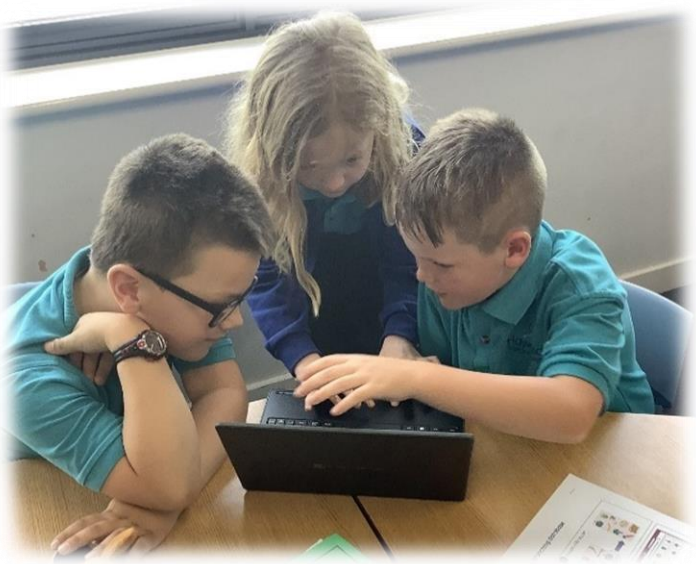
Cabot Learning Federation

I am a computer scientist

I am a computer scientist. I study computers and computing, including their theoretical and algorithmic foundations, hardware and software, and their uses for processing information. As a computer scientist, I am developing innovative ways of exploring information, and what I am able to do with it: enhancing my own thinking skills through algorithms, logic, visualisation, precision, and abstraction. I understand that computational thinking involves and illuminates other disciplines and the collaboration of these are vital, when addressing the advances in technology, and the inventive ways to use it. I am interested in pushing the boundaries of invention and transformation, using technology to creatively solve problems around me.



	Key Concepts	Contexts
What is computing? Algorithms have been used for around 4000 years, with evidence in Sumerian tablets displaying examples of division. People have used tools , such as an abacus, to help with logical thinking for 2000 years. Over time, these tools and algorithms have developed in complexity and the first modern computer was designed by Charles Babbage in the 1820s and 30s. Slow and massive machines have developed into more efficient and compact devices we know today. The versatile nature of this technology means that it is in constant use and is ever changing but in essence runs on similar mathematical principals as the original machines. The study and use of these machines and their algorithms is computer science.	**Computer components and resultant hardware** Computers are electronic devices used for storing or processing data (information). They can be used by inputting, storing, and outputting data. To do this, computer programs are written by coders (programmers) and can be very sophisticated. Therefore, computers do not think and cannot make decisions by themselves, rather the software (programs to do a specific job) enables users to interact to give (input) and receive (output) data.	Y1: Using computers Y2: How computers work and the internet Y3: Global computers Y4: Networks and data Y5: Computing & Security Y6: Compatibility and design
	Digital Literacy relates to having functional IT skills, which support the creation or presentation of content. To be digitally literate is to have access to a broad range of practices and cultural resources that you are able to apply to digital tools. It is the ability to make and share meaning in different modes and formats; to create, collaborate and communicate effectively and to understand how and when digital technologies can best be used to support these processes.	Y1: Word processing; Working with sound, images and video Y2: Word processing; Animation Y3: Working with sound, images and video; Handling Data Y4: Animation Y5: Presenting information online; Handling Data Y6: Working with sound, images and video
	Computational Thinking • Understanding and using algorithms: a sequence of specific, ordered instructions to complete a task • De-bugging: finding and resolving bugs (defects or problems that prevent the correct operation • Abstraction: removing or filtering out all unnecessary information to focus on what we need to solve a problem • Decomposition: breaking down a problem into smaller, easier to solve parts • Pattern Recognition: recognising patterns within outcomes	Y1: Introduction to algorithms Y2: Knowing and exploring algorithms Y3: Programming Y4: Being a Programme Engineer Y5: Complex Programming with conditions and patterns Y6: Mastering Programming
	Technology should be used safely, respectfully, and responsibly. Electronic safety (e-safety) incorporates: • Safe, respectful, responsible use of technology • Identifying dangers • Know where or who to contact if they have concerns	E-safety is explicitly taught within the CLF Citizenship/PSHE curriculum. Opportunities to develop pupils e-safety are expected to be referred to within the teaching of Computer Scientists.

