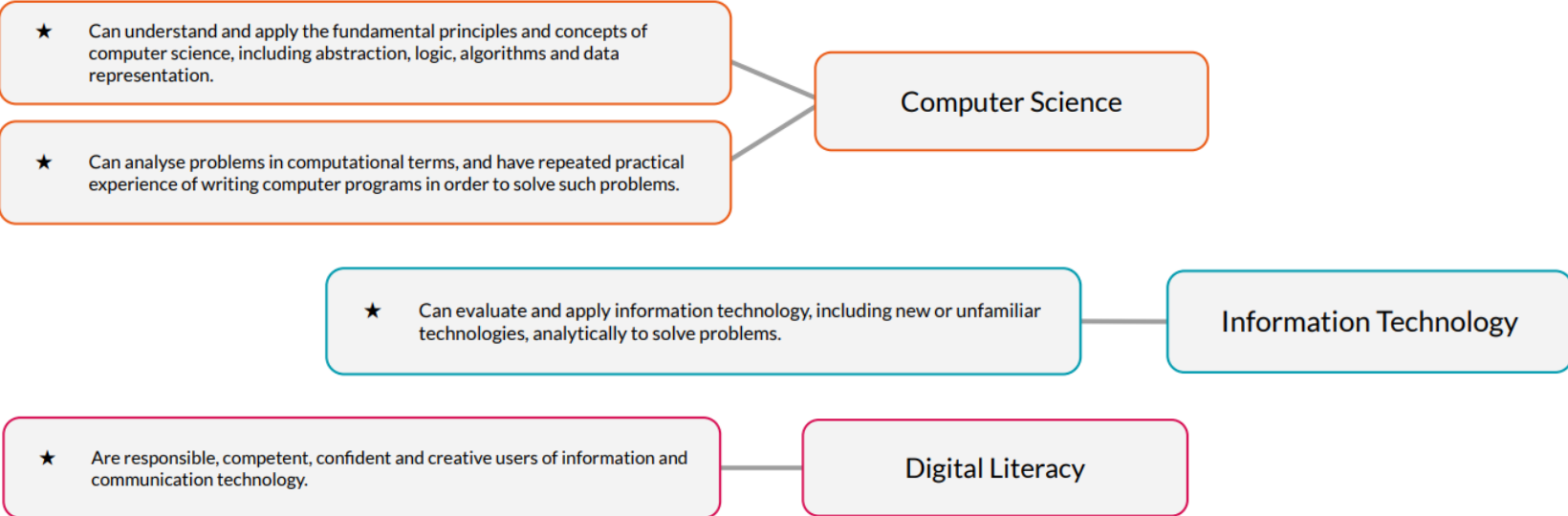


# Curriculum Subject Overview – Computing

NC Key Stage	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Phase	Year 1&2	Year 3&4	Year 5&6
St Peter's Classes	Kingfishers, Finches and Sparrows	Owls and Starlings	Eagles, Herons and Ravens

**National Curriculum Aims**

We have identified three aims that run through our curriculum which fulfils the statutory requirements outlined in the National Curriculum (2014):



- ★ Can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation.
- ★ Can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems.
- ★ Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems.
- ★ Are responsible, competent, confident and creative users of information and communication technology.

<b>National Curriculum Requirements</b>	Key Stage 1	Lower Key Stage 2
	<ol style="list-style-type: none"> <li>1. Create and debug simple programs</li> <li>2. Use logical reasoning to predict the behaviour of simple programs</li> <li>3. Use technology purposefully to create, organise, store, manipulate and retrieve digital content</li> <li>4. Recognise common uses of information technology beyond school</li> <li>5. Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts</li> <li>2. Use sequence, selection, and repetition in programs; work with variables and various forms of input and output</li> <li>3. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs</li> <li>4. Understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration</li> <li>5. Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content</li> <li>6. Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information</li> <li>7. Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.</li> </ol>

