Computing Knowledge and Skills Progression

Subject name: Computing		Subject content EYFS		
Unit	**Sticky Knowledge**		**Topic**	**Key Skills**
Computing systems and networks 1	• To be able to understand what a computer keyboard is and recognise some letters and numbers. • To know that a mouse can be used to click, drag and create simple drawings. • To know that to use a computer you need to log in to it and then log out at the end of your session.		Computer Science	Learning how to operate a camera to take photographs of meaningful creations or moments.
				Learning how to explore and tinker with hardware to develop familiarity and introduce relevant vocabulary.
				Recognising and identifying familiar letters and numbers on a keyboard.
Programming 1	• To know that being able to follow and give simple instructions is important in computing. • To understand that it is important for instructions to be in the right order • To understand why a set of instructions may have gone wrong.			Developing basic mouse skills such as moving and clicking.
				Using logical reasoning to understand simple instructions and predict the outcome.
				Following instructions as part of practical activities and games.
Computing systems and networks 2	• To know that different types of technology can be found at home and in school. • To know that you can take simple photographs with a camera or iPad. • To know that you must hold the camera still and ensure the subject is in the shot to take a photo.			Learning to give simple instructions.
				Experimenting with programming a Bee-bot/ Blue-bot and learning how to give simple commands.
				Learning to debug instructions, with the help of an adult, when things go wrong.
Programming 2	• To know that you can program a Bee-Bot with some simple commands. • To understand that debugging means how to fix some simple programming errors. • To understand that an algorithm is a set of clear and precise instructions.		IT	Using a simple online paint tool to create digital art.
			Digital Literacy	Recognising that a range of technology is used in places such as homes and schools.
				Learning to log in and log out.
Online safety and health and wellbeing	• Share ideas about activities that are safe to do on electronic devices. • What to do and who to talk to if they feel unsafe online			Learning how to be safe when using a computer (screen time)

Computing Knowledge and Skills Progression

Subject name: Computing				Subject content Key Stage 1		Year 1
National Curriculum	**Unit**	**Sticky Knowledge**		**Topic**	**Key Skills**	
• understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions • create and debug simple programs • use logical reasoning to predict the behaviour of simple programs • use technology purposefully to create, organise, store, manipulate and retrieve digital content • recognise common uses of information technology beyond school • 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	Computing systems and networks	• To know that "log in and log out" means to begin and end a connection with a computer. • To know that a computer and mouse can be used to click, drag, fill and select and also add backgrounds, text, layers, shapes and clip art. • To know that passwords are important for security		**Computer Science**	Know how to explore and tinker with hardware to find out how it works	
					Understanding that computers and devices around us use inputs and outputs, identifying some of these	
					Learning where keys are located on the keyboard	
					Learning how to operate a camera	
	Programming 1	• To understand that an algorithm is when instructions are put in an exact order. • To know that input devices get information into a computer and that output devices get information out of a computer • To understand that decomposition means breaking a problem into manageable chunks and that it is important in computing • To know that we call errors in an algorithm 'bugs' and fixing these 'debugging'.			Understanding what the internet is	
					Learning that decomposition means breaking a problem down into smaller parts	
					Using decomposition to solve unplugged challenges	
					Using logical reasoning to predict the behaviour of simple programs	
					Learning that an algorithm is a set of step by step instructions used to carry out a task, in a specific order Follow a basic set of instructions	
	Programming 2	• To understand the basic functions of a Bee-Bot. • To know that you can use a camera/tablet to make simple videos. • To know that algorithms move a Bee-Bot accurately to a chosen destination.			Developing the skills associated with sequencing in unplugged activities	
					Assembling instructions into a simple algorithm	
					Programming a Bee-bot/Virtual Bee-bot to follow a planned route	
					Learning to debug instructions when things go wrong	
	Creating media	• To understand that holding the camera still and considering angles and light are important to take good pictures.			Developing a how to video to explain how the Bee-bot works	

