

Substantive and Disciplinary knowledge (conceptual and procedural) in Computing

INTENT

We believe a high-quality computing education equips pupils to use 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. At Brabourne School, pupils are introduced to a wide range of technology, including laptops, iPads and interactive whiteboards, allowing them to continually practice and improve the skills they learn. This ensures they become digitally literate so that they are able to express themselves and develop their ideas through information and computer technology— at a level suitable for the future workplace and as active participants in a digital world.

The principal aims of Computing at Brabourne are to ensure that all pupils:

- Access a high-quality computing curriculum equips pupils to use computational thinking and creativity to understand and change the world
- Have opportunities to make deep links with other subjects such as mathematics, science and design and technology
- Leave ready for the next stage of their education and early adult life
- Are trained for the digital age, able to harness the huge advantages of digital literacy, yet educated to be safe and secure online as both responsible children and adults of the future.

In line with the National Curriculum, we ensure that children:

- 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

End Points:**By the end of EYFS pupils will:**

1. Recognise that a range of technology is used in places such as homes and schools.
2. Be able to select and use technology for particular purposes. This includes operating and completing a range of simple programmes with an understanding of what they can achieve.

By the end of KS1 pupils will:

1. Have developed the basic skills of computer science to create simple programmes which employ the use of algorithms, with an understanding of what algorithms are.
2. Be able to find errors in their programmes and predict outcomes.
3. Know how to keep themselves safe online in a range of ways including how to respond to inappropriate contact and content.
4. Have a secure understanding and range of information technology skills.
5. Be able to locate and handle information from a range of digital sources including the online world.

By the end of Key Stage 2 pupils will:

1. Have developed further skills to create and manipulate programmes, using elements such as variables and debugging to accomplish specific goals.
2. Have a secure understanding of the role of algorithms and be able to successfully use them.
3. Have a secure understanding of how to keep themselves safe online. This includes identity and password security, identifying inappropriate and inaccurate content and being aware of cyber-bullying and knowing how to respond to it.
4. Have a sound knowledge of how to be a positive and responsible member of the online community.
5. Be able to select and manipulate software and online resources to create their own digital content.
6. Have a range of skills including being able to analyse, evaluate and present information on a range of devices for specific purposes.

IMPLEMENTATION

Teachers follow the mixed-year Kapow Scheme of Work to deliver the main part of the curriculum, which is a two year rolling programme. These cover the concepts of Computer Science, Information Technology and Digital Literacy. Lessons are planned to fit a rolling program of learning for mixed year groups which builds upon skills within each key stage, with clearly defined outcomes for each year group. Teachers are able to adapt this planning to fit with their wider medium term plans. This learning is supplemented by additional tools such as I pads, to teach more creative content, such as Green Screen and animation, as well as discrete lessons on the use of computers and E-Safety. We believe strongly in involving parents in this process and we deliver workshops throughout the year to educate parents on e-safety outside of school.

There are discrete units in the scheme which build upon knowledge of e-safety over the course of 7 years. Lessons from the scheme are taught discretely each week with individual year groups at a time, or can be blocked should the teacher choose. Monitoring standards of teaching and learning within Computing is the primary responsibility of the Computing Leader and takes place 3 times a year. Monitoring takes place through work scrutiny, learning walks, observations, pupil voice, teacher voice and reflective teacher feedback. Teachers keep a snap-shot of work in a 'Big Book', with examples of work covered throughout the year. At the beginning of each unit and throughout, children revisit prior learning and link this to new concepts being taught using a knowledge mind-map. At the end of the sequence, children record what new knowledge they have gained, building upon the concept already learnt previously. End of unit quizzes assess summatively what has been learnt. Computing is reinforced in other subjects throughout the broader curriculum.

Pupils will develop a deep understanding of key concepts as they move through our computing programme. Key concepts have been carefully considered and identified as the core knowledge and skills required to successfully achieve in computing. These key concepts are revisited and developed as the pupils move through the school to ensure that knowledge and skills are firmly embedded with their long-term memory.

We have categorised our lessons into the five concepts below, which we return to in each year group, making it clear to see prior and future learning for pupils and allowing teaching to fit into the pupils' wider learning journey.

- **Computing systems and networks:** (systems, networks and how they are used, the internet, hardware and software)
- **Programming:** (interpreting, creating and evaluating algorithms, programming to accomplish specific goals, detecting and correcting errors)

- **Data and information:** (collecting, analysing, evaluating, presenting data and information)
- **Creating media:** (design and development, communicating and collaborating online, evaluating online content, respectful and responsible communication, presenting, creating content)
- **Online Safety:** (knowing how to stay safe online)

Curriculum areas studied:

- **Computer systems & networks**
- **Programming**
- **Creating media**
- **Data Handling**
- **Online Safety**
- **Skills Showcase**

A typical teaching sequence in computing is designed to teach new skills, practise and refine these and give children the opportunity to use and apply them:

1. Set the learning that is about to take place within the chronology of pupils learning and skill development to date, starting with what the children know, understand, are able to do and able to say.
2. Specify key vocabulary / new terminology to be used and its meaning.
3. Develop understanding of the new knowledge or skill
4. Use and apply new skill or knowledge to achieve a required outcome
5. Provide opportunities for children to recall and practise new knowledge or skill
6. Assess and reflect on the learning and skill development that has taken place
7. Provide further teaching to address any errors/ misconception

Early Years Foundation Stage

- The current ELG for Technology is:
- Children recognise that a range of technology is used in places such as homes and schools. They select and use technology for particular purposes.
- The children in reception have opportunities to develop their understanding by:
- Interacting and accessing a variety of games (maths, phonics etc) and tools using the IWB to develop hand/eye coordination and listening and understanding skills.
- Know that we can use the IWB/laptop to find information, watch videos, look at photos, print resources.
- Making use of the Ipads to complete apps (maths, phonics, art, etc) and know that we can use the internet as a source to find information.
- Use Ipads to take photos and record videos as well as be able to look back and play them.
- Have access to a range of toys and equipment which make use of buttons, switches etc to support and develop their understanding through their play. Items such as torches, talls, phones, RC toys, remote controls, light boxes etc.
- Begin to explore Beebots and programme them to move in simple directions.