Hardware support can be offered through the NCCE loan system: https://teachcomputing.org/physical-computing-kit

Key Concepts, Knowledge, Vocabulary and Skills – Computer scientists: Year 1

<table>
<tr><th>Key Concept</th><th colspan="2">Key Knowledge and Vocabulary</th><th colspan="2">Skills: Techniques & Application</th></tr>
<tr><td>Computer components and resultant hardware</td><td colspan="2">Using computers
Identify technology e.g. traffic lights, pass entry systems,
Identify a computer and its main parts e.g. monitor/screen, keyboard, central processing unit, mouse/navigator, speakers
Computers can do nothing, unless instructed by a user
Data is collected and can be stored on a computer
A network is two or more computers that are linked</td><td colspan="2">Using computers
Turning devices on/off safely
Using the equipment in a safe and respectful manner
Troubleshoot the computer/device for errors e.g. checklist for start up: monitor on, computer on</td></tr>
<tr><td rowspan="2">Digital Literacy relates to having functional IT skills, which support the creation or presentation of content.</td><td colspan="2">Word processing
See computer components key knowledge and vocabulary
There are words commonly used in in word processing:
Undo – To undo the last known command or action that the program was given
Format – To change the presentation of the information, e.g. layout or text
Edit – To make specific changes, including corrections to the presentation
Cursor – The cursor is an indicator of the current position for user interaction e.g. arrow
Font – The style of the words in the presentation</td><td colspan="2">Word processing
Type using a keyboard, locating letters, numbers, keys, and some punctuation (?!.), recognising two hands are required.
Explore different key features on a keyboard e.g., the space bar to make space, delete to delete letters and/or words / enter to make a new line and/or return
Use a shift key for punctuation including capital letters
Make the arrow keys move the cursor
Use ‘undo’ to remove changes
Move cursor and left click to select, using a mouse and trackpad, including selecting some / all the text by clicking and dragging
Use text within work
Edit and improve my work by changing, adding, or removing words
Use tools to edit - font size, colour, and style</td></tr>
<tr><td colspan="2">Working with sound, images and video:
Devices can capture photos of real life
Devices can capture a video of real life
Sounds can be recorded on digital devices</td><td colspan="2">Working with sound, images and video:
Take a photograph using a digital camera
Record a video using a camera application
Record sounds</td></tr>
<tr><td rowspan="2">Computational Thinking:
Understanding and using algorithms
De-bugging
Abstraction
Decomposition
Pattern recognition</td><td>Key Knowledge</td><td>Skills/Learning Checkpoints</td><td>Vocabulary</td><td>Ideas for Great Teaching</td></tr>
<tr><td>Introduction to algorithms
Algorithms:
An algorithm is a series of set of instructions
Know the sequence of an algorithm is important
De-bugging
Debugging is identifying and removing errors from an algorithm.
Abstraction:
Abstraction is taking out instructions you do not need in an algorithm
Decomposition:
Decomposition is solving a problem in smaller parts to make it easier
Pattern & Recognition:
Know which parts of instructions/algorithms are similar and different</td><td>I can predict, match and run an algorithm.

I can debug my program.

I can streamline my algorithm.

I can program my algorithm into manageable parts.

I can identify similar and different algorithms.</td><td>Command - A single instruction that can be used in a program to control a computer
Computer - A programmable machine that accepts and processes inputs and produces outputs (input, process, output; IPO)
Algorithm - A precise set of ordered steps that can be followed by a human and implemented on a computer to achieve a task
Program - A set of ordered commands that can be run by a computer to complete a task
Programming - the process of writing commands (coding)
Run - To action the commands in a program
Sprite - a 2-D image in a programme
Reset - to start again/to clear any errors</td><td>NCCE
Programming A – A robot
https://teachcomputing.org/curriculum/key-stage-1/programming-a-moving-a-robot

NCCE
Programming B -Programming animations
https://teachcomputing.org/curriculum/key-stage-1/programming-b-introduction-to-animation

Hardware/software requirements:

Bee-bot robots

Scratch Jr</td></tr>
<tr><td>Technology should be used safely, respectfully, and responsibly.</td><td colspan="4">Electronic safety (e-safety) incorporates:
Safe, respectful, responsible use of technology
Identifying dangers
Know where or who to contact if they have concerns
E-safety is explicitly taught within the CLF Citizenship/PSHE curriculum. Opportunities to develop pupils e-safety are expected to be referred to within the teaching of Computer Scientists.</td></tr>
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Key Concepts, Knowledge, Vocabulary and Skills – Computer scientists: Year 2

