

St. Albans Curriculum Mapping



Purpose of Study:

A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science and design and technology, and provides insights into both natural and artificial systems. The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Computing also ensure that pupils become digitally literate – able to use, and express technology – at a level suitable for the future workplace and as active participants in a digital world.

Aims:

The national curriculum for computing aims to ensure that all pupils:

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

Subject Content KS1:

Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.

An algorithm is a precisely defined procedure – a sequence of instructions, or a set of rules for performing a specific task (e.g. instructions for changing a wheel or making a sandwich).

Create and debug simple programs.

Computer programs, like algorithms, are comprised of sets of rules or instructions, but they differ in that they need to be written in a precise language a computer can ‘understand’. When you write a program you need to have a clear idea of what it will do and how it should do it. Most programs don’t work as they should first time round. Mistakes in programs are called ‘bugs’. Finding and fixing them is ‘debugging’.

Use logical reasoning to predict the behaviour of simple programs.

Computers are deterministic machines and we can predict exactly how a computer will behave. In the classroom, getting one pupil to role-play a floor turtle or screen sprite while another steps through the program can give a far more immediate sense of what is going on. When working on a computer, encourage pupils to make a prediction about what the program will do before they press return or click the button, and to explain their prediction logically.

Logical reasoning also implies that pupils are following a set of rules when making predictions. Pupils who step outside these rules are not using logical reasoning. A pupil who expects a roamer to jump doesn't understand the constraints of its programming language or hardware.

Use technology purposefully to create, organise store, manipulate and retrieve digital content.

Creating digital content has many practical possibilities. These include common place tasks such as word-processing, creating pictures, using paint packages, working with digital photographs and video (including animations), writing computer programs and creating online content such as blog posts, forum contributions, wiki entries and social network updates.

Manipulate: The skill here is not just using software but also knowing how best to change the content for the audience and purpose, and to take into principles of good design account.

Retrieving: Opening and saving documents. It also requires you to remember what you called a file and where you saved it. Children can use the OS search feature to find the file.

Recognise common uses of information technology beyond school.

In KS1, children might be woken up by a digital alarm clock, have a bowl of microwaved porridge for breakfast, then watch TV or play an iPad game before travelling to school, their journey guided or tracked via GPS (SAT NAV). There are many opportunities for children to consider the applications of algorithms, programs and systems.

Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.

This statement covers the key principles of e-safety. Pupils should be aware of the main risks associated with the Internet, and recognise that they should not share certain types of personal information online.

Young children have little awareness of who can access online information so it is best to teach them not to communicate any personal information online. Pupils should develop their sensitivity to others online, treating them with respect, and showing respect for their privacy.

Pupils should have an age appropriate understanding of their responsibilities under the school's acceptable use policy. As many pupil's inadvertently access inappropriate content on the web, they need to know how to report a worry, and they should be encouraged to talk to teachers or parents about their concerns.

Adults worry about extreme content, but pupils' worries are often at a lower level, related to material they consider unfair or unkind. In order for pupils to feel supported, it is important that adults empathise with, and address, these worries, and there should normally be no blame attached to a pupil reporting such concerns.

Pupils must have a clear understanding of what to do if they have concerns about inappropriate online behaviour (such as unwelcome contact or cyberbullying). Telling a teacher or parent should normally be the first response, but pupils should also know that they can talk directly and confidentially to Childline about such matters.

You must follow your school's child protection policy, and your child protection lead must be informed about any potential abuse, whether online or offline. This may include informing the Child Exploitation and Online Protection Centre (CEOP).

Subject Content KS2:

Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.

Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts The focus on algorithms at key stage 1 leads pupils into the design stage of programming at key stage 2. Algorithms are the necessary start of the process of creating working code, and identifying the steps needed to solve any problem is essential. Splitting problems into smaller parts is part of computational thinking.

Use sequence, selection and repetition in programs; work with variables and various forms of input and output.

Sequence in this context is the step-by-step nature of computer programs, mirroring the sequence of steps the algorithm would list.