<p><b>Essential Characteristics of learning in Computing</b></p> <p>The learning characteristics developed through the subject overtime</p>	<ul style="list-style-type: none"> <li>• Competence in coding for a variety of practical and inventive purposes, including the application of ideas within other subjects.</li> <li>• The ability to connect with others safely and respectfully, understanding the need to act within the law and with moral and ethical integrity.</li> <li>• An understanding of connected nature of devices.</li> <li>• The ability to communicate ideas well by using applications and devices throughout the curriculum.</li> <li>• The ability to collect, organise and manipulate data effectively.</li> </ul>
<p><b>Threshold Concepts</b></p> <p>Threshold concepts are the 'big ideas' that shape children's thinking within each subject.</p>	<p><b>Computer Systems and Networks</b> – identifying hardware and using software, while exploring how computers communicate and connect to one another.</p> <p><b>Programming</b> – Understanding that a computer operates on algorithms, and learning how to write, adapt and debug code to instruct a computer to perform set tasks.</p> <p><b>Creating Media</b> – Learning how to use various devices – record, capture and edit content such as videos, music, pictures and photographs.</p> <p><b>Data Handling</b> – ensuring that information is collected, recorded, stored, presented and analysed in a manner that is useful and can help to solve problems.</p> <p><b>Online Safety</b> – Understanding the benefits and risks of being online – how to remain safe, keep personal information secure and recognising when to seek help in difficult situations. <i>(This concept is taught on an ongoing basis but also discretely through the PSHE curriculum).</i></p>

# Computing Intent- What and When

NC Key Stage	Key Stage 1	Lower Key Stage 2	Year 4 and 5	Upper Key Stage 2
Phase	Year 1&2	Year 3&4		Year 5&6
St Peter's Classes	Kingfishers, Finches and Sparrows	Owls and Starlings	Hérons	Eagles and Ravens
Threshold Concepts	<ul style="list-style-type: none"> <li>• Programming</li> <li>• Creating Media</li> <li>• Data Handling</li> <li>• Online Safety</li> </ul>			
<b>Cycle A Autumn</b>	Programming 2: Algorithms and debugging	Computer Systems and Networks: Emailing	Online Safety: Taught in Autumn term PSHE unit  Computer Systems and Networks: Journey Inside a Computer	Online Safety: Taught in Autumn term PSHE unit  Computer Systems and Networks: Search Engines
<b>Cycle A Spring</b>		Online Safety: Taught in Spring term PSHE unit		
<b>Cycle A Summer</b>	Programming: Bee-Bots  Data Handling: Introduction to data  Online Safety: Taught in Summer term PSHE unit	Data Handling: Comparison Cards Databases	Data Handling: Investigating Weather	Data Handling: Big Data 1
<b>Cycle B Autumn</b>		Programming: Programming Scratch	Programming: Programming Scratch  (Y5 – Further coding with Scratch)	Programming: Further Coding with Scratch
<b>Cycle B Spring</b>		Creating Media: Website Design	Creating Media: Stop Motion Animation	Creating Media: History of Computers
<b>Cycle B Summer</b>				

Note: Pupils revisit the five key threshold concepts throughout KS1 and KS2. Each time it is revisited, it is covered with greater complexity. Upon returning to each concept, prior knowledge is utilised so pupils can build on previous foundations, rather than starting again.