<table>
<tr><th>Key Concept</th><th colspan="2">Key Knowledge and Vocabulary</th><th colspan="2">Skills: Techniques & Application</th></tr>
<tr><td>Computer components and resultant hardware</td><td colspan="2">How computers work and the internet
• Know that computers have no intelligence and that computers can do nothing unless a program is run
• Know the purpose of a network and why they are computers are networked.
• Recognise different storage tools, e.g. memory sticks, external hard drives, cable connections i.e. USB
• The internet is a global network of computers, including online devices and servers
• The World Wide Web is the collection of public webpages stored on the internet
• Some websites are blocked or have limited access because of network administration permissions e.g. parental and school controls
• Explain the roles within a computer system for hardware and application software:
- Computer memory and processing speed
- Size of files and storage available
- There are operating systems and these may look differently
- Understand where files are stored and saved
• Be aware that websites and videos are files that are shared from one digital device to another. Know that computers collect data from various input devices, including sensors and application software., e.g. digital camera, mouse roller, gate/motion sensors, temperature and weather sensors</td><td colspan="2">How computers work and the internet
• Troubleshoot the computer/device to identify possible errors such as connections to networks, e.g. symbols for wi-fi, online/offline, battery power
• Seek technical help for an error message e.g. “cannot connect to the server”
• Correctly insert and remove different storage tools to ensure data in not corrupted

Maintain a safe and organised working environment e.g. keep liquids and consumables away; cables to be managed for safety</td></tr>
<tr><td rowspan="2">Digital Literacy relates to having functional IT skills, which support the creation or presentation of content.</td><td colspan="2">Word processing
• Know what is meant by the home, bottom and top rows when typing
• Know the shift and caps locks in capital letters
• Copy and paste means to select and copy text or images and relocate them within or to another document
• Know the indicators of programme errors in word processing e.g. lines beneath words for spelling errors
• Know shortcuts are commands to assist speed in function skills
• Know the universal symbols within operating platforms e.g., cursor arrow, saved disk, processing/thinking</td><td colspan="2">Word processing
• Type with awareness of home, bottom and top rows
• Use the shift and caps locks in capital letters
• Use the space bar only once between words and use touch to navigate to words / letters to edit
• Move the cursor using arrow keys and insert text and/or make changes
• Using ‘back space’ and delete interchangeably
• Click and drag to move items / highlight text and use arrow keys to edit
• Copy and paste images and text
• Use shortcuts for undo, redo, copy and paste
• Use spell check features to check text
Incorporate different tools: apply font style, minimise, and maximise pages, page set up and align text</td></tr>
<tr><td colspan="2">Animation
• Animation is sequence of still scenes/images that can create a sense of movement when viewed in rapid succession
• Stop-film animation is a term to describe capturing a photograph</td><td colspan="2">Animation
• Explain how an animation / flip chart works
• Create an animation to tell a story with more than one scene
• Create multiple animations of an image and edit these together
Design and produce a simple stop-film motion animation</td></tr>
<tr><td>Computational Thinking:
• Understanding and using algorithms
• De-bugging
• Abstraction
• Decomposition
• Pattern recognition</td><td>Key Knowledge</td><td>Skills/Learning Checkpoints</td><td>Vocabulary</td><td>Ideas for Great Teaching</td></tr>
<tr><td></td><td>Knowing and exploring algorithms
Algorithms:
• An algorithm is a series of set of instructions
• Know the sequence of an algorithm is important
• Be aware algorithms can be represented in simple formats [flow chart, storyboards, and narrative text]
De-bugging
• Debugging is identifying and removing errors from an algorithm.
Abstraction:
• Abstraction is taking out instructions you do not need in an algorithm
Decomposition:
• Decomposition is solving a problem in smaller parts to make it easier
Pattern & Recognition:
• Know which parts of instructions/algorithms are similar and different

Note: The Year 2 key knowledge and vocabulary is the same as Year 1</td><td>I can program a computer algorithm to perform a specific task

I can check, debug and update my program

I can improve and add to a program (existing and ones I have created)

I can create sequenced / ordered parts of a program

I can make changes to programs (existing and ones I have created)</td><td>• Sequence – a series of instructions/commands
• Algorithm - A precise set of ordered steps that can be followed by a human and implemented on a computer to achieve a task
• Program - A set of ordered commands that can be run by a computer to complete a task
• Debugging - The process of finding and correcting errors in a program
• Decomposition - To break down a task into smaller, more achievable steps
• Command - A single instruction that can be used in a program to control a computer
• Run - To action the commands in a program
• Sprite - a 2-D image in a programme
• Code - The commands that a computer can run</td><td>NCCE
Programming A – Robot algorithms
https://teachcomputing.org/curriculum/key-stage-1/programming-a-robot-algorithms

NCCE
Programming B -Programming quizzes
https://teachcomputing.org/curriculum/key-stage-1/programming-b-an-introduction-to-quizzes

Hardware/software requirements:

Bee-bot robots

Scratch Jr</td></tr>
<tr><td>Technology should be used safely, respectfully, and responsibly.</td><td colspan="4">Electronic safety (e-safety) incorporates:
• Safe, respectful, responsible use of technology
• Identifying dangers
• Know where or who to contact if they have concerns

