Computing Progression Map

Computing Progression of Skills Map

Computer Science

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Hardware	*By the end of EYFS, children will be taught to:* • operate a camera to take photographs of meaningful creations or moments. • explore and tinker with hardware to develop familiarity and introduce relevant vocabulary. • Recognise and identify familiar letters and numbers on a keyboard. • Develop basic mouse skills such as moving and clicking.	*By the end of Year 2, children will be taught to:* • operate a camera or tablet to take photos and videos. • explore and tinker with hardware to find out how it works. • recognise that some devices are input devices and others are output devices. • where keys are located on the keyboard. • understanding what a computer is and that it's made up of different components. • know that technology is doing what we want it to do via its output. • develop confidence with the keyboard and the basics of touch typing. • recognise that buttons cause effects and that technology follows instructions. • use greater control when taking photos with cameras, tablets or computers.	*By the end of Year 4, children will be taught to:* • understand what the different components of a computer do and how they work together. • draw comparisons across different types of computers. • learn about the purpose of routers. • use tablets or digital cameras to film a weather forecast. • understand that weather stations use sensors to gather and record data which predicts the weather.	*By the end of Year 6, children will be taught to:* • learn that external devices can be programmed by a separate computer. • learn the difference between ROM and RAM. • recognise how the size of RAM affects the processing of data. • understand the fetch, decode, execute cycle. • learn about the history of computers and how they have evolved over time. • use the understanding of historic computers to design a computer of the future • understand and identifying barcodes, QR codes and RFID. • identify devices and applications that can scan or read barcodes, QR codes and RFID. • understand how corruption can happen within data during transfer

Computing Progression of Skills Map

Computer Science

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Networks and data representation	*By the end of EYFS, children will be taught to:* N/A	*By the end of Year 2, children will be taught to:* N/A	*By the end of Year 4, children will be taught to:* • understand that computer networks provide multiple services, such as the World Wide Web, and opportunities for communication and collaboration. • understand the role of the key components of a network. • identify the key components within a network, including whether they are wired or wireless. • understand that websites and videos are files that are shared from one computer to another. • learn about the role of packets. • understand how networks work and their purpose. • recognise links between networks and the internet. • learn how data is transferred.	*By the end of Year 6, children will be taught to:* • learn the vocabulary associated with data: data and transmit. • learn how the data for digital images can be compressed. • recognise that computers transfer data in binary and understanding simple binary addition. • relate binary signals (Boolean) to the simple character-based language, ASCII. • learn that messages can be sent by binary code, reading binary up to eight characters and carrying out binary calculations. • understand how bit patterns represent images as pixels. • Understanding that computer networks provide multiple services

Computing Progression of Skills Map

Computer Science

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Computational thinking	*By the end of EYFS, children will be taught to:* • use logical reasoning to understand simple instructions and predict the outcome.	*By the end of Year 2, children will be taught to:* • learn that decomposition means breaking a problem down into smaller parts and articulating this. • use decomposition to solve unplugged challenges. • use logical reasoning to predict the behaviour of simple programs. • develop the skills associated with sequencing in unplugged activities. • follow a basic set of instructions. • assemble instructions into a simple algorithm. • explain what an algorithm is. • follow an algorithm. • create a clear and precise algorithm. • learn that programs execute by following precise instructions. • incorporate loops within algorithms. • decompose a game to predict the algorithms used to create it. • learn that there are different levels of abstraction.	*By the end of Year 4, children will be taught to:* • use decomposition to explore the code behind an animation. • use repetition in programs. • use logical reasoning to explain how simple algorithms work. • explain the purpose of an algorithm. • form algorithms independently. • use decomposition to solve a problem by finding out what code was used. • use decomposition to understand the purpose of a script of code. • identify patterns through unplugged activities. • use past experiences to help solve new problems. • use abstraction to identify the important parts during both plugged and unplugged activities.	*By the end of Year 6, children will be taught to:* • decompose a program without support. • predict how software will work based on previous experience. • use past experiences to help solve new problems. • write increasingly complex algorithms for a purpose. • decompose a program into an algorithm. • decompose animations into a series of images. • decompose a story to be able to plan a program to tell a story.