IMPACT

Teachers assess children's work in Computing by making informal judgments as they observe them during lessons. As part of our assessment for learning process, children will receive verbal feedback in order to aid their progress in the subject. Children are encouraged to self, peer and group assess work in a positive way. End of unit quizzes, pupil questioning and assessment of work/ mind-maps inform summative assessment. Monitoring/moderation of work is undertaken three times a year, against our progression document. Data-drops are collected three times a year to target any pupils working below. This is then discussed as a staff and any adjustments to the delivery of the curriculum can be made. Progress is reported to parents at the end of the year.

Computing overview

<i>Cycle A</i>				<i>Cycle B</i>		
Year 1/2	Usual curriculum year	Key area		Year 1/2	Usual curriculum year	Key area
Improving mouse skills	Year 1	Computing systems and networks	Autumn 1	Bee-bots	Year 1	Programming
Algorithms unplugged	Year 1	Programming	Autumn 2	Digital imagery	Year 1	Creating media
Rocket to the moon	Year 1	Skills showcase	Spring 1	Introduction to data	Year 1	Data handling
What is a computer?	Year 2	Computing systems and networks	Spring 2	Scratch Jr	Year 2	Programming
Algorithms and debugging	Year 2	Programming	Summer 1	Stop-motion	Year 2	Creating media
Word processing	Year 2	Computing systems and networks	Summer 2	International space station	Year 2	Data handling
Year 1			Online safety	Year 2		

<i>Cycle A</i>				<i>Cycle B</i>		
Year 3/4	Usual curriculum year	Key area		Year 3/4	Usual curriculum year	Key area
Emailing	Year 3	Computing systems and networks	Autumn 1	Networks and the internet	Year 3	Computing systems and networks
Programming: Scratch	Year 3	Programming	Autumn 2	Comparison cards	Year 3	Data handling
Video trailers	Year 3	Creating media	Spring 1	Journey inside a computer	Year 3	Computing systems and networks
Website design	Year 4	Creating media	Spring 2	Collaborative learning	Year 4	Computing systems and networks
Further coding with Scratch	Year 4	Programming	Summer 1	Investigating weather	Year 4	Data handling
Computational thinking	Year 4	Programming	Summer 2	HTML	Year 4	Skills showcase
Year 3			Online safety	Year 4		

Cycle A				Cycle B		
Year 5/6	Usual curriculum year	Key area		Year 5/6	Usual curriculum year	Key area
Micro:bit	Year 5	Programming	Autumn 1	Programming:Music	Year 5	Programming
Mars Rover 1	Year 5	Data handling	Autumn 2	Stop motion animation	Year 5	Creating media
Mars Rover 2	Year 5	Skills showcase	Spring 1	Search engines	Year 5	Computing systems and networks
Bletchley Park	Year 6	Computing systems and networks	Spring 2	Big data 1	Year 6	Data handling
History of computers	Year 6	Creating media	Summer 1	Big data 2	Year 6	Data handling
Inventing a product	Year 6	Skills showcase	Summer 2	Introduction To Python	Year 6	Programming
Year 5			Online safety	Year 6		

Progression in vocabulary

Unit	EYFS - Key Vocabulary
Using a computer	arrow, click, computer, computer safety, computer tower, cursor, drag, drop, keyboard, left click, letters, lock, log in, log out, lowercase, monitor, mouse, mouse control, move, numbers, paint, password, personal, protect, right click, secure, security, stamp, type, uppercase
All about instructions	adjective, algorithm, bend down, blindfold, debug, describe, duck, first, follow, give, hop, instructions, last, left, next, order, predict, prediction, right, run, second, sequence, shuffle, skip, stand still, step over, stop, straight on, third, tiptoe, timer, turn, two-part instructions, under, walk around
Exploring hardware	batteries, behind, blurred, blurry, buttons, camera, capture, clear, lick, computer, computer tower, crisp, digital camera, dial, digital clock, electricity, electric toothbrush, gallery, hard-drive, image, iPad, keyboard, keys, larger, lens, memory, mobile phones, monitor, motherboard, mouse, off, on, on top of, open, photograph, photographer, picture, point, power, pull, push, record, remote control, shoot, shut, smaller, speaker, still, system fan, tablets, technology, tinker, twist, under, USB stick, walkie-talkies
Programming Bee-Bots	algorithm, arrow, back, backwards, Bee-Bot, circle, debug, direction, directions, forward, instructions, left, program, right, route, sequence, straight on, turn
Introduction to data	altogether, bigger than, branch database, categorise, category, colour, collect, column, count, data, describe, divide, equal, graph, group, height, in total, least popular, length, less, more, most popular, pattern, pictogram, record, row, share, size, smaller than, sort, square, texture, thicker than, thinner than, weight

Unit	Year 1 - Key Vocabulary
Computing systems and networks: Improving mouse skills	account, click, ctrl, cursor, drag, drag and drop, digital photograph , drop, duplicate , keyboard, layers , log on/ in, log out/ off, menu, mouse, mouse pointer, password, right click, screen (monitor), software, tool , username
Programming 1: Algorithms unplugged	algorithm, automatic, bug, chunks , clear, code, debug, decompose , decomposition , device, directions, input , instructions, manageable , motion, order, organise, output, precise, programming, problem, robot, sensor, sequence, solution , specific , steps , tasks, virtual assistant
Skills showcase: Rocket to the moon	annotate, cells, components, create, data, debug, designing , digital content, digital image, document, e-document, edit, editing program, evaluate, folder, input, instructions, log in, photo, program, order, robot, save, sequence, share, software, spreadsheet, table
Programming 2: Bee-Bots	algorithm, artificial intelligence , Bee-Bot , clear, code, debug, demonstration , filming , inputting, instructions, pause, precise, predict, program, tinker, video, video recording (Option 2 only: emulator, virtual)
Creating media: Digital imagery	Background, blurred, camera, clear, crop, delete, device, digital camera, download, drag and drop, edit, editing software, filter, image, import, internet, keyword, online, photograph, resize, save as, screen, search engine, sequence, software, storage space, visual effects
Data handling: Introduction to data	bar chart, block graph, branching database, categorise, chart, click and drag, compare, count, data, data collection, data record, data representation, edit, input, keyboard, line graph, mouse, information, label, pictogram, pie chart, process, record, resize, sort, table, tally, values
Online safety	communicate, connect, console, devices, digital footprint , emotion, feelings, instructions, internet, internet safety, laptop, mood, online, personal information, phone, posting, predict, respect, sharing, smart device, smartphone, smart TV, smartwatch, strangers, tablet, trust, wired, wireless