E-safety is explicitly taught within the CLF Citizenship/PSHE curriculum. Opportunities to develop pupils e-safety are expected to be referred to within the teaching of Computer Scientists.</td></tr>
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Key Concepts, Knowledge, Vocabulary and Skills – Computer scientists: Year 3

<table>
<tr><th>Key Concept</th><th colspan="2">Key Knowledge and Vocabulary</th><th colspan="2">Skills: Techniques & Application</th></tr>
<tr><td>Computer components and resultant hardware</td><td colspan="2">Global computers
Recognise the components within digital devices [processor, memory storage, motherboard, display, speakers, microphone – other input devices webcam, finger-print scanner]
Recognise what computers do when they receive instructions that can not be executed [error messages]
Recognise one or more computing language [binary, html (hyper-text markup language)
Understand how computers can be connected to form a network either wirelessly or via LAN
The internet is a global network of computers, including online devices and servers
The World Wide Web is the collection of public webpages stored on the internet [understand URLs and domains)
URL means Universal Resource Locater and is an address to locate data
A domain is the name of a website e.g. google or BBC bitesize
Understand that copyright exists and that they are whole libraries of content available for public use</td><td colspan="2">Global computers
Troubleshoot the computer/device to identify possible visual errors such as connections to devices, e.g. microphone, speakers, camera, printers
Locate general device information e.g. wifi network, storage capacity and usage, which programmes are installed etc
Recognise when a problem can be solved individually without ’technical support’
Use the language URL and domain to describe the location of information and identify if there are errors with the domain or url
Relate domains and urls to wider world context e.g. home address, room locations in a building</td></tr>
<tr><td rowspan="2">Digital Literacy relates to having functional IT skills, which support the creation or presentation of content.</td><td colspan="2">Handling data
Data is facts and information collected for a purpose usually expressed as numbers, usually used with a computer
Data is collected for a variety of purposes, and this can be collected responsibly or irresponsibly i.e. with permission or not
Data can be considered more important than others, e.g. personal information
Spreadsheets is table to organise information. This is usually used for numerical information.
A cell is single point in a spreadsheet that holds one piece of information. This is usually a number
A formulae is an instruction. It is like an algorithm
There are formulas for functions: sum, count
Sorting means to organise the data by an order e.g. alphabetically, largest to smallest</td><td colspan="2">Handling data
How data can be used:
Identify real life scenarios where data is collected and interpretated e.g. weather
Collecting data:
Identify a line of enquiry that requires data in order to answer it e.g. “The older you are the taller you are.”
Review and select the appropriate method of collecting data
Collect data with paper/pencil and transfer to a computer program
Navigate the data handling software e.g. excel
Add text and numbers to spreadsheet cells with accuracy
Use formatting skills to aid organisation and presentation e.g. adding borders, bolding titles, colouring cells
Sharing data:
Discuss the data that has been shared, linking to the line of enquiry.
Analysing data:
Use functions to explore and highlight important data e.g. selecting sort or auto sum icons/tools
Answer questions relating to data collected and pose my own questions.
Notice patterns and trends in the data e.g. similarities and differences, most, least</td></tr>
<tr><td colspan="2">Working with sound, images, and video:
Devices (which capture photo, video, and sound) can be used to create a mixed media project
Photographs, videos, and sounds can be edited (using different tools) to create new digital artwork
A frame in a video is equivalent to a static / still image
Cropping means removing sections of video or images
Visual effects are the creation or adjustment to imagery, including video</td><td colspan="2">Working with sound, images, and video:
Create a mixed media outcome which contains audio, video, and music
Record a film with a clear brief, reviewing the creation noting areas for improvement, and reorder the film with the necessarily changes
Manipulate and or adjust images with effects: colour, features, framing etc</td></tr>
<tr><td>Computational Thinking:
Understanding and using algorithms
De-bugging
Abstraction
Decomposition
Pattern recognition</td><td>Key Knowledge</td><td>Skills/Learning Checkpoints</td><td>Vocabulary</td><td>Ideas for Great Teaching</td></tr>
<tr><td></td><td>Programming
Algorithms:
Different algorithms work for different purposes; there are patterns
Programs are executed by following precise and unambiguous instructions
It is possible to predict, and test completed algorithms
De-bugging
Debugging is necessary for all algorithms for a variety of situations
A systematic approach to debugging means describing, explaining and correcting errors
Abstraction:
A sequence of events will have more important information
Information is not always needed for the sequence of events and so some instructions can be removed.
Decomposition:
Decomposition can be explored without computers (unplugged activity): Visual representation, including mathematics can be used to solve problems.
Pattern & Recognition:
Patterns can be recognised and included within a program</td><td>I can recognise (and use) algorithms being represented in different ways (eg: as blocks)

I can recognise, use and build a sequence of commands.