Selection refers to instructions such as if ... then ... otherwise decisions in which the operation (what the program does) depends on whether or not certain conditions are met. For example, a quiz provides different feedback if the player answers the question correctly or incorrectly. It is helpful to refer pupils to selections (choices) they make in everyday life; for example, if it rains in the morning, then I will wear my anorak to school, otherwise I won't.

Repetition is a programming structure such as a repeat ... until loop in which the computer runs part of the program a certain number of times or until a particular condition is met.

Variables are used to keep track of the things that can change while a program is running. They are a bit like x or y in algebra, in that the values may not initially be known. Variables are not just used for numbers. They can also hold text, including whole sentences ('strings'), or the logical values 'true' or 'false'. For our quiz we would use variables to keep track of the player's score and the number of questions they attempt. Variables are like boxes, in that the computer can use them to store information that can be changed by the user, the program or by another variable.

Use logic reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.

Key stage 2 pupils should be able to explain the thinking behind their algorithms, talking through the steps and explaining why they've solved a problem the way they have. They also need to be able to look at a simple programming project and explain what's going on. Thinking through programs and algorithms helps develop pupils' abilities to think logically and algorithmically, which leads to planned debugging of code rather than just a trial-and-error approach.

Understand computer networks including the Internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration.

Computer networks, including the internet, are made up of computers connected together. The computers include fast, dedicated machines that pass on data that's not intended for them (called 'routers', 'gateways', 'hubs' or 'switches', depending on particular roles), and 'servers' (always-on machines looking after emails, web pages and files that other computers might ask for from time to time). The connections between the computers in a network may consist of radio or satellite signals, copper wires or fibre-optic cables.

Information stored on computers and information travelling over networks must be digitised (i.e. represented as numerical data). The computernetwork in your school and the internet use the same method or 'protocol' to send and receive this data. The data is broken up into small 'packets', each with identifying information, which includes the IP (internet protocol) address of the sender and recipient.

These packets of information make their way across the internet from source to recipient. At the far end, the packets get stitched back together in the right order and the email is delivered, the website is accessed, or the Skype call gets connected. Many of these packets, travelling at near light-speed, are generated by web servers returning web pages to the browser requesting them. By connecting people around the world and passing on packets of data from sender to recipient, the internet has created many opportunities. These range from communication (such as email, video conferencing, blogs, forums, social networks) and collaboration, such as wikis (including Wikipedia), to real-time collaborative editing, Creative Commons media (permission to share and use creative work with conditions stated by the creator) and open-source software, which is available for us to use and change.

Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.

Using search technologies involves aspects of computer science, information technology and digital literacy. Effective use of search engines gets the results you want. It relies on specifying the right keyword, skimming and scanning the results to see which seems most relevant, and distinguishing between the main results and adverts presented as sponsored results. It may also involve using other features⁷ of the search engine, including searching for phrases rather than keywords, or limiting searches to a particular time frame, language, reading level or website. In order to return results, search engines use 'web crawler' programs. These programs visit the pages of the web, follow the links they find and can make a copy of each page visited. The pages are indexed, keeping track of keywords on each page. When you enter a search query, the search engine returns pages from its index on which your keyword(s) or phrase appears.

Search engines take many factors into account. At the heart of Google's algorithms⁸ is 'PageRank', which determines the quality and rank of a page based on the quality of the pages that link to it. Their quality is, in turn, determined by the quality of the pages that link to them, and so on.

Just because a page has a high rank in Google or another search engine for a particular query, it doesn't mean that the content is true, age-appropriate or relevant to a particular project. Pupils need to develop skills in evaluating digital content, including how trustworthy the information is (perhaps by verifying it with another independent source), whether it's something that the audience for a project would be able to grasp, and why the content was posted in the first place (e.g. to give a balanced overview, or simply to advance one side of an argument).

Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.

This is something of a catch-all requirement, bringing together various aspects of the computing curriculum. Pupils might typically be expected to demonstrate progression by:

- using software under the control of the teacher
- then, using software with increasing independence
- then, combining software (e.g. importing an edited image or video into a presentation or web page)
- then, selecting software themselves (perhaps from the full range of applications installed on computers, smartphones and tablets at home or at school, or available to them via the web).

