St Helen's Computing Progression Map

Substantive Knowledge-

This is the subject knowledge and explicit vocabulary used to learn about the content. In our Computing Curriculum we focus on three main areas:

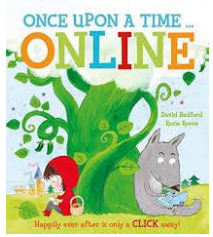
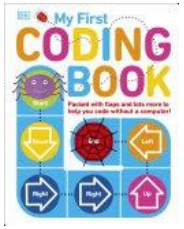
Computer Science	The technical design. The design of new software, the solution to computing problems and the development of different ways to use technology.
Information technology	The technical knowledge. The design, use and understanding of hardware and software; computers and electronic systems for storing and using information.
Digital Literacy	The technical skills. The ability to use information and communication technologies to find, create, evaluate, and communicate information.

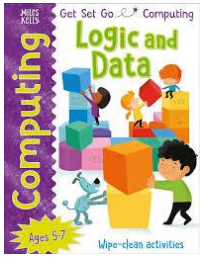
Disciplinary Knowledge- This is knowing how to collect, use, interpret, understand and evaluate learning through the Computing knowledge that is taught. There are 4 main skill strands:

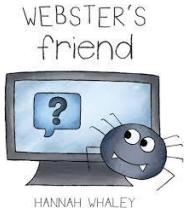
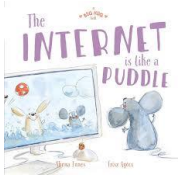
Code	Using and writing codes to produce instructions and algorithms; to solve problems; to test and use logic and sequences against inputs and outputs.
Connect	Being able to safely, efficiently and confidently digitally connect with others
Communicate	Being able to safely, efficiently and confidently use apps and information technology to communicate ideas
Collect	Being able to safely, efficiently and confidently find, evaluate, store, sort and use appropriate data.

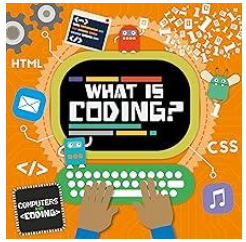
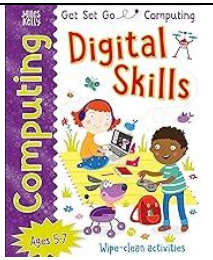
Key Stage 1 and 2

- All learning outcomes are planned out under four strands, which provides categories and an organised view of content to encapsulate the discipline of computing: -
- **Computer Systems and Networks**- Understand what a computer is, and how its constituent parts function together as a whole, and understand how networks can be used to retrieve and share information, and how they come with associated risks.
- **Programming**- Create software to allow computers to solve problems.
- **Creating Media**- Select and create a range of media including text, images, sounds, and video
- **Data and Information**- Understand how data is stored, organised, and used to represent real-world artefacts and scenarios Embedded within these main strands, are the following Digital Literacy skills that are crucial for pupil's use of technology in the world:
  • Effective use of tools — Use software tools to support computing work
  • Impact of technology — Understand how individuals, systems, and society as a whole interact with computer systems
  • Safety and security — Understand risks when using technology, and how to protect individuals and systems

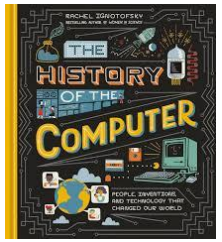
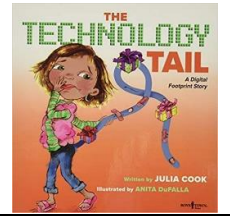
Key stage 1 Cycle A				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts**
Computing systems and networks- technology around us.	To name 3 types of technology (computer, iPad, traffic lights, laptop, heating system). To use a mouse, I click and drag. To know that the shift key creates a capital letter.	To identify technology To identify the toolbar and use bold and change font and size To type capital letters To use the space bar To find letters on a keyboard to type words To insert a picture from a picture box To follow rules for using technology responsibly	Computer mouse/trackpad, draw, click, double-click, click and drag Input device, computer, keyboard, mouse Shift, space bar, capital letter, full stop Safely, responsibly, computer, technology	
Digital Painting	To know the icons for the shape and line tools to draw a picture. To explain how to change the colour and size of the paintbrush. Art can be created digitally.	To draw lines and make marks on a screen and explain which tools I used To make marks with the square and line tools To use the shape and line tools effectively To use the shape and line tools to recreate the work of an artist To explain why I have chosen specific tools	sort, font, size, toolbar, shift, bold, italic, shape, line, tools, space bar, insert	
Moving a robot	To know that an algorithm is a set of instructions used to solve a problem or achieve an objective. To know that an algorithm written for a computer is called a program. To know finding errors in an algorithm is called debugging.	To use a start block in a program To use more than one block by joining them together To compare left and right turns To experiment with turn and move commands to move a physical computer To use event, action and object code blocks To select appropriate background artwork for a project	Beebot, sequence, program, debug, challenge, instructions, event, action, object, block, command	