Unit	Year 2 - Key Vocabulary
Computing systems and networks 1: What is a computer?	battery, buttons, camera, computer, desktop , device, digital , digital recorder, electricity, function, input, invention, keyboard, laptop , monitor , mouse, output, paying till , scanner, screen, system, tablet, technology , video, wires
Programming 1: Algorithms and debugging	abstraction , algorithm, artificial intelligence, bug, clear, correct, data, debug, decompose, error, key features , loop , predict, unnecessary
Computing systems and networks 2: Word processing	backspace, bold , copy, copyright, cut, delete, forward button , highlight , home row, home screen, image, import, italics , keyboard, keyboard character , keyword, layout, navigate, paste, redo, search, space bar, text, text effects, touch typing, underline, undo, word processing
Programming 2: Scratch Jr	algorithm, animation, blocks , bug, button, CGI , computer code, code (verb), debug, fluid , icon, imitate, instructions, loop, 'on tap', programming, repeat, Scratch JR , sequence, sound recording
Creating media: Stop motion	Animation, animator, background, digital device, drawing, flipbook, frames, moving images, opinion skinning, still images (Option 1- as above, plus: decompose, object, plan) (Option 2- as above, plus: decompose, digital camera, duration, focus, import, object, plan, save, upload) (Option 3- as above, plus: debug, effects, evaluate, fluid, pen tool, static)
Data handling: International space station	algorithm, astronaut, data, digital, digital content, experiment, galaxy, insulation, interactive map, International Space Centre, International Space Station, interpret, laboratory, monitor, planet, satellite, sensor, space, temperature, thermometer, water reservoir
Online safety	accept, comment, consent, content, deny, emojis, offline, online, password, permission, personal information, pop-ups, pressure, private information, reliable, share, terms and conditions, trusted adult

Unit	Year 3 - Key Vocabulary
Computing systems and networks 1: Networks and the internet	cables, component, connection, corrupted , data, desktop, device, DSL (digital subscriber line) , fibre , file, internet, laptop, network , network map , network switch , packets , radio waves, router , server, submarine cables, tablet, text map, The Cloud , web server, website, website trackers, WiFi , wired, wireless, Wireless Access Points , World Wide Web
Programming: Scratch	algorithm, animation, application , code, code block, coding application , debug, decompose, Interface , game, loop, predict, program, remixing code, repetition code, review, Scratch , sprite, tinker
Computing systems and networks 2: Emailing	attachment , bcc (blind carbon copy) cc (carbon copy), compose, content, cyberbullying , document, domain , download , email , email account , email address , emoji , emotions, fake , font, genuine , hacker , icons, inbox , information, link , log in, log out, negative language , password, personal information, positive language , reply , responsible digital citizen , scammer , settings , send , sign in , spam email , subject bar , theme , tone , username , virus , WiFi
Computing systems and networks 3: Journey inside a computer	algorithm, assemble , CPU (central processing unit) , data, decompose, desktop, disassemble , GPU (graphics processing unit) , hard drive , HDD (hard disk drive) , infinite loop, input, keyboard, laptop, memory , microphone , monitor, mouse, output, photocopier, program, QR code , RAM (random access memory) , ROM (read only memory) , storage , tablet device, technology, touchscreen , touchpad
Creating media: Video trailers	application, camera angle, clip , edit, film editing software , graphics , import, key events, photo, plan, recording, sound effects , storyboard, time code , trailer , transition , video, voiceover (Option 1 - as above, plus: cross blur , cross fade , cross zoom , desktop, digital device, dip to black , directional wipe , laptop) (Option 2 - as above, plus: cross dissolve , fade to black/white , slide , wipe)
Data handling: Comparison cards databases	categorise, category, chart, data, database, fields , filter , graph, information, interpret , PDF , questionnaire , record, representation, sort, spreadsheet
Online safety	accurate, age restricted , autocomplete , beliefs , block , content, digital devices, fact , fake news , internet, opinion , password, persuasive, privacy settings , reliable, report , requests , search engine, security questions , sharing, smart devices, social media platforms , social networking , wellbeing

Unit	Year 4 - Key Vocabulary
Computing systems and networks: Collaborative learning	animations, average , bar chart, collaboration , comment, conditional formatting , contribution , data, edited , email account, format , freeze , icon, images, insert , link, multiple choice , numerical data , pie chart, presentations , resolved , reviewing comments , share, slides , software, spreadsheets , suggestions , survey, teamwork , themes , transitions (Microsoft version add in: rating)
Programming 1: Further coding with Scratch	broadcast block , code blocks, conditional , coordinates , decomposition, features , game, information, negative numbers , orientation , parameters , position , program, project, script , sprite, stage , tinker , variables
Creating media: Website design	assessment , audience , collaboration, content, contribution, create, design , embed , evaluate, features, hyperlinks , images, insert , online, plan, progress , review, web page , website, World Wide Web (Google version add in: checklist , Google Sites , hobby , homepage , published , record, style , subpage , tab , theme) (Microsoft version add in: design view , information, Microsoft Sway , stack , storyline view , style , transform , web browser)
Skills showcase: HTML	code, component, content, copyright, CSS , end tag , fake news, hacking , heading , headline , hex code , HTML , input, internet browser , output, paragraph , permission, remixing , script , start tag , tags , text, URL , webpage
Programming 2: Computational thinking	abstraction, algorithm, code, computational thinking , decomposition, input, logical reasoning , output, pattern recognition , script , sequence, variable
Data handling: Investigating weather	accurate, backdrop , climate zone , cold, collaboration, condensation , cylinder, degrees , evaporation , extreme weather, forecast , heat sensor , lightning , measurement, pinwheel , presenter , rain, satellite, script , sensitive, sensor data , solar panel , tablet/digital camera, temperature, thermometer, tornado , warm, weather , weather forecast , wind
Online safety	accuracy , advantages , advertisements , belief , bot, chatbot, computer, distractions , fact, hashtag , implications , in-app purchases , influencer , opinion, program, recommendations , reliable, risks , screen time , search results , snippets , sponsored , trustworthy

