Computing

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 ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.

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

- can understand and apply the 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 such 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.

KS1 Pupils should be taught to:

- understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
- create and debug simple programs use logical reasoning to predict the behaviour of simple programs
- use technology purposefully to create, organise, store, manipulate and retrieve digital content
- recognise common uses of information technology beyond school
- use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies

KS2 Pupils should be taught to:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration
- use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
- select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information
- use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

Intent

At Anderton, we aim to prepare our learners for their future by giving them the opportunities to gain knowledge and develop skills that will equip them for an ever-changing digital world. Knowledge and understanding of ICT is of increasing importance for children's future both at home and for employment. Our Computing curriculum focuses on a progression of skills in digital literacy, computer science, information technology and online safety to ensure that children become competent in safely using, as well as understanding, technology. These strands are revisited repeatedly through a range of themes during children's time in school to ensure the learning is embedded and skills are successfully developed. Our intention is that Computing also supports children's creativity and cross curricular learning to engage children and enrich their experiences in school.

Implementation

Our whole curriculum is shaped by our school vision which aims to enable all children, regardless of background, ability, additional needs, to flourish to become the very best version of themselves they can possibly be. We teach the National Curriculum through Teach Computing and Project Evolve, supported by a clear skills and knowledge progression. This ensures that skills and knowledge are built on year by year and sequenced appropriately to maximise learning for all children. To ensure a broad range of skills and understanding, Computing is taught across three main strands: digital literacy, computer science and information technology. As part of information technology, children learn to use and express themselves and develop their ideas through ICT for example writing and presenting as well as exploring art and design using multimedia. Within digital literacy, children develop practical skills in the safe use of ICT and the ability to apply these skills to solving relevant, worthwhile problems for example understanding safe use of internet, networks and email. In computer science we teach children to understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. Also, to analyse problems to computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. We also teach a progression of Computing vocabulary to support children in their understanding. At Anderton, we give children access to a wide range of good quality resources and provide cross-curricular opportunities for children to apply their Computing knowledge and skills. Online safety is taught within each Computing lesson as a short starter activity as well as being taught as a unit each year. Online safety procedures are communicated with all staff and parents. We recognise that Computing is no longer included as a separate strand in the Early Years Framework, however we believe that children are exposed to a variety of digital systems and resources through their daily lives and therefore want to support them to become conscientious and confident users of technology. We also ensure that all children know how to protect themselves and stay safe in a digital world.

Impact

The implementation of this curriculum ensures that when children leave Anderton Primary School, they are competent and safe users of ICT with an understanding of how technology works. They will have developed skills to express themselves and be creative in using digital media and be equipped to apply their skills in Computing to different challenges going forward.

Key Concepts (Curriculum Overview)							
	EYFS	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**YEAR 6**
Computing Systems & Networks		Technology around us	IT around us	Connecting Computers	The Internet	Systems and searching	Communication and collaboration
Creating Media		Digital Painting Digital Writing	Digital Photography Digital Music	Stop-frame animation Desktop publishing	Audio production Photo Editing	Video production Vector Graphics	Web-page creation 3D modelling
Programming		Moving a robot Animations	Robot Algorithms Quizzes	Sequencing sounds Events and actions	Repetition in shapes Repetition in games	Selection in physical computing Selection in quizzes	Variables in games Sensing movement
Data & Information		Grouping data	Pictograms	Branching Databases	Data logging	Flat-file databases	Spreadsheets
Online Safety	Responsible use of technology Taught through PSHE & Project Evolve	Responsible use of technology Taught through PSHE & Project Evolve	Responsible use of technology Taught through PSHE & Project Evolve	Responsible use of technology Taught through PSHE & Project Evolve	Responsible use of technology Taught through PSHE & Project Evolve	Responsible use of technology Taught through PSHE & Project Evolve	Responsible use of technology Taught through PSHE & Project Evolve