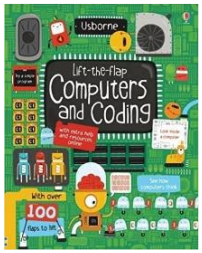
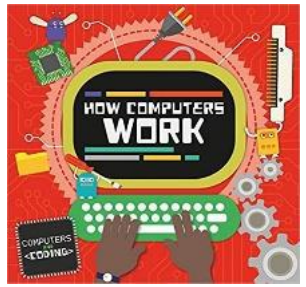
Grouping data	Objects can be counted digitally. Labels are used to show the contents of a group. Objects can be grouped depending on the question.	To describe objects using labels and match objects to a group. To count groups of objects and describe their properties. To count and group objects with the same properties To compare groups of objects and answer questions about them.	Group, object, property, value, label, colour, data set, more, less, most, least, fewest, the same	

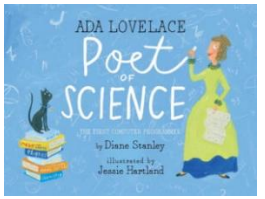
Key stage 1 Cycle B				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts**
Computing systems and networks- IT around us	IT is part of everyday life. Computers work alongside other electronic devices. IT must be used safely	To recognise the uses and features of information technology: describing some uses of computers and examples of computers. To can identify information technology in school and at home and say what it is used for. To explain the benefits of IT and how devices work together. To recognise how to use IT responsibly and that rules are in place to keep me safe and help me.	device, camera, photograph, capture, image, digital, landscape, portrait, horizontal, vertical, field of view, narrow, wide, format, Framing, focal point, subject matter, field of view, format, compose, natural lighting, artificial lighting, flash, focus, background, foreground Editing, tools, colour, filter, images, Pixlr, lighting, focus, filter, changed, real	
Creating media- Digital photography	Digital devices can take photographs. Photos can be taken either landscape or portraits.	To capture a digital photograph and talk about how to take a photograph. To take a photograph in landscape or portrait and explain why one or other might look better.	device, camera, photograph, capture, image, digital, landscape, portrait, horizontal, vertical, field of view, narrow, wide, format, Framing, focal point, subject matter, field of view, format, compose, natural lighting, artificial lighting, flash, focus, background,	

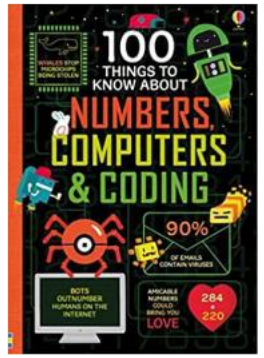
	Lighting can affect how a photograph is taken. A program of sequences controls the way a Beebot moves. Testing and debugging improves a program	To identify what is wrong with a photograph and reframe it. To decide how photographs can be improved by using light. To use editing to change my photograph, experimenting with colour and filters. To identify if an image is real or if it has been changed.	foreground Editing, tools, colour, filter, images, lighting, focus, filter, changed, real	
Robot Algorithms	Instructions must be clear and easy to follow. A program of sequences controls the way a Beebot moves. Testing and debugging improves a program	To choose a series of words that can be enacted as a sequence. To create different algorithms for a range of sequences using the same commands and show the difference in outcomes between two sequences that have the same command. To predict the outcome of my algorithm and compare this with what did happen. To explain that programming projects can have code and artwork. To design a specific algorithm to meet my goal and explain what it should achieve. To create and debug a program that I have written	instruction, sequence, clear, unambiguous, algorithm, program, sequence, order, algorithm, commands, prediction, artwork, design, route, mat, debugging	
Pictograms	Data can be recorded in a tally chart. A computer displays data in different formats. A pictogram can be created digitally.	To count and compare objects (data) using tally charts, comparing totals. To enter data on a computer and view that data in a different format: To use a pictogram to answer simple questions about the data. To use a tally chart to create a pictogram. To answer 'more than'/'less than' and 'most/least' questions about an attribute. To create a pictogram to arrange objects by attributes.	More than, less than, most, least, organise, data, object, tally chart, votes, total Pictogram, enter, compare, objects, count, explain, more, less, more common, least common, Attribute, group, same, different, more than/less, than, most/least, sharing, data	