Unit	Year 5 - Key Vocabulary
Computing systems and networks: Search engines	algorithm, appropriate, copyright, correct, credit, data leak, deceive, fair, fake, inappropriate, incorrect, index, information, keywords, network, privacy, rank, real, search engine, TASK, web crawler, website
Programming 1: Music	beat, bugs, coding, command, debug, decompose, error, instructions, loop, melody, mindmap, music, output, performance, pitch, play, predict, programming, rhythm, tempo, timbre, tinker, tutorials, typing (Sonic Pi version add in: buffer, format, live loops, rehearsal, repetition, sleep, Sonic Pi, soundtrack, spacing, typo) (Scratch version add in: plan, repeat, scratch, soundtrack, spacing)
Data handling: Mars Rover 1	8-bit binary, addition, ASCII, binary code, boolean, byte, communicate, construction, CPU, data transmission, decimal numbers, design, discovery, distance, hexadecimal, input, instructions, internet, Mars Rover, moon, numerical data, output, planet, radio signal, RAM, research, scientist, sequence, signal, simulation, space, subtraction, technology, transmit
Programming 2: Micro:bit	algorithm, animation, app, blocks, bluetooth, code block, connection, create, debug, decompose, designing, desktop, device, download, images, input, instructions, laptop, load, loop, Micro:bit, outputs, pairing, pedometer, polling, predict, program, repetition, reset, sabotage, scoreboard, screen, systematic, tablet, tinkering, USB, variables, wifi, wireless, wires
Creating media: Stop motion	animation, animator, background, character, decomposition, design, edit, evaluate, flip book, fluid movement, frame, model, moving images, still image, storyboard, thaumatrope, zoetrope (Option 1 add in: digital device, onion skinning, stop motion) (Option 2 add in: effects, photos, script)
Skills showcase: Mars Rover 2	3D, algorithm, binary image, CAD, compression, CPU, data, drag and drop, "Fetch, decode, execute", ID card, input, JPEG, memory, online community, operating system, output, pixels, RAM, responsible, RGB, ROM, safe
Online safety	accurate information, advice, app permissions, application, apps, bullying, communication, emojis, health, in-app purchases, information, judgement, memes, mental health, mindfulness, mini-biography, online communication, opinion, organisation, password, personal information, positive contributions, private information, real world, strong password, summarise, support, technology, trusted adult, wellbeing

Unit	Year 6 - Key Vocabulary
Computing systems and networks: Bletchley Park	acrostic code, brute force hacking, caesar cipher, chip and pin system, cipher, code, combination, contribute, convince, date shift cipher, discovery, hero, invention, Nth Letter Cipher, password, Pig Latin, Pigpen cipher, present, scrambled, secret, secure, technological advancement, trial and error
Programming: Introduction to Python	algorithm, code, command, design, import, indentation, input, instructions, loop, output, patterns, random, remix, repeat, shape
Data handling 1: Big data 1	algorithms, barcode, binary, Boolean, brand, chips, commuter, contactless, data, encrypted, infrared, MagicBand, privacy, proximity, QR code, QR scanner, radio waves, RFID, signal, systems/data analyst, transmission, wireless
Creating media: History of computers	background noise, byte, computer, devices, file, FX, gigabyte, graphics, hard drive, hardware, kilobytes, megabyte, memory storage, mouse, operating system, overlay, play, processor, radio play, RAM, Raspberry Pi, record, reverb, ROM, script, smartphone, sound, sound effects, terrabytes, touch screen, track, trackpad, trailer
Data handling 2: Big data 2	Big Data, bluetooth, corrupted, data, energy, GPS, improve, infrared, Internet of Things, personal, privacy, QR codes, revolution, RFID, SIM, simulation, Smart city, Smart school, stop motion, threat, wifi, wireless
Skills showcase: Inventing a product	adapt, advert, algorithm, bugs, coding, debugging, design, edit, electronic, evaluate, facts, image rights, images, influence, information, inputs, loops, manipulation, opinions, output, photos, product, program, repetition, screenshot, search engine, selection, sequence, snippets, software, structures, variables, video, website
Online safety	anonymity, antivirus, biometrics, block and report, consent, copy, digital footprint, digital personality, financial information, hacking, inappropriate, malware, online bullying, online reputation, password, paste, personal information, personality, phishing, privacy settings, private, reliable source, report, reputation, respect, scammers, screengrab, secure, settings, software updates, two factor authentication, URL, username

Progression of skills

Progression of skills

Computer Science

	EYFS	Year 1/2	
		Cycle A	Cycle B
Computational thinking	Using logical reasoning to understand simple instructions and predict the outcome.	<p>Learning that decomposition means breaking a problem down into smaller parts and articulating this.</p> <p>Using decomposition to solve unplugged challenges.</p> <p>Using logical reasoning to predict the behaviour of simple programs.</p> <p>Developing the skills associated with sequencing in unplugged activities.</p> <p>Following a basic set of instructions.</p> <p>Assembling instructions into a simple algorithm.</p> <p>Explaining what an algorithm is.</p> <p>Following an algorithm.</p> <p>Creating a clear and precise algorithm.</p> <p>Learning that programs execute by following precise instructions.</p> <p>Incorporating loops within algorithms.</p> <p>Decomposing a game to predict the algorithms used to create it.</p> <p>Learning that there are different levels of abstraction.</p>	<p>Using decomposition to solve unplugged challenges.</p> <p>Using logical reasoning to predict the behaviour of simple programs.</p> <p>Developing the skills associated with sequencing in unplugged activities.</p> <p>Following a basic set of instructions.</p> <p>Assembling instructions into a simple algorithm.</p> <p>Explaining what an algorithm is.</p> <p>Following an algorithm.</p> <p>Creating a clear and precise algorithm.</p> <p>Learning that programs execute by following precise instructions.</p> <p>Incorporating loops within algorithms.</p>
Programming	<p>Following instructions as part of practical activities and games.</p> <p>Learning to give simple instructions.</p> <p>Experimenting with programming a Bee-bot/Blue- bot and learning how to give simple commands.</p> <p>Learning to debug instructions, with the help of an adult, when things go wrong.</p>	<p>Learning to debug instructions when things go wrong.</p> <p>Learning to debug an algorithm in an unplugged scenario.</p> <p>Using logical thinking to explore software, predicting, testing and explaining what it does.</p> <p>Using an algorithm to write a basic computer program.</p>	<p>Programming a Floor robot to follow a planned route.</p> <p>Using programming language to explain how a floor robot works.</p> <p>Using logical thinking to explore software, predicting, testing and explaining what it does.</p> <p>Using an algorithm to write a basic computer program.</p> <p>Using loop blocks when programming to repeat an instruction more than once.</p> <p>Learning to debug instructions when things go wrong.</p> <p>Learning to debug an algorithm in an unplugged scenario.</p>