Skills and Knowledge Progression							
	EYFS	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**YEAR 6**
Computing Systems & Networks		**Technology around us** To identify technology To identify a computer and its main parts To use a mouse in different ways To use a keyboard to type To use the keyboard to edit text To create rules for using technology responsibly	**Information technology around us** To recognise the uses and features of information technology To identify information technology in the home To identify information technology beyond school To explain how information technology benefits us To show how to use information technology safely To recognise that choices are made when using information technology	**Connecting computers** To explain how digital devices function To identify input and output devices To recognise how digital devices can change the way we work To explain how a computer network can be used to share information To explore how digital devices can be connected To recognise the physical components of a network	**The internet** To describe how networks physically connect to other networks To recognise how networked devices make up the internet To outline how websites can be shared via the World Wide Web To describe how content can be added and accessed on the World Wide Web To recognise how the content of the WWW is created by people To evaluate the consequences of unreliable content	**Sharing information** To explain that computers can be connected together to form systems To recognise the role of computer systems in our lives To recognise how information is transferred over the internet To explain how sharing information online lets people in different places work together To contribute to a shared project online To evaluate different ways of working together online	**Communication** To identify how to use a search engine To describe how search engines select results To describe how search engines select results To explain how search results are ranked To recognise why the order of results is important, and to whom To recognise how we communicate using technology To evaluate different methods of online communication
Creating Media		Describe what freehand tools do. Use the shape tool and the line tools. Make careful choices when painting a digital picture. Explain why I chose the tools I used. Use a computer on my own to paint a picture. Compare painting a picture on a computer and on paper.	Know what devices can be used to take photographs. Use a digital device to take a photograph. Describe what makes a good photograph. Decide how photographs can be improved. Use tools to change an image. Recognise that images can be changed.	Explain that animation is a sequence of drawings or photographs. Relate animated movement with a sequence of images. Plan an animation. Identify the need to work consistently and carefully. Review and improve an animation. Evaluate the impact of adding other media to an animation.	Identify that sound can be digitally recorded. Use a digital device to record sound. Explain that a digital recording is stored as a file. Explain that audio can be changed through editing. Show that different types of audio can be combined and played together. Evaluate editing choices made.	Recognise video as moving pictures, which can include audio. Identify digital devices that can record video. Capture video using a digital device. Recognise the features of an effective video. Identify that video can be improved through reshooting and editing. Consider the impact of the choices made when making and sharing a video.	Review an existing website and consider its structure. Plan the features of a web page. Consider the ownership and use of images (copyright). Recognise the need to preview pages. Outline the need for a navigation path. Recognise the implications of linking to content owned by other people.

		Use a computer to write. Add and remove text on a computer. Identify that the look of text can be changed on a computer. Make careful choices when changing text. Explain why I used the tools that I chose. Compare writing on a computer with writing on paper.	Say how music can make us feel. Identify that there are patterns in music. Describe how music can be used in different ways. Show how music is made from a series of notes. Create music for a purpose. Review and refine our computer work.	Recognise how text and images convey information. Recognise that text and layout can be edited. Choose appropriate page settings. Add content to a desktop publishing publication. Consider how different layouts can suit different purposes. Consider the benefits of desktop publishing.	Explain that digital images can be changed. Change the composition of an image. Describe how images can be changed for different uses. Make good choices when selecting different tools. Recognise that not all images are real. Evaluate how changes can improve an image.	Identify that drawing tools can be used to produce different outcomes. Create a vector drawing by combining shapes. Use tools to achieve a desired effect. Recognise that vector drawings consist of layers. Group objects to make them easier to work with. Evaluate my vector drawing.	Use a computer to create and manipulate three-dimensional (3D) digital objects. Compare working digitally with 2D and 3D graphics. Construct a digital 3D model of a physical object. Identify that physical objects can be broken down into a collection of 3D shapes. Design a digital model by combining 3D objects. Develop and improve a digital 3D model.
Programming		Explain what a given command will do. Act out a given word. Combine forwards and backwards commands to make a sequence. Combine four direction commands to make sequences. Plan a simple program. Find more than one solution to a program.	Describe a series of instructions as a sequence. Explain what happens when we change the order of instructions. Use logical reasoning to predict the outcome of a program (series of commands). Explain that programming projects can have code and artwork. Design an algorithm. Create and debug a program that I have written.	Explore a new programming environment. Identify that each sprite is controlled by the commands I choose. Explain that a program has a start. Recognise that a sequence of commands can have an order. Change the appearance of my project. Create a project from a task description.	Identify that accuracy in programming is important. Create a program in a text-based language. Explain what 'repeat' means. Modify a count-controlled loop to produce a given outcome. Decompose a program into parts. Create a program that uses count-controlled loops to produce a given outcome.	Control a simple circuit connected to a computer. Write a program that includes count-controlled loops. Explain that a loop can stop when a condition is met, eg number of times. Conclude that a loop can be used to repeatedly check whether a condition has been met. Design a physical project that includes selection. Create a controllable system that includes selection.	Define a 'variable' as something that is changeable. Explain why a variable is used in a program. Choose how to improve a game by using variables. Design a project that builds on a given example. Use my design to create a project. Evaluate my project.
		Choose a command for a given purpose. Show that a series of commands can be joined together.	Explain that a sequence of commands has a start. Explain that a sequence of	Explain how a sprite moves in an existing project. Create a program to move a sprite in four directions.	Develop the use of count-controlled loops in a different programming environment.	Explain how selection is used in computer programs. Relate that a conditional statement	Create a program to run on a controllable device. Explain that selection can control the flow of a program.

