

Computing Progression Map



| Computing Progression of Skills MapComputer 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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|  |  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
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| Computing Progression of Skills MapComputer Science |
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|  |  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.
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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:** 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.
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| Computing Progression of Skills MapInformation 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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| Computing Progression of Skills MapInformation Technology |
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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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|  |  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.
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| Computing Progression of Skills MapInformation Technology |
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|  |  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.
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| Computing Progression of Skills MapDigital 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.
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| Computing Progression of Knowledge MapCreating 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.
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| Computing Progression of Knowledge MapComputing 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
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| Computing Progression of Knowledge MapProgramming |
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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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| Computing Progression of Knowledge Map |
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|  |   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.
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| Computing Progression of Knowledge Map |
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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.
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