	Year 3/4		Year 5/6	
	Cycle A	Cycle B	Cycle A	Cycle B
Hardware	N/A	<p>Understanding what the different components of a computer do and how they work together.</p> <p>Drawing comparisons across different types of computers.</p> <p>Learning about the purpose of routers.</p> <p>Using tablets or digital cameras to film a weather forecast.</p> <p>Understanding that weather stations use sensors to gather and record data which predicts the weather.</p>	<p>Learning that external devices can be programmed by a separate computer.</p> <p>Learning the difference between ROM and RAM.</p> <p>Recognising how the size of RAM affects the processing of data.</p> <p>Understanding the fetch, decode, execute cycle.</p> <p>Learning about the history of computers and how they have evolved over time.</p> <p>Using the understanding of historic computers to design a computer of the future.</p>	<p>Understanding and identifying barcodes, QR codes and RFID.</p> <p>Identifying devices and applications that can scan or read barcodes, QR codes and RFID.</p> <p>Understanding how corruption can happen within data during transfer (for example when downloading, installing, copying and updating files).</p>
Networks and data representation	N/A	<p>Understanding that computer networks provide multiple services, such as the World Wide Web, and opportunities for communication and collaboration.</p> <p>Understanding the role of the key components of a network.</p> <p>Identifying the key components within a network, including whether they are wired or wireless.</p> <p>Understanding that websites and videos are files that are shared from one computer to another.</p> <p>Learning about the role of packets.</p> <p>Understanding how networks work and their purpose.</p> <p>Recognising links between networks and the internet.</p> <p>Learning how data is transferred.</p>	<p>Learning the vocabulary associated with data: data and transmit.</p> <p>Learning how the data for digital images can be compressed.</p> <p>Recognising that computers transfer data in binary and understanding simple binary addition.</p> <p>Relating binary signals (Boolean) to the simple character-based language, ASCII.</p> <p>Learning that messages can be sent by binary code, reading binary up to eight characters and carrying out binary calculations.</p> <p>Understanding how bit patterns represent images as pixels.</p>	<p>Understanding that computer networks provide multiple services.</p>

	Year 3/4		Year 5/6	
	Cycle A	Cycle B	Cycle A	Cycle B
Computational thinking	<p>Using decomposition to explore the code behind an animation.</p> <p>Using repetition in programs.</p> <p>Using logical reasoning to explain how simple algorithms work.</p> <p>Explaining the purpose of an algorithm.</p> <p>Forming algorithms independently.</p> <p>Using decomposition to solve a problem by finding out what code was used.</p> <p>Using decomposition to understand the purpose of a script of code.</p> <p>Identifying patterns through unplugged activities.</p> <p>Using past experiences to help solve new problems.</p> <p>Using abstraction to identify the important parts during both plugged and unplugged activities.</p>	<p>Using decomposition to explain the parts of a laptop computer.</p> <p>Explaining the purpose of an algorithm.</p>	<p>Decomposing a program without support.</p> <p>Predicting how software will work based on previous experience.</p> <p>Using past experiences to help solve new problems.</p> <p>Writing increasingly complex algorithms for a purpose.</p>	<p>Decomposing a program into an algorithm.</p> <p>Decomposing animations into a series of images.</p> <p>Decomposing a story to be able to plan a program to tell a story.</p> <p>Predicting how software will work based on previous experience.</p> <p>Writing increasingly complex algorithms for a purpose.</p>

Progression of skills

Information Technology

	EYFS	Year 1/2	
		Cycle A	Cycle B
Using software	Using a simple online paint tool to create digital art.	<p>Using a basic range of tools within graphic editing software.</p> <p>Taking and editing photographs.</p> <p>Developing control of the mouse through dragging, clicking and resizing of images to create different effects.</p> <p>Developing understanding of different software tools.</p> <p>Developing word processing skills, including altering text, copying and pasting and using keyboard shortcuts.</p> <p>Using word processing software to type and reformat text.</p> <p>Creating and labelling images.</p>	<p>Using a basic range of tools within graphic editing software.</p> <p>Taking and editing photographs.</p> <p>Developing control of the mouse through dragging, clicking and resizing of images to create different effects.</p> <p>Developing understanding of different software tools.</p> <p>Using software (and unplugged means) to create story animations.</p> <p>Creating and labelling images.</p>
Using email and internet searches	N/A	<p>Recognising devices that are connected to the internet.</p> <p>Understanding that we are connected to others when using the internet.</p> <p>Searching for appropriate images to use in a document.</p> <p>Understanding what online information is.</p>	<p>Searching and downloading images from the internet safely.</p> <p>Recognising devices that are connected to the internet.</p> <p>Understanding that we are connected to others when using the internet.</p>
Using data	<p>Representing data through sorting and categorising objects in unplugged scenarios.</p> <p>Representing data through physical pictograms.</p> <p>Exploring branch databases through physical games.</p>	<p>Understanding that technology can be used to represent data in different ways: pictograms, tables, pie charts, bar charts, block graphs etc.</p>	<p>Understanding that technology can be used to represent data in different ways: pictograms, tables, pie charts, bar charts, block graphs etc.</p> <p>Collecting and inputting data into a spreadsheet.</p> <p>Interpreting data from a spreadsheet.</p> <p>Using representations to answer questions about data.</p> <p>Using software to explore and create pictograms and branching databases.</p>
Wider use of technology	N/A	<p>Recognising common uses of information technology, including beyond school.</p> <p>Understanding some of the ways we can use the internet.</p> <p>Learning how computers are used in the wider world.</p>	<p>Learning how computers are used in the wider world.</p>