on the internet or other online technologies		• To know that you can edit, crop and filter photographs. • To know how to search safely for images online.		Learning to debug an algorithm in an unplugged scenario
			Information Technology	Using a basic range of tools within graphic editing software.
				Taking and editing photographs.
	Data handling	• To know how that charts and pictograms can be created using a computer. • To understand that a branching database is a way of classifying a group of objects. • To know that computers understand different types of 'input'.		Developing control of the mouse through dragging, clicking and resizing of images to create different effects.
				Developing understanding of different software tools.
				Recognising devices that are connected to the internet.
				Understanding that we are connected to others when using the internet.
				Searching and downloading images from the internet safely.
	E-Safety	• To know that the internet is many devices connected to one another. • To know what to do if you feel unsafe or worried online - tell a trusted adult. • To know that people you do not know on the internet (online) are strangers and are not always who they say they are. • To know that to stay safe online it is important to keep personal information safe • To know that 'sharing' online means giving something specific to someone else via the internet and 'posting' online means placing information on the internet.		Understanding that technology can be used to represent data in different ways: pictograms, tables, pie charts, bar charts, block graphs etc.
				Using data representations to answer questions about data.
				Using software to explore and create pictograms and branching databases.
				Understanding some of the ways we can use the internet.
				Recognising common uses of information technology, including beyond school
			Digital Literacy	Logging in and out and saving work on their own account.
				When using the internet to search for images, learning what to do if they come across something online that worries them or makes them feel uncomfortable.
				Understanding how to interact safely with others online.
				Recognising how actions on the internet can affect others.
				To be able to recognise what a digital footprint is and how to be careful about what we "post"

Computing Knowledge and Skills Progression

Subject name Computing			Subject content Key Stage 1		Year 2
National Curriculum	**Unit**	**Sticky Knowledge**	**Topic**	**Key Skills**	
• understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions • create and debug simple programs • use logical reasoning to predict the behaviour of simple programs • use technology purposefully to create, organise, store, manipulate and retrieve digital content • recognise common uses of information technology beyond school • use technology safely and respectfully,	Computing systems and networks 1	• To know the difference between a desktop and laptop computer. • To know that people control technology • To know some input devices that give a computer an instruction about what to do (output). • To know that computers often work together.	Computer Science	Understanding what a computer is and that it's made up of different components.	
				Recognising that buttons cause effects and that technology follows instructions.	
				Learning how we know that technology is doing what we want it to do via its output.	
				Using greater control when taking photos with cameras, tablets or computers.	
	Programming 1	• To understand what machine learning is and how it enables computers to make predictions. • To know that loops in programming are where you set a certain instruction (or instructions) to be repeated multiple times • To know that abstraction is the removing of unnecessary detail to help solve a problem.		Developing confidence with the keyboard and the basics of touch typing.	
				Articulating what decomposition is.	
				Decomposing a game to predict the algorithms used to create it.	
				Learning that there are different levels of abstraction.	
	Computing systems and networks 2	• To know that touch typing is the fastest way to type • To know that I can make text a different style, size and colour • To know that "copy and paste" is a quick way of duplicating text.		Creating a clear and precise algorithm.	
				Explaining what an algorithm is.	
				Learning that programs execute by following precise instructions.	
				Incorporating loops within algorithms.	
	Programming 2	• To know that coding is writing in a special language so that the computer understands what to do. • To understand that the character in ScratchJr is controlled by the programming blocks.		Using logical thinking to explore software, predicting, testing and explaining what it does.	
				Using an algorithm to write a basic computer program.	
				Using loop blocks when programming to repeat an instruction more than once.	

Computing Knowledge and Skills Progression

National Curriculum	Unit	Sticky Knowledge	Topic	Key Skills
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	Data handling	• To know that you can write a program to create a musical instrument or tell a joke. • To understand that you can enter simple data into a spreadsheet. • To understand what steps you need to take to create an algorithm. • To know what data to use to answer certain questions. • To know that computers can be used to monitor supplies.	Information Technology	Developing word processing skills, including altering text, copying and pasting and using keyboard shortcuts. Using word processing software to type and reformat text. Using software (and unplugged means) to create story animations. Creating and labelling images. Searching for appropriate images to use in a document. Understanding what online information is. Collecting and inputting data into a spreadsheet. Interpreting data from a spreadsheet. Learning how computers are used in the wider world.
	E-Safety	• To understand the difference between online and offline. • To understand what information I should not post online. • To know what the techniques are for creating a strong password. • To know that you should ask permission from others before sharing about them online and that they have the right to say 'no.' • To understand that not everything I see or read online is true.	Digital Literacy	Identifying whether information is safe or unsafe to be shared online. Learning how to create a strong password. Learning to be respectful of others when sharing online and ask for their permission before sharing content. Learning strategies for checking if something they read online is true. Understanding how to stay safe when talking to people online and what to do if they see or hear something online that makes them feel upset or uncomfortable.