		Identify the effect of changing a value. Explain that each sprite has its own instructions. Design the parts of a project. Use an algorithm to create a program.	commands has an outcome. Create a program using a given design. Change a given design. Create a program using my own design. Decide how my project can be improved.	Adapt a program to a new context. Develop my program by adding features. Identify and fix bugs in a program. Design and create a maze-based challenge.	Explain that in programming there are infinite loops and count controlled loops. Develop a design which includes two or more loops which run at the same time. Modify an infinite loop in a given program. Design a project that includes repetition. Create a project that includes repetition.	connects a condition to an outcome. Explain how selection directs the flow of a program. Design a program which uses selection. Create a program which uses selection. Evaluate my program.	Update a variable with a user input. Use a conditional statement to compare a variable to a value. Design a project that uses inputs and outputs on a controllable device. Develop a program to use inputs and outputs on a controllable device.
Data & Information		Label objects. Identify that objects can be counted. Describe objects in different ways. Count objects with the same properties. Compare groups of objects. Answer questions about groups of objects.	Recognise that we can count and compare objects using tally charts. Recognise that objects can be represented as pictures. Create a pictogram. Select objects by attribute and make comparisons. Recognise that people can be described by attributes. Explain that we can present information using a computer.	Create questions with yes/no answers. Identify the object attributes needed to collect relevant data. Create a branching database. Identify objects using a branching database. Explain why it is helpful for a database to be well structured. Compare the information shown in a pictogram with a branching database.	Explain that data gathered over time can be used to answer questions. Use a digital device to collect data automatically. Explain that a data logger collects 'data points' from sensors over time. Use data collected over a long duration to find information. Identify the data needed to answer questions. Use collected data to answer questions.	Use a form to record information. Compare paper and computer-based databases. Outline how grouping and then sorting data allows us to answer questions. Explain that tools can be used to select specific data. Explain that computer programs can be used to compare data visually. Apply my knowledge of a database to ask and answer real-world questions.	Identify questions which can be answered using data. Explain that objects can be described using data. To explain that formula can be used to produce calculated data To apply formulas to data, including duplicating To create a spreadsheet to plan an event To choose suitable ways to present data
Online Safety		See PHSE Scheme & Project Evolve	See PHSE Scheme & Project Evolve	See PHSE Scheme & Project Evolve	See PHSE Scheme & Project Evolve	See PHSE Scheme & Project Evolve	See PHSE Scheme & Project Evolve

