Computing

By the end of Year 6 we want our pupils to:

- Understand and apply the fundamental principles and concepts of computer science, including logic, algorithms and data representation.
  (Computer science)

- Analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems.
  (Computer science).

- Evaluate and apply information technology, including new or unfamiliar technologies and solve problems.
  (Information technology)

- Be responsible, competent, confident and creative users of information and communication technology.
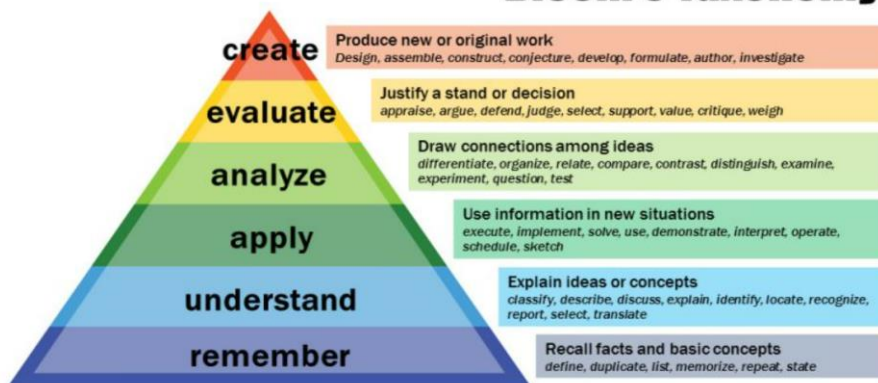 (Digital literacy)

Department for Education

Computing programmes of study: key stages 1 and 2

National curriculum in England

Purpose of study

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

Bloom's Taxonomy

create — Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate

evaluate — Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh

analyze — Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

apply — Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

understand — Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

remember — Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state

Teach Computing

Ofsted
raising standards
improving lives

Research and analysis
Research review series: computing
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Pupils need the computer skills for today and for their futures.

The Curriculum is made up of 3 strands:

Computer science (CS) will introduce children of all ages to understanding how computers and networks work. It will also give all children the opportunity to learn basic computer programming.

Information technology (IT) is about the use of computers for functional purposes, such as collecting and presenting information, or using search technology.

Digital literacy (DL) is about the safe and responsible use of technology, including recognising its advantages for collaboration or communication.

Curriculum

Our scheme of work for Computing is adapted from the 'Teach Computing' scheme and covers all aspects of the National Curriculum. This scheme was chosen as it has been created by subject experts and based on the latest pedagogical research. It provides an innovative progression framework where computing content (concepts, knowledge, skills/objectives) has been organised into interconnected networks called learning graphs. The curriculum aims to equip young people with the knowledge, skills and understanding they need to thrive in the digital world of today and the future. In EYFS the children use interactive screens, physical inputs and outputs and control floor robots to gain the skills and knowledge that will prepare them for Computing in year 1 and above.

Curriculum coverage from Year 1 to Year 6

Year group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	Technology all around us (Computer science)	Digital painting (Information technology)	Moving a robot (Computer science)	Grouping data (Information technology)	Digital writing (Information technology)	Programming animations (Computer science)
Year 2	Information technology around us (Computer science)/ (Information technology)	Digital photography (Information technology)	Robot algorithms (Computer science)	Pictograms (Information technology)	Making music (Information technology)	Programming quizzes (Computer science)
Year 3	Connecting computers (Computer science)	Creating media Stop-frame animation (Information technology)	Programming A Sequencing sounds (Computer science)/ (Information technology)	Data and information Branching databases (Information technology)	Creating media Desktop publishing (Information technology)	Programming B Events and actions in programs (Computer science)
Year 4	The Internet (Computer science)	Audio editing (Information technology)	Repetition in shapes (Computer science)/ (Information technology)	Data logging (Information technology)	Photo editing (Information technology)	Repetition in games (Computer science)
Year 5	Sharing information (Computer science)	Video editing (Information technology)	Selection in physical computing (Computer science)	Flat-file databases (Information technology)	Vector drawing (Information technology)	Selection in quizzes (Computer science)
Year 6	Computing systems and network - Communicatio	Creating Media- Web Page Creation	Programming A- Variables in Games (Computer	Data and Information- An introduction to	Creating Media- 3D modelling	Programming B- Sensing movement

	n and Collaboration (Computer science)	(Information technology)	science)/ (Information technology)	spreadsheets (Information technology)	(Information technology)	(Computer science)
Digital Literacy runs throughout all the units (and in PSHE)						

