Croxley Danes School : Key Stage 3 Curriculum Map

Subject: Computer Studies

Key Concepts

Computational Thinking and Programming	Data and Data Representation	Hardware and Systems	The Impact of Computing	Digital Literacy
Decomposition Abstraction Algorithmic thinking Pattern recognition Solving problems using a computer program	Understanding simple Boolean logic (AND, OR, NOT) Understand how numbers are represented in binary Understand how text, sounds and images can be represented in binary	The components that make up a computer system How computers communicate with other computers	How instructions are stored and executed Impact on wider society (ethical, legal, environmental, privacy, cybersecurity)	Be comfortable using common digital devices, software and online platforms to solve problems in an increasingly digital world Gain an appreciation of key emerging technologies

What is the Croxley vision for this subject at Key Stage 3

Computer Science at Croxley Danes school is designed to build a solid foundation in computing, enabling students to develop the knowledge, skills, and problem-solving abilities necessary for success in the digital age. Throughout their studies, students will explore key concepts such as computational thinking, algorithms, data structures, and the principles of programming, all of which are central to the field of computer science. This curriculum is structured to nurture critical thinking and logical reasoning, while also emphasising the practical application of these concepts to real-world problems. As students progress, they will gain a deeper understanding of how computer systems work, the ethical implications of technology, and the importance of cybersecurity. By the time students complete their studies, they will have honed vital skills, such as coding, debugging, and designing software solutions, which are in high demand across many industries. These skills not only prepare students for further study in computer science and related fields but also equip them with transferable competencies, such as problem-solving, creativity, and adaptability, which are essential for thriving in an increasingly technology-driven world. Our aim is for students to leave with a strong understanding of how to harness technology to innovate, solve problems, and make informed decisions, ensuring they are well-prepared for the challenges and opportunities of the future workforce.

Links to Key Stage 2 National Curriculum:

The Computer Science curriculum is designed to build up the knowledge and computing skills that were used during primary school. The primary focus of the curriculum is to provide an understanding of how computers work (make use of computers improving students' digital literacy (ICT) skills. Students will also learn a structured approach to problem solving called Computational Thinking. The knowledge and skills they learn in Computer Science are particularly useful in GCSE Computer Science but they are transferable to any academic subject or future career path they wish to follow.

Key Stage 3 Year Group: 7			
	Autumn Term 1	**Autumn Term 2**	**Spring Term 1**
key concept	Using computers safely, effectively and responsibly	Computational Thinking	Understanding Computers
Content: (Know what…)	Pupils begin by looking at file management and security. The unit then moves on to e-safety and online profiles to give pupils a better understanding and awareness of using social media and the Internet safely. The functionality and operation of email and search engines and how to use them effectively are covered, and a final lesson includes a multiple choice test on the contents of the unit and basic computer use.	Students get to understand the power of problem solving and the different methods that Computer Scientists use to tackle problems.	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; be able to convert between binary and decimal, and perform simple binary arithmetic
Skills: (know how…)	● Organise your files in File Explorer,Know what social media is and the risks ● Understand the importance of backup,Use common shortcut keys ● Understand the importance of protecting your online identity including the use of privacy settings ● Know what identity theft is and how to react to phishing and spam ● Understand how email works and the advantages and disadvantages of using it ● Be able to give some examples of different search engines	● Be able to ask logical questions to solve problems ● Know the common Boolean operators: ● Know different logic gates ,Understand what an algorithm is ● Create a sequence of instructions to achieve a goal ● Understand how Boolean operators can be represented in written expressions and Venn diagrams ● Be able to complete truth tables for logic gates and circuits with up to three inputs ● Understand how loops can be used to reduce the amount of code required for a solution	● Distinguish between hardware and software ● Identify Input, Output and Storage devices ● Understand how processor speed affects computation time ● Review the history and development of communication ● Understand how modern communication and computing devices combine multiple technologies ● Discuss the different ways and applications in which modern technology is used ● Be able to draw a block diagram of the main components of a computer including input, processor, output and storage ● Distinguish between main memory and permanent storage devices
Key vocabulary (5- 10 words)	File, File Explorer, filename, backup, shortcut, acceptable use policy, folder, folder structure, social media, cyber bullying	Logical thinking, logic, Boolean operators, AND, OR, NOT, logic gates, AND gate, OR gate, NOT gate, algorithm, sequence, selection, iteration.	Input, output, storage, display, smart watch, SD card, printer, headphones, compact disc (CD), digital versatile disc (DVD), Blu-ray (BD), webcam, mouse, keyboard, hard disk drive (HDD), solid state drive (SSD)
End of Half term assessment	End of topic test	End of topic test	End of topic test
Planned trips / Clubs / links			