Online safety is taught throughout the year. The curriculum has been designed so that online safety is taught through our PSHE curriculum in some cases. **Highlighted in yellow.**

## Summary of Essential Knowledge & Threshold Concepts By Sequences of Learning

KEY STAGE ONE	Cycle A		Cycle B
Year 1&2	Autumn Term		
Unit Title:	Algorithms Unplugged	Algorithms and Debugging	What is a computer?
Threshold Concept	Programming		Computer Systems and Networks
Agreed Core Knowledge	<p>An algorithm is when instructions are put in exact order.</p> <p>Decomposition means breaking a problem into manageable chunks and that it is important in computing.</p> <p>Know that we call errors in an algorithm 'bugs' and fixing these is 'debugging.'</p>	<p>To understand what machine learning is and how it enables computers to make predictions.</p> <p>Loops in programming are when you set a certain instruction (or instructions) to be repeated multiple times.</p> <p>Abstraction is the removing of unnecessary detail to help solve a problem.</p>	<p>To know the difference between a desktop and a laptop computer.</p> <p>To know that people control technology.</p> <p>To know some input devices that give a computer an instruction about what to do.</p> <p>To know computers often work together.</p>
Key Skills	<p>Recognising that some devices are input devices and others are output devices.</p> <p>Learning that decomposition means breaking a problem down into smaller parts.</p> <p>Using decomposition to solve unplugged challenges.</p> <p>Developing the skills associated with sequencing in unplugged activities.</p> <p>Following a basic set of instructions.</p> <p>Assembling instructions into a simple algorithm.</p> <p>Learning to debug instructions when things go wrong.</p> <p>Learning to debug an algorithm in an unplugged scenario</p>	<p>Developing confidence with the keyboard and the basics of touch typing.</p> <p>Articulating what decomposition is.</p> <p>Decomposing a game to predict the algorithms used to create it.</p> <p>Learning that there are different levels of abstraction.</p> <p>Explaining what an algorithm is.</p> <p>Following an algorithm.</p> <p>Creating a clear and precise algorithm.</p> <p>Learning that programs execute by following precise instructions.</p> <p>Incorporating loops within algorithms.</p> <p>Using logical thinking to explore software, predicting.</p> <p>Using an algorithm to write a basic computer program.</p>	<p>Understanding what a computer is and that it's made up of different components.</p> <p>Recognising that buttons cause effects, and that technology follows instructions.</p> <p>Learning how we know that technology is doing what we want to do via its output.</p> <p>Using greater control when taking photos with cameras. Tablets or computers.</p> <p>Developing word processing skills, including altering text, copying and pasting and using keyboard shortcuts.</p> <p>Using word processing software to type and reformat text. Creating and labelling images</p>

		Developing word processing skills, including altering text, copying and pasting and using a keyboard.	
Agreed Essential Vocabulary	Algorithm, automatic, bug, chunks, clear, code, debug, decompose, decomposition, device, directions, input, instructions, manageable, motion, order, organise, output, precise, programming, problem, robot, sensor, sequence, solution, specific, steps, tasks	Abstraction, algorithm, artificial intelligence, bug, clear, correct, data, debug, decompose, error, key features, loop, predict, unnecessary	Battery, buttons, camera, computer, desktop, device, digital, digital recorder, electricity, function, input, invention, keyboard, laptop, monitor, mouse, output, paying till, scanner, screen, system, tablet, technology, video, wires
Resources (including software and hardware)	Dressing up clothes and accessories, dice, selection of reading books for sorting, 2D shapes for drawing around	Scratch website, lego or building blocks, mini figures	Sketchpad (free online software), sticky notes, clipboards, tablets or digital cameras, a device for filming
<b>Year 1&amp;2</b>	<b>Spring Term</b>		
Unit Title:			Digital Imagery
Threshold Concept:			Creating Media (Microsoft Office 365 Version)
Agreed Core Knowledge			To understand that holding a camera or device still and considering angles and light are important to take good pictures.  To know that you can edit, crop and filter photographs.  To know how to search safely for images online.
Key Skills			Learning how to explore and tinker with hardware to find out how it works. Learning where keys are located on the keyboard. Learning how to operate a camera to take photographs and videos. Developing the skills associated with sequencing in unplugged activities. Using a basic range of tools within graphic editing software. Taking and editing photographs. Developing control of the mouse through dragging, clicking and resizing of images to create different effects. Developing understanding of different software tools. Searching and downloading images from the internet safely.
Agreed Essential Vocabulary			Background, blurred, camera, clear, crop, delete, device, digital camera, download, drag and drop, edit, editing software, filter, image, import, internet, keyword, online, photograph, resize, save as, screen, search engine, sequence, software, storage space, visual effects
Resources (including software and hardware)			Microsoft photos, Microsoft PowerPoint, a selection of small people toys, animals and dinosaurs, picture books, small world play characters, digital cameras, tablets