I can decide actions for each individual sprite in a program.

I can add various additional features to improve a program.</td><td>Algorithm - A precise set of ordered steps that can be followed by a human and implemented on a computer to achieve a task
Bug – an unexpected problem in the code
Code - The commands that a computer can run
Commands - A single instruction that can be used in a program to control a computer
Debugging - The process of finding and correcting errors in a program
Programming - the process of writing commands (coding)
Run - To action the commands in a program
Sequence – a series of instructions/commands
Sprite - a 2-D image in a programme</td><td>NCCE
Programming A – Sequencing sounds
https://teachcomputing.org/curriculum/key-stage-2/programming-a-sequence-in-music

NCCE
Programming B – Events and actions in programs
https://teachcomputing.org/curriculum/key-stage-2/programming-b-events-and-actions

Hardware/software requirements:

Scratch</td></tr>
<tr><td>Technology should be used safely, respectfully, and responsibly.</td><td colspan="4">Electronic safety (e-safety) incorporates:
Safe, respectful, responsible use of technology
Identifying dangers
Know where or who to contact if they have concerns
E-safety is explicitly taught within the CLF Citizenship/PSHE curriculum. Opportunities to develop pupils e-safety are expected to be referred to within the teaching of Computer Scientists.</td></tr>
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Key Concepts, Knowledge, Vocabulary and Skills – Computer scientists: Year 4

<table>
<tr><th>Key Concept</th><th colspan="4">Key Knowledge and Vocabulary</th><th colspan="2">Skills: Techniques & Application</th></tr>
<tr><td>Computer components and resultant hardware</td><td colspan="4">Networks and data
There are a range of connected networks e.g. home network, school, organisation, national and intranets
Computer networks provide multiple services, such as the world wide web and opportunities for communication and collaboration
There are types of different network hardware where computers are linked e.g. desktop computers, mobile devices, servers, routers
A server is a computer or system that stores all the data of a website to allow access from another device (clients) and its user e.gl. cloud storage
An IP address (internet protocol address) is an unique address that identifies a device on the internet or a local network, using numbers
Digital computers use binary to represent all data
Packets of data are units of data made into a single package that travels along a given network path</td><td colspan="2">Networks and data
Identify the range of connected networks e.g. home network, school, organisation, national and intranets
Describe and design/map(draw) real and fictional networked devices and how they connect through websites, web pages, apps and IPs
Locate information about storage capacity on devices e.g. file explorer
Store and share data and understand the role of packets
Identify suitable storage locations for own information: e.g. saving files onto personal or school networks</td></tr>
<tr><td>Digital Literacy relates to having functional IT skills, which support the creation or presentation of content.</td><td colspan="4">Animation
Animation is a sequence of still images that can be planned, scripted, manipulated and edited
Different animation types: tradition / hand drawn animation; stop-film; 2D, 3D, motion graphics</td><td colspan="2">Animation
Use software to plan, script and create 3D animated stories
Improve and develop stop motion animation clips with techniques such as onion skinning
Editing sections of animation videos together to create a continuous piece
Export animations as GIFs or videos</td></tr>
<tr><td>Computational Thinking:
Understanding and using algorithms
De-bugging
Abstraction
Decomposition
Pattern recognition</td><td>Key Knowledge</td><td>Skills/Learning Checkpoints</td><td>Vocabulary</td><td>Ideas for Great Teaching</td></tr>
<tr><td></td><td>Being a Programme Engineer
A programme engineer will design using programming language for an intended purpose.
Algorithms:
Understand that a program is a sequence of statements written in programming language
Algorithms for use when programming can become increasingly more precise
Remix existing code
De-bugging
Being systematic and applying logical reasoning can assist in the detection and correction of errors in programs
Abstraction:
Abstraction (removing of instructions) can help to focus on what is important in a design
Abstraction (removing of instructions) ad pattern recognition can help to modify code
Decomposition:
Decomposition can be explored without computers (unplugged activity): Visual representation, including mathematics can be used to solve problems
Pattern & Recognition:
Procedures, pattern matching, and simple selection can be used in algorithms
Know that a computer can repeatedly call a procedure
A procedure is set of coded instructions within the program
Patterns are similarities or characteristics that some of the problems share
Pattern recognition involves finding the similarities or patterns among small, decomposed problems that can help us solve more complex problems more efficiently
Simple selection is a decision or question. In an algorithm, there may need to be a question because the algorithm has reached a step where one or more options are available. Depending on the answer given, the algorithm will follow certain steps and ignore others</td><td>I can use block and text-based programming (eg: Scratch, Logo).

I can identify and use loops (patterns) within programming.

