Computer Science KS3 Overview

The computing Program of study for KS3 computing aims to develop students' interest in computing, and computer Science. We aim to embed a deep interest in the subject and equip students with the necessary skills and knowledge so they can be successful and allow them to fully participate in the digital world we live in. We also look to build students ability in computational thinking, so that they use it within their own programming, and more broadly within all their digital interactions.

Year 7						
Order	**1**	**2**	**3**	**4**	**5**	**6**
Topic	**Introduction to Computer Science**	**Media – Vector Graphics**	**Computational Thinking**	**Programming intro (Edublocks)**	**Spreadsheets**	**HTML (Web development)**
Est Weeks	**8**	**6**	**6**	**6**	**6**	**6**
Knowledge	IT systems (files, folders, organisation), correct use of email, netiquette, web awareness, using MS office. Introduce school wellbeing and personal development platform – YouHQ.	A topic which focuses on Vector graphics versus raster graphics, using Inkscape / vectr.com. The intent is to ultimately create digital artefacts which incorporate layering, grouping, combining, subtracting objects from each other, and editing the paths of the objects to create images that meet a brief.	A first look at computational thinking. Introduction to the key parts of flowcharts, algorithms, abstraction, decomposition, and logical questioning.	Programming with Scratch with further promotion of computational thinking and problem solving. Looking at fundamental programming concepts including, sequencing, variables, selection, operators, and iteration,	An introduction to spreadsheets and how they can organise and display data. Use of formulas, conditional formatting, functions, and graphs to store, analyse and visualise data.	An introduction to web development using HTML and CSS. Students will learn how to create web pages using HTML and CSS. They will Investigate code (debugging) and develop problem-solving skills.
Skills / software	Microsoft software File organisation Email use MS teams Online Safety YouHQ	Creating vector graphics using Inkscape Vectr.com Presentation skills	Using and creating flowcharts Flowol4 Develop algorithms	Using scratch to create simple programs, and development of computational thinking. Kodu Lab	MS Excel Office 365 MS teams Spreadsheet structures Basic formula using: *, -, +, / Functions - SUM, MIN, MAX, AVERAGE Graphs Conditional formatting	Code club Computational thinking HTML, CSS Web browser
NC links National Curriculum	Understand a range of ways to use technology safely, respectfully, responsibly, and	Create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness,	Design, use, and evaluate computational abstractions that model the state and behaviour of real-world	Use two or more programming languages, one of which is textual, to solve a variety of	Undertake creative projects that involve selecting, using, and combining multiple applications, preferably	Use two or more programming languages, one of which is textual, to solve a variety of computational problems; make appropriate use of

Computing key stages 3 and 4	securely, including protecting their online identity and privacy; recognise inappropriate content, contact, and conduct, and know how to report concerns.	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, analysing data, and meeting the needs of known users.	problems and physical systems. Understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming.	computational problems; design and develop modular programs that use procedures or functions.	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	data structures such as lists, tables, or arrays. Design and develop modular programs that use procedures or functions. use logical reasoning to compare the utility of alternative algorithms for the same problem
External links	The impact of ICT on society: https://www.bbc.co.uk/bitesize/guides/zbxbkqt/revision/1 E Safety: https://www.bbc.co.uk/bitesize/guides/zrtrd2p/revision/1 How ICT has changed communication and collaboration: https://www.bbc.co.uk/bitesize/guides/zg6g87h/revision/1 Search engines: https://www.bbc.co.uk/bitesize/guides/zpkhpv4/revision/1 Tech through time: https://www.bbc.co.uk/bitesize/guides/z4p4jxs/revision/1	Graphics software: https://www.bbc.co.uk/bitesize/guides/zv2v4wx/revision/1 Online vector graphics www.vectr.com Bias and reliability: https://www.bbc.co.uk/bitesize/guides/z2g2mp3/revision/1	Introduction to Computational thinking: https://www.bbc.co.uk/bitesize/guides/zp92mp3/revision/1	Scratch: https://scratch.mit.edu/ Edublocks Control and sequencing: https://www.bbc.co.uk/bitesize/guides/zfjsgk7/revision/1 Introduction to programming: https://www.bbc.co.uk/bitesize/guides/zts8d2p/revision/1 Scratch: https://scratch.mit.edu/ Programming basics: https://www.bbc.co.uk/bitesize/guides/zwmbgk7/revision/1 Selection in programming: https://www.bbc.co.uk/bitesize/guides/z2p9kqt/revision/1 Iteration: https://www.bbc.co.uk/bitesize/guides/z3khpv4/revision/1	Spreadsheets: https://www.bbc.co.uk/bitesize/guides/zdydmp3/revision/1 Presenting information on computers: https://www.bbc.co.uk/bitesize/guides/zksk7ty/revision/1 Modelling simulation: https://www.bbc.co.uk/bitesize/guides/zyqfr82/revision/1	HTML: https://www.bbc.co.uk/bitesize/guides/z993tv4/revision/1 Internet and communication: https://www.bbc.co.uk/bitesize/guides/z8nk87h/revision/1
End Point	**E-Safety, File management, and MS office**	**Creation of Vector graphics**	**Algorithms and flow diagrams**	**Programming fundamentals with Edublocks**	**Spreadsheets**	**HTML development using code club**

