By the end of KS3, pupils will know:

- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- Understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem
- Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions
- 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 [for example, binary addition, and conversion between binary and decimal]
- Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
- Understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits
- Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users
- Create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability
- Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct and know how to report concerns.

	Computer Systems	Networks	Collecting and Presenting Data	Data Representation	Algorithms and Programming	Personal Development Golden Threads
Year 9 Greater Depth	• Can Associate the use of artificial intelligence with moral dilemmas • Can Describe how machine learning differs from traditional programming • Can Describe the steps involved in training machines to perform tasks (gathering data, training, testing) • Can Identify examples of artificial intelligence and machine learning in the real world • Can Provide broad definitions of ‘artificial intelligence’ and ‘machine learning’" • Can Explain the implications of sharing program code	• Can Explain how data travels between computers across the internet • Can Explain the difference between the internet, its services, and the World Wide Web • Can Explain the term ‘connectivity’ as the capacity for connected devices (‘Internet of Things’) to collect and share information about me with or without my knowledge (including microphones, cameras, and geolocation) • Can List some of these services and the context in which they are used	• Can Define data science • Can Explain how visualising data can help identify patterns and trends in order to help us gain insights • Can Use an appropriate software tool to visualise data sets and look for patterns or trends • Can Evaluate findings to support arguments for or against a prediction • Can Recognise examples of where large data sets are used in daily life • Can Select criteria and use data set to investigate predictions • Can Define the terms ‘correlation’ and ‘outliers’ in relation to data trends • Can Identify the steps of the investigative cycle • Can Solve a problem by implementing steps of the investigative cycle on a data set • Can Use findings to support a recommendation • Can Create a data capture form • Can Identify the data needed to answer a question defined by the learner • Can Identify the steps of the investigative cycle • Can Apply data cleansing techniques to a data set • Can Describe the need for data cleansing • Can Visualise a data set • Can Analyse visualisations to identify patterns, trends, and outliers • Can Draw conclusions and report findings • Can Visualise a data set	• Can Describe the trade-off between representation size and perceived quality for digital images • Can Describe and assess the creative benefits and ethical drawbacks of digital manipulation - Can Explain how the manipulation of digital images amounts to arithmetic operations on their digital representation • Can Recall that sound is a wave" • Can Calculate representation size for a given digital sound, given its attributes • Can Explain how attributes such as sampling frequency and sample size affect characteristics such as representation size and perceived quality, and the trade-offs involved • Can Perform basic sound editing tasks using appropriate software and combine them in order to solve more complex problems requiring sound manipulation • Can Define ‘compression’, and describe why it is necessary • Can Recall that bitmap images and pulse code sound are not the only binary representations of images and sound available	• Can Perform common operations on lists or individual items • Can Perform common operations on strings or individual characters • Can Use iteration (while statements) to control the flow of program execution" • Can Perform common operations on lists or strings • Can Use iteration (for statements) to iterate over list items" • Can Combine key programming language features to develop solutions to meaningful problems • Can Use iteration (for loops) to iterate over lists and strings • Can Use variables to keep track of counts and sums"	• Revisit and Recall the key legal elements of The Online Safety Act. • The meaning of ‘Fake News’ and key examples of this from the UK. • Bias in the British press in relation to key political view points. • The causes and risks of radicalisation, including grooming and religious extremism.
Year 9 Expected Year 8 Greater Depth	• Can Describe how hardware is built out of increasingly complex logic circuits • Can Describe the NOT, AND, and OR logical operators, and how they are used to form logical expressions • Can Recall that, since hardware is built out of logic circuits, data and instructions alike need to be represented using binary digits • Can Use logic gates to construct logic circuits, and associate these with logical operators and expressions	• Can Describe key words such as ‘protocols’, ‘packets’, and ‘addressing’ • Can Describe how internet-connected devices can affect me • Can Describe how services are provided over the internet	• Can Explain the difference between data and information • Can Explain the difference between primary and secondary sources of data • Can Identify the different ways Data is collected • Can Identify the 3 Vs of BIG data • Can understand different ways Big Data is used in our daily lives. • Can Identify Legislation used to protect data • Can explain ways in which bog data is misused • Discuss the benefits to organisations of collecting this information about their users	• Can Compute the representation size of a digital image, by multiplying resolution (number of pixels) with colour depth (number of bits used to represent the colour of individual pixels) • Can Describe how colour can be represented as a mixture of red, green, and blue, with a sequence of bits representing each colour’s intensity • Can Perform basic image editing tasks using appropriate software and combine them in order to solve more complex problems requiring image manipulation	• Can Use variables as counters in iterative programs" • Can Combine iteration and selection to control the flow of program execution • Can Use Boolean variables as flags" • Can Create lists and access individual list items • Can Locate and correct common syntax errors • Can Use selection (**if-elif-else* statements) to control the flow of program execution • Can Write programs that display messages, receive keyboard	• Revisit and Recall the key legal elements of The Online Safety Act. • The meaning of ‘Fake News’ and key examples of this from the UK. • Bias in the British press in relation to key political view points. • The causes and risks of radicalisation, including grooming and religious extremism.