Year 1&2	Summer Term	
Unit Title:	Bee-Bots	Introduction to Data
Threshold Concept:	Programming	Data Handling
Agreed Core Knowledge	<p>To understand the basic functions of a Bee-Bot.</p> <p>To know that you can use a camera/tablet to make simple videos.</p> <p>To know that algorithms move a Bee-Bot accurately to a chosen destination.</p>	<p>To know how charts and pictograms can be created using a computer.</p> <p>To understand that a branching database is a way of classifying a group of objects.</p> <p>To know that computers understand different types of 'input'.</p>
Key Skills	<p>Learning how to explore and tinker with hardware to find out how it works.</p> <p>Learning how to operate a camera to take photos and videos.</p> <p>Using decomposition to solve unplugged challenges.</p> <p>Using logical reasoning to predict the behaviour of simple programs.</p> <p>Developing the skills associated with sequencing in unplugged activities.</p> <p>Following a basic set of instructions.</p> <p>Assembling instructions into a simple algorithm.</p> <p>Programming a floor robot to follow a planned route.</p> <p>Learning to debug instructions when things go wrong.</p> <p>Using programming language to explain how a floor robot works.</p> <p>Learning to debug n algorithm in an unplugged scenario.</p> <p>Taking and editing photographs.</p>	<p>Learning how to explore and tinker with hardware to find out how it works.</p> <p>Recognising that some devices are input devices and others are output devices.</p> <p>Learning where keys are located on the keyboard.</p> <p>Developing control of the mouse through dragging, clicking and resizing of images to create different effects,</p> <p>Developing understanding of different software tools.</p> <p>Recognising devices that are connected to the internet.</p> <p>Understanding that technology can be used to represent data in different ways: pictograms, tables, pie charts, bar charts, block graphs etc.</p> <p>Using data representations to answer questions about data.</p> <p>Using software to explore and create pictograms and branching databases.</p>
Agreed Essential Vocabulary	<p>Algorithm, artificial intelligence, Bee-Bot, clear, code, debug, demonstration, filming, inputting, instructions, pause, precise, predict, program, tinker, video, video recording</p>	<p>Bar chart, block graph, branching database, categories, chart, click and drag, compare, count, data, data collection, data record, data representation, edit, input, keyboard, line graph, mouse, information, label, pictogram, pie chart, process, record, resizer, sort, tables. Values, tally</p>
Resources (including	<p>Building blocks, charged Bee-Bots or Blue-Bots, fully charged digital recording devices e.g. digital cameras or tablets,</p>	<p>J2E – JIT5, sketchpad (free online software), tablet or digital camera, clipboards</p>

