



## Computing Key Stage 4 Curriculum 2023/24

	Topic	Focus	Enrichment
Year 10	Network Security	<ul style="list-style-type: none"> <li>• Different forms of network/system attacks</li> </ul> Threats posed to networks: <ul style="list-style-type: none"> <li>• Malware</li> <li>• Phishing</li> <li>• People as the 'weak point' in secure systems (social engineering)</li> <li>• Brute force attacks</li> <li>• Denial of service attacks</li> <li>• Data interception and theft</li> <li>• The concept of SQL injection</li> <li>• Poor network policy</li> </ul> Identifying and preventing vulnerabilities: <ul style="list-style-type: none"> <li>• Penetration testing</li> <li>• Network forensics</li> <li>• Network policies</li> <li>• Anti-malware software</li> <li>• Firewalls</li> <li>• User access levels</li> <li>• Passwords</li> <li>• Encryption</li> </ul>	Weekly in lesson quizzes Past paper practice In Lesson exam style questions: Developing exam technique Seneca Premium
	Systems Architecture	<ul style="list-style-type: none"> <li>• The purpose of the CPU</li> </ul> Von Neumann architecture: <ul style="list-style-type: none"> <li>• MAR (Memory Address Register)</li> <li>• MDR (Memory Data Register)</li> <li>• Program Counter</li> <li>• Accumulator</li> </ul> Common CPU components and their function: <ul style="list-style-type: none"> <li>• ALU (Arithmetic Logic Unit)</li> <li>• CU (Control Unit)</li> <li>• Cache</li> <li>• The function of the CPU as fetch and execute instructions stored in memory</li> </ul> How common characteristics of CPUs affect their performance: <ul style="list-style-type: none"> <li>• Clock speed</li> </ul>	

	<ul style="list-style-type: none"> <li>● Cache size</li> <li>● Number of cores</li> </ul> <p>Embedded systems:</p> <ul style="list-style-type: none"> <li>● Purpose of embedded systems</li> <li>● Examples of embedded systems</li> </ul>
Memory & Storage	<ul style="list-style-type: none"> <li>● The difference between RAM and ROM</li> <li>● The purpose of ROM in a computer system</li> <li>● The purpose of RAM in a computer system</li> <li>● The need for virtual memory</li> <li>● Flash memory</li> <li>● The need for secondary storage</li> <li>● Data capacity and calculation of data capacity requirements</li> </ul> <p>Common types of storage:</p> <ul style="list-style-type: none"> <li>● Optical</li> <li>● Magnetic</li> <li>● Solid state</li> <li>● Suitable storage devices and storage media for a given application, and the advantages and</li> </ul> <p>Disadvantages of these, using characteristics:</p> <ul style="list-style-type: none"> <li>● Capacity</li> <li>● Speed</li> <li>● Portability</li> <li>● Durability</li> <li>● Reliability</li> <li>● Cost</li> </ul>
Wired & Wireless Networks	<p>Types of networks:</p> <ul style="list-style-type: none"> <li>● LAN (Local Area Network)</li> <li>● WAN (Wide Area Network)</li> <li>● Factors that affect the performance of networks</li> <li>● The different roles of computers in a client-server and a peer-to-peer network</li> </ul> <p>The hardware needed to connect stand-alone computers into a Local Area Network:</p> <ul style="list-style-type: none"> <li>● Wireless access points</li> <li>● Routers/switches</li> <li>● NIC (Network Interface Controller/Card)</li> <li>● Transmission media</li> </ul> <p>The internet as a worldwide collection of computer networks:</p> <ul style="list-style-type: none"> <li>● DNS (Domain Name Server)</li> <li>● Hosting</li> <li>● The cloud</li> <li>● The concept of virtual networks</li> </ul>
Network Topologies, Protocols, & Layers	<ul style="list-style-type: none"> <li>● Star and mesh network topologies</li> </ul> <p>Wifi:</p>