Computing Progression of Skills Map

Computer Science

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Programming	*By the end of EYFS, children will be taught to:* • follow instructions as part of practical activities and games. • learn to give simple instructions. • experiment with programming a Bee-bot/Blue- bot and learn how to give simple commands. • learn to debug instructions, with the help of an adult, when things go wrong.	*By the end of Year 2, children will be taught to:* • learn to debug instructions when things go wrong. • learn to debug an algorithm in an unplugged scenario. • use logical thinking to explore software, predicting, testing and explaining what it does. • use an algorithm to write a basic computer program. • program a floor robot to follow a planned route. • use programming language to explain how a floor robot works. • use loop blocks when programming to repeat an instruction more than once.	*By the end of Year 4, children will be taught to:* • use logical thinking to explore more complex software; predicting, testing and explaining what it does. • incorporate loops to make code more efficient. • continue existing code. • make reasonable suggestions for how to debug their own and others' code. • create algorithms for a specific purpose. • code a simple game. • use abstraction and pattern recognition to modify code. • incorporate variables to make code more efficient. • remix existing code.	*By the end of Year 6, children will be taught to:* • program an animation. • iterate and develop their programming as they work. • confidently use loops in programming. • use a more systematic approach to debugging code, justifying what is wrong and how it can be corrected. • write code to create a desired effect. • use a range of programming commands. • use repetition within a program. • predict code and adapt it to a chosen purpose. • change a program to personalise it. • evaluate code to understand its purpose. • debug quickly and effectively to make a program more efficient. • remix existing code to explore a problem. • use and adapt nested loops. • program using the language Python • Amend code within a live scenario.

Computing Progression of Skills Map

Information Technology

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Using software	*By the end of EYFS, children will be taught to:* • use a simple online paint tool to create digital art.	*By the end of Year 2, children will be taught to:* • use a basic range of tools within graphic editing software. • take and edit photographs. • develop control of the mouse through dragging, clicking and resizing of images to create different effects. • develop understanding of different software tools. • develop word processing skills, including altering text, copying and pasting and using keyboard shortcuts. • use word processing software to type and reformat text. • create and label images • use software (and unplugged means) to create story animations.	*By the end of Year 4, children will be taught to:* • taking photographs and recording video to tell a story. • use software to edit and enhance their video adding music, sounds and text on screen with transitions. • design and create a webpage for a given purpose. • build a web page and create content for it. • use software to work collaboratively with others. • use online software for documents, presentations, forms and spreadsheets.	*By the end of Year 6, children will be taught to:* • Use logical thinking to explore software more independently, making predictions based on their previous experience, iterating ideas and testing continuously. • identify ways to improve and edit programs, videos, images etc. • use search and word processing skills to create a presentation. • independently learn how to use 3D design software package TinkerCAD. • create and edit sound recordings for a specific purpose. • create and edit videos, adding multiple elements: music, voiceover, sound, text and transitions. • use design software TinkerCAD to design a product. • create a website with embedded links and multiple pages. • Use software programme Sonic Pi/Scratch to create music. • use video editing software to animate.

Computing Progression of Skills Map

Information Technology

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Using email and internet searches	*By the end of EYFS, children will be taught to:* N/A	*By the end of Year 2, children will be taught to:* • recognise devices that are connected to the internet. • understand that we are connected to others when using the internet. • search for appropriate images to use in a document. • understanding what online information is. • search and download images from the internet safely	*By the end of Year 4, children will be taught to:* • learn to log in and out of an email account. • write an email including a subject, 'to' and 'from.' • send an email with an attachment. • reply to an email. • understand why some results come before others when searching. • use keywords to effectively search for information on the internet. • understand that information found by searching the internet is not all grounded in fact. • search the internet for data.	*By the end of Year 6, children will be taught to:* • understand how search engines work. • develop searching skills to help find relevant information on the internet. • learn how to use search engines effectively to find information, focussing on keyword searches and evaluating search returns.