Direct links to other curriculum areas within existing year group

SCIENCE   /   HISTORY   /   Art & DT   /   MUSIC

Progression of vocabulary

	Explanation	Examples	Recommendation for teaching
Tier 1	**Everyday** words encountered in everyday conversation	dog go happy drink phone play sad	These words do not necessarily need to be explicitly taught, especially in upper grades with native English speakers. *Note: Children with learning difficulties or an English as a Second Language background may still benefit from explicit teaching of some Tier 1 words.*
Tier 2	Words that are needed in an academic context, and provide access to more complex topics and discussions outside of the everyday. Words that are useful across **multiple topic and subject areas**.	relative vary formulate specificity accumulate calibrate itemise falsely description hypothesis misfortune dignified faltered distinctly resolve	**Teachers should explicitly teach these words,** to ensure they can develop their students' understanding and expression of complex ideas. **These words are useful for multiple purposes**, and their use and understanding reflect and mature understanding of academic language. Students should learn to use Tier 2 words in multiple contexts and for multiple purposes.
Tier 3	Words that are **relevant for specific subjects or content-areas**. Words that have distinct meanings and purposes, relevant to a specialised topic or discourse.	lava carburettor legislature circumference aorta polyglot sonata isosceles	**Students should learn these for the particular content-areas**, but should not be preferenced over more useful Tier 2 words. Students should learn to use Tier 3 words in the context of the specific subject matter where they are useful.

Vocabulary

Throughout the Teach Computing Curriculum, we introduce new terms progressively and revisit them often. As such, this glossary is a first release that will be added to, revised, and updated regularly.

Glossary

There is a lot of vocabulary that carries over and across the different units of work.		
Green = Tier 1 Vocabulary	Pink = Tier 2 Vocabulary	Red = Tier 3 Vocabulary
Term	**Key Stage**	**Definition**
Algorithm	1&2	A precise set of ordered steps that can be followed by a human or a computer to achieve a task

Attribute (property)	1&2	A word or a phrase that can be used to describe an object such as its colour, size, or price
Browser	2	SEE: Web browser
Code	1&2	The commands that a computer can run
Code snippet	1&2	A section of a program viewed in isolation
Command	1&2	A single instruction that can be used in a program to control a computer
Computer	1&2	A programmable machine that accepts and processes inputs and produces outputs (input, process, output; IPO)
Computer network	2	A group of interconnected computing devices
Computer system	2	A combination of hardware and software that can have data input to it, which it then processes and outputs. It can be programmed to perform a variety of tasks.
Condition	2	A statement that can be either True or False
Condition-controlled loop	2	SEE: Loop (condition-controlled)
Count-controlled loop	2	SEE: Loop (count-controlled)
Data	1&2	A letter, word, number etc. that has been collected for a purpose, but stored without context
Data set	2	A collection of related data
Debugging	1&2	The process of finding and correcting errors in a program
Decompose	2	To break down a task into smaller, more achievable steps
Digital device	2	A computer or a device with a computer inside that has been programmed for a specific task
Domain name	2	The part of a website's URL that is user friendly and identifies that it is under the control of a particular person or organisation e.g. raspberrypi.org
Execute (run)	2	SEE: Run
Hardware	2	The physical parts of a computer system
HTML (HyperText Markup Language)	2	A standardised language used to define the structure of web pages
Hyperlink	2	(Also: link, weblink) Text or media that when clicked, takes the user to another specified location (URL)
Infinite loop	2	SEE: Loop (infinite)
Information	1&2	Data put into a context that provides meaning
Information technology	1	The study, use, and development of computer systems for storing, processing, retrieving, and sending information