Progression of skills

Information Technology

	Year 3/4		Year 5/6	
	Cycle A	Cycle B	Cycle A	Cycle B
Using software	<p>Taking photographs and recording video to tell a story.</p> <p>Using software to edit and enhance their video adding music, sounds and text on screen with transitions.</p> <p>Designing and creating a webpage for a given purpose.</p> <p>Building a web page and creating content for it.</p> <p>Using software to work collaboratively with others.</p>	<p>Building a web page and creating content for it.</p> <p>Use online software for documents, presentations, forms and spreadsheets.</p> <p>Using software to work collaboratively with others.</p>	<p>Using logical thinking to explore software more independently, making predictions based on their previous experience, iterating ideas and testing continuously.</p> <p>Identify ways to improve and edit programs, videos, images etc.</p> <p>Using search and word processing skills to create a presentation.</p> <p>Independently learning how to use 3D design software package TinkerCAD.</p> <p>Creating and editing sound recordings for a specific purpose.</p> <p>Creating and editing videos, adding multiple elements: music, voiceover, sound, text and transitions.</p> <p>Using design software TinkerCAD to design a product.</p> <p>Creating a website with embedded links and multiple pages.</p>	<p>Using logical thinking to explore software more independently, making predictions based on their previous experience, iterating ideas and testing continuously.</p> <p>Identify ways to improve and edit programs, videos, images etc.</p> <p>Using search and word processing skills to create a presentation.</p> <p>Using software programme Sonic Pi/Scratch to create music.</p> <p>Using video editing software to animate.</p>
Using email and internet searches	<p>Learning to log in and out of an email account.</p> <p>Writing an email including a subject, 'to' and 'from.'</p> <p>Sending an email with an attachment.</p> <p>Replying to an email.</p>	<p>Understanding why some results come before others when searching.</p> <p>Using keywords to effectively search for information on the internet.</p> <p>Understanding that information found by searching the internet is not all grounded in fact.</p> <p>Searching the internet for data.</p>	<p>Understanding how search engines work.</p>	<p>Developing searching skills to help find relevant information on the internet.</p> <p>Learning how to use search engines effectively to find information, focussing on keyword searches and evaluating search returns.</p>

	Year 3/4		Year 5/6	
	Cycle A	Cycle B	Cycle A	Cycle B
Using data	N/A	<p>Understanding the vocabulary associated with databases: field, record, data.</p> <p>Learning about the pros and cons of digital versus paper databases.</p> <p>Sorting and filtering databases to easily retrieve information.</p> <p>Creating and interpreting charts and graphs to understand data.</p> <p>Understanding that data is used to forecast weather.</p> <p>Recording data in a spreadsheet independently.</p> <p>Sorting data in a spreadsheet to compare using the 'sort by...' option.</p> <p>Designing a device which gathers and records sensor data.</p>	<p>Understanding how data is collected in remote or dangerous places.</p> <p>Understanding how data might be used to tell us about a location.</p>	<p>Understanding how barcodes, QR codes and RFID work.</p> <p>Gathering and analysing data in real time.</p> <p>Creating formulas and sorting data within spreadsheets.</p>
Wider use of technology	<p>Understanding the purpose of emails.</p> <p>Recognising how social media platforms are used to interact.</p>	<p>Understanding that software can be used collaboratively online to work as a team.</p>	<p>Learn about different forms of communication that have developed with the use of technology.</p>	<p>Learning about the Internet of Things and how it has led to 'big data'.</p> <p>Learning how 'big data' can be used to solve a problem or improve efficiency.</p> <p>Learn about different forms of communication that have developed with the use of technology.</p>

Progression of skills

Digital Literacy

EYFS	Year 1/2 Cycle A	Year 1/2 Cycle B	
<p>Recognising that a range of technology is used for different purposes.</p> <p>Learning to log in and log out.</p>	<p>Logging in and out and saving work on their own account.</p> <p>When using the internet to search for images, learning what to do if they come across something online that worries them or makes them feel uncomfortable.</p> <p>Understanding how to interact safely with others online.</p> <p>Recognising how actions on the internet can affect others.</p> <p>Recognising what a digital footprint is and how to be careful about what we post.</p> <p>Identifying whether information is safe or unsafe to be shared online.</p>	<p>Learning how to create a strong password.</p> <p>Understanding 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</p> <p>Identifying whether information is safe or unsafe to be shared online.</p> <p>Learning to be respectful of others when sharing online and ask for their permission before sharing content.</p> <p>Learning strategies for checking if something they read online is true.</p> <p>When using the internet to search for images, learning what to do if they come across something online that worries them or makes them feel uncomfortable.</p> <p>Understanding how to interact safely with others online.</p>	
Year 3/4 Cycle A	Year 3/4 Cycle B	Year 5/6 Cycle A	Year 5/6 Cycle B
<p>Recognising that different information is shared online including facts, beliefs and opinions.</p> <p>Learning how to identify reliable information when searching online.</p> <p>Learning how to stay safe on social media.</p> <p>Considering the impact technology can have on mood.</p> <p>Learning about cyberbullying.</p> <p>Learning that not all emails are genuine, recognising when an email might be fake and what to do about it.</p>	<p>Recognising that information on the internet might not be true or correct and that some sources are more trustworthy than others.</p> <p>Learning to make judgements about the accuracy of online searches.</p> <p>Identifying forms of advertising online.</p> <p>Recognising what appropriate behaviour is when collaborating with others online.</p> <p>Reflecting on the positives and negatives of time spent online.</p> <p>Identifying respectful and disrespectful online behaviour.</p>	<p>Identifying possible dangers online and learning how to stay safe.</p> <p>Evaluating the pros and cons of online communication.</p> <p>Recognising that information on the internet might not be true or correct and learning ways of checking validity.</p> <p>Learning what to do if they experience bullying online.</p> <p>Learning to use an online community safely.</p> <p>Using search engines safely and effectively.</p> <p>Understanding the importance of secure passwords and how to create them.</p>	<p>Learning about the positive and negative impacts of sharing online.</p> <p>Learning strategies to create a positive online reputation.</p> <p>Understanding the importance of secure passwords and how to create them.</p> <p>Learning strategies to capture evidence of online bullying in order to seek help.</p> <p>Recognising that updated software can help to prevent data corruption and hacking.</p> <p>Recognising that information on the internet might not be true or correct and learning ways of checking validity.</p>