Computing Progression of Skills Map

Information Technology

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Using data	*By the end of EYFS, children will be taught to:* • represent data through sorting and categorising objects in unplugged scenarios. • represent data through physical pictograms. • explor branch databases through physical games.	*By the end of Year 2, children will be taught to:* • understand that technology can be used to represent data in different ways: pictograms, tables, pie charts, bar charts, block graphs etc • collect and inputting data into a spreadsheet. • interpret data from a spreadsheet. • use representations to answer questions about data. • use software to explore and create pictograms and branching databases.	*By the end of Year 4, children will be taught to:* • understand the vocabulary associated with databases: field, record, data. • learn about the pros and cons of digital versus paper databases. • sort and filter databases to easily retrieve information. • create and interpret charts and graphs to understand data. • understand that data is used to forecast weather. • record data in a spreadsheet independently. • sort data in a spreadsheet to compare using the 'sort by...' option. • design a device which gathers and records sensor data.	*By the end of Year 6, children will be taught to:* • understand how data is collected in remote or dangerous places. • understand how data might be used to tell us about a location. • understand how barcodes, QR codes and RFID work. • gather and analyse data in real time. • create formulas and sorting data within spreadsheets.

Computing Progression of Skills Map

Information Technology

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Wider use of technology	*By the end of EYFS, children will be taught to:* N/A	*By the end of Year 2, children will be taught to:* • recognise common uses of information technology, including beyond school. • understand some of the ways we can use the internet. • learn how computers are used in the wider world.	*By the end of Year 4, children will be taught to:* • understand the purpose of emails. • recognise how social media platforms are used to interact. • understand that software can be used collaboratively online to work as a team.	*By the end of Year 6, children will be taught to:* • learn about different forms of communication that have developed with the use of technology. • learn about the Internet of Things and how it has led to 'big data'. • learn how 'big data' can be used to solve a problem or improve efficiency.

Computing Progression of Skills Map

Digital Literacy

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Digital Literacy	*By the end of EYFS, children will be taught to:* • recognise that a range of technology is used for different purposes. • learn to log in and log out.	*By the end of Year 2, children will be taught to:* • log in and out and saving work on their own account. • when using the internet to search for images, learn what to do if they come across something online that worries them or makes them feel uncomfortable. • understand how to interact safely with others online. • recognise how actions on the internet can affect others. • recognise what a digital footprint is and how to be careful about what we post. • identify whether information is safe or unsafe to be shared online. • learn how to create a strong password. • understand 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 • learn to be respectful of others when sharing online and ask for their permission before sharing content. • learn strategies for checking if something they read online is true.	*By the end of Year 4, children will be taught to:* • recognise that different information is shared online including facts, beliefs and opinions. • learn how to identify reliable information when searching online. • learn how to stay safe on social media. • consider the impact technology can have on mood. • learn about cyberbullying. • learn that not all emails are genuine, recognising when an email might be fake and what to do about it. • recognise that information on the internet might not be true or correct and that some sources are more trustworthy than others. • learn to make judgements about the accuracy of online searches. • identify forms of advertising online. • recognise what appropriate behaviour is when collaborating with others online. • reflect on the positives and negatives of time spent online. • identify respectful and disrespectful online behaviour.	*By the end of Year 6, children will be taught to:* • identify possible dangers online and learning how to stay safe. • evaluate the pros and cons of online communication. • recognise that information on the internet might not be true or correct and learning ways of checking validity. • learn what to do if they experience bullying online. • learn to use an online community safely. • use search engines safely and effectively. • understand the importance of secure passwords and how to create them. • learn about the positive and negative impacts of sharing online. • learn strategies to create a positive online reputation. • learn strategies to capture evidence of online bullying in order to seek help. • recognise that updated software can help to prevent data corruption and hacking.

Computing Progression of Knowledge Map

Creating Media

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Creating Media	*By the end of EYFS, children will be taught to:* N/A	*By the end of Year 2, children will be taught to:* • understand that holding the camera still and considering angles and light are important to take good pictures. • know that you can edit, crop and filter photographs. • know how to search safely for images online. • understand that an animation is made up of a sequence of photographs. • know that small changes in my frames will create a smoother looking animation. • understand what software creates simple animations and some of its features e.g. onion skinning.	*By the end of Year 4, children will be taught to:* • know that different types of camera shots can make my photos or videos look more effective. • know that I can edit photos and videos using film editing software. • understand that I can add transitions and text to my video. • know some of the features of web design software. • know that a website is a collection of pages that are all connected. • know that websites usually have a homepage and subpages as well as clickable links to new pages, called hyperlinks. • know that websites should be informative and interactive.	*By the end of Year 6, children will be taught to:* • know that radio plays are plays where the audience can only hear the action so sound effects are important. • know that sound clips can be recorded using sound recording software. • know that sound clips can be edited and trimmed. • understand that stop motion animation is an animation filmed one frame at a time using models, and with tiny changes between each photograph. • know that decomposition of an idea is important when creating stop-motion animations. • know that editing is an important feature of making and improving a stop motion animation.