		To create a pictogram to compare people by a common attribute. To explain that we can present information using a computer and that sometimes it is this data should not be shared.		

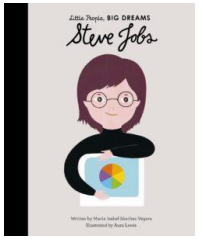
Lower Key stage 2 Cycle A				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts**
Computing systems and networks- Connecting computers	A computer network is formed when two or more computers are connected. A computer only processes information it has been given (input) When the computer has processed the information, it sends it back out (output).	To classify input and output devices; design a digital device and model a simple process. To recognise similarities and differences between using digital devices and non-digital tools. To explain how a computer network can be used to share information and that messages pass through multiple connections. To explain how digital devices can be connected and what the role of a switch, server and wireless access point is. To recognise the physical components of a network and how they are connected.	Digital device, input, output, process, program, connection, network, network switch, network switch, server, wireless access point (WAP)	
Creating media- stop frame animation	Stop-motion animation involves moving a model a tiny amount at a time. Small changes are needed for each frame to make it effective.	To explain that animation is a sequence of drawings or photographs To create a stop frame animation and predict what it will look like. To break down a story into setting, characters and events to create a storyboard.	Animation, flip book, stop frame animation, frame, sequence, image, photograph, setting, character, events, onion skinning, consistency	

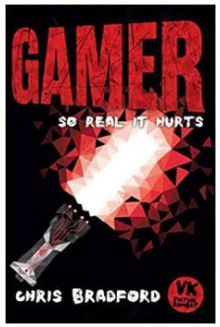
	Skinning helps me to see which frame was before. Skinning helps me to see which frame was before.	To evaluate the quality of my animation and review a series of frames to check my work. To review and improve an animation explaining how I will improve it. To evaluate the impact of adding other media to my animation.	evaluation, animation, delete, frame, media, import, transition	
Sequencing sounds- events and actions in programs	Commands in scratch are shown as blocks. Sound commands can be used when sequencing. A number of sprites can be programmed at the same time.	To explain how a sprite moves in an existing project To create a program to move a sprite in four directions To adapt a program to a new context To develop my program by adding features To identify and fix bugs in a program To design and create a maze-based challenge	Motion, event, sprite, algorithm, logic, move, resize, algorithm Extension block, pen up, set up, pen, design, actions, debugging, errors, setup	
Branching databases	A tree structure can be used to arrange objects. Objects can be separated based on attributes. Information can be arranged in a branching database.	To create a branching database by grouping groups of objects separated by one attribute. To make up yes/no questions about these groups. To identify the object attributes needed to collect relevant data To explain why it is helpful for a database to be well structured To compare the information shown in a pictogram with a branching database	Attribute, value, questions, table, objects, branching database, database, , equal, even, separate, order, organise, value, question, j2data, selecting, pictogram, compare, information, decision tree	

