Curriculum Map

Subject: Computer Science **Year Group: 11**

The Curriculum Map for Computer Science follows two parallel strands, split between Computational Thinking (CT) - the programming aspects covered in Topics 1 & 6 and the Principles of Computer Science (P) - the theory aspects covered by Topics 1 – 5

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Content	**Topic1 and 6:** Computation Thinking and Problem Solving **Key Areas:** 1.7 Subprograms 1.8 Working with algorithms 1.9 Two-dimensional data structures **Keywords:** Decomposition, subprograms, subprogram call, abstraction, function, procedure, local and global variable, IDE, parameters, dry run, trace table, logic error, loop, infinite loop, truth table, two-dimensional array, list, record	**Topic 1 and 6:** Computation Thinking and Problem Solving **Key Areas:** 1.10 Validation and strings 1.11 Working with files 1.12 Sorting and searching **Keywords:** Validation, runtime error, range check, length check, presence check, look-up check, menus, constant, patterns, authentication, exception handling, text file, bubble sort, merge sort, traversal, recursion, brute force, divide and conquer, linear search, binary search	**Topic 4:** Networks **Key Areas:** 4.1 Networks **Keywords:** Network, IoT, VoIP, LAN, WAN, WLAN, bandwidth, latency, internet, wired, wireless, fibre optic, UTP, router, switch, WAP, node, topology, ISP, POP, IMAP, IP, DNS, packet, TCP/IP	**Topic 4:** Networks **Key Areas:** 4.2 Network security **Keywords:** Malware, hacker, virus, ransomware, DoS, Pen testing, social engineering, access control, authentication, encryption, firewall	**Topic 5:** Issues and Impact **Key Areas:** 5.1 Environmental Issues 5.2 Ethical and Legal Issues **Keywords:** e-waste, replacement cycle, cloud computing, carbon footprint, personal data, privacy, identity theft, data breach, data misuse, ethics, robotics, AI, algorithmic bias, LAWS, copyright, intellectual property, patent, trademark	**Topic 5:** Issues and Impact **Key areas:** 5.3 Cybersecurity **Keywords:** Cybersecurity, cyberattack, malware, viruses, worms, trojans, ransomware, cryptocurrency, decryption, spam, spyware, social engineering, phishing, baiting, patches, unpatched software, anti-malware, heuristics, cypher text, backup

Skills	➢ Analytical skills ➢ Critical-thinking skills ➢ Problem-solving skills ➢ Programming skills					
Key questions	➢ Describe what decomposition is. ➢ Describe what abstraction is. ➢ What is an IDE? ➢ Explain what a subprogram is. ➢ Identify the local and global variables. ➢ Identify a built-in subprogram. ➢ Identify a user-written subprogram. ➢ Use a trace table to find and fix logic errors. ➢ Construct indexing expressions to access records in a two-	➢ Explain what validation is. ➢ Describe what a runtime error is. ➢ Explain the following types of validation, range check, length check, presence check, and look-up check. ➢ What is authentication ? ➢ What is exception handling? ➢ Describe the bubble sort algorithm. ➢ Describe the merge sort algorithm. ➢ Explain what traversal recursion is. ➢ Explain what brute force is. ➢ Describe the divide and	➢ Describe what a network is. ➢ Give five reasons for connecting devices on a network. ➢ State the purpose of a network protocol. ➢ Describe how a router directs data traffic on the internet. ➢ Describe the following protocols, TC/IP, IMAP, HTTP ➢ Describe the difference between a LAN and a WAN. ➢ List the main advantages and disadvantages of the star, bus and mesh networks. ➢ Compare copper and fibre optic cables. ➢ Compare wired and wireless methods of connecting devices. ➢ POP and IMAP are both email protocols operating at the Applications Layer of the TCP/IP stack. Summarise the difference between the two.	➢ Explain how the hardware and software firewalls work together to enhance data security on the network. ➢ Biometric authentication offers several advantages over passwords. Name three. ➢ Password managers help to improve password security. How is this achieved? ➢ Explain why keeping the operating system and application software up to date	➢ Describe two environmental issues associated with the manufacture of digital devices ➢ State two ways in which governments are attempting to control the environmental impact of digital device manufacture. ➢ Explain how having a short replacement cycle for digital devices is harmful to the environment. ➢ Discuss the impact of computing technology on the environment.	➢ Define what is meant by the term malware. ➢ State the name of the malware that does not need a user to distribute it. ➢ Explain the connection between ransomware and cryptocurrency. ➢ Define what is meant by the term 'baiting cyberattack'. ➢ State two ways that anti-malware software may identify an infection. ➢ Describe the role of a signature file in anti-

	dimensional array	conquer algorithm. ➢ Explain the main difference between the linear search and binary search.	➢ Explain the TCP/IP protocol layers. ➢ Explain how are static IP addresses assigned? ➢ Draw annotated diagrams of the bus, star and mesh topologies. ➢ Explain how a wireless hotspot works and outline the security issues associated with them. ➢ Explain how high latency internet connection might affect online gamer's user experience? ➢ Explain what a data packet is. ➢ Explain what packet switching is.	helps to keep the network secure.	➢ Explain one reason why data centres use large amounts of energy. ➢ Give four measures that can be taken to make data centres more environmentally friendly. ➢ Explain the similarities and differences between the main types of malware. ➢ Describe one ethical concern about the use of driverless vehicles. ➢ State what is meant by 'artificial intelligence'. ➢ Explain how algorithmic bias can be introduced. ➢ List the Data Protection Act legal responsibilities	malware software. ➢ An acceptable use policy states that employees must not attach one of their own portable devices to the network. State two reasons for this policy. ➢ Discuss procedures that an organisation should include in its backup policy.

					of data holders. ➢ List the three types of offence listed in the Computer Misuse Act. ➢ Discuss the ethical and legal issues associated with the use of driverless cars.	
Assessment	**Formative Assessment:** Target questioning, quizzes, individual and group tasks **Summative Assessment:** Unit test End-of-term test					
Literacy/ Numeracy / SMSC/ Character	Demonstrate and apply knowledge and understanding of the key concepts and principles of computer science Analyse problems in computational terms: - to make reasoned judgements - to design, program, evaluate and refine solutions					