I can choose which values to change within a loop.

I can predict outcomes in a program and develop it by debugging.

I can reuse code so more than one loop/sequence runs at the same time.</td><td>Algorithm - a precise set of ordered steps that can be followed by a human and implemented
Animate – to create movement using a series of still images
Code – the commands that a computer can run
Code snippet – a section of code on a computer to achieve a task
Commands - a single instruction that can be used in a program to control a computer
Count-controlled loop – a set of instructions that repeats a set amount of times
Infinite loop – a set on instructions that repeats endlessly
Debugging - the process of finding and correcting errors in a program
Duplicate – to copy
Programming - the process of writing commands (coding)
Sprite – a 2-D image in a programme
Variable – a value that can change depending on instructions.</td><td>NCCE
Programming A – Repetition in shapes
https://teachcomputing.org/curriculum/key-stage-2/programming-a-repetition-in-shapes

NCCE
Programming B – Repetition in games
https://teachcomputing.org/curriculum/key-stage-2/programming-b-repetition-in-games

Hardware/software requirements:

FMS Logo (free download)
Or
Turtle Academy (can be used on tablets/iPads)

Scratch</td></tr>
<tr><td>Technology should be used safely, respectfully, and responsibly.</td><td colspan="4">Electronic safety (e-safety) incorporates:
Safe, respectful, responsible use of technology
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E-safety is explicitly taught within the CLF Citizenship/PSHE curriculum. Opportunities to develop pupils e-safety are expected to be referred to within the teaching of Computer Scientists.</td><td colspan="2"></td></tr>
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Key Concepts, Knowledge, Vocabulary and Skills – Computer scientists: Year 5

<table>
<tr><th>Key Concept</th><th colspan="3">Key Knowledge and Vocabulary</th><th colspan="2">Skills: Techniques & Application</th></tr>
<tr><td>Computer components and resultant hardware</td><td colspan="3">Computing & Security
• There are a range of computing technology that is used as part everyday life e.g. contactless payments, mobile apps, entry systems, security surveillance systems
• The security of data relates to passwords, access privileges/rights and data encryption
• Data encryption means the process of converting data into an unusable form (but knowing this does not itself stop hacking or data theft)
• Malware (short for malicious software) means software which is designed to harm or exploit any programmable device, service or network e.g. viruses, ransomware and spyware
• A computer virus is a type of malicious code or program written to alter the way a computer operates and that is designed to spread from one computer to another
• Antivirus is a kind of software used to prevent, scan, detect and delete viruses from a computer</td><td colspan="2">Computing & Security
• Check network connection and availability for owned devices, including ‘levels of access’ and the source of connection
• Identify network speed and how to improve connection
• Explain the impact a server may have on a connection speed and suggest improvements
• Transfer data safely and securely across the internet with an understanding of data protection rules, including encryption of messages
• Describe and map(draw) real and fictional networked devices and the intended security and access privileges/rights, including home and organisational access, as well as software program installation rights
Identify unsafe networks or websites, including signs of malware or viruses</td></tr>
<tr><td rowspan="2">Digital Literacy relates to having functional IT skills, which support the creation or presentation of content.</td><td colspan="3">Handling data
• Collect data and identify where it could be inaccurate
• Discrete data is data that can only take specific values e.g. shoe size
• Continuous data is data that can take any value or range of value e.g. height
• There are different graphs that can be used for different purposes. These include bar charts, pie charts, pictograms, line graphs, scatter graphs
• Formulae: count, sum, average, sum conversion, countif,
• Filtering means to show or hide particular data e.g. numbers greater than 25
• Conditional formatting is a visual form of filtering and highlights particular data e.g. show cell in red if greater than 2
• Interpretating means drawing conclusions.
• A database is a collection of structured information e.g. a database on land based animals
• Databases hold information in fields. A field is single point to hold one piece of information used in a database. This is usually in words.</td><td colspan="2">Handling data
How data can be used
• Identify real life scenarios where data is collected and interpretated, which is known or unknow to them e.g. pupil voice, number plate car tracking
Collecting data
• Add text and numbers to spreadsheet cells
• Use formatting skills to aid organisation and presentation e.g. number formatting (£, decimals, date), data validation
• Organising data in a systematic way entering common characteristics of the data, including labelling columns and rows e.g. numbers for height measurements
Sharing data
• Collect data using an electronic device and appropriate program e.g. excel
• Present data in a graph, selecting the most appropriate layout
• Selecting the most suitable representation for the data e.g. line graph to represent continuous data
• Presenting data to an audience and sharing the answer to a chosen enquiry
Analysing data:
• Answer questions relating to graphs and pose my own questions
• Interpretating data identifying patterns, correlations
• Use skills to scrutinise the data: sorting, filtering, conditional formatting</td></tr>
<tr><td colspan="3">Presenting information online
• An ebook is short for "electronic book" and uses either a computer, mobile device or ebook reader to display the content
• Webpages are created using code known as hmtl
• Html is an acronym for HyperText Markup Language (HTML). HTML is the set of codes inserted into a file intended for display on the Internet
Embedding means to place content, usually from a different website, onto a webpage rather sharing a webpage linking</td><td colspan="2">Presenting information online
• Create an eBook with text, images, and sound
• Design and publish a webpage and embed videos
• Make and export an interactive presentation including a variety of media, animations, transitions, and other effects.
• Create an interactive guide to an image by embedding digital content and publishing it online.
• Understand purpose e.g. inform, entertain or persuade
• Produce a website / web app which includes a variety of media
Be able to reflect on the effectiveness of a presentation and seek feedback</td></tr>
<tr><td>Computational Thinking:
• Understanding and using algorithms
• De-bugging
• Abstraction
• Decomposition
• Pattern recognition</td><td>Key Knowledge</td><td>Skills/Learning Checkpoints</td><td>Vocabulary</td><td colspan="2">Ideas for Great Teaching</td></tr>
<tr><td></td><td>Complex Programming with conditions and patterns
Algorithms:
• Write complex algorithms for a purpose, evaluate work, and identify errors
• Include a sequence, selection, and repetition commands, combined with variables as required, to implement a design
• The flow of a program refers to the sequence of the instructions in a program
• Understand that websites can be altered by exploring the code beneath the site
De-bugging
• Being systematic and applying logical reasoning can assist in the detection and correction of errors in programs
Abstraction:
• Understanding abstraction (removing of instructions) can help to identify errors in code i.e. what has been removed accidentally or deliberatively
Decomposition:
• Understand decomposition is and how it facilitates problem solving of increasing complex problems
Pattern & Recognition:
• Include patterns and selection to create specific outputs in algorithms.
• Compare various programmes to identify commonalities / similarities.
• A count-controlled loop repeats a series of one or more instructions until a determined number of repetitions of the loop/sequence has been completed
• An infinite loop is a sequence of instructions in a computer program which loops endlessly, either due to the loop having no terminating condition
• A conditional loop is a sequence of instructions in a computer program which repeats set of commands depending on the conditions set</td><td>I can use previous learning to explore physical computing (eg: micro:bit).

