Computing Year 8 Long Term Plan

Rationale (with end points): 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. 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 2 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 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; be able to convert between binary and decimal, and perform simple binary arithmetic. Create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability.
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, reuse, revise, and repurpose digital artefacts for a given audience, with attention to trustworthiness, design, and usability.

Term	Topic	Knowledge	Skills	*Reading /wider reading*
Autumn term 1	Cyber Security	Explain the difference between data and information Explain the need for the Data Protection Act Recognise how human errors pose security risks to data Define hacking in the context of cybersecurity Explain how a DDoS attack can impact users of online services	Critique online services in relation to data privacy Identify what happens to data entered online Implement strategies to minimise the risk of data being compromised through human error Identify strategies to reduce the chance of a brute force attack being successful Learn ways to protect yourself from malware & hacking	Alan Turing and the Enigma machine https://www.iwm.org.uk/history/how-alan-turing-cracked-the-enigma-code

		Explain the need for the Computer Misuse Act Examine how different types of malware cause problems for computer systems Identify how networks can be protected from common security threats Identify the most effective methods of preventing cyberattacks	List the common malware threats Question how malicious bots can have an impact on societal issues Compare security threats against probability and potential impact to organisations	
Autumn 2	Control Systems with Flowol	Identify control flowchart symbols and understand how they are used to describe systems Understand why a control system might fail and explain the impact this can have on safety Identify common types of sensors used in control systems Use decision symbols in a flowchart	Develop a control flowchart solution for a simple problem Develop a control solution for a system that uses two flowcharts operating in sequence Develop a control solution for a system that uses multiple sensors. Develop a control solution for a system that includes a subroutine	Can machines replicate a human brain? https://www.linkedin.com/pulse/can-computers-replicate-human-brain-prashant-mishra-9k-?trk=portfolio_article-card_title

		Understand how the use of subroutines can make programs more efficient be explained in a little more detail. Understand what an actuator is used for in a control system Understand what a variable is and explain how variables can be used to help control systems	Solve a problem with a Greenhouse to automate it while the owners are on holidays. Develop a control solution for a system that uses actuators and variables	
Spring 1	Introduction to Python	Learn what Python is and some of the applications it is used for Understand what a syntax error is and how to interpret an error message Know the rules for variable names and use variables in a program Understand the use and value of comments in a program	Run a simple Python program in Interactive mode using the input and print functions Write, save and run a program in Script mode Perform arithmetic using the BIDMAS rule Use the int, float and round functions Write a program involving input, calculation and output Use selection statements if, else and elif in a program	The history of programming languages https://devskiller.com/history-of-programming-languages/

		Understand the importance of using correct data types string, integer, float Understand how to use assignment statements correctly Review the difference between syntax errors, run-time errors and logic errors	Use indentation correctly to define a block of code Learn techniques for debugging programs Learn to write algorithms in pseudocode	
Spring 2	Understanding Computers Part 2	Why data for computers need to be stored in binary State the typical capacities, strengths and weaknesses of different storage devices Describe how data is stored on a CD Describe how 0s and 1s are represented by pits and lands on a CD Name three types of optical storage device Review the history and development of communication.	Convert integers to binary numbers Convert binary numbers to integers Add two binary numbers (each less than 7 binary digits) Multiply a binary number by 2 Identify a binary number as being odd or even	Silicon Valley and how sand changed the world https://www.pellcenter.org/why-is-silicon-valley-called-silicon-valley/

		Understand how modern communication and computing devices combine multiple technologies Discuss the different ways and applications in which modern technology is used Discuss future uses of technology and the pace of change (Moore's Law)		
Summer 1	AI and Machine Learning	Understand the origin and uses of AI Understand how rules are used in AI decision making Understand what ethics is Consider some simple ethical hypothetical problems Understand how intelligence can be measured in humans and computers	Know what the Turing test is and how it works Program a chatbot Discuss the strengths and weaknesses of machine learning Understand how bias can be introduced into AI algorithms and machine learning Describe the opportunities and problems of using AI for sentiment analysis	https://www.ibm.com/topics/machine-learning

		Understand how jobs can be affected by AI and automation Understand issues that make facial recognition difficult Understand how images are stored as binary data	Understand why interpreting patterns is not as useful a skill as 'thinking'	
Summer 2	Developing for the Web	Describe what HTML is Describe what CSS is Assess the benefits of using CSS to style pages instead of in-line formatting Describe what a search engine is Explain how search engines 'crawl' through the World Wide Web and how they select and rank results Analyse how search engines select and rank results when searches are made Discuss the impact of search technologies	Use HTML to structure static web pages Modify HTML tags using inline styling to improve the appearance of web pages Display images within a web page Apply HTML tags to construct a web page structure from a provided design Use CSS to style static web pages Use search technologies effectively Create hyperlinks to allow users to navigate between multiple web pages	Using technology to improve productivity https://www.glasscubes.com/how-can-technology-improve-productivity/

		and the issues that arise by the way they function and the way they are used	Implement navigation to complete a functioning website	