Internet services might include, for example, learning platforms, school, class or individual blogs, and cloud-based tools such as Google Drive, Office 365 or image-editing sites.

The reference to 'a range of digital devices' encompasses using both fixed and mobile technologies. It also includes running software (such as that described in the previous paragraph) on web servers via the internet.

There is an important distinction between data and information at GCSE and A level, where information is defined as structured data that has been processed and has meaning attached to it. At key stage 2 it might be more helpful to think of data as numbers and information as richer media such as text, images, audio, and video or 3D representations. However, it is worth remembering that both data and information are digitised by computers (i.e. stored in the form of numbers).

Collecting, analysing, evaluating and presenting data is an important application of computers. Pupils should gain experience of working with data they have generated or collected for themselves, as well as big, public datasets.⁹

Pupils have an opportunity to develop a more critical media literacy as they work with tools that, until relatively recently, were the domain of professionals. Tools for recording audio and video, and for creating animation, web pages, digital photos, digital music and 3D models, are all available to primary schools for low (often zero) cost. Providing a potentially global audience for the pupils' work is tremendously motivating.

Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.

Safe and responsible use of technology at key stage 2 builds on skills learned in key stage 1. As well as requiring pupils to keep themselves safe and to treat others with respect, the programme of study at key stage 2 introduces an emphasis on responsible use of technology.

Pupils need to consider how their online actions impact other people. They need to be aware of their legal and ethical responsibilities, such as showing respect for intellectual property rights (e.g. musical, literary and artistic works), keeping passwords and personal data secure, and observing the terms and conditions for web services they use (such as the 13+ age restriction on most US websites, including Facebook, resulting from COPPA10 legislation).

Pupils should also develop some awareness of their digital footprint: the data automatically generated when they use the internet and other communication services, and how this is, or could be, used.

Pupils should be aware of, and abide by, the school's acceptable use policy, as well as the requirements of any other services they use. Encourage pupils to think twice, and to check terms and conditions, before signing up for internet-based services.

As in key stage 1, pupils should report any concerns to a parent or teacher. They should also be aware that they can talk directly to the police, report their concern to CEOP, or talk in confidence to counsellors at Childline..

PC Software:

	
<p>Audacity is a free, easy-to-use, multi-track audio editor and recorder.</p> <ul style="list-style-type: none">• Record live audio.• Edit WAV, AIFF, FLAC, MP2, MP3 or Ogg Vorbis sound files.• AC3, M4A/M4R (AAC), WMA and other formats supported using optional libraries.• Cut, copy, splice or mix sounds together.• Numerous effects including change the speed or pitch of a recording.	<p>'Big Writing' Games is a set of 9 interactive games to be used during the Big Writing lesson. They are designed to be simple to learn and effective to use, suitable for the ICT novice and expert. All of the ideas are based on the work of Ros Wilson and valuable feedback from classroom teachers.</p>
	
<p>CDBurnerXP is a free application to burn CDs and DVDs, including Blu-Ray and HD-DVDs. It also includes the feature to burn and create ISOs, as well as a multilanguage interface. Everyone, even companies, can use it for free. It does not include adware or similar malicious components.</p>	<p>With Scratch, you can program your own interactive stories, games, and animations — and share your creations with others in the online community.</p> <p>Scratch helps young people learn to think creatively, reason systematically, and work collaboratively — essential skills for life in the 21st century.</p>
	