I can connect and program components.

I can create, test and debug a project.

I can create, identify and modify conditions in a program.

I can use condition and selection to test and share my program with others.</td><td>• Algorithm - a precise set of ordered steps that can be followed by a human and implemented
• Microcontroller – a self-contained microcomputer. Used to perform one specific job.
• Components – Hardware
• Condition – a state of something in the programme that’s true or false
• Conditional statement - used to make decisions in code based on whether a certain condition is true or false
• Count-controlled loop - a set of instructions that repeats a set amount of times
• Infinite loop - a set on instructions that repeats endlessly
• Input – information provided to a computer (mouse clicks, keys on a keyboard)
• Output – the result of an input
• Debugging - the process of finding and correcting errors in a program
• Programming - the process of writing commands (coding)
• Operator - An operator is a character, or characters, that determine what action is to be performed or considered (= > < etc.)
• Selection - Part of a program where if a condition is met, then a set of commands is run
• Variable - a value that can change depending on instructions.</td><td colspan="2">NCCE
Programming A – Selection in physical computing
https://teachcomputing.org/curriculum/key-stage-2/programming-a-selection-in-physical-computing

NCCE
Programming B -Selection in quizzes
https://teachcomputing.org/curriculum/key-stage-2/programming-b-selection-in-quizzes

Hardware/software requirements:

Micro:bit/Crumble devices + Microsoft makecode

Scractch</td></tr>
<tr><td>Technology should be used safely,</td><td colspan="5">Electronic safety (e-safety) incorporates:
• Safe, respectful, responsible use of technology
• Identifying dangers</td></tr>
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respectfully, and responsibly.	• Know where or who to contact if they have concerns E-safety is explicitly taught within the CLF Citizenship/PSHE curriculum. Opportunities to develop pupils e-safety are expected to be referred to within the teaching of Computer Scientists.