Subject name Computing				Subject content Key Stage 2	**Year 3**
National Curriculum	**Unit**	**Sticky Knowledge**	**Topic**	**Key Skills**	

Computing Knowledge and Skills Progression

				Computer Science
• design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts • use sequence, selection, and repetition in programs; work with variables and various forms of input and output • use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs • 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 • use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content • 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	Computing systems and networks 1	• To understand what a network is and how a school network might be organised. • To know that a server is central to a network and responds to requests made • To know that a router connects us to the internet • To know how the internet uses networks to share files • To know what a packet is and why it is important for website data transfer		Understanding what the different components of a computer do and how they work together.
				Learning about the purpose of routers.
				Drawing comparisons across different types of computers.
				Understanding the role of the key components of a network.
				Understanding that websites & videos are files that are shared from one computer to another.
				Learning about the role of packets.
	Programming	• To know that Scratch is a programming language and some of its basic functions. • To understand how to use loops to improve programming. • To understand how decomposition is used in programming. • To understand that you can remix and adapt existing code.		Understanding how networks work and their purpose.
				Identifying the key components within a network, including whether they are wired or wireless.
				Recognising links between networks and the internet.
				Learning how data is transferred.
				Using decomposition to explain the parts of a laptop computer.
				Using decomposition to explore the code behind an animation.
				Using repetition in programs.
	Computing systems and networks 3	• To know the roles that inputs and outputs play on computers. • To know what some of the different components inside a computer are e.g. CPU, RAM, hard drive, and how they work together • To know what a tablet is and how it is different from a laptop/desktop computer.		Using logical reasoning to explain how simple algorithms work
				Explaining the purpose of an algorithm.
				Forming algorithms independently.
				Using logical thinking to explore more complex software; predicting, testing and explaining what it does
				Incorporating loops to make code more efficient.
				Continuing existing code.
	Creating medi	• To know that different types of camera shots can make my photos or videos look more effective.		Making reasonable suggestions for how to debug their own and others' code.

and presenting data and information • use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact		• To know that I can edit photos and videos using film editing software. • To understand that I can add transitions and text to my video.	**Information Technology**	Taking photographs and recording video to tell a story.
				Using software to edit and enhance their video adding music, sounds and text on screen with transitions.
	Data handling	• To know that a database is a collection of data stored in a logical, structured 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.		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.
	E-Safety	• To know that not everything on the internet is true: people share facts, beliefs and opinions online. • To understand that the internet can affect your moods and feelings. • To know that privacy settings limit who can access your important personal information such as your name, age, gender etc. • To know what social media is and that age restrictions apply		Recognising how social media platforms are used to interact.
			Digital Literacy	Recognising that different information is shared online including facts, beliefs and opinions
				Learning how to identify reliable information when searching online.
				Learning how to stay safe on social media.
				Considering the impact technology can have on mood.

Computing Knowledge and Skills Progression

Subject name Computing				Subject content Key Stage 2	Year 4
National Curriculum	**Unit**	**Sticky Knowledge**		**Topic**	**Key Skills**
• design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts • use sequence, selection, and repetition in programs; work with variables and various forms of input and output • use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs • 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 • use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content	Computing systems and networks	• To understand that software can be used collaboratively online to work as a team. • To know what type of comments and suggestions on a collaborative document can be helpful. • To know that you can use images, text, transitions and animation in presentation slides		Computer Science	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.
					Understanding that computer networks provide multiple services, such as the World Wide Web, and opportunities for communication and collaboration
					Using decomposition to solve a problem by finding out what code was used.
					Using decomposition to understand the purpose of a script of code.
					identifying patterns through unplugged activities.
	Programming 1	• 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.			Using past experiences to help solve new problems.
					Using abstraction to identify the important parts when completing both plugged and unplugged activities.
					Creating algorithms for a specific purpose.
					Coding a simple game.
	Creating media	• 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.			Using abstraction and pattern recognition to modify code.
					Incorporating variables to make code more efficient.
					Remixing existing code.
				Information Technology	Building a web page and creating content for it.
					Designing and creating a webpage for a given purpose.
	Programming 2	• To know that combining computational thinking skills can help you to solve a problem. • To understand that pattern recognition means identifying patterns to help them work out how the code works.			Use online software for documents, presentations, forms and spreadsheets.
					Using software to work collaboratively with others.
					Understanding why some results come before others when searching.

