Computing

National Curriculum 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.

EYFS Outcomes

People and communities: children talk about past and present events in their own lives and in the lives of family members. They know that other children don't always enjoy the same things, and are sensitive to this. They know about similarities and differences between themselves and others, and among families, communities and traditions.

The world: children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.

KS1 Outcomes

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 Outcomes

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.

What does it mean to be a user of technology?

- Competence in coding for a variety of practical and inventive purposes, including the application of ideas within other subjects
- The ability to connect with others safely and respectfully, understanding the need to act within the law and with moral and ethical integrity
- An understanding of the connected nature of devices
- The ability to communicate ideas well by using applications and devices throughout the curriculum
- The ability to collect, organise and manipulate data effectively

Progression of Skills and Knowledge

	EYFS	1	2	3	4	5	6	Links to Y7 Curriculum
Computing Systems and Networks								
	To discuss the similarities and differences between how we communicate with each other, and understand how technology has changed how we communicate e.g. letters, emails, texts, WhatsApp.	Start to become familiar with the different components of a computer by developing their keyboard and mouse skills.	Identify that a computer is a part of information technology and can find examples of it at home and school.	Be familiar with computer networks, including devices that make up a network's infrastructure, such as wireless access points and switches.	Understand that the internet as a network of networks which need to be kept secure	Understand how information is transferred between systems and devices.	Learn how we find information on the World Wide Web, through learning how search engines work (including how they select and rank results) and what influences searching	Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
			Identify the purpose of information technology.		.	Explain the input, output, and process aspects of a variety of different real-world systems eg. computers communicate with devices such as speakers, USBs, wireless, webcams and keyboards.		
Vocabulary	Technology, parts, phone, computer, tablet, old, new, internet, communicate	Technology, computer, mouse, keyboard, screen, program, file, save, delete, cursor, keys	IT, computer, information technology, device	Input, output, process, digital device, non-digital, network, connections, wireless, switch, server, access point	Networks, media, WWW, website, online, content, upload	Address, input, output, process, communication, transferred, computer system, media, shared files, online , offline, public, private, internet	Search engine, web crawlers, search, refine, index, communicate, private	
Online Safety	I understand that I can communicate using technology with both humans and robots.	Consider how to use technology responsibly.	Learn about using information technology responsibly.	Discover the benefits of connecting devices in a network.	Evaluate online content to decide how honest, accurate, or reliable it is, and understand the consequences of false information	Can collaborate safely as part of an online network.	Investigate different methods of communication and evaluate which methods are appropriate to use for particular purposes.	Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct, and know how to report concerns
Vocabulary	Humans, robots, communication, clear,	Technology, device, safe, healthy, rules, personal information	Use, rules, keep me safe, why we use IT, editing photos,	Self-image, selfie, record, personal information	Website, WWW, content online, legal, honest, protect	Communication through devices, online/offline, working	Sharing, fair-use, copyright-free, webpage, links,	

	personal information for you.		capturing images, personal information		content, sharing content, re-share, digital recording, images and editing, real/fake, personal information	together, public/private, collaboration, videos, edits personal information	content owned, personal information	
Creating Media – 2 units per year								
Images & Modelling		Images Develop their understanding of a range of tools used for digital painting and use these to create their own.	Images Recognise that different devices can be used to capture photographs and gain experience capturing, editing, and improving photos.		Images Understand how digital images can be changed and edited, and how they can then be resaved and reused.	Images Learn how to use the different drawing tools and how images are created in layers and that they can be grouped or duplicated.	3D Modelling Produce 3D models, including combining 3D objects.	Understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits Create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability
		Consider their preferences when painting with and without the use of digital devices	Recognise that images they see may not be real.		Consider the impact that editing images can have and evaluate the effectiveness of their choices.	Suggest improvements to a vector drawing.	Plan, develop, and evaluate their own 3D model.	
Audio			Audio Compare creating music digitally and non-digitally.		Audio Produce a short podcast, edit, save and open their work where appropriate. Evaluate their work and give feedback to their peers.			
			Use a computer to purposefully create music and look at patterns within it.		Discuss the ownership of digital audio and the copyright implications of duplicating the work of others.			
Text		Text Create, manipulate and change the look of text, whilst becoming more familiar with using a keyboard and mouse.		Text Use desktop publishing software and consider careful choices of font size, colour and type to edit and improve premade documents.			Text Investigate the creation of websites for a chosen purpose, identify what makes a good web page and use this information to design and evaluate their own website.	