<ul style="list-style-type: none">• Fantastic new painting and special effect tools, including felt tip pens, outline and advanced tile.• Over 250 brand new curriculum relevant pictures added to the already extensive RM Topic Bank.• An ideal program for digital image editing.• Speech function that reads out icon names, so helping users with reading difficulties.• Detailed manual included electronically	<p>All under the Interactive Resources folder</p> <ul style="list-style-type: none">• Primary Games Volume 1• Primary Games Volume 2• Maths Pack 1• Maths Pack 2• Teaching; Measures, Money, Tables, Times



textease Studio CT

A suite of nine Textease tools

- Textease Publisher CT: For all your writing and publishing needs
- Textease Movies CT: Produce exciting movies in minutes
- Textease Presenter CT: Create top-notch presentations to be proud of
- Textease Draw CT: A revolutionary vector drawing tool
- Textease Database CT: A truly easy to use, multi-user database
- Textease Turtle CT: Flexible, progressive on-screen turtle graphics
- Textease Spreadsheet CT: The perfect introduction to simple spreadsheets
- Textease Paint CT: Vibrant, creative painting tool
- Textease Branch CT



Microsoft Office

- Microsoft Word
- Microsoft Access (Database Software)
- Microsoft PowerPoint
- Microsoft Publisher



Write apps, build games, share them and play them. Enter the Discovery Education Coding universe with our sample lessons and amaze yourself with how quickly you can code. It's fun, it's friendly and it's for pupils of all abilities.

iPad (x6) Software:

	
<p>Take a virtual journey to any location in the world. Explore 3D buildings, imagery and terrain. Find cities, places and local businesses.</p>	<p>The NASA App showcases a huge collection of the latest NASA content, including images, videos on-demand, NASA Television, mission information, news & feature stories, latest tweets, ISS sighting opportunities, satellite tracking, Third Rock Radio and much more</p>
	
<p>GarageBand turns your iPad, iPhone, and iPod touch into a collection of Touch Instruments and a full-featured recording studio — so you can make music anywhere you go. Use Multi-Touch gestures to play a piano, organ, guitar, and drums. They sound and play like their counterparts, but let you do things you could never do on a real instrument. Enjoy Smart Instruments that make you sound like a pro — even if you've never played a note before. Plug an electric guitar into your iPad, iPhone, or iPod touch and play through classic amps and stompbox effects.</p>	<p>"The Three Little Pigs - The Puppet Show" is an adaptation of the classic tale of the Three Little Pigs presented in a mini theater.</p> <ul style="list-style-type: none">• Narration and Text in both English and Spanish.• Choose your Narrator (Illustration).• Take pictures of the Show!• Automatic bookmark• Controls to Play, Pause, Rewind, set Volume and Text.• Sound effects across the entire show.
	
<p>iMovie lets you enjoy your videos and tell stories like never before. Browse your video library, share favourite moments, create beautiful movies and watch them on all your devices in iMovie Theater. And with the iMovie extension, it's fast and fun to make every video more memorable — directly in the Photos app.</p>	<p>Brushes is a painting app designed exclusively for iOS.</p> <ul style="list-style-type: none">• General Features• Create paintings with dimensions up to 2048x2048• Full support for all Retina devices• Background autosave• Unlimited undo and redo• Simple and approachable interface



Battle Times: Who's the quickest on the draw when it comes to multiplication? Now you can find out by dueling head-to-head to see whose mind and hands can move the fastest. Both players solve the same problem, and only one of you will get it first. It's 60 seconds of furious multiplication action!



Move The Turtle is an educational application for iPhone and iPad that teaches children the basics of creating computer programs, using intuitive graphic commands.

Do you remember the Logo programming language? A friendly Turtle will introduce your child step by step to the basic concepts of programming in a colourful graphic environment. Who knows, maybe your child will be the next outstanding programmer!



The new **Bee-Bot** App from TTS Group has been developed based on our well-loved, award-winning Bee-Bot floor robot. The app makes use of Bee-Bot's keypad functionality and enables children to improve their skills in directional language and programming through sequences of forwards, backwards, left and right 90 degree turns.



Puppet Pals: Create your own unique shows with animation and audio in real time! Simply pick out your actors and backdrops, drag them on to the stage, and tap record. Your movements and audio will be recorded in real time for playback later. This app is as fun as your own creativity. Act out a story of Pirates on the high seas, fight as scary monsters, or play the part of a Wild West bandit on the loose. You can even combine any characters however you want!