Lower Key stage 2 Cycle B				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts**
Computing systems and networks- The Internet	The internet is a network of networks. The World Wide Web contains websites and web pages. Content on the internet is created and owned by individuals.	To explain how the internet is made up of connected networks. To explain how websites are stored on the www, what types of media can be shared and how to access websites on the WWW. To explain that that content of the www is created by people. To evaluate the consequences of unreliable content. To name the different parts of a desktop computer and know what the function of the different parts of a computer is. E.g. Make a leaflet labelling a computer.	internet, network, router, network, security, switch, server, wireless, access point (WAP), web page, web address, links, files, content, download, sharing, ownership, permission, information, accurate, honest, adverts, legal.	
Creating media- Photo editing	Cropping an image changes the size of the photo. Colour effects can be added to edit a photo	To explain the effect that editing can have on an image. To change the composition of an image by selecting parts of it. To use editing tools on a photograph and can explain the effect these have.	image, edit, arrange, select, crop, undo, save, copyright, pixels, rotate, flip, adjustment, effects, colours, hue/ saturation, sepia, save, version, illustrator, vignette, retouch, edit, clone, recolour, image, fake, real, composite, cut, copy,	

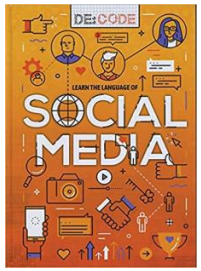
	Parts of a photo can be copied, edited or removed.	To evaluate how changing can improve an image. To save and retrieve an image.	paste, background, foreground.	
Repetition in games	A snippet of code can be modified instead of the whole thing.	To develop the use of count-controlled loops in a different programming environment, for example scratch. To explain that in programming there are infinite loops and count controlled loops. To develop a program which includes two or more loops which run at the same time. To modify an infinite loop.	scratch, programming, sprite, blocks, code, loop, repeat, value, forever, count controlled loop, costume, animate,	
	A count-controlled loop repeats a sequence a set number of times			
	An infinite loop repeats a sequence continuously.			
Data logging	Data can be gathered over time.	To explain that data gathered can be used to	data, table, input device, sensor,	

	A datalogger contains sensors that collect information from the environment. Questions can be created based on logged data.	answer a given question and to suggest questions to be asked of the data. To use a data logger to collect data and that the data logger collects 'data points' from sensors over a given time. To use collected data to answer questions and draw conclusions.	data logger, data point, interval, analyse, data set, import, export, logged, collection, review, conclusion.	

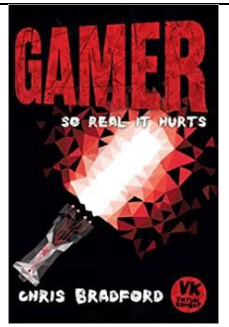
Upper Key stage 2 Cycle A				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts**
Computing systems and networks- Systems and searching	A computer system features inputs, processes and outputs. Search results can be influenced and ranked. There are a range of different search engines.	To explain how computers are connected together to form systems. To explain the role that computers have in our lives and how information is transferred over the internet. To work collectively on a shared project online. To evaluate different ways of working together online.	System, connection, digital, input, process, output, protocol, address, packet, chat, explore, slide deck, reuse, remix, collaboration	
	A video is a visual media format.	To explain that a video can hold visual and audio media.	Video, audio, AV, recording,	

Creating media – video production	Different camera angles help to make a video more effective. Videos can be reshot and edited.	To plan a video using a storyboard. To make a recording taking into account light and angles. To reshot, edit and improve my video and include special effects, title screen and end credits	capture, zoom, storage, digital, tape, save, videographer, technique, pan, tilt, content, light, camera, angles, export, lighting, setting, computer, split, edit, timeline, transition, special effects, title screen, end credits, export, constructive, feedback.	
Programming A – Variables in games	A variable is something that is changeable.	I can define a 'variable' as something that is changeable, variables can hold numbers or letters. I can explain why a variable is used in a program; it is a place holder in memory for a single value. I can choose how to improve a game by using variables. I can design a project that builds on a given example: choosing artwork and creating the algorithm. To use my design to create a project, testing the code that I have written. To evaluate my project	variable, change, name, value, set, change, event, design, algorithm, code, task, artwork, program, debug, improve, evaluate, share.	
	A database consists of records and each record contains 'fields'.	To create a database, using fields which hold and record the data.	Database, data, information,	

Fact file databases	Records can be grouped. Fields can be searched by asking and answering questions.	To search a database using 'and' and 'or.' To apply filters and select an appropriate chart or graph to visually compare data. To apply my knowledge of a database to ask questions that will need more than one field to answer.	record, field, sort, order, group, search, criteria, graph, chart, axis, compare, filter, presentation.	