Assessment	**Support:** Basic knowledge of E-Safety and Cybersecurity. Can access the school computer systems. Basic grasp of file management Basic knowledge of MS Office applications and their use. **Secure:** Secure knowledge of E-Safety and Cybersecurity. Good grasp of file management Secure knowledge of MS Office applications and their use. **Greater Depth:** Excellent knowledge of E-Safety and Cybersecurity. Detailed grasp of file management Excellent knowledge of MS Office applications and their use.	**Support:** Create a basic vector image. Create vector shapes, with simple manipulation of their paths. Basic knowledge and understanding of Inkscape's use. **Secure:** Create a complex vector image. Good manipulation of vector images and their paths. Secure knowledge and understanding of Inkscape's use. **Greater Depth:** Create a more complex vector image. Excellent manipulation of vector images and their paths. Deep knowledge and understanding of Inkscape's use.	**Support:** Limited knowledge of flow diagram symbols. Simple flow chart created. Basic knowledge of problem decomposition and computational thinking. **Secure:** Secure knowledge of flow diagram symbols. Flow chart created. Good knowledge of problem decomposition and computational thinking. **Greater Depth:** Excellent knowledge of flow diagram symbols. Complex flow chart created. Very good knowledge of problem decomposition and computational thinking.	**Support:** Limited programming skills in scratch, with some knowledge of fundamental programming concepts Can create a simple program in scratch. **Secure:** Secure programming skills in scratch, with some knowledge of fundamental programming concepts Can create a program in scratch which uses more than one programming constructs. **Greater Depth:** Very good programming skills in scratch, with knowledge of several fundamental programming concepts. Can create a program in scratch which uses several programming constructs.	**Support:** Basic knowledge of MS Excel's use. Can create a table in MS Excel. **Secure:** Secure knowledge of MS Excel's use Can create a table and perform calculations using MS Excel. Can format cells. **Greater Depth:** Very good knowledge of MS Excel's use Can create complex tables, perform calculations, and display data use charts/graphs using MS Excel. Can begin to use conditional formatting in MS Excel.	**Support:** Limited understanding of HTML and CSS with some knowledge of fundamental tagging concepts Can create a simple HTML website **Secure:** Secure programming skill in HTML, with some knowledge of fundamental CSS concepts. Can create a HTML website which uses CSS styling. **Greater Depth:** Very good understanding of HTML tagging and CSS styling. Good knowledge of several different HTML elements, CSS styling and design considerations. Can create a HTML website, which uses several CSS styles.

Year 8							
Order	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Topic	**Computer Systems**	**Web design**	**Computer Networks**	**eSafety (Licensing and credibility of sources**	**Binary**	**Python Programming with Turtle**	**Physical and embedded computing**
Est Weeks	**7**	**6**	**4**	**6**	**4**	**6**	**6**
Knowledge	Exploration of the different parts of computing systems: from the OS to the Hardware. This will also include a look at Logic, AI, sharing code etc	Exploration of the building blocks of the World Wide Web, HTML, and CSS. A revisit to internet safety, searching the web, and a look at how search engines effectively retrieve information and catalogue webpages.	Network components, layouts and security, protocols for transferring data, LAN, WAN, the internet, transferring data across networks. Look at the internet as a source of information and how to scrutinise webpages / resources retrieved.	This topic revisits eSafety, credibility of online sources, and how to safely and accurately search the internet.	The use of AND/OR/NOT gates, truth tables, and building simple logic circuits.	First look at the textual programming language, Python, use an IDE to develop code, revisiting the idea of an algorithm, look at user Inputs into programs, using libraries (python turtle), using functions, passing arguments to functions, etc	A look at embedded computing including the programming of a Micro: bit. Identify the key parts of a Micro: bit program and apply programming knowledge to extend existing programs. Further develop event driven programming skills and strengthen skills of decomposition, algorithm design.
Skills / software	Identify computer components, Little Man Computer simulator. PPT and presentation skills	Using web design software, wireframing websites, functional models of websites	Network security. Data management. Computer programming. Computer networking and communication tools.	Safe searching Blog post creation Search engine use Word use	Logic circuit use in computer science. Truth Tables Computational Thinking	Problem Solving Sequencing Selection Iteration Reflection Programming Using an IDE	Micro:bit / Arduinos (Scratch)
NC links National Curriculum Computing key stages 3 and 4	Understand the hardware and software components that make up computer systems, and how they communicate with one another and with	Create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design, and usability.	Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other networks.	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	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	Understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative	To make appropriate use of data structures and develop modular programs that use procedures or functions. Undertake creative projects that involve challenging goals.

		Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting, analysing data, and meeting the needs of known users	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.	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.	binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal]	algorithms for the same problem. Use two or more programming languages, one of which is textual, to solve a variety of computational problems; make appropriate use of data structures such as lists, tables, or arrays.	Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
External links	The CPU and the fetch-execute cycle: https://www.bbc.co.uk/bitesize/guides/zws8d2p/revision/1 Software: https://www.bbc.co.uk/bitesize/guides/zcxgr82/revision/1 Digital devices: https://www.bbc.co.uk/bitesize/guides/zxb72hv/revision/1	HTML: https://www.bbc.co.uk/bitesize/guides/z993tv4/revision/1 Internet and communication: https://www.bbc.co.uk/bitesize/guides/z8nk87h/revision/1	Networks: https://www.bbc.co.uk/bitesize/guides/zc6rcdm/revision/1 The internet: https://www.bbc.co.uk/bitesize/guides/z8nk87h/revision/1	Search engines: https://www.bbc.co.uk/bitesize/guides/zpkhpv4/revision/1 Bias: https://www.bbc.co.uk/bitesize/guides/z2g2mp3/revision/1 Law and ethics: https://www.bbc.co.uk/bitesize/guides/z9nk87h/revision/1	Logical Reasoning: https://www.bbc.co.uk/bitesize/guides/z8jfyrd/revision/1 Binary: https://www.bbc.co.uk/bitesize/guides/z26rcdm/revision/1 Boolean logic: https://www.bbc.co.uk/bitesize/guides/zqp9kqt/revision/1	Introduction to programming: https://www.bbc.co.uk/bitesize/guides/zts8d2p/revision/1	Micro:bit projects: https://microbit.org/projects/make-it-code-it/
End Point	**Cybersecurity and e-safety**	**Web design**	**Creating animations**	**Blog post**	**Binary and Logic**	**Analysing data with python**	**Physical and embedded computing**
Assessment	**Support:** Basic knowledge of computer systems, operating systems, AI, and logic. Basic grasp of sharing code and the benefits of sharing code. **Secure:** Secure knowledge of computer systems,	**Support:** Has a basic understanding of wireframing and the core principals of web design. Can create a simple webpage design including titles and text. **Secure:**	**Support:** Has a basic knowledge of computer networks and their components. A limited knowledge of how data is transferred across networks. A basic knowledge of how to scrutinise	**Support:** basic understanding of consequences for illegal access or downloading online material. Some knowledge of licensing and plagiarism, and a limited ability to quality assure	**Support:** Has a basic knowledge of Boolean algebra and logic. Can describe at least one logic gate. Has a basic understanding of truth tables. Can convert a denary number up to 15 into	**Support:** Can write a simple program using python which uses at least one variable, and a print statement. Has a basic knowledge pf python functions and can use print statements.	**Support:** Has a basic knowledge embedded computing. A limited knowledge of how to program a micro: bit. Can construct a simple program and transfer it onto a micro: bit and successfully run it. **Secure:**