		<ul style="list-style-type: none"> <li>● Frequency and channels</li> <li>● Encryption</li> <li>● Ethernet</li> </ul> <p>The uses of IP addressing, MAC addressing, and protocols including:</p> <ul style="list-style-type: none"> <li>● TCP/IP (Transmission Control Protocol/Internet Protocol)</li> <li>● HTTP (Hyper Text Transfer Protocol)</li> <li>● HTTPS (Hyper Text Transfer Protocol Secure)</li> <li>● FTP (File Transfer Protocol)</li> <li>● POP (Post Office Protocol)</li> <li>● IMAP (Internet Message Access Protocol)</li> <li>● SMTP (Simple Mail Transfer Protocol)</li> <li>● The concept of layers</li> <li>● Packet switching</li> </ul>
	System Software	<ul style="list-style-type: none"> <li>● The purpose and functionality of systems software</li> </ul> <p>Operating systems:</p> <ul style="list-style-type: none"> <li>● User interface</li> <li>● Memory management/multitasking</li> <li>● Peripheral management and drivers</li> <li>● User management</li> <li>● File management</li> </ul> <p>Utility system software:</p> <ul style="list-style-type: none"> <li>● Encryption software</li> <li>● Defragmentation</li> <li>● Data compression</li> </ul> <p>The role and methods of backup:</p> <ul style="list-style-type: none"> <li>● Full backup</li> <li>● Incremental backup</li> </ul>
	Ethical, Legal, Cultural, and Environmental concerns	<p>How to investigate and discuss Computer Science technologies while considering:</p> <ul style="list-style-type: none"> <li>● Ethical issues</li> <li>● Legal issues</li> <li>● Cultural issues</li> <li>● Environmental issues</li> <li>● Privacy issues</li> <li>● How key stakeholders are affected by technologies</li> <li>● Environmental impact of Computer Science</li> <li>● Cultural implications of Computer Science</li> <li>● Open source vs proprietary software</li> </ul> <p>Legislation relevant to Computer Science:</p> <ul style="list-style-type: none"> <li>● The Data Protection Act 1998</li> <li>● Computer Misuse Act 1990</li> <li>● Copyright Designs and Patents Act 1988</li> <li>● Creative Commons Licensing</li> </ul>

- Freedom of Information Act 2000

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Year 11	Algorithms	Computational thinking: <ul style="list-style-type: none"> <li>• Abstraction</li> <li>• Decomposition</li> <li>• Algorithmic thinking</li> </ul> Standard searching algorithms: <ul style="list-style-type: none"> <li>• Binary search</li> <li>• Linear search</li> </ul> Standard sorting algorithms: <ul style="list-style-type: none"> <li>• Bubble sort</li> <li>• Merge sort</li> <li>• Insertion sort</li> </ul> How to produce algorithms using: <ul style="list-style-type: none"> <li>• Pseudocode</li> <li>• Using flow diagrams</li> <li>• Interpret, correct or complete algorithms</li> </ul>	Weekly in lesson quizzes Past paper practice In Lesson exam style questions: Developing exam technique Seneca Premium
	Programming Fundamentals	<ul style="list-style-type: none"> <li>• the use of variables, constants, operators, inputs, outputs and assignments</li> </ul> The use of the three basic programming constructs used to control the flow of a program: <ul style="list-style-type: none"> <li>• Sequence</li> <li>• Selection</li> <li>• Iteration (count and condition controlled loops)</li> <li>• The use of basic string manipulation</li> </ul> The use of basic file handling operations: <ul style="list-style-type: none"> <li>• Open</li> <li>• Read</li> <li>• Write</li> <li>• Close</li> <li>• The use of records to store data</li> <li>• The use of SQL to search for data</li> <li>• The use of arrays (or equivalent) when solving problems, including both one and two dimensional</li> <li>• Arrays</li> <li>• How to use subprograms (functions and procedures) to produce structured code</li> </ul> The use of data types: <ul style="list-style-type: none"> <li>• Integer</li> <li>• Real</li> <li>• Boolean</li> </ul>	

		<ul style="list-style-type: none"> <li>● Character and string</li> <li>● Casting</li> <li>● The common arithmetic operators</li> <li>● The common Boolean operators</li> </ul>
	Producing Robust Programs	<p>Defensive design considerations:</p> <ul style="list-style-type: none"> <li>● Input sanitisation/validation</li> <li>● Planning for contingencies</li> <li>● Anticipating misuse</li> <li>● Authentication</li> </ul> <p>Maintainability:</p> <ul style="list-style-type: none"> <li>● Comments</li> <li>● Indentation</li> <li>● The purpose of testing</li> </ul> <p>Types of testing:</p> <ul style="list-style-type: none"> <li>● Iterative</li> <li>● Final/terminal</li> <li>● How to identify syntax and logic errors</li> <li>● Selecting and using suitable test data</li> </ul>
	Boolean Logic	<ul style="list-style-type: none"> <li>● Why data is represented in computer systems in binary form</li> <li>● Simple logic diagrams using the operations AND, OR and NOT</li> <li>● Truth tables</li> <li>● Combining Boolean operators using AND, OR and NOT to two levels</li> <li>● Applying logical operators in appropriate truth tables to solve problems</li> </ul> <p>Applying computing-related mathematics:</p> <ul style="list-style-type: none"> <li>● +</li> <li>● -</li> <li>● /</li> <li>● *</li> <li>● Exponentiation (^)</li> <li>● MOD</li> <li>● DIV</li> </ul>
	Programming Logic & Integrated Development Environments	<ul style="list-style-type: none"> <li>● Characteristics and purpose of different levels of programming language, including low level languages</li> <li>● The purpose of translators</li> <li>● The characteristics of an assembler, a compiler and an interpreter</li> </ul> <p>Common tools and facilities available in an integrated development environment (IDE):</p> <p>Editors</p> <ul style="list-style-type: none"> <li>● Error diagnostics</li> <li>● Run-time environment</li> <li>● Translators</li> </ul>