Computing Progression of Knowledge Map

Computing Systems and Networks

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Computing Systems and Networks	*By the end of EYFS, children will be taught to:* • be able to understand what a computer keyboard is and recognising some letters and numbers. • know that a mouse can be used to click, drag and create simple drawings. • know that to use a computer you need to log in to it and then log out at the end of your session. • know that different types of technology can be found at home and in school. • know that you can take simple photographs with a camera or iPad. • know that you must hold the camera still and ensure the subject is in the shot to take a photo	*By the end of Year 2, children will be taught to:* • know that "log in and log out" means to begin and end a connection with a computer. • 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. • know that passwords are important for security. • know that when we create something on a computer it can be more easily saved and shared than a paper version. • know some of the simple graphic design features of a piece of online software. • know the difference between a desktop and laptop computer. • know that people control technology. • know that buttons are a form of input that give a computer an instruction about what to do (output). • know that computers often work together. • know that touch typing is the fastest way to type. • know that I can make text a different style, size and colour. • know that "copy and paste" is a quick way of duplicating text.	*By the end of Year 4, children will be taught to:* • know what a tablet is and to understand that email stands for 'electronic mail.' • know that an attachment is an extra file added to an email. • understand that emails should contain appropriate and respectful content. • know that cyberbullying is bullying using electronics such as a computer or phone. • understand that software can be used collaboratively online to work as a team. • know what type of comments and suggestions on a collaborative document can be helpful. • know that you can use images, text, transitions and animation in presentations. • know what a tablet is and how it is different from a laptop/desktop computer. • understand what a network is and how a school network might be organised. • know that a server is central to a network and responds to requests made. • know how the internet uses networks to share files. • know that a router connects us to the internet. • know what a packet is and why it is important for website data transfer. • know the roles that inputs and outputs play. • know what some of the different components inside a computer are e.g. CPU, RAM, hard drive, and how they work together.	*By the end of Year 6, children will be taught to:* • know the difference between ROM and RAM. • understand the importance of having a secure password and what "brute force hacking" is. • know that the first computers were created at Bletchley Park to crack the Enigma code to help the war effort in World War 2. • know about some of the historical figures that contributed to technological advances in computing. • understand what techniques are required to create a presentation using appropriate software. • know how search engines work. • understand that anyone can create a website and therefore we should take steps to check the validity of websites. • know that web crawlers are computer programs that crawl through the internet. • understand what copyright is

Computing Progression of Knowledge Map

Programming

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Programming	*By the end of EYFS, children will be taught to:* • know that being able to follow and give simple instructions is important in computing. • understand that it is important for instructions to be in the right order. • understand why a set of instructions may have gone wrong. • know that you can program a Bee-Bot with some simple commands. • understand that debugging means how to fix some simple programming errors. • understand that an algorithm is a set of clear and precise instructions.	*By the end of Year 2, children will be taught to:* • understand that an algorithm is when instructions are put in an exact order. • know that input devices get information into a computer and that output devices get information out of a computer. • understand that decomposition means breaking a problem into manageable chunks and that it is important in computing. • know that we call errors in an algorithm 'bugs' and fixing these 'debugging'. • know that coding is writing in a special language so that the computer understands what to do. • understand that the character in ScratchJr is controlled by the programming blocks. • know that you can write a program to create a musical instrument or tell a joke. • understand the basic functions of a Bee-Bot. • know that you can use a camera/tablet to make simple videos. • know that algorithms move a bee-bot accurately to a chosen destination. • understand what machine learning is and how that enables computers to make predictions. • know that loops in programming are where you set a certain instruction (or instructions) to be repeated multiple times. • know that abstraction is the removing of unnecessary detail to help solve a problem.	*By the end of Year 4, children will be taught to:* • know that Scratch is a programming language and some of its basic functions. • understand how to use loops to improve programming. • understand how decomposition is used in programming. • understand that you can remix and adapt existing code. • understand that a variable is a value that can change (depending on conditions) and know that you can create them in Scratch. • know what a conditional statement is in programming. • understand that variables can help you to create a quiz on Scratch. • know that combining computational thinking skills (sequence, abstraction, decomposition etc) can help you to solve a problem. • understand that pattern recognition means identifying patterns to help them work out how the code works. • understand that algorithms can be used for a number of purposes e.g. animation, games design etc.	*By the end of Year 6, children will be taught to:* • know that a Micro:bit is a programmable device. • know that Micro:bit uses a block coding language similar to Scratch. • understand and recognise coding structures including variables. • know what techniques to use to create a program for a specific purpose (including decomposition). • know that there are text-based programming languages such as Logo and Python. • know that nested loops are loops inside of loops. • understand the use of random numbers and remix Python code. • know that a soundtrack is music for a film/video and that one way of composing these is on programming software. • understand that using loops can make the process of writing music simpler and more effective. • know how to adapt their code while performing their music.