	operating systems, AI, and logic. Good grasp of sharing code and the benefits/drawbacks of doing so. **Greater Depth:** Excellent knowledge of computer systems, operating systems, AI, and logic. Excellent grasp of sharing code and can evaluate the merits of sharing code.	Has a secure understanding of wireframing and the core principals of web design, including the need for usability and accessibility. Can create a clear and well laid out webpage design including titles and text. **Greater Depth:** Has a deep understanding of wireframing and the core principals of web design, including the need for usability and accessibility. Can create a clear and well laid out website design including titles and text.	webpages for reliable information. **Secure:** Has a good knowledge of computer networks and their components. A secure knowledge of how data is transferred across networks. A good knowledge of how to scrutinise webpages for reliable information. **Greater Depth:** Has an excellent knowledge and understanding of computer networks and their components. Excellent knowledge of how data is transferred across networks. An excellent knowledge of how to scrutinise webpages for reliable information,	content accessed online. **Secure:** Secure understanding of the potential consequences of illegal access or downloading online material. A secure understanding of licensing and plagiarism, and some ability to quality assure content accessed online. **Greater Depth:** Good understanding of the potential consequences of illegal access or downloading online material. Good understanding of licensing and plagiarism, and the ability to quality assure content accessed online.	a 4-bit binary number. **Secure:** Has a secure knowledge of Boolean algebra and logic. Can describe at least two logic gates. Has a secure understanding of truth tables. Can convert a denary number up to 31 into a 5-bit binary number. **Greater Depth:** Has an excellent knowledge of Boolean algebra and logic. Can describe at least three logic gates. Has an excellent knowledge of truth tables. Can convert a denary number up to 63 into a 6-bit binary number.	Can describe simple code, and explain what it does. **Secure:** Can write a simple program using python, which takes a user input, stores data in a variable, and uses print statements. Has a secure knowledge pf python functions and can use print statements. Can describe more complex code. **Greater Depth:** Can write a simple program using python, which takes a user input, stores data in a variable, uses print statements, and includes a user defined function. Has an excellent knowledge pf python functions and can use print statements. Can describe more complex code, and explain what it does.	Has a good knowledge of embedded computing. Has a secure knowledge of how to program a micro: bit. Can construct a program containing at least two different programming constructs (iteration, selection, and sequence) and transfer it onto a micro: bit and successfully run it. **Greater Depth:** Has an excellent knowledge of embedded computing. Has a very good knowledge of how to program a micro: bit. Can construct a program containing several different programming constructs (iteration, selection, and sequence) and transfer it onto a micro: bit and successfully run it.

Year 9						
Order	**1**	**2**	**3**	**4**	**5**	**6**
Topic	**Cybersecurity and cybercrime**	**Audiovisual representations**	**Python fundamentals**	**Spreadsheets**	**Animations**	**Mobile App development**
Est Weeks	**7**	**6**	**6**	**6**	**6**	**7**
Knowledge	You and your data, social engineering, hacking, bots, the Data Protection Act, the Computer Misuse Act, Hacking, Malware, protection methods such as anti-malware and authentication	Representing images and sounds digitally using audacity, paint.net and GIMP. Focus is on the making of digital media such as images and sounds, and the understanding of the underlying principles which underpin digital representations.	Continuation of python from year 8. Students revisit Python, use an IDE to develop code, revisiting the idea of an algorithm, look at user Inputs into programs, using libraries, using functions, passing arguments to functions, taking user input, assignment, iteration, selection, sequencing code and defining functions.	An revisit to spreadsheets and how they can organise and display data. Use of formulas, conditional formatting, functions, and graphs to store, analyse and visualise data. This topic will extend students awareness and understanding of spreadsheet functions, and will introduce students to data validation, macros and more advanced functions.	Films, television, computer games, etc have been transformed by computer-based 3D modelling and animation. Using Blender to make animations, and to gain an appreciation of how this important creative field uses technology to model and animate.	Develop experience using a coding environment build on the programming concepts from previous years to build a unique app. Customise GUI element to meet the needs of their app concept. Event-driven programming. Decomposition of a problem.
Skills / Software	Critical thinking, self-awareness, and a better appreciation of societal issues surrounding technology and its use(s).	Image manipulation including altering colour balance, cropping, retouching, constructing images from layers, masking tools, flattening images etc	Mu IDE Visual Studio Code Python IDLE	MS Excel Office 365 MS teams Spreadsheet structures Basic formula using: *, -, +, / Functions - SUM, MIN, MAX, AVERAGE Graphs Conditional formatting	Blender – use of filters, creation of animations, using layers within animations, rendering	APP lab with Event driven programming Error Detection / error handling in Programming Decomposition User Inputs Block Programming (like Scratch)
NC links National Curriculum Computing key stages 3 and 4	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	Understand how instructions are stored and executed within a computer system; understand how data of several types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits	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	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.	Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems. Create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design, and	Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems.