software and hardware)	a large space e.g. school hall, coloured cones		
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<b>LOWER KEY STAGE TWO</b>	<b>Cycle A</b>	<b>Cycle B</b>
<b>Year 3&amp;4</b>	<b>Autumn Term</b>	
Unit Title:	Networks and the Internet	Programming Scratch
Threshold Concept	Computer Systems and Networks	Programming
Agreed Core Knowledge	<p>To know that a network connects computers and other devices together enabling them to link together quickly and easily.</p> <p>To know that a server is central to a network and responds to requests made.</p> <p>To know that a router connects us to the internet.</p> <p>To know how the internet uses networks to share files.</p> <p>To know what a packet is and why it is important for website data transfer.</p>	<p>To know that Scratch is a programming language and some of its basic functions.</p> <p>To understand how to use loops to improve programming.</p> <p>To understand how decomposition is used in programming.</p> <p>To understand that you can remix and adapt existing code.</p>
Key Skills	<p>Learning about the process of routers.</p> <p>Understanding the role of the key components of a network.</p> <p>Understanding that websites and videos are files that are shared from one computer to another.</p> <p>Learning about the role of packets.</p> <p>Understanding how networks work and their purpose.</p> <p>Identifying the key components within a network, including whether they are wired or wireless.</p> <p>Recognising links between networks and the internet.</p> <p>Learning how data is transferred.</p>	<p>Using decomposition to explore the code behind an animation.</p> <p>Using repetition in games.</p> <p>Using logical reasoning to explain how simple algorithms work.</p> <p>Explaining the purpose of an algorithm.</p> <p>Forming algorithms independently.</p> <p>Using logical thinking to explore more complex software: predicting, testing and explaining what it does.</p> <p>Incorporating loops to make code more efficient.</p> <p>Continuing existing code.</p> <p>Making reasonable suggestions for how to debug their own and others' code.</p>
Agreed Essential Vocabulary	Cables, component, connection, corrupted, data, desktop, device, DSL, fibre, file, internet, laptop, Network, network map, network switch, packets, radio waves, router, server, submarine cables, tablet, text map, The Cloud, Web Server, website, website trackers, WiFi, wired	Algorithm, animations, application, code, code block, coding application, debug, decompose, interface, game, loop, predict, program, remixing code, repetition code, review, scratch, sprite, tinker
Resources (including software and hardware)	Microsoft PowerPoint, Scratch (website), digital cameras or tablets to take photographs, string	Scratch (website)
<b>Year 3&amp;4</b>	<b>Spring Term</b>	

Unit Title:		Website Design
Threshold Concept:		Creating Media
Agreed Core Knowledge		To know that a website is a collection of pages that are all connected.  To know that websites usually have a homepage and subpages as well as clickable links to new pages, called hyperlinks.  To know that websites should be informative and interactive.
Key Skills		Building a web page and creating content for it. Designing and creating a webpage for a given purpose. Using software to work collaboratively with others.
Agreed Essential Vocabulary		Assessment, audience, checklist, collaboration, content, contributions, create, design, embed, evaluate, features, Google Sites, hobby, homepage, hyperlinks, images, insert, online, plan, progress, published, record. Review, style, subpage, tab, theme, web page
Resources (including software and hardware)		Microsoft Sway, Microsoft Word
<b>Year 3&amp;4</b>	<b>Summer Term</b>	
Unit Title:	Comparison Cards Databases	
Threshold Concept:	Data Handling	
Agreed Core Knowledge	To know that a database is a collection of data stored in a logical, structures and orderly manner.  To know that computer databases can be useful for sorting and filtering data.  To know that different visual representations of data can be made on a computer.	
Key Skills	Using logical thinking to explore more complex software; predicting, resting and explaining what it does. Understanding the vocabulary associated with databases: field, record. Data. Learning about the pros and cons of digital versus paper databases. Sorting and filtering databases to easily retrieve information. Creating and interpreting charts and graphs to understand data.	



Agreed Essential Vocabulary	Categorise, category, chart, data, database, excel, fields, filter, graph, information, interpret, PDF, questionnaire, record, representation, sort, spreadsheets	
Resources (including software and hardware)	Microsoft Forms, Microsoft Excel	