Input	2	Data that is sent to a program to be processed
Input device	2	A piece of hardware used to control, or send data to, a computer
Internet	2	The global system of interconnected computer networks
Loop	2	(Count-controlled, condition-controlled, or infinite) Commands that repeatedly run a defined section of code
Loop (condition-controlled)	2	A command that repeatedly runs a defined section of code until a condition is met
Loop (count-controlled)	2	A command that repeatedly runs a defined section of code a predefined number of times
Loop (infinite)	2	A command that repeatedly runs a defined section of code indefinitely
Network	2	SEE: Computer network
Object	1	Something that can be named and has other attributes (properties), which can be labelled
Object	2	Something that is uniquely identifiable and has attributes
Output	2	The result of data processed by a computer
Output device	2	A piece of hardware that is controlled by outputs from a computer
Procedure	2	A named set of commands that can be called multiple times throughout a program. This type of subroutine does not return a value.
Process	2	A program, or part of a program, that is running on a computer
Program	1&2	A set of ordered commands that can be run by a computer to complete a task
Property (attribute)	1	A word or a phrase that can be used to describe an object such as its colour, size, or price
Repetition	2	Part of a program where one or more commands are run multiple times in a loop
Router	2	A device that manages the flow of data between computer networks
Run (execute)	1&2	To action the commands in a program
Selection	2	Part of a program where if a condition is met, then a set of commands is run
Server	2	A networked computer that manages, stores, and provides data such as files to other computers

Software	2	The programs used to control computers and perform specific tasks
Stored (data)	2	Data kept digitally so that it can be accessed by a computer
Subroutine	2	A named sequence of commands designed to perform a specific task
Switch (network switch)	2	A device that manages the flow of data packets within a computer network
Technology	1	The use of scientific knowledge for practical purposes
URL (Uniform Resource Locator)	2	The address of a file on the internet
Variable	2	A named piece of data (often a number or text) stored in a computer's memory, which can be accessed and changed by a computer program
Web	2	SEE: WWW (World Wide Web)
Web address	2	SEE: URL (Uniform Resource Locator)
Web browser	2	A program used to view, navigate, and interact with web pages
Web page	2	A HTML document viewed using a web browser
Website	2	A collection of interlinked web pages, stored under a single domain
Wi-Fi	2	A technology that allows devices to wirelessly access a network and transfer data
WAP (Wireless Access Point)	2	A network device that allows wireless computing devices to connect to a wired network
WWW (World Wide Web)	2	A service provided via the internet that allows access to web pages and other shared files

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Substantive knowledge and disciplinary knowledge (skills) progression KS1 and KS

YEAR 1	Unit 1 – Technology Around Us	Unit 2 – Digital Painting	Unit 3 – Moving a Robot	Unit 4 – Grouping Data	Unit 5 – Digital Writing	Unit 6 – Programming Animations
SUBSTANTIVE KNOWELDGE	I can name the main parts of a computer. I can switch on and log into a computer. I can discuss how we benefit from these rules for using technology responsibly. I can give examples of some of these rules. I can identify rules to keep us safe and healthy when we are using technology in and beyond the home. I can tell you that writing on a computer is called typing.	I can say which tools were helpful and why. I know that different paint tools do different jobs.	I can match a command to an outcome. I can predict the outcome of a command on a device. I can recall words that can be acted out. I can compare forwards and backwards movements. I can predict the outcome of a sequence involving forwards and backwards commands. I can start a sequence from the same place. I can compare left and right turns. I can experiment with turn and move commands to move a	I can describe objects using labels. I can describe an object. I can compare groups of objects. I can choose how to group objects. I can describe groups of objects. I can find objects with similar properties. I can describe a property of an object. I can record how many objects are in a group. I can decide how to group objects to answer a question.	I can compare using a computer with using a pencil and paper. I can say what tool I used to change the text. I can explain what the keys that I have learnt about already do. I can decide if my changes have improved my writing. I can say which method I like best.	I can compare different programming tools. I can say what happens when I change a value. I can decide how each sprite will move. I can show that a project can include more than one sprite. I can find blocks which have numbers.