Computing Knowledge and Skills Progression

• 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 • use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact	Data handling	• To understand that algorithms can be used for a number of purposes e.g. animation, games design etc. • 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 a 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.		Using keywords to effectively search for information on the internet.
				Understanding that information found by searching the internet is not all grounded in fact.
				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.
				Understanding that data is used to forecast weather.
	E-Safety	• To understand some of the methods used to encourage people to buy things online • To understand that technology can be designed to act like or impersonate living things. • To understand that technology can be a distraction and identify when someone might need to limit the amount of time spent using technology. • To understand what behaviours are appropriate in order to stay safe and be respectful online	Digital Literacy	Learning to make judgements about the accuracy of online searches.
				Identifying forms of advertising online.
				Recognising what appropriate behaviour is when collaborating with others online.
				Reflecting on the positives and negatives of time online.
				Recognising that information on the Internet might not be true or correct and that some sources are more trustworthy than others.
				Identifying respectful and disrespectful online behaviour.

Computing Knowledge and Skills Progression

Subject name Computing				Subject content KS2		Year 5
National Curriculum	**Unit**	**Sticky Knowledge**		**To pic**	**Key Skills**	
• design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts • use sequence, selection, and repetition in programs; work with variables and various forms of input and output • use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs • 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 • use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content	Computing systems and networks	• 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		Computer Science	Learning that external devices can be programmed by a separate computer.	
					Learning the difference between ROM and RAM.	
					Recognising how the size of RAM affects the processing of data.	
					Understanding the fetch, decode, execute cycle.	
					Learning the vocabulary associated with data: data and transmit.	
	Programming 1	• To know that a soundtrack is music for a film/video and that one way of composing these is on programming software. • To understand that using loops can make the process of writing music simpler and more effective. • To know how to adapt their music while performing.			Learning how the data for digital images can be compressed.	
					Recognising that computers transfer data in binary and understanding simple binary addition.	
					Relating binary signals (Boolean) to the simple character-based language, ASCII.	
	Data handling	• To know that Mars Rover is a motor vehicle that collects data from space by taking photos and examining samples of rock. • To know what numbers using binary code look like and be able to identify how messages can be sent in this format • To understand that RAM is Random Access Memory and acts as the computer's working memory. • To know what simple operations can be used to calculate bit patterns.			Learning that messages can be sent by binary code, reading binary up to eight characters and carrying out binary calculations.	
					Understanding how bit patterns represent images as pixels.	
					Decomposing animations into a series of images.	
					Decomposing a story to be able to plan a program to tell a story.	
					Predicting how software will work based on previous experience.	
	Creating media	• To know that decomposition of an idea is important when creating stop-motion animations.			Writing more complex algorithms for a purpose.	
					Iterating and developing their programming as they work.	
					Confidently using loops in their programming	