Year 4&5	Cycle A	Cycle B
	Autumn Term	
Unit Title:	Journey Inside a Computer	Programming Scratch
Threshold Concept	Computer Systems and Networks	Programming
Agreed Core Knowledge	<p>To know that inputs and outputs play on computers.</p> <p>To know what the following components inside a computer are: CPU, RAM, hard drive, and how they work together.</p> <p>To know what a tablet is and how it is different from a laptop/desktop computer.</p>	<p>To know that Scratch is a programming language and some of its basic functions.</p> <p>To understand how to use loops to improve programming.</p> <p>To understand how decomposition is used in programming.</p> <p>To understand that you can remix and adapt existing code.</p>
Key Skills	<p>Understanding what the different components of a computer do and how they work together.</p> <p>Drawing comparisons across different types of computers.</p> <p>Using decomposition to explain the parts of a laptop computer.</p> <p>Explaining the purpose of an algorithm.</p>	<p>Using decomposition to explore the code behind an animation.</p> <p>Using repetition in games.</p> <p>Using logical reasoning to explain how simple algorithms work.</p> <p>Explaining the purpose of an algorithm.</p> <p>Forming algorithms independently.</p> <p>Using logical thinking to explore more complex software: predicting, testing and explaining what it does.</p> <p>Incorporating loops to make code more efficient.</p> <p>Continuing existing code.</p> <p>Making reasonable suggestions for how to debug their own and others' code.</p>
Agreed Essential Vocabulary	Algorithm, assemble, CPU, data, decompose, desktop, disassemble, GPU (Graphics processing unit), hard drive, HDD (hard disk drive), infinite loop, input, keyboard, laptop, memory, microphone, monitor, mouse, output, photocopies, program, QR code, RAM (random access memory), ROM (read only memory), storage, tablet device, technology, touchscreen	Algorithm, animations, application, code, code block, coding application, debug, decompose, interface, game, loop, predict, program, remixing code, repetition code, review, scratch, sprite, tinker

Resources (including software and hardware)	Sketchpad, pieces of string, large sized paper, felt tip pens, tablet or device with QR scanner installed	Scratch (website)
<b>Year 4&amp;5</b>	<b>Spring Term</b>	
Unit Title:		Stop-Motion Animation
Threshold Concept:		Creating Media
Agreed Core Knowledge		To know that decomposition of an idea is important when creating stop-motion animations.  To understand that stop motion animation is an animation filmed one frame at a time using models, and with tiny changes between each photograph.  To know that editing is an important feature of making and improving a stop motion animation.
Key Skills		Decomposing animations into a series of images. Decomposing a story to be able to plan a program to tell a story. Using video editing software to animate.
Agreed Essential Vocabulary		Animation, animator, background, character, decomposition, design, digital device, edit, evaluate, flip book, fluid movement, frames, model, moving images, onion skinning, still images, stop motion, storyboard, thaumatrope, zoetrope
Resources (including software and hardware)		Microsoft Photos, plasticine to create objects/characters, plastic containers or cellophane to wrap children's creations with, cameras or tablets
<b>Year 4&amp;5</b>		<b>Summer Term</b>
Unit Title:	Investigating Weather	
Threshold Concept:	Data Handling	
Agreed Core Knowledge	To know that computers can use different forms of input to sense the world around them so that they can record and respond to data ('sensor data').  To know that the weather machine is an automated machine that respond to sensor data.	

	To understand that weather forecasters use specific language, expression and pre-prepared scripts to help create weather forecast films.	
Key Skills	Using tablets or digital cameras to film a weather forecast. Understanding that weather stations use sensors to gather and record data which predicts the weather. Using keywords to effectively search for information on the internet. Searching the internet for data. Designing a device which gathers and records sensor data. Recording data in a spreadsheet independently. Sorting data in a spreadsheet to compare using the 'sort by...' option. Understanding that data is used to forecast weather.	
Agreed Essential Vocabulary	Accurate, backdrop, climate zone, cold, collaboration, condensation, cylinder, degrees, evaporation, extreme weather, forecast, heat sensor, lightning, measurement, pinwheel, presenter, rain, satellite, script, sensitive, sensor data, solar panel, tablet/digital camera, temperature, thermometer, tornado, warm, weather	
Resources (including software and hardware)	Microsoft Excel, Sketchpad, iMovie or other film editing software (optional)	