Key Concepts, Knowledge, Vocabulary and Skills – Computer scientists: Year 6

Key Concept	Key Knowledge and Vocabulary	Skills: Techniques & Application
Computer components and resultant hardware	**Compatibility and design** • There are links between internal parts within a computer, to ensure compatibility. • Compatibility is the ability to live and work together without any discrepancy • Not all hardware/components are compatible with each other (Window, Apple, *Linux,* Chrome) app compatibility • Computer software develops solve problems of compatibility, *i.e. compatible with Windows* • Updates refer to software improvements that are made and support the functionality of the software and hardware effectiveness **Servers** • A private server is any computer used as a server that is privately administrated. • A public server is data can be accessed by others who are also connected to it • Data transmission between digital computers over networks, including the internet i.e. IP addresses and packet switching • An IP address is a unique address that identifies a device on the internet or a local network. IP stands for "Internet Protocol," which is the set of rules governing the format of data sent via the internet or local network Packet switching is the transfer of small pieces of data across various networks. These data chunks or "packets" allow for faster, more efficient data transfer, i.e *When a user sends a file across a network, it gets transferred in smaller data packets, not in one pieces*	**Compatibility and design** • Link different parts of computer hardware to achieve an outcome *e.g.: raspberry pi, maKey-maKey* • Recognise where hardware components are compatible and not compatible • Critically analyse different networks, viewing their purpose and suitability for specific outcomes • Describe and design (draw) real and fictional networks, viewing their purpose and suitability for specific outcomes Recognise the need, rights/permissions and need to run software updates, which in turn support hardware
Digital Literacy relates to having functional IT skills, which support the creation or presentation of content.	**Working with sound, images and video:** • Green screen is a technique used to create special effects through the use of a green backdrop (large or small scale). • A WEBMs is an audio-visual media file format which is designed for sharing files • GIF is a graphic interchange format which presents as a short, looped animation • Editing is used to remove unwanted elements, join different parts, adjust the geometry or to enhance the effects of the image. video or sound Photo editing is the process in digital photography of making adjustments to photographs in a photo editing program	**Working with sound, images and video:** • Create a video of high quality, using a range of media – green screen, animations, film, and image • Incorporate different tools in video creating including subtitles, crop, resize • Create a purposeful multi-layered digital image, for a specific design brief • Evaluate and discuss images explaining effects and filters that been used to enhance the media • Create WEBMs and MP4 with sound GIFS • Create different sound GIFs • Store, retrieve and export media to a computer • Explore photo editing capabilities, detailing changes made to an image

Computational Thinking: • **Understanding and using algorithms** • **De-bugging** • **Abstraction** • **Decomposition** • **Pattern recognition**	**Key Knowledge**	**Skills/Learning Checkpoints**	**Vocabulary**	**Ideas for Great Teaching**
	Mastering Programming Algorithms: • Increasingly complex algorithms are written for purpose • Generic code can be written for use across multiples projects • A variable are storage locations with assigned names (categories) that hold data that you can change or use later • Controllable device are ones which can be programmed and controlled De-bugging • Editing code contributes to unsuccessful and successful outputs and applications • A software bug is an error in a programme that causes it to produce an incorrect or unexpected result. The elimination of software errors is called bug fixing • A bug fix is a change to a system or product designed to handle a programming bug/glitch Abstraction: • Logical reasoning can help to explain how processes can be more efficient, reducing the number of potential steps needed in a program • Knowing abstraction is part of the planning process before creating algorithms Decomposition: • Use decomposition across a range of situations, to break down complex programs, making improvements where required Pattern & Recognition: • Recognise, and make use, of patterns across programming projects, identifying variables needed, and explain their uses in selection and repetition • A nested loop is a loop within a loop, an inner loop within the body of an outer one Iteration is the repetition of a process such as a loop	I can use, modify and create variables within a project. I can use different values in variables, predicting then testing these. I can write increasingly complex algorithms, using variables to extend projects. I can use abstraction/modifying to increase efficiency of a program. I will use a range of approaches to debug programs.	• Algorithm - a precise set of ordered steps that can be followed by a human and implemented • Accelerometer – a device that detects acceleration • Code - the commands that a computer can run • Debugging - the process of writing commands (coding) • Event – an action carried by software • Programming - the process of writing commands (coding) • Input - information provided to a computer (mouse clicks, keys on a keyboard) • Process - A program, or part of a program, that is running on a computer • Output - the result of an input • Operator - An operator is a character, or characters, that determine what action is to be performed or considered (= > < etc.) • Set – an unordered collection of objects • Variable - a value that can change depending on instructions.	NCCE Programming A – Variables in games https://teachcomputing.org/curriculum/key-stage-2/programming-a-variables-in-games NCCE Programming B - https://teachcomputing.org/curriculum/key-stage-2/programming-b-sensing **Hardware/software requirements:** Scratch Micro:bit + Microsoft makecode

Technology should be used safely, respectfully, and responsibly.	Electronic safety (e-safety) incorporates: • Safe, respectful, responsible use of technology • Identifying dangers • Know where or who to contact if they have concerns E-safety is explicitly taught within the CLF Citizenship/PSHE curriculum. Opportunities to develop pupils e-safety are expected to be referred to within the teaching of Computer Scientists.