Vocabulary	
EYFS	
Year 1	**<u>Digital painting</u>** paint program, tool, paintbrush, erase, fill, undo, Piet Mondrian, primary colours, shape tools, line tool, Henri Matisse, Wassily Kandinsky, tools, feelings, colour, brush style, Georges Seurat, Pointillism, brush size, pictures, painting, computers, like, prefer, dislike **<u>Digital writing</u>** Word processor, keyboard, keys, letters, Microsoft Word, Google Docs, numbers, space, backspace, text cursor, toolbar, bold, italic, underline, mouse, cursor, select, font, undo, font, backspace

	Grouping data Object, label, group, search, image, property, colour, size, shape, value, label, data set, more, less, most, fewest, the same **Intro to animation** ScratchJr, Bee-Bot, command, sprite, compare, programming, programming area, block, joining, command, **Start** block, run, program, background, delete, reset, algorithm, predict, effect, change, value, instructions, appropriate, design **Moving a robot** Forwards, backwards, turn, clear, go, commands, instructions, directions, left, right, turn, plan, algorithm, program, route **Technology all around us** Technology, computer, mouse, trackpad, keyboard, screen, double-click, typing
Year 2	**Digital photography** Device, camera, photograph, capture, image, digital, landscape, portrait, framing, subject, compose, light sources, flash, focus, background, editing, filter, format, lighting, focus **Intro to quizzes** Sequence, command, program, run, start, outcome, predict, blocks, sprite, algorithm, design, actions, project, design, modify, change, build, match, compare, debug, features, evaluate **IT around us** Information technology (IT), computer, barcode, scanner/scan **Making music** Music, planets, Mars, Venus, war, peace, quiet, loud, feelings, emotions, pattern, rhythm, pulse, Neptune, pitch, tempo, notes, instrument, create, pulse/beat, open, edit **Pictograms** More than, less than, most, least, organise, data, object, tally chart, votes, total, enter, compare, count, pictogram, explain, more common, least common, attribute, group, same, different most popular, least popular, conclusion, block diagram, sharing, data **Robot algorithms** Instruction, sequence, clear, unambiguous, algorithm, program, order, algorithm, commands, prediction, artwork, design, route, mat, debugging
Year 3	**Animation** Animation, flip book, stop-frame animation, frame, sequence, image, photograph, setting, character, events, onion skinning, consistency, evaluation, delete, media, import, transition **Branching databases** Branching database, database, attribute, value, questions, objects, equal, even, separate, structure, compare, order, organise, j2data, selecting, pictogram, information, decision tree **Connecting computers** Digital device, input, output, process, process, pictogram, connection, network, network switch, server, wireless access point, **Desktop publishing** Text, images, advantages, disadvantages, communicate, font, font style, communicate, template, landscape, portrait, orientation, placeholder, layout, content, desktop publishing, copy, paste, purpose, benefits **Events and actions** Motion, event, sprite, algorithm, logic, move, resize, algorithm, extension block, pen up, set up, pen, design, event, action, debugging, errors, design, code, test