EYFS	Year 1/2	Year 3/4	Year 5/6	
	Cycle B only*	Cycle A only*	Cycle A	Cycle B
N/A	<p>To understand that holding the camera still and considering angles and light are important to take good pictures.</p> <p>To know that you can edit, crop and filter photographs.</p> <p>To know how to search safely for images online.</p> <p>To understand that an animation is made up of a sequence of photographs.</p> <p>To know that small changes in my frames will create a smoother looking animation.</p> <p>To understand what software creates simple animations and some of its features e.g. onion skinning.</p>	<p>To know that different types of camera shots can make my photos or videos look more effective.</p> <p>To know that I can edit photos and videos using film editing software.</p> <p>To understand that I can add transitions and text to my video.</p> <p>To know some of the features of web design software.</p> <p>To know that a website is a collection of pages that are all connected.</p> <p>To know that websites usually have a homepage and subpages as well as clickable links to new pages, called hyperlinks.</p> <p>To know that websites should be informative and interactive.</p>	<p>To know that radio plays are plays where the audience can only hear the action so sound effects are important.</p> <p>To know that sound clips can be recorded using sound recording software.</p> <p>To know that sound clips can be edited and trimmed.</p>	<p>To understand that stop motion animation is an animation filmed one frame at a time using models, and with tiny changes between each photograph.</p> <p>To know that decomposition of an idea is important when creating stop-motion animations.</p> <p>To know that editing is an important feature of making and improving a stop motion animation.</p>

Progression of knowledge

Computing systems and networks

EYFS	Year 1/2	Year 3/4		Year 5/6	
	Cycle B only*	Cycle A	Cycle B	Cycle A	Cycle B
<p>To be able to understand what a computer keyboard is and recognising some letters and numbers.</p> <p>To know that a mouse can be used to click, drag and create simple drawings.</p> <p>To know that to use a computer you need to log in to it and then log out at the end of your session.</p> <p>To know that different types of technology can be found at home and in school.</p> <p>To know that you can take simple photographs with a camera or iPad.</p> <p>To know that you must hold the camera still and ensure the subject is in the shot to take a photo.</p>	<p>To know that "log in and log out" means to begin and end a connection with a computer.</p> <p>To 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.</p> <p>To know that passwords are important for security.</p> <p>To know that when we create something on a computer it can be more easily saved and shared than a paper version.</p> <p>To know some of the simple graphic design features of a piece of online software.</p> <p>To know the difference between a desktop and laptop computer.</p> <p>To know that people control technology.</p> <p>To know that buttons are a form of input that give a computer an instruction about what to do (output).</p> <p>To know that computers often work together.</p> <p>To know that touch typing is the fastest way to type.</p> <p>To know that I can make text a different style, size and colour.</p> <p>To know that "copy and paste" is a quick way of duplicating text.</p>	<p>To know what a tablet is and to understand that email stands for 'electronic mail'.</p> <p>To know that an attachment is an extra file added to an email.</p> <p>To understand that emails should contain appropriate and respectful content.</p> <p>To know that cyberbullying is bullying using electronics such as a computer or phone.</p>	<p>To understand that software can be used collaboratively online to work as a team.</p> <p>To know what type of comments and suggestions on a collaborative document can be helpful.</p> <p>To know that you can use images, text, transitions and animation in presentations.</p> <p>To know what a tablet is and how it is different from a laptop/desktop computer.</p> <p>To understand what a network is and how a school network might be organised.</p> <p>To know that a server is central to a network and responds to requests made.</p> <p>To know how the internet uses networks to share files.</p> <p>To know that a router connects us to the internet.</p> <p>To know what a packet is and why it is important for website data transfer.</p> <p>To know the roles that inputs and outputs play.</p> <p>To know what some of the different components inside a computer are e.g. CPU, RAM, hard drive, and how they work together.</p>	<p>To know the difference between ROM and RAM.</p> <p>To understand the importance of having a secure password and what "brute force hacking" is.</p> <p>To know that the first computers were created at Bletchley Park to crack the Enigma code to help the war effort in World War 2.</p> <p>To know about some of the historical figures that contributed to technological advances in computing.</p> <p>To understand what techniques are required to create a presentation using appropriate software.</p>	<p>To understand the To know how search engines work.</p> <p>To understand that anyone can create a website and therefore we should take steps to check the validity of websites.</p> <p>To know that web crawlers are computer programs that crawl through the internet.</p> <p>To understand what copyright is.</p>