			robot. I can predict the outcome of a sequence involving up to four commands. I can debug my program. I can explain what my program should do. I can identify several possible solutions. I can plan two programs. I can choose the order of commands in a sequence.	I can identify the label for a group of objects. I can record and share what I have found.		
DISCIPLINARY KNOWLEDGE	I know how to use a mouse to click and drag. I know how to click and drag to make objects on a screen. I know how to use a mouse to create a picture.	I know how to draw lines on a screen and explain which tools I used. I know how to make marks on a screen and explain which tools I used. I know how to use the paint tools to draw a picture.	I know how to run a command on a device. I know how to follow an instruction. I know how to give directions. I know how to use two different programs to get to the same place.	I know how to count objects. I know how to match objects to groups. I know how to group objects. I know how to count a group of objects.	I know how to open a word processor. I know how to recognise keys on a keyboard. I know how to identify and find keys on a keyboard. I know how to enter text into a computer.	I know how to run my program. I know how to find which commands move a sprite. I know how to use commands to move a sprite. I know how to test the programs.

I know how to use a mouse to open a program. I know how to type my name on a computer. I know how to delete letters. I know how to open my work from a file. I know how to save my work to a file. I know how to use the arrow keys to move the cursor.	I know how to make marks with the square and line tools. I know how to use the shape and line tools effectively. I know how to use the shape and line tools to recreate the work of an artist. I know how to choose appropriate shapes. I know how to create a picture in the style of an artist. I know how to make appropriate colour choices. I know how to choose appropriate paint tools and colours to recreate the work of an artist.		I know how to group similar objects. I know how to group objects in more than one way. I know how to count how many objects share a property.	I know how to use letter, number, and space keys. I know how to use backspace to remove text. I know how to identify the toolbar and use bold, italic, and underline. I know how to type capital letters. I know how to select a word by double-clicking. I know how to select all of the text by clicking and dragging. I know how to change the font. I know how to use 'undo' to remove changes. I know how to write a message on a computer and on paper.	I know how to use a start block in a program. I know how to use more than one block by joining them together. I know how to change the value. I know how to add blocks to each of my sprites. I know how to delete a sprite. I know how to choose appropriate artwork for my project. I know how to create an algorithm for each sprite. I know how to add programming blocks based on my algorithm. I know how to use sprites which match my design.

E Safety	Children recognise the Internet as an exciting place to be but understand the need for a balance in how they spend their time and make good choices about age appropriate activities. I know that work I create belongs to me. I know how to name my work so that others know it belongs to me.	Children begin to understand what personal information is and who you can share it with, including the need to keep passwords private. They begin to recognise the need to know who they are sharing their learning with online and recognise the difference between real and imaginary online experiences.		I understand that when I am working on an online platform, I may have access to the rest of the internet. I know who to tell when I see something that makes me uncomfortable.	Children know who to tell when they see something that makes them uncomfortable and make sure an adult knows what they are doing.	I understand that when I am working on an online platform, I may have access to the rest of the internet. I know who to tell when I see something that makes me uncomfortable. I know that work I create belongs to me. I know how to name my work so that others know it belongs to me
KEY VOCABULARY (see Glossary)	technology, computer, laptop, desktop, keyboard, screen, click, drag, mouse, program, type, save, edit, file, cursor, delete, text, Log in, username, password, log out, notification, save	Tools, line, shape, fill, undo, erase, brush, shape	Command, instruction, forwards, backwards, sequence,	Sort, criteria, data, collate, object	Keys,	Sprite, animation, sound effect, debug, debugging, command, code, block.