Year 5&6	Cycle A	Cycle B
	Autumn Term	
Unit Title:	Search Engines	Further Coding with Scratch
Threshold Concept	Computer Systems and Networks	Programming
Agreed Core Knowledge	To know how search engines work.  To understand that anyone can create a website and therefore we should take steps to check the validity of websites.  To know that web crawlers are computer programs that crawl through the internet.  To understand what copyright is.	To understand that a variable is a value that can change (depending on conditions) and know that you can create them in Scratch.  To know what a conditional statement is in programming.  To understand that variables can help you to create a quiz on Scratch.
Key Skills	Developing searching skills to help find relevant information on the internet. Learning how to use search engines effectively to find information, focusing on keyword searches and evaluating search returns.	Using decomposition to solve a problem by finding out what code was used. Using decomposition to understand the purpose of a script of code. Creating algorithms for a specific purpose.

	Learn about different forms of communication that have developed with the use of technology. Recognise that information on the internet might not be true or correct and learning ways of checking validity.	Coding a simple game. Incorporating variables to make code more efficient. Remixing existing code.
Agreed Essential Vocabulary	Algorithm, appropriate, copyright, correct, credit, data leak, deceive, fair, fake, inappropriate, incorrect, index, information, keywords, network, privacy, rank, real, search engine, TASK, web crawler, website	Broadcast block, code blocks, conditional, coordinates, decomposition, features, game, information, negative numbers, orientation, parameters, position, program, project, script, sprite, stage, tinker, variables
Resources (including software and hardware)	Sketchpad (free online tool)	Scratch website
<b>Year 5&amp;6</b>	<b>Spring Term</b>	
Unit Title:		History of Computers
Threshold Concept:		Creating Media
Agreed Core Knowledge		To know that radio plays are plays where the audience can only hear the action so sound effects are important.  To know that sound clips can be recorded using sound recording software.  To know that sound clips can be edited and trimmed.
Key Skills		Learning about the history of computers and how they have evolved over time. Using the understanding of historic computers to design a computer for the future. Using search and word processing skills to create a presentation. Planning, recording and editing a radio play. Creating and editing sound recordings for a specific purpose.
Agreed Essential Vocabulary		Background noise, byte, computer, devices, file, FX, gigabyte, graphics, hard drive, hardware, kilobytes, megabytes, memory storage, mouse, overlay, play, processor, radio play, RAM, raspberry Pi, record, reverb, ROM, script, smartphone, sound, sound effects
Resources (including software and hardware)		Soundtrap or Audacity,
<b>Year 5&amp;6</b>		<b>Summer Term</b>
Unit Title:	Big Data 1	

Threshold Concept:	Data Handling	
Agreed Core Knowledge	<p>To know that data contained within barcodes and QR codes can be used by computers.</p> <p>To know that infrared waves are a way of transmitting data.</p> <p>To know that Radio Frequency Identification (RFID) is a more private way of transmitting data.</p> <p>To know that data is often encrypted so that even if it stolen it is not useful to the thief.</p>	
Key Skills	<p>Understanding and identifying barcodes, QR codes and RFID.</p> <p>Identifying devices and applications that can scan or read barcodes, QR codes and RFID.</p> <p>Understanding how barcodes, QR codes and RFID work.</p> <p>Gathering and analysing data in real time.</p> <p>Creating formulas and sorting data within spreadsheets.</p> <p>Learning how 'big data' can be used to solve a problem or improve efficiency.</p>	
Agreed Essential Vocabulary	<p>Algorithms, barcode, binary, Boolean, brand, chips, Commuter, contactless, data, encrypted, infrared, magicband, privacy, proximity, QR code, QR scanner, radio waves, RFID, signal, systems/data analyst, transmission, wireless</p>	
Resources (including software and hardware)	<p>Microsoft Excel, video recording devices, range of working remote controls (e.g. for interactive whiteboard, television, stereo).</p>	

**Progression of Skills within Each Threshold Concept**