			• Discuss the benefits/drawbacks to individuals of having their data collected by companies • Define what a cookie is and how it tracks data • Explain ways of protecting your own data	• Can Define key terms such as ‘sample’, ‘sampling frequency/rate’, ‘sample size’ • Can Describe how sounds are represented as sequences of bits • Can Explain the function of microphones and speakers as components that capture and generate sound	input, and use simple arithmetic expressions in assignment statements"	
Year 8 Expected Year 7 Greater Depth	• Can Recall that all computing systems, regardless of form, have a similar structure (‘architecture’) • Can Analyse how the hardware components used in computing systems work together in order to execute programs • Can Define what an operating system is, and recall its role in controlling program execution"	• Can List examples of the hardware necessary for connecting devices to networks • Can Compare wired to wireless connections and list examples of specific technologies currently used to implement such connections	• Can Analyse data • Can Use conditional formatting in a spreadsheet • Can Create appropriate charts in a spreadsheet	• Can Recall that representations are used to store, communicate, and process information • Can Provide examples of how symbols are carried on physical media • Can Recall that characters can be represented as sequences of symbols and list examples of character coding schemes • Can Define key terms such as ‘pixels’, ‘resolution’, and ‘colour depth’ • Can Describe how an image can be represented as a sequence of bits • Can Describe how digital images are composed of individual elements • Can Recall that the colour of each picture element is represented using a sequence of binary digits	• Can Describe the semantics of assignment statements • Can Use binary selection (if, else statements) to control the flow of program execution • Can Use relational operators to form logical expressions" • Can Describe how iteration (while statements) controls the flow of program execution • Can Use multi-branch selection (if, elif, else statements) to control the flow of program execution" • Can Use iteration (while loops) to control the flow of program execution	• Can identify the meaning of representation, stereotypes and the use of this in relation to online social media platforms • Recall the key legal elements of The Online Safety Act. • Explain the laws and morality in relation to image Sharing. • Evaluate the risks of the rise in AI
Year 7 Expected	• Can Explain the difference between a general-purpose computing system and a purpose-built device • Can Recall that a general-purpose computing system is a device for executing programs • Can Recall that a program is a sequence of instructions that specify operations that are to be performed on data" • Can Describe how the hardware components used in computing systems work together in order to execute programs • Can Describe the function of the hardware components used in computing systems	• Can Define ‘protocol’ and provide examples of non-networking protocols • Can define what a computer network is and explain how data is transmitted between computers across networks • Can Define ‘bandwidth’, using the appropriate units for measuring the rate at which data is transmitted, and discuss familiar examples where bandwidth is important • Can Define what the internet is	• Can Identify columns, rows, cells, and cell references in spreadsheet software • Can Use formatting techniques in a spreadsheet • Can Use basic formulas with cell references to perform calculations in a spreadsheet (+, -, *, /) • Can Use the autofill tool to replicate cell data • Can Use the functions SUM, COUNTA, MAX, and MIN in a spreadsheet • Can Use a spreadsheet to sort and filter data • Can Use the functions AVERAGE, COUNTIF, and IF in a spreadsheet	• Can List examples of representations • Can Provide examples of how different representations are appropriate for different tasks • Can Measure the length of a representation as the number of symbols that it contains • Can Explain what binary digits (bits) are, in terms of familiar symbols such as digits or letters • Can Measure the size or length of a sequence of bits as the number of binary digits that it contains • Can Convert a decimal number to binary and vice versa • Can Describe how natural numbers are represented as sequences of binary digits • Can Convert between different units and multiples of representation size • Can Provide examples of the different ways that binary digits are physically represented in digital devices	• Can Describe what algorithms and programs are and how they differ • Can Locate and correct common syntax errors • Can Recall that a program written in a programming language needs to be translated in order to be executed by a machine • Can Write simple Python programs that display messages, assign values to variables, and receive keyboard input" • Can Receive input from the keyboard and convert it to a numerical value • Can Use simple arithmetic expressions in assignment statements to calculate values" • Can Generate and use random integers	• Can critically evaluate online platforms and discuss the issues with these