YEAR 2	Unit 1 – Information Technology Around Us	Unit 2 – Digital Photography	Unit 3 – Robot Algorithms	Unit 4 - Pictograms	Unit 5 – Making Music	Unit 6 – Introduction to Quizzes
SUBSTANTIVE KNOWELDGE	I can identify examples of computers. I can describe some uses of computers. I can identify that a computer is a part of information technology. I can explain the purpose of information technology in the home. I can talk about uses of information technology. I can compare types of information technology. I can list different uses of information technology. I can recognise how to use information	I can sort devices into old and new. I can talk about how to take a photograph. I can explain the process of taking a good photograph. I can identify what is wrong with a photograph. I can discuss how to take a good photograph. I can improve a photograph by retaking it. I can explore the effect that light has on a photo. I can experiment with different light sources.	I can show the difference in outcomes between two sequences that consist of the same commands. I can follow a sequence. I can predict the outcome of a sequence. I can compare my prediction to the program outcome. I can identify different routes around my mat. I can test my mat to make sure that it is usable. I can explain what my algorithm should achieve.		I can connect images with sounds. I can relate an idea to a piece of music. I can identify that music is a sequence of notes. I can recognise that images can be changed. I can use a computer to create a musical pattern using three notes. I can refine my musical pattern on a computer.	I can create an algorithm. I can predict the outcome of a sequence of commands. I can identify that a program needs to be started. I can identify the start of a sequence. I can show how to run my program. I can change the outcome of a sequence of commands. I can compare my project to my design. I can tell the actions of a sprite in an algorithm. I can match two sequences with the same outcome.

	technology responsibly. I can say how those rules/guides can help me. I can identify the choices that I make when using information technology. I can explain simple guidance for using information technology in different environments and settings. I can enjoy a variety of activities.	I can recognise that images can be changed. I can use a tool to achieve a desired effect. I can explain my choices. I can recognise which images have been changed. I can explain why a photo looks better in portrait or landscape format.	I can create an algorithm to meet my goal. I can use my algorithm to create a program. I can explain the choices I made for my mat design.			
DISCIPLINARY KNOWLEDGE	I know how to move and resize images. I know how to open a file. I know how to recognise that information technology can be connected. I know how to demonstrate how	I know how to capture digital photos and talk about my experience. I know how to take photos in both landscape and portrait format. I know how to focus on an object.	I know how to follow instructions given by someone else. I know how to choose a series of words that can be enacted as a sequence. I know how to give clear and unambiguous instructions.	I know how to record data in a tally chart. I know how to organise data in a tally chart. I know how to use a tally chart to create a pictogram. I know how to represent a tally count as a total.	I know how to use a computer to experiment with pitch and duration.	I know how to build sequences of blocks to match my design. I know how to create a program based on the new design. I know how to debug. I know how to improve my project by adding features.

information technology is used in a shop. I know how to find examples of information technology. I know how to explain how information technology helps people.	I know how to apply a range of photography skills to capture a photo. I know how to identify which images are real and which have been changed.	I know how to create different algorithms for a range of sequences (using the same commands). I know how to use an algorithm to program a sequence on a floor robot. I know how to plan algorithms for different parts of a task. I know how to put together the different parts of my program. I know how to test and debug each part of the program.	I know how to compare totals in a tally chart. I know how to enter data onto a computer. I know how to use a computer to view data in a different format. I know how to use pictograms to answer simple questions about objects. I know how to explain what the pictogram shows. I know how to tally objects using a common attribute. I know how to create a pictogram to arrange objects by an attribute. I know how to answer 'more than'/'less than' and 'most/least' questions about an attribute.		I know how to choose backgrounds for the design. I know how to choose characters for the design. I know how to build the sequences of blocks I need. I know how to decide which blocks to use to meet the design. I know how to choose the images for my own design.

