

Computing Progression Map



| Computing Progression of Skills Map  Computer Science | | | | |
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|  | 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 |

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| 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 |

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| 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. |

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| 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 | | | | |
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|  | 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. |

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|  | 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. |

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| 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. |

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| 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 | | | | |
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|  | 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 | | | | |
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|  | 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 | | | | |
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|  | 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 | | | | |
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|  | 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. |

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| **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. |

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|  | 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. |