producing Robust Programs</b></p> <p><b>All pupils will be assessed:</b></p> <p><b>Mock Examinations</b></p>	<p><b>Subject specific skills being developed:</b></p> <ul style="list-style-type: none"> <li>develop their capability, creativity and knowledge in computer science, digital media and information technology</li> <li>develop and apply their analytic,</li> </ul>

<p><b>Impact - Why do we teach this?</b></p> <p>Students will study the impacts that digital technology has on the wider society and also the legislations relevant to computer science. They will expand their knowledge on ethical and cultural issues as well as environmental issues. This will allow them to become better digital citizens and raising their awareness of issues such as the digital divide. These are areas that will be important for them to be aware of even if they don't pursue a future in computing.</p> <p>They will also look at legal issues such as data protection and misuse act. In a world where they create large amounts of online data, these are vital for them to understand to protect themselves better online.</p> <p>The students will also begin using practical high-level language techniques to develop small applications and to help them solve problems using their computers. They will understand the basic programming constructs that controls the flow of a program – Sequence, Selection and Iteration.</p> <p>They will practice using different data types in their high-level language and also be able to choose the most suitable data types for a given scenario. They will also learn how to change data types and their uses.</p> <p>They will expand their knowledge of programming learning how to use local and global variables, arrays, functions and procedures.</p>	<p>report a range of concerns.</p> <ul style="list-style-type: none"> <li>develop and apply their analytic, problem-solving, design, and computational thinking skills</li> <li>can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems</li> </ul> <p><b>Reading Skills needed for this unit:</b></p> <p><b>Key Vocabulary: open source/proprietary software, Data Protection/Computer Misuse/Freedom of Information/Copyright Designs &amp; Patents Act, Creative Commons Licensing, Variable, constant, i/o, data types, sequence, selection, Iteration, count/condition-controlled loop</b></p> <p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li><b>Numeracy – Algorithms, number systems and units of measure in Computer Science, and network protocols.</b></li> <li><b>Literacy – The importance of checking content accuracy and</b></li> </ul>	<p><b>Impact - Why do we teach this?</b></p> <p>The students will also begin using practical high-level language techniques to develop small applications and to help them solve problems using their computers. They will understand the basic programming constructs that controls the flow of a program – Sequence, Selection and Iteration.</p> <p>They will practice using different data types in their high-level language and also be able to choose the most suitable data types for a given scenario. They will also learn how to change data types and their uses.</p> <p>They will expand their knowledge of programming learning how to use local and global variables, arrays, functions and procedures.</p> <p>The students will also learn how to create and read simple logic diagrams using the operators AND, OR and NOT. They will expand their knowledge of the truth tables for each logic gate. They will understand how to create, complete and edit logic diagrams and truth tables for given scenarios.</p> <p>This will expand on prior knowledge developed from systems architecture and memory and storage expanding students overall understanding of the workings of a computer.</p>	<p>practical experience of writing computer programs in order to solve such problems</p> <ul style="list-style-type: none"> <li>understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers</li> </ul> <p><b>Reading Skills needed for this unit:</b></p> <p><b>Key Vocabulary: Variable, constant, i/o, data types, sequence, selection, Iteration, count/condition-controlled loop, Truth tables, Boolean operators, Low/high level language, IDE, editors, error diagnostics, run-time environment</b></p> <p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li><b>Numeracy – Algorithms, number systems and units of measure in Computer Science, and network protocols.</b></li> </ul>	<p><b>Impact- Why do we teach this?</b></p> <p>Students will learn the difference between high and low-level programming languages giving them more of an insight into different approaches and languages that can be used in development. This will help them become better computer scientists. This will benefit them if they wish to move into a career of software development of progress to the A Level. They will be able to discuss the need for translators and the benefits and drawbacks of using a compiler or an interpreter.</p> <p>The further help them become stronger developers they will expand their knowledge of different IDE's and the tools and facilities included in them. This will give them practical experience of using a wide range of tools in the development of software.</p> <p>To further their programming skills, they will study various defensive design considerations as well as maintainability. This will allow them to produce more robust applications ready for general use. The students will study the different types of tests during development as well as syntax errors and logic errors. This will allow them to produce and complete test data and test plans.</p>	<p>problem-solving, design, and computational thinking skills</p> <ul style="list-style-type: none"> <li>can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems</li> </ul> <p><b>Reading Skills needed for this unit:</b></p> <p><b>Key Vocabulary: Low/high level language, translator, assembler, compiler, interpreter, IDE, error diagnostics, run-time environment, Defensive design, maintainability, iterative/final testing, syntax/logic errors, test data</b></p> <p><b>Opportunity for cross-curricular skill development</b></p> <ul style="list-style-type: none"> <li>Digital Literacy across all subjects – The ability to find, evaluate, utilize, share and create content using Information Technologies and the Internet.</li> <li>Numeracy – Algorithms, number systems and units of measure in Computer</li> </ul>
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	<p><b>proof –reading own content and utilizing the tools provided through IT. The use of appropriate language and formatting in professional documents.</b></p>				<p>Science, and network protocols.</p> <ul style="list-style-type: none"> <li>• Literacy – The importance of checking content accuracy and proof –reading own content and utilizing the tools provided through IT. The use of appropriate language and formatting in professional documents.</li> </ul>
<p><b>Ensuring this curriculum meets the needs of all pupils:</b> this curriculum has been designed to ensure pupils from all starting points will develop the key curriculum skills and knowledge identified. The curriculum design ensures that each unit forms part of the overall learning journey and there are opportunities for revisiting skills and linking together key pieces of knowledge. Whole Academy policies and practices are followed to tailor the delivery of the curriculum for individuals and groups of students. For example SEND students have individual learning profiles that outline needs/strategies to be used, Whole group RIPs are in place to identify key teaching strategies that will be used with individual teaching groups. Ongoing formative assessment and clear summative assessment points allow individual staff and departments to identify misconception and adjust curriculum appropriately.</p>					
<p><b>Enrichment opportunities:</b></p> <ul style="list-style-type: none"> <li>• Coding Club</li> <li>• Visits/Trips</li> </ul>					
<p><b>Career opportunities/ links: Software development / systems engineer / support roles / network architecture / law / cyber-security / cloud-computing</b></p>					