		Explain the differences between using a computer to create text and writing text on paper and explain their preferences.		Start to add text and images to create their own pieces of work using desktop publishing software.			Pay specific attention to copyright and fair use of media.	
				Evaluate how and why desktop publishing is used in the real world.				
Animation and Video	I can create a GIF which combines at least 3 images using online software. Ie. IMovie.			Animation Use a range of techniques to create a stop frame animation. They apply those skills to create a story-based animation.		Video Learn how to create short videos - capturing, editing and manipulating videos.		
				Add other types of media to their animation, such as music and text.				
Vocabulary	Picture, join, GIF, camera, iPad, app, website, photo	Screen, tools, recreate, computer, brush Keyboard, processor, backspace, (double) clicking and dragging, keys, font, toolbar, undo	Portrait, landscape, capture, process, effect, format, sources Range, sequence, pattern, reopen, save	Animation, stop frame, storyboard, onion skinning, image Desktop publishing, font, communicate, page orientation, place holders, layouts, purpose	Digital device, audio, editing, input, output, podcast, device, digital recording, file, combine, export Editing, image, composition, select, retouch, 'fake' or 'real', publication	Tools, camera angles, microphone, visuals, filming, editing, retrieve, store, export Vector, alignment grids, resize, rotate, tools, zoom, layer, reuse, duplicate	HTML, purpose, copyright-free, fair use, navigation, hyperlinks, preview, content, website, user Graphic, 3D, modify, place holder, real world, represent, construct, model, criteria, multiple	
Data and Information		Sorting	Tally Chart/Pictogram	Branching Database	Data Logging	Database	Spreadsheets	
	Understand that objects can be sorted by their properties into different groups using simple language e.g. colour, shape, 2D/3D, boy/girl. This could be done physically using manipulatives e.g. using hoops (Venn diagram)	Begin to demonstrate their ability to sort objects into different groups, based on the properties they choose.	Begin to understand what data means and how this can be collected and organised.	Gain an understanding of what attributes are and how to use them to sort groups of objects by using yes/no questions, in a branching database.	Collect data and look at data points, data sets, and logging intervals.	Organise data in records and use tools within a database to order and answer questions about data.	Organise data into columns and rows, using spreadsheets.	Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users
		Use their ability to sort objects into different groups to answer questions about data.	Present data in the form of a tally chart, pictogram and block diagram.	Evaluate the effectiveness of branching databases and will decide what types of data should	Use a computer to review and analyse data. They then pose questions and then use data loggers to	Use a real-life database to answer a question, and present their work to others.	Begin to apply formulas to organise data in multiple cells.	

				be presented as a branching database.	automatically collect the data needed to answer those questions.			
			Use data to answer questions.				Create graphs and charts and evaluate their results in comparison to questions asked.	

| **Vocabulary** | Group, object. | Group, sort, property | Pictogram, data, format, attribute, information | Structure, order, pictogram, branching database, group, presenting information | Data, sensors, intervals, data logger, import, input devices | Navigate, database, field, record, flat-file database, grouping, value, 'AND', 'OR', filter, graph, refine | Formula, data set, data headings, spreadsheet, cell, data type, operations | |

Programming A

| | Physically act out a set of instructions and understand that instructions have an outcome e.g. aim to get a partner to a designated location. | Use individual commands, both with other learners and as part of a computer program.

Identify what each floor robot command does and use that knowledge to start predicting the outcome of programs. | Develop understanding of instructions in sequences and the use of logical reasoning to predict outcomes.

Use given commands in different orders to investigate how the order affects the outcome.

Design algorithms, test those algorithms as programs and debug them. | Identify that each sprite can be controlled by different commands.

Use a selection of motion, sound, and event blocks which they use to create their own programs, featuring sequences. | Use repetition and loops within a programme.

Create programs by planning, modifying, and testing commands to create shapes and patterns. | Write algorithms and programs, making use of their knowledge of repetition and conditions when introduced to the concept of selection (through the 'if... then...' structure). | Use variables to create a simulation.

Experiment with variables in an existing project. | Understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem

Use 2 or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions |

| **Vocabulary** | Instructions, follow, forward, rotate, backwards, left, right, again | Command, device, instruction, sequence, debug, solutions, programs | Algorithm, instructions, outcome, robot, program, sequence, debug | Object, Scratch, backdrop control, commands, project, program, code, attributes, identify | Repetition, programming, code snippet, value, pattern, outcome, count-controlled loop, chunks, repeat, procedure, debug | Output component, micro-controller, condition, met, infinite loop, switch, count-controlled, conditional, 'IF', ;THEN', debug | Variable, changes, algorithm, project, code snippet, improve, memory | |

| **Programming B** | | Explore the way a project looks by investigating/using | Begin to understand that sequences of commands have an outcome and make | Move a sprite in four directions (up, down, left, and right). | Understand the difference between count-controlled and infinite loops. | Learn how to write programs that ask questions and use selection to control | Create a simple program for learners to build in and test in the programming | Understand simple Boolean logic [for example, AND, OR |

		sprites and backgrounds. Use programming blocks to use, modify, and create programs.	predictions based on their learning. Use and modify designs to create their own work, which they then evaluate and make improvements where appropriate.	Explore movement within a context, through use of Pen blocks, drawing lines with sprites and changing the size and colour of lines.	Design and create a game which uses repetition, applying stages of programming design throughout.	the outcomes based on the answers given, eg. if, then, else commands Evaluate their program by identifying how it meets the requirements of the task, the ways they have improved it, and further ways it could be improved.	environment, before transferring it to their micro:bit. Use their previous knowledge of sequencing from Year 3, repetition from Year 4, selection from Year 5 and variables from Year 6 to create their own micro: bit-based program.	and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal] Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
Vocabulary		Programming, value, sprite, tool, commands	Sequence, design, algorithm, blocks, debug, outcome, feature	Event, action, feature, outcome, program, relationship, blocks, code	Repetition, snippet, code, count-controlled loop, repeated sequences, outcome	Condition, outcomes, infinite loop, design format, algorithm, program, flow	Controllable, device, physical input, variable, condition, program flow, fix bugs, test	