	concerns.		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, one of which is textual, to solve a variety of computational problems; make appropriate use of data structures such as lists, tables, or arrays.	Create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design, and usability	usability.	
External Links	IBM cybersecurity game: https://www.ibm.com/security/digital-assets/cybersecurity-ops/terminal/ Graphics software: https://www.bbc.co.uk/bitesize/guides/zv2v4wx/revision/12 Collaboration: https://www.bbc.co.uk/bitesize/guides/zg6g87h/revision/1 Search engines: https://www.bbc.co.uk/bitesize/guides/zpkhpv4/revision/1	Online image editor www.pixlr.com/e Representing text, images, and sound: https://www.bbc.co.uk/bitesize/guides/zpfdwmn/revision/1 Binary: https://www.bbc.co.uk/bitesize/guides/z26rcdm/revision/1 Bias and reliability: https://www.bbc.co.uk/bitesize/guides/z2g2mp3/revision/1	Sorting: https://www.bbc.co.uk/bitesize/guides/z2m3b9q/revision/1 Searching: https://www.bbc.co.uk/bitesize/guides/zgr2mp3/revision/1	Spreadsheets: https://www.bbc.co.uk/bitesize/guides/zdydmp3/revision/1 Presenting information on computers: https://www.bbc.co.uk/bitesize/guides/zksk7ty/revision/1 Modelling simulation: https://www.bbc.co.uk/bitesize/guides/zyqfr82/revision/1	Graphics Software: https://www.bbc.co.uk/bitesize/guides/zv2v4wx/revision/1 Computer models: https://www.bbc.co.uk/bitesize/guides/zyqfr82/revision/1	App lab: https://code.org/educate/applab App lab projects: https://studio.code.org/projects/public
End Point	**Cybersecurity and e-safety**	**Audiovisual representations**	**Python Fundamentals**	**Spreadsheets**	**Creating animations**	**App creation**
Assessment	**Support:** Basic knowledge of cybersecurity and how to keep yourself safe online. Limited knowledge of how to protect your data and data protection.	**Support:** Basic understanding of how images and sounds are represented using binary. A limited understanding of how software link GIMP is used to edit images.	**Support:** Limited programming skills, with some knowledge of fundamental programming concepts but with gaps in this knowledge. Basic knowledge of how to process data.	**Support:** Basic knowledge of MS Excel's use. Can create a table in MS Excel. **Secure:** Secure knowledge of MS Excel's use	**Support:** Basic understanding of how to use Blender to create simple animations. Can render objects in Blender, A basic knowledge of Blender's uses.	**Support:** Has a basic knowledge of software development. A limited knowledge of computational thinking skills.

	Secure: Secure knowledge and understanding of cybersecurity and how to keep yourself safe online. Limited knowledge of data protection. **Greater Depth:** Excellent understanding of cybersecurity and how to keep yourself safe online. Detailed knowledge of how to protect your data online and data protection.	With support can create simple edits of an image using GIMP. Can record sounds using Audacity. With support can make simple sound edits using Audacity. **Secure:** Secure understanding of how images and sounds are represented using binary. A Good understanding of how software like GIMP is used to edit images. Can independently create simple edits of an image using GIMP. Can record sounds using Audacity. Can independently make simple sound edits using Audacity. **Greater Depth:** Excellent understanding of how images and sounds are represented using binary. A very good understanding of how software like GIMP is used to edit images. Can independently create complex edits of an image using GIMP. Can record sounds using Audacity. Can independently make complex sound edits using Audacity.	**Secure:** secure programming skills, with knowledge of the fundamental programming concepts sequencing and iteration. Good knowledge of how to process data. A secure knowledge of functions. **Greater Depth:** Excellent programming skills, with knowledge of the fundamental programming concepts sequencing, selection, and iteration. A good knowledge of functions, and how they are defined. Excellent knowledge of how to process data.	Can create a table and perform calculations using MS Excel. Can format cells. Can create macros with support and know what data validation is.Can use IF functions with guidance. **Greater Depth:** Very good knowledge of MS Excel's use Can create complex tables, perform calculations, and display data use charts/graphs using MS Excel. Can begin to use conditional formatting in MS Excel. Can create macros and use data validation. Can successfully use IF functions.	**Secure:** Secure understanding of how to use Blender to create animations. Can render objects in Blender and create multitone affects. A good knowledge of Blender's uses. **Greater Depth:** Excellent understanding of how to use Blender to create animations. Can render several objects in Blender, create multitone affects, and animate them. An excellent knowledge of Blender's uses.	Can construct a simple program using a block-based programming language. **Secure:** Has a secure knowledge of software development. A secure knowledge of computational thinking skills, and is able to decompose simple tasks into smaller sub tasks. Can construct a simple program using a block-based programming language. **Greater Depth:** Has a good grasp of some of the key areas in software development. A clear appreciation and good knowledge of computational thinking skills, and is able to decompose more complex tasks into smaller sub tasks. Can construct more complex programs using a block-based programming language.