Key Stage 3 **Year Group: 7**			
	Spring 2	**Summer 1**	**Summer 2**
Key Concept	Control Systems with Flowol	Introduction to Spreadsheets	Introduction to Python Programming
Content: **(Know what…)**	Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems	Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems.	An introduction to Python, a powerful but easy-to-use high-level programming language. The focus is on getting pupils to understand the process of developing programs, the importance of writing correct syntax, being able to formulate algorithms for simple programs and debugging their programs.
Skills: **(Know how…)**	• Understand how flowcharts are used to explain algorithms • Know and be able to use flowchart symbols • Understand what **actuators** are used for in control system • Explain how control systems are used in theme park rides such as rollercoasters • Be able to use decisions in flowcharts to alter what instructions are run based on inputs • Identify common types of sensors used in control systems • Be able to use input sensors that have a variety of values • Understand the advantages of using subroutines • Understand what a **variable** is and explain how **variables** can be used to control systems	• Be able to reference cells • Be able to create simple formulas including * / + - • Be able to automatically create formulae using relative cell referencing • Understand what computer models are used for • Be able to format cells and insert a graphic into a spreadsheet • Be able to create simple functions including SUM and AVERAGE • Make use of relative and absolute cell referencing • Use **functions** • Make the model as realistic as possible based on known sales figures and prices	• Understand the purpose and be able to use **comments** • Be able to make use of assignment • Use selection statements **if** and **else** in a program • Understand what Python is and some applications for it • Understand what a **syntax error** is • Be able to create and use **variables** with meaningful **variable names** • Understand the data types string, integer and float • Make use of conditions in **if** statements • Identify the different types of programming errors and how to fix them • Be able to use a random number function
Key vocabulary **(5- 10 words)**	Algorithm, flowchart, flowchart symbol, start, stop, output, input, process, delay, arrow, control system, infinite loop, sensor.	Cell, row, column, sheet, formula, value, data, chart, table	Sequence, interactive mode, script mode, input, print, variables, error messages, variable names, comments, type conversion, data types, assignment
End of Half term assessment	End of topic test	End of topic test	End of topic test
Planned trips / Clubs / links			