				I know how to choose a suitable attribute to compare people. I know how to collect the data I need. I know how to create a pictogram and draw conclusions from it. I know how to use a computer program to present information in different ways. I know how to share what I have found out using a computer. I know how to give simple examples of why information should not be shared.		
E Safety	Children understand what personal information is and who you can share it with, including the need to keep passwords private. Children begin to recognise the need to know who they are	Recognising that images can be changed. Development an awareness that not all pictures they see are 'real'	Children know who to tell when they see something that makes them uncomfortable and make sure an adult knows what they are doing. I know that work I create belongs to me.	Children recognise the Internet as an exciting place to be but understand the need for a balance in how they spend their time and make good choices about age-appropriate activities.		I understand that when I am working on an online platform, I may have access to the rest of the internet. I know who to tell when I see something that makes me uncomfortable.

	sharing their learning with online and recognise the difference between real and imaginary online experiences. I know how to identify rules that help keep us safe and healthy in and beyond the home when using technology. I know how to give some simple examples.					I know that work I create belongs to me. I know how to name my work so that others know it belongs to me.
KEY VOCABULARY (see Glossary)	Technology	Photo, landscape, portrait, focus, edit, digital, light.	Algorithm, command, instructions, sequence, debug, test.	Pictogram, tally, compare, more / less than, data, totals.	Images, sound, pitch, duration, pattern, sequence.	Algorithm, project, design, sequences, run, blocks.

YEAR 3	Unit 1 – Connecting Computers	Unit 2 –Stop Frame Animation	Unit 3 – Sequence in Music	Unit 4 – Branching Databases	Unit 5 – Desktop Publishing	Unit 6 – Events and Actions
SUBSTANTIVE KNOWELDGE	I can explain that digital devices accept inputs.

I can explain that digital devices produce outputs.

I can explain how I use digital devices for different activities.

I can recognise similarities between using digital devices and non-digital tools.

I can suggest differences between using digital devices and non-digital tools.

I can discuss why we need a network switch. | I can explain how an animation/flip book works.

I can explain why little changes are needed for each frame.

I can predict what an animation will look like.

I can break down a story into settings, characters and events.

I can create a storyboard.

I can describe an animation that is achievable on screen. | I can explain that objects in Scratch have attributes (linked to).

I can identify the objects in a Scratch project (sprites, backdrops).

I can recognise that commands in Scratch are represented as blocks.

I can choose a word which describes an on-screen action for my design.

I can identify that each sprite is controlled by the commands I choose. | I can compare two branching database structures

I can create yes/no questions using given attributes.

I can explain that questions need to be ordered carefully to split objects into similarly sized groups.

I can compare two ways of presenting information.

I can explain what a branching database tells me.

I can explain what a pictogram tells me. | I can explain the difference between text and images.

I can identify the advantages and disadvantages of using text and images.

I can recognise that text and images can communicate messages clearly.

I can explain that text can be changed to communicate more clearly.

I can define the term 'page orientation'.

I can recognise placeholders and say why they are | I can explain the relationship between an event and an action.

I can identify a way to improve a program.

I can match a piece of code to an outcome.

I can modify a program using a design.

I can test a program against a given design. |

	I can explain how messages are passed through multiple connections. I can recognise different connections. I can demonstrate how information can be passed between devices. I can explain the role of a switch, server, and wireless access point in a network. I can recognise that a computer network is made up of a number of devices. I can identify how devices in a network are connected with one another. I can identify networked devices around me. I can identify the benefits of computer networks.	I can evaluate the quality of my animation. I can review a sequence of frames to check my work. I can evaluate another learner's animation. I can explain ways to make my animation better.	I can explain that the objects in my project will respond exactly to the code. I can explain what a sequence is. I can relate a task description to a design.		important. I can identify different layouts. I can compare work made on desktop publishing to work created by hand. I can identify the uses of desktop publishing in the real world. I can say why desktop publishing might be helpful.	

DISCIPLINARY KNOWLEDGE	I know how to follow a process. I know how to classify input and output devices. I know how to design a digital