Upper Key stage 2 Cycle B				
Units taught	**Core Knowledge- what do we want the children to know and remember?**	**Core Skills- What do we want the children to be able to do?**	**Core Vocabulary- Words we want the children to be able to use**	**Key linked texts**
Computing systems and networks- Communication and collaboration	Computers use addresses to access websites. Data is transferred across the internet and networks in packets. Files can be shared over the internet to allow for collaborative work	To search the web for specific information and identify and compare results from different search engines. To explain that web crawlers are the digital bots that search the internet for index pages for web address. To explain web pages are ranked and how search engines make money. To identify that there are different ways to communicate over the internet	Search, search engine, Google, Bing, Yahoo!, Swisscows, DuckDuckGo, refine Index, crawler, bot, search engine, ranking, search engine, search engine optimisation, links, web crawlers, selection, ranking, communication, internet, public, private, oneway, two-way, one to one, one to many, SMS,	

			email, WhatsApp, blog, YouTube, Twitter, BBC Newsround	
Creating media- Web page creation	Websites are written in HTML. Copyright is used to protect original work. Pages are linked together by navigation paths.	I can explore a webpage and identify the different types of media that are used in its construction and its common features. I can plan a design for a webpage that suits my purpose. I can find suitable images and consider the ownership of these images. I can add content to my page, make edits and preview it on a different device. I can make multiple pages and link them using hyperlinks. I can evaluate my the users experience of website.	Website, web page, browser, media, Hypertext Markup Language (HTML), Website, web page, breadcrumb trail, navigation, hyperlink, subpage, evaluate, implications, external link, embed, copyright, fair use.	
Selection in physical computing	A conditional loop is either true or false. A microcontroller responds to an input. If a condition is met, an action can start.	To control a simple circuit connected to a computer; including a microcontroller (crumble), an infinity loop and an LED light. To connect more than one output device to a microcontroller, deciding which output device I control with a count-controlled loop. To experiment with a 'do until' loop. To use selection (an 'if ...then' statement) to direct the flow of a program. To make a physical drawing/model of a physical computing project. To create an algorithm to control my robot/simulation using repetition, sequencing, coordinates and text inputs. Using crumble or 2code a game linked to our topics.	Microcontroller, Crumble controller, components, switch, motor, LED, Sparkle, crocodile clips, connect, battery box, program, condition, true, false, input, output devices, selection, condition, action, task, design, selection, repetition, condition, action, microcontroller, Crumble controller, switch, crocodile clips, battery box Task, design, selection, repetition, algorithm, debug, evaluate	

Programming A – Variables in games	A variable is something that is changeable. A variable has a name and a value. An event can be used to set a variable.	I can define a 'variable' as something that is changeable, variables can hold numbers or letters. I can explain why a variable is used in a program; it is a place holder in memory for a single value. I can choose how to improve a game by using variables. I can design a project that builds on a given example: choosing artwork and creating the algorithm. To use my design to create a project, testing the code that I have written. To evaluate my project	variable, change, name, value, set, change, event, design, algorithm, code, task, artwork, program, debug, improve, evaluate, share.	
Introduction to spreadsheets	Each cell can be individually formatted. Formulas can be used to produce calculated data A formula can be duplicated and applied to multiple cells	I can create a formula in a spreadsheet for simple conversions e.g. cm to m and use formulas to calculate the perimeter of a rectangle. I can work collaboratively to solve a problem using spreadsheets. I can use simple formulae to solve calculations including =sum and other statistical functions. I can present data visually using graphs in2calculate and/or Excel. I can decide which keys are more suitable to perform a task. E.g. Numerical keys when typing long numbers.	Spreadsheet, data, data heading, data set, cells, columns and rows, object, spreadsheet application, format, common attribute, formula, calculation, cell reference, operation, range, duplicate, sigma Propose, question, organised, graph, chart, evaluate, results, comparison, questions, software, tools, data	