Key Stage 3 **Year Group: 8**			
	Autumn Term 1	**Autumn Term 2**	**Spring Term 1**
key concept	Computer Crime and Cybersecurity	Web Design with HTML	Introduction to Python Programming 2
Content: **(Know what…)**	Legal safeguards regarding computer use, including overviews of the Computer Misuse Act, Data Protection Act, Copyright Law and their implications for computer use. Phishing scams and other email frauds, hacking, identity theft and safe use of personal data are discussed together with ways of protecting online identity and privacy. Health and Safety Law and how to use computers safely is also discussed.	Pupils will learn the basics of HTML and CSS, and how to create a responsive design which adapts to any size of screen for viewing on, say, a mobile phone or a PC. They will learn how to create text styles and add content, including text and graphics, in a specified position on a page, as well as navigation links to other pages on their website and to external websites.	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; be able to convert between binary and decimal, and perform simple binary arithmetic
Skills: **(know how…)**	● Understand what personal data is ● Learn about different types of email scam ● Understand the term copyright: ● Learn about some of the common health and safety problems associated with computer use ● Understand the Computer Misuse Act and what computer activities are illegal ● Know different types of malware ● Know how to minimise the risk of identity theft ● Understand the effects of computer crime	● Be able to make a simple web page ● Understand the features of good web design including: ● Add content to web pages ● Be able to use HTML tags ● Write CSS code to set styles ● Understand the need for responsive web design and make use of percentages for width and height dimensions ● Create internal and external links and make sure they all work ● Understand what happens to the input data once it has been submitted	● Be able to program a sequence in Python ● Be able to make use of assignment ● Use selection statements **if**, **elif** and **else** in a program ● Understand what a **syntax error** is ● Be able to create and use **variables** with meaningful **variable names** ● Understand the data types string, integer and float ● Be able to write algorithms in **pseudocode** ● Identify the different types of programming errors and how to fix them:
Key vocabulary **(5- 10 words)**	Computer misuse, Computer Misuse Act, hacking, malware, unauthorised access, password,ransomware, personal data, identity theft, Data Protection Act, shoulder surfing, phishing	World wide web, HTML, Hypertext Markup Language, web browser, HTML tags, start tag, end tag, headings, paragraphs, images, line breaks, hyperlinks, head, body, line break, CSS, cascading style sheets	Sequence, interactive mode, script mode, input, print, variables, error messages, variable names, comments, type conversion, data types, assignment, round function BIDMAS, IF, ELIF, ELSE, IF, comparison operators, code indentation, pseudocode, syntax errors, run-time error
End of Half term assessment	End of topic test	End of topic test	End of topic test
Planned trips / Clubs / links			

Key Stage 3 / Year Group: 8			
	Spring 2	**Summer 1**	**Summer 2**
Key Concept	Spreadsheets and Data Analysis	Spreadsheets and Data Analysis (Continued from Spring 2)	Microbit Physical Computing
Content: **(Know what…)**	This unit is a practical, skills-based unit covering the principles of creating and formatting basic spreadsheets to produce and use simple computer models. The unit assumes no prior knowledge of spreadsheets and lesson 1 gives an introduction to some spreadsheet basic. Spreadsheet features covered include SUM, MAX, IF and COUNTIF functions, absolute cell references, conditional formatting, validation, charting and simple macros.	See Spreadsheets and Data Analysis - Spring 1	Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems Understand several key algorithms that reflect computational thinking; use logical reasoning to compare the utility of alternative algorithms for the same problem Understand how instructions are stored and executed within a computer system Design, use, and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
Skills: **(Know how…)**	**At the end of this Unit all pupils should be able to:** ● Be able to create simple formulas including * / + - ● Be able to automatically create formulae using relative cell referencing ● Understand what computer models are used for ● Be able to format cells and insert a graphic into a spreadsheet ● Make use of relative and absolute cell referencing ● Use **functions**	See Spreadsheets and Data Analysis - Spring 1	● Describe what the micro:bit is ● List the micro:bit's input and output devices ● Use a development environment to write, execute, and debug a Python program for the micro:bit ● Write programs that use GPIO pins to generate output and receive input ● Design a physical computing artifact purposefully, keeping in mind the problem at hand, the needs of the audience involved, and the available resources
Key vocabulary **(5- 10 words)**	Cell reference, formula, SUM, AVERAGE, function, relative cell referencing, plus, minus, times, divide, computer model, absolute cell referencing, fill colour, merge cells, font, cell	See Spreadsheets and Data Analysis - Spring 1	Micro:bit,Microcontroller,LED (Light Emitting Diode),Input, Output,Accelerometer, Compass, USB Port,Pins
End of Half term assessment	End of topic test	End of topic test	End of topic test
Planned trips / Clubs / links			

Key Stage 3 **Year Group: 9**			
	Autumn Term 1	**Autumn Term 2**	**Spring Term 1**
key concept	AI and Machine Learning	Computational Thinking and Logic	Programming using Python
Content: **(Know what…)**	Looks at what AI is and the history and developments behind it. It then moves onto machine learning, which is used in more modern AI applications today. Ethics of AI are covered with students being able to consider a number of different areas of ethical concern.	Introduces students to the world of computational thinking and logic. With the help of many unplugged activities, students get to understand the power of problem solving and the different methods that Computer Scientists use to tackle problems.	Pupils then use **FOR** loops and compare their use with **WHILE** loops, before moving on to Python lists, which are introduced as a new data structure and are used in conjunction with **FOR** loops. Functions with and without parameters are covered to help pupils understand the concept and benefits of modular programming.