Computing Progression of Knowledge Map

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Data Handling	*By the end of EYFS, children will be taught to:* • know that sorting objects into various categories can help you locate information. • know that using yes/no questions to find an answer is a branching database. • know that a pictogram is a way of showing information.	*By the end of Year 2, children will be taught to:* • know how that charts and pictograms can be created using a computer. • understand that a branching database is a way of classifying a group of objects. • know that computers understand different types of 'input'. • understand that you can enter simple data into a spreadsheet. • understand what steps you need to take to create an algorithm. • know what data to use to answer certain questions. • know that computers can be used to monitor supplies.	By the end of Year 4, children will be taught to: • know that a database is a collection of data stored in a logical, structured and orderly manner. • know that computer databases can be useful for sorting and filtering data. • know that different visual representations of data can be made on a computer. • know that computers can use different forms of input to sense the world around them so that they can record and respond to data. This is called 'sensor data'. • know that a weather machine is an automated machine that responds to sensor data. • understand that weather forecasters use specific language, expression and pre-prepared scripts to help create weather forecast films	By the end of Year 6, children will be taught to: • know that Mars Rover is a motor vehicle that collects data from space by taking photos and examining samples of rock. • know what numbers using binary code look like and be able to identify how messages can be sent in this format. • understand that RAM is Random Access Memory and acts as the computer's working memory. • know what simple operations can be used to calculate bit patterns. • know that data contained within barcodes and QR codes can be used by computers. • know that infrared waves are a way of transmitting data. • know that Radio Frequency Identification (RFID) is a more private way of transmitting data. • know that data is often encrypted so that even if it is stolen it is not useful to the thief. • know that data can become corrupted within a network but this is less likely to happen if it is sent in 'packets'. • know that devices that are not updated are most vulnerable to hackers. • know the difference between mobile data and WiFi.

Computing Progression of Knowledge Map

	EYFS	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Online Safety	*By the end of EYFS, children will be taught to:* • N/A	*By the end of Year 2, children will be taught to:* • know that the internet is many devices connected to one another. • know that you should tell a trusted adult if you feel unsafe or worried online. • know that people you do not know on the internet (online) are strangers and are not always who they say they are. • know that to stay safe online it is important to keep personal information safe. • know that 'sharing' online means giving something specific to someone else via the internet and 'posting' online means placing information on the internet • understand the difference between online and offline. • understand what information I should not post online. • know what the techniques are for creating a strong password. • know that you should ask permission from others before sharing about them online and that they have the right to say 'no.' • understand that not everything I see or read online is true.	*By the end of Year 4, children will be taught to:* • know that not everything on the internet is true: people share facts, beliefs and opinions online. • understand that the internet can affect your moods and feelings. • know that privacy settings limit who can access your important personal information Information, such as your name, age, gender etc. • know what social media is and that age restrictions apply. • understand some of the methods used to encourage people to buy things online. • understand that technology can be designed to act like or impersonate living things. • understand that technology can be a distraction and identify when someone might need to limit the amount of time spent using technology. • understand what behaviours are appropriate in order to stay safe and be respectful online	*By the end of Year 6, children will be taught to:* • know different ways we can communicate online. • understand how online information can be used to form judgements. • understand some ways to deal with online bullying. • know that apps require permission to access private information and that you can alter the permissions. • know where I can go for support if I am being bullied online or feel that my health is being affected by time online. • know that a 'digital footprint' means the information that exists on the internet as a result of a person's online activity. • know what steps are required to capture bullying content as evidence. • understand that it is important to manage personal passwords effectively. • understand what it means to have a positive online reputation. • know some common online scams.