Computing Knowledge and Skills Progression

• 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 • use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact	**Skills showcase**	• 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. • To understand that bit patterns represent images as pixels. • To understand that the data for digital images can be compressed. • To know the difference between ROM and RAM. • To understand various techniques that will improve the design of a 3D object (using CAD software).	Using a more systematic approach to debugging code, justifying what is wrong and how it can be corrected.	
			Writing code to create a desired effect.	
			Using a range of programming commands.	
			Using repetition within a program	
			Amending code within a live scenario.	
	E-Safety	• To know different ways we can communicate online. • To understand how online information can be used to form judgements. • To understand some ways to deal with online bullying • To know that apps require permission to access private information and that you can alter the permissions. • To know where I can go for support if I am being bullied online or feel that my health is being affected by time online.	**Information Technology**	Using logical thinking to explore software more independently, making predictions based on their previous experience.
				Using a software programme (Sonic Pi/Scratch) to create music.
				Using video editing software to animate.
				Identify ways to improve and edit programs, videos, images etc.
				Independently learning how to use 3D design software package TinkerCAD.
				Developing searching skills to help find relevant information on the internet.
				Developing searching skills to help find relevant information on the internet.
				Understanding how data is collected in remote or dangerous places.
				Understanding how data is collected in remote or dangerous places.
				Learn about different forms of communication that have developed with the use of technology
			Digital Literacy	Identifying possible dangers online and learning how to stay safe.
				Evaluating the pros and cons of online communication
				Recognising that information on the Internet might not be true or correct and learning ways of checking validity
				Learning what to do if they experience bullying online.
				Learning to use an online community safely.

Computing Knowledge and Skills Progression

Subject name Computing			Subject content Key Stage 2		Year 6
National Curriculum	**Unit**	**Sticky Knowledge**	**Topic**	**Key Skills**	
• design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts • use sequence, selection, and repetition in programs; work with variables and various forms of input and output • use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs • 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 • use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content	Computing systems and networks	• To understand the importance of having a secure password and what "brute force hacking" is. • To know that the first computers were created at Bletchley Park to crack the Enigma code to help the war effort in World War 2 • To know about some of the historical figures that contributed to technological advances in computing. • To understand what techniques are required to create a presentation using appropriate software	**Computer Science**	Learning about the history of computers and how they have evolved over time	
				Using the understanding of historic computers to design a computer of the future.	
				Identifying devices and applications that can scan or read barcodes, QR codes and RFID.	
				Understanding and identifying barcodes, QR codes and RFID.	
				Decomposing a program into an algorithm.	
				Using past experiences to help solve new problems.	
	Programming	• To know that there are text-based programming languages such as Logo and Python. • To know that nested loops are loops inside of loops. • To understand the use of random numbers and remix Python code.		Writing increasingly complex algorithms for a purpose.	
				Debugging quickly and effectively to make a program more efficient.	
				Remixing existing code to explore a problem.	
				Using and adapting nested loops.	
				Programming using the language Python.	
	Data handling 1	• To know that data contained within barcodes and QR codes can be used by computers. • To know that infrared waves are a way of transmitting data. • To know that Radio Frequency Identification (RFID) is a more private way of transmitting data. • To know that data is often encrypted so that even if it is stolen it is not useful to the thief.		Changing a program to personalise it.	
				Evaluating code to understand its purpose.	
				Predicting code and adapting it to a chosen purpose.	
	Creating media	• 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.	**Information Technology**	Using logical thinking to explore software independently, iterating ideas and testing continuously	
				Using search and word processing skills to create a presentation.	
				Planning, recording and editing a radio play.	

Computing Knowledge and Skills Progression

• 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 • use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact	**Skills showcase**	• To know that sound clips can be edited and trimmed. • To know what designing an electronic product involves. • To know which programming software/ language is best to achieve a purpose. • To know the building blocks of computational thinking e.g. sequence, selection, repetition, variables and inputs and outputs.		Planning, recording and editing a radio play.
				Creating and editing videos, adding multiple elements: music, voiceover, sound, text and transitions.
				Using design software TinkerCAD to design a product.
				Creating a website with embedded links and multiple pages.
				Understanding how search engines work.
				Understanding how barcodes, QR codes and RFID work.
				Gathering and analysing data in real time.
				Creating formulas and sorting data within spreadsheets.
				Learning how 'big data' can be used to solve a problem or improve efficiency.
	E-Safety	• To know that a digital footprint means the information that exists on the internet as a result of a person's online activity • To know what steps are required to capture bullying content as evidence. • To understand that it is important to manage personal passwords effectively. • To understand what it means to have a positive online reputation. • To know some common online scams.	**Digital Literacy**	Learning about the positive and negative impacts of sharing online
				Learning strategies to create a positive online reputation.
				Understanding the importance of secure passwords and how to create them.
				Learning strategies to capture evidence of online bullying in order to seek help.
				Using search engines safely and effectively.
				Recognising that updated software can help to prevent data corruption and hacking