Skills: **(know how…)**	• Understand the origin and uses of AI • Understand how rules are used in AI decision making • Understand what ethics is • Understand how intelligence can be measured in humans and computers • Know what the Turing test is and how it works • Understand the difference between facts and rules • Describe uses of machine learning • Use training data to create rules that solve problems of categorising data • Understand what ethics is • 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 • Describe a technique for detecting patterns in a grid of pixels • Review program code and adapt it to detect given shapes • Program a chatbot • Understand the analysis of text to rate an attitude or opinion • Review the program and identify areas for improvement	• Understand how Boolean operators can be represented in written expressions and Venn diagrams • Understand how logic is used in different situations • Be able to complete truth tables for logic gates and circuits with up to three inputs • Understand how loops can be used to reduce the amount of code required for a solution • Be able to refine algorithms to reduce the number of instructions required • Understand the difference between lossy and lossless compression • Be able to use an algorithm to communicate data • Understand why compression is needed for video transmission and photo storage • Understand how abstractions are used in everyday life • Be able to create abstractions for different purposes • Understand how networks are used to make an abstraction of a maze • Understand how decomposition can be used to break down problems into more manageable components • Be able to break down a large Computing problem into its parts and understand:	**At the end of this Unit all pupils should be able to:** • Recall different data types • Write an IF-ELSE statement • Understand the advantage of using a list over many single variables • Be able to create and use lists • Understand what a procedure is • Be able to define functions

Key vocabulary (5- 10 words)	Facial recognition, fingerprint recognition, language processing, neural network, self-driving cars, sensors, embedded, camera, push button, rules, decisions, training data, machine learning	Logical thinking, logic, Boolean operators, AND, OR, NOT, logic gates, AND gate, OR gate, NOT gate, algorithm, sequence, Venn diagram, truth table, circuit, loop, nested loop.	Data types, integer, float/floating point number, string, IF-ELIF-ELSE, WHILE, FOR, iteration, list, append, element, item, procedures, parameters, functions, return value, call function, call procedure.

End of Half term assessment	End of topic test	End of topic test	End of topic test
Planned trips / Clubs / links			

Key Stage 3 / Year Group: 9

	Spring 2	**Summer 1**	**Summer 2**
Key Concept	The Ethics and Impacts of Technology on Society	Graphics	Animation
Content: **(Know what…)**	Gain knowledge and understanding of the impact of technology on individuals, organisations, and the planet. Through a range of real-world examples, they will learn how to identify the specific type of impact, ie legal, cultural, privacy, environmental, and ethical. They will then progress to identifying stakeholders who are impacted by technology, and learn how these impacts are experienced, negated, or adapted to. Throughout the unit, learners will be encouraged to discuss their views and make use of sample long-form answers.	This unit is an introduction to graphics and covers useful theory from a Computing angle along with practical skills using graphics editing software such as Photoshop. Pupils will understand and create vector graphics in the first lesson, before looking at how bitmap graphics are stored. Practical skills are given in investigating the effect on file size and quality of changing image resolutions. The second half of the unit gives practical skills in using graphics editing software including the use of layers, isolating images and adding text. Pupils will bring in all the skills they have learnt during the unit to make a greetings card. This will then be added to an assessment portfolio. This unit gives a solid foundation to the theory and practical skills required for KS4 courses such as Computer Science or iMedia.	Learners will discover how professionals create 3D animations using the industry-standard software package, Blender. By completing this unit learners will gain a greater understanding of how this important creative field is used to make the media products that we consume. Sessions will take learners through the basics of modelling, texturing, and animating; outputs will include 3D models and short videos.