	Sequence in music Scratch, programming, blocks, commands, code, sprite, costume, stage, backdrop, motion, turn, point in direction, go to, glide, sequence, event, task, design, code, run the code, order, note, chord, stage, costume, backdrop, design, algorithm, bug, debug
Year 4	**Audio editing** Audio, record, playback, microphone, speaker, headphones, input, output, sound, start, pause, stop, podcast, save, file, edit, selection, open, mixing, time shift, export, MP3, audio, editing, evaluate, feedback **Data logging** Data, table (layout), input device, sensor, data logger, logging, data point, interval, analyse, data set, import, export, data, data logger, logged, collection, review, conclusion **Photo editing** Image, edit, arrange, select, digital, crop, undo, save, search, save, copyright, composition, pixels, crop, rotate, flip, adjustments, effects, colours, hue/saturation, sepia, version, illustrator, vignette, retouch, clone, recolour, magic wand, adjust, sharpen, brighten, fake, real, composite, cut, copy, paste, alter, background, foreground, publication, elements, original, font style, shapes, border, layer **Repetition in games** Scratch, programming, sprite, blocks, code, loop, repeat, value, block, repeat, forever, infinite loop, count-controlled loop, costume, repetition, forever, infinite loop, count-controlled loop, animate, costume, event block, duplicate, repeat, forever, modify, design, sprite, algorithm, duplicate, debug, refine, evaluate **Repetition in shapes** Program, turtle, commands, code snippet, algorithm, design, debug, pattern, repeat, repetition, count-controlled loop, value, trace, value, decompose, procedure **The internet** Internet, network, router, network security, network switch, server, wireless access point, website, web page, web address, routing, browser, World Wide Web, content, website, links, files, use, content, download, sharing, ownership, permission, Information, sharing, accurate, honest, content, adverts,
Year 5	**Flat file databases** Database, data, information, record, field, sort, order, group, search, value, criteria, chart, axis, compare, filter, graph, chart, presentation **Selection in physical computing** Microcontroller, Crumble controller, components, LED, Sparkle, crocodile clips, connect, battery box, program, repetition, infinite loop, output devices, motor, count-controlled loop, switch, condition, true, false, input, selection, condition, action, task, design, selection, condition, algorithm, program, debug, evaluate **Selection in quizzes** Selection, condition, true, false, count-controlled loop, outcomes, conditional statement (the linking together of a condition and outcomes), algorithm, program, debug, question, answer, debug, task, design, input, implement, design, test, run, test, setup, share, evaluate, constructive **Sharing info** System, connection, digital, input, process, output, protocol, address, packet, chat, explore, slide deck, reuse, remix, collaboration **Vector drawing** Vector, drawing tools, shapes, object, icons, toolbar, object, move, resize, colour, rotate, duplicate/copy, organise, zoom, select, rotate, alignment grid, resize, handles, consistency, modify, layers, object, front, back, order, copy, paste, group, ungroup, duplicate, reuse, improvement, evaluate, alternatives, **Video editing** Video, audio, recording, storyboard, script, soundtrack, dialogue, capture, zoom, storage, digital, tape, audio, AV (audiovisual), save, videographer, video techniques: Zoom, pan, tilt, angle, lighting, setting, YouTuber, content, light, audio/sound, camera angle, colour, Export, computer, Microsoft Movie Maker,

	split, trim/clip, edit, titles, end credits, timeline, transitions, soundtrack, content, retake/reshoot (choose agreed language), special effects, title screen, end credits, export, constructive feedback
Year 6	**3D modelling** 2D, 3D, 3D object, 3D space, view, resize, colour, lift, rotate, position, select, duplicate, dimensions, placeholder, hole, group, ungroup, resize, ungroup, design, modify, evaluate, improve **Communication** Search, search engine, Google, Bing, Yahoo!, Swisscows, DuckDuckGo, refine, index, crawler, bot, search engine, ranking, optimisation, links, content creator, selection, communication, internet, public, private, one-way, two-way, one-to-one, one-to-many, SMS, email, WhatsApp, blog, YouTube, Twitter, BBC Newsround **Sensing** Micro:bit, MakeCode, input, process, output, flashing, USB, selection, condition, if then else, variable, random, input, selection, condition, variable, sensing, accelerometer, compass, direction, navigation, design, task, algorithm, step counter, plan, create, code, test, debug **Spreadsheets** Spreadsheet, data, data heading, data set, cells, columns and rows, data item, data set, object, spreadsheet application, format, common attribute, formula, calculation, input, output, cell reference, calculate, operation, cell, range, duplicate, sigma, propose, question, organised, graph, chart, evaluate, results, comparison, questions, software, tools **Variables in games** Variable, change, name, value, set, design, event, algorithm, code, task, algorithm, artwork, program, project, code, test, debug, improve, evaluate, share **Web page creation** Website, web page, browser, media, Hypertext Markup Language (HTML), logo, layout, header, media, purpose, copyright, fair use, home page, preview, evaluate, device, Google Sites, breadcrumb trail, navigation, hyperlink, subpage, hyperlink, implication, external link, embed