Old Macdonalds Farm: Sing and Play with the happiest animals in the App-Store! Fabulous animated activities, ideal for an engaging, educational, visually and audibly exciting experience. With 10 fabulous educational games and an interactive sing-along song your little ones will have hours of fun.

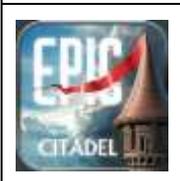


Planets: 3D guide to the solar system for aspiring astronomers

	
<p>Popplet is the simplest tool to capture and organize your ideas. With Popplet you can quickly jot down your ideas and sort them visually.</p>	<p>Hold the Moon in your hands. Moon Globe turns your iPhone, iPod Touch or iPad into a precision instrument for viewing Earth's Moon. Satellite imagery and topographic laser altimeter data are combined to render the Moon with realistic lighting in realtime 3D.</p>

iPad Games

	<p>Words with Friends is a multi-player word game developed by Zynga with Friends (formerly Newtoy, Inc.). Players take turns building words crossword puzzle style in a manner similar to the classic board game Scrabble.</p>
	<p>Gasketball is an action, sports video game. Players flick basketballs through 2D physics puzzles into the hoop in single-player, local multiplayer, and asynchronous HORSE-style online multiplayer modes</p>
	<p>You are the Harbor Master in a busy harbor. Direct boats into the docks, watch them unload their cargo, and direct them off the screen. But be careful not to let boats crash!</p>
	<p>"Labyrinth 2 is one of the absolutely very best games in the App Store. I didn't know Labyrinth could be this deluxe, fun, challenging, easy, and addicting. Illusion Labs gives you absolutely everything with great levels already made, a level editor, local multiplayer, and access to a potentially limitless supply of more levels."</p>
	<p>The Pinball Arcade features exact recreations of the all-time greatest pinball tables from Williams®, Bally®, Stern®, and Gottlieb® together in one game. Every flipper, bumper, sound effect, and display pixel has been painstakingly emulated in astonishing detail!</p>
	<p>King of Math is a fast-paced mathematics game with lots of fun and diverse problems in different areas. Starting as a male or female farmer, you level up your character by answering math questions and improving your total score. New character design and music for each of the ten levels. Collect stars, get achievements and compare your scores against your friends and players all over the world!</p>

	<p>With the option for 1 or 2 pucks, this 1 and 2-player air hockey favorite is a blast for young & old alike! This is the only air hockey that lets you play with 2 pucks at once! If you're alone, play a computer opponent ranging from Kiddie to INSANE! Get a friend and grab your mallets to see who dominates the table in 2-player mode. Try off the wall banks & combos to spoil your opponent's defenses and be the first to score 7 points - just like in real air hockey!</p>
	<p>Tic Tac Toe Free supports one player and two player gameplay, so you can play against another human or against your iPhone. The AI for one player mode includes three difficulty levels, so you can play against a computer player that matches your skill level. A move randomization engine ensures that your iPhone won't keep making the same moves over and over again.</p>
	<p>The #1 Checkers app for iOS just got better. Play against your Game Center friends or random opponents using our new turn-based multiplayer feature! Checkers Free supports 1 player and 2 player gameplay, so you can play against your friends or test your skills against a challenging computer opponent.</p>
	<p>Pinball Collection HD: This unique table features pinball bumpers and targets, plus a color monitor where you can take on a variety of old-school digital minigame challenges - an endless space scroller, plus car racing, missile defense, a block breaker, and more at incrementing skill levels.</p>
	<p>What's the difference between Trainyard and Express? In the full game there are more than 100 more puzzles, and you can even MAKE YOUR OWN PUZZLES.</p>
	<p>Hangman Free is the best Hangman game available for the iPhone and iPod Touch. The game faithfully captures every detail of the classic Hangman experience, right down to the chalk dust.</p>
	<p>Enter Epic Citadel, the dynamic fantasy setting of the award-winning Infinity Blade. From the circus bazaar to the sweeping cathedral in the center of town, Epic Citadel dazzles with a visual parade of special effects, as only imagined by Epic Games and powered by the critically acclaimed Unreal Engine 3.</p>