Skills: **(Know how…)**	Know the significance of the five broad areas of impact, ie law, environment, culture, ethics, and privacy. They will be able to identify and discuss the impact areas through genuine examples. Finally, learners will begin to understand the legal impact of technology specifically, and work through an example relating to the Data Protection Act (2018), Freedom of Information Act, Computer Misuse Act. Learners will understand what the term 'cultural impact' means. They will learn about downtime and its effect on businesses and individuals. In addition, they will closely examine the concept of 'digital divide' and work through examples of its impact. They will analyse the cultural implications of the growing use of mobile technology and the responsibility of stakeholders in mitigating any risks. Learners will discover the reality and limitations of privacy and surveillance. They will learn the laws that protect us directly, and others that enable the security services to protect us from harm. They will also learn about the tension between these requirements. In addition, they will consider the different technologies that we encounter in our daily lives and the privacy implications of these. They will also learn about how social media platforms collect data, and become more informed about the data that they are making available through their engagement with technology. They will also learn about the environmental impacts of social media, though you will discuss this in more detail in Lesson 6.	**At the end of this Unit all pupils should be able to:** ● Understand the characteristics of a vector graphic and how it is stored ● Be able to create a vector-based logo that includes: o Shapes o Fills ● Understand how bitmap graphics are made from individual pixels including: o Black and white images ● Understand how layers work and be able to use them to create a composite image o Be able to re-size and rotate images ● To be able to isolate images from their background including the use of: o Magic Wand tool and Tolerance ● To make use of layers to create a composite image ● Be able to add text to an image and alter text properties including: o Size ● Be able to use layers to create a greetings card including: o Use a template layout layer o Be able to show and hide layers **Most pupils will be able to:** ● Be able to create a vector-based logo that includes: o Outlines (strokes) o Grouping ● Understand how bitmap graphics are made from individual pixels including: o Grayscale images o Colour images ● Know how colour maps are used to create colour images ● Understand how the use of vector or bitmap images affects file quality and file size	Add, delete, and move objects Scale and rotate objects Use a material to add colour to objects Add, move, and delete keyframes to make basic animations Play, pause, and move through the animation using the timeline Create useful names for objects Join multiple objects together using parenting Use edit mode and extrude Use loop cut and face editing Apply different colours to different parts of the same model Use edit mode and extrude Use loop cut and face editing Apply different colours to different parts of the same model Use proportional editing Use the knife tool Use subdivision Use proportional editing Use the knife tool Use subdivision Add and edit set lighting Set up the camera Compare different render modes Create a 3–10 second animation Render out the animation

		• Understand the effect of altering the resolution of an image including:
		  o The quality
		  o The file size
		  o Being able to create images of varying resolutions
		• Understand how layers work and be able to use them to create a composite image
		  o Be able to transform images
		• To be able to isolate images from their background including the use of:
		  o Magnetic Lasso tool
		• Be able to add text to an image and alter text properties including:
		  o Fill colour
		• Be able to use layers to create a greetings card including:
		  o Be able to change layer properties such as drop shadow and stroke
		• Be able to use layers to create a greetings card including:
		  o Be able to show and hide layers
		Some pupils will be able to:
		• Be able to create a vector-based logo that includes:
		  o Merging
		• Understand that the number of bits per pixel determines the number of available colours for an image
		• Be able to add text to an image and alter text properties including:
		  o Leading (line height)
		• Be able to use layers to create a greetings card including:
		  o Be able to change layer properties such as drop shadow and stroke	

Key vocabulary (5- 10 words)	Positive impacts include increased efficiency, improved communication, enhanced access to information, and advancements in healthcare and scientific discovery. Negative impacts encompass privacy concerns, security threats, job displacement, social isolation, and the spread of misinformation.	Vector, logo, basic shape, fills, outlines, strokes, merge, group, radius, pixel, x-axis, y-axis, wireframe, block arc, rectangle, right triangle, union, layer, pixels per inch, PPI, dots per inch, DPI,	
End of Half term assessment	End of topic test	End of topic test	End of topic test
Planned trips / Clubs / links			