EYFS	Year 1/2		Year 3/4	Year 5/6	
	Cycle A	Cycle B	Cycle A only*	Cycle A	Cycle B
<p>To know that being able to follow and give simple instructions is important in computing.</p> <p>To understand that it is important for instructions to be in the right order.</p> <p>To understand why a set of instructions may have gone wrong.</p> <p>To know that you can program a Bee-Bot with some simple commands.</p> <p>To understand that debugging means how to fix some simple programming errors.</p> <p>To understand that an algorithm is a set of clear and precise instructions.</p>	<p>To understand that an algorithm is when instructions are put in an exact order.</p> <p>To know that input devices get information into a computer and that output devices get information out of a computer.</p> <p>To understand that decomposition means breaking a problem into manageable chunks and that it is important in computing.</p> <p>To know that we call errors in an algorithm 'bugs' and fixing these 'debugging'.</p> <p>To know that coding is writing in a special language so that the computer understands what to do.</p> <p>To understand that the character in ScratchJr is controlled by the programming blocks.</p> <p>To know that you can write a program to create a musical instrument or tell a joke.</p>	<p>To understand the basic functions of a Bee-Bot.</p> <p>To know that you can use a camera/tablet to make simple videos.</p> <p>To know that algorithms move a bee-bot accurately to a chosen destination.</p> <p>To understand what machine learning is and how that enables computers to make predictions.</p> <p>To know that loops in programming are where you set a certain instruction (or instructions) to be repeated multiple times.</p> <p>To know that abstraction is the removing of unnecessary detail to help solve a problem.</p>	<p>To know that Scratch is a programming language and some of its basic functions.</p> <p>To understand how to use loops to improve programming.</p> <p>To understand how decomposition is used in programming.</p> <p>To understand that you can remix and adapt existing code.</p> <p>To understand that a variable is a value that can change (depending on conditions) and know that you can create them in Scratch.</p> <p>To know what a conditional statement is in programming.</p> <p>To understand that variables can help you to create a quiz on Scratch.</p> <p>To know that combining computational thinking skills (sequence, abstraction, decomposition etc) can help you to solve a problem.</p> <p>To understand that pattern recognition means identifying patterns to help them work out how the code works.</p> <p>To understand that algorithms can be used for a number of purposes e.g. animation, games design etc.</p>	<p>To know that a Micro:bit is a programmable device.</p> <p>To know that Micro:bit uses a block coding language similar to Scratch.</p> <p>To understand and recognise coding structures including variables.</p> <p>To know what techniques to use to create a program for a specific purpose (including decomposition).</p>	<p>To know that there are text-based programming languages such as Logo and Python.</p> <p>To know that nested loops are loops inside of loops.</p> <p>To understand the use of random numbers and remix Python code.</p> <p>To know that a soundtrack is music for a film/video and that one way of composing these is on programming software.</p> <p>To understand that using loops can make the process of writing music simpler and more effective.</p> <p>To know how to adapt their code while performing their music.</p>

EYFS	Year 1/2	Year 3/4	Year 5/6	
	Cycle B only*	Cycle B only*	Cycle A	Cycle B
<p>To know that sorting objects into various categories can help you locate information.</p> <p>To know that using yes/no questions to find an answer is a branching database.</p> <p>To know that a pictogram is a way of showing information.</p>	<p>To know how that charts and pictograms can be created using a computer.</p> <p>To understand that a branching database is a way of classifying a group of objects.</p> <p>To know that computers understand different types of 'input'.</p> <p>To understand that you can enter simple data into a spreadsheet.</p> <p>To understand what steps you need to take to create an algorithm.</p> <p>To know what data to use to answer certain questions.</p> <p>To know that computers can be used to monitor supplies.</p>	<p>To know that a database is a collection of data stored in a logical, structured and orderly manner.</p> <p>To know that computer databases can be useful for sorting and filtering data.</p> <p>To know that different visual representations of data can be made on a computer.</p> <p>To 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'.</p> <p>To know that a weather machine is an automated machine that responds to sensor data.</p> <p>To understand that weather forecasters use specific language, expression and pre-prepared scripts to help create weather forecast films.</p>	<p>To know that Mars Rover is a motor vehicle that collects data from space by taking photos and examining samples of rock.</p> <p>To know what numbers using binary code look like and be able to identify how messages can be sent in this format.</p> <p>To understand that RAM is Random Access Memory and acts as the computer's working memory.</p> <p>To know what simple operations can be used to calculate bit patterns.</p>	<p>To know that data contained within barcodes and QR codes can be used by computers.</p> <p>To know that infrared waves are a way of transmitting data.</p> <p>To know that Radio Frequency Identification (RFID) is a more private way of transmitting data.</p> <p>To know that data is often encrypted so that even if it is stolen it is not useful to the thief.</p> <p>To know that data can become corrupted within a network but this is less likely to happen if it is sent in 'packets'.</p> <p>I know that devices or that are not updated are most vulnerable to hackers.</p> <p>To know the difference between mobile data and WiFi.</p>

Progression of knowledge

Online safety

EYFS	Year 1/2		Year 3/4		Year 5/6	
	Cycle A	Cycle B	Cycle A	Cycle B	Cycle A	Cycle B
N/A	<p>To know that the internet is many devices connected to one another.</p> <p>To know that you should tell a trusted adult if you feel unsafe or worried online.</p> <p>To know that people you do not know on the internet (online) are strangers and are not always who they say they are.</p> <p>To know that to stay safe online it is important to keep personal information safe.</p> <p>To know that 'sharing' online means giving something specific to someone else via the internet and 'posting' online means placing information on the internet.</p>	<p>To understand the difference between online and offline.</p> <p>To understand what information I should not post online.</p> <p>To know what the techniques are for creating a strong password.</p> <p>To know that you should ask permission from others before sharing about them online and that they have the right to say 'no.'</p> <p>To understand that not everything I see or read online is true.</p>	<p>To know that not everything on the internet is true: people share facts, beliefs and opinions online.</p> <p>To understand that the internet can affect your moods and feelings.</p> <p>To know that privacy settings limit who can access your important personal information. Information, such as your name, age, gender etc.</p> <p>To know what social media is and that age restrictions apply.</p>	<p>To understand some of the methods used to encourage people to buy things online.</p> <p>To understand that technology can be designed to act like or impersonate living things.</p> <p>To understand that technology can be a distraction and identify when someone might need to limit the amount of time spent using technology.</p> <p>To understand what behaviours are appropriate in order to stay safe and be respectful online.</p>	<p>To know different ways we can communicate online.</p> <p>To understand how online information can be used to form judgements.</p> <p>To understand some ways to deal with online bullying.</p> <p>To know that apps require permission to access private information and that you can alter the permissions.</p> <p>To know where I can go for support if I am being bullied online or feel that my health is being affected by time online.</p>	<p>To know that a 'digital footprint' means the information that exists on the internet as a result of a person's online activity.</p> <p>To know what steps are required to capture bullying content as evidence.</p> <p>To understand that it is important to manage personal passwords effectively.</p> <p>To understand what it means to have a positive online reputation.</p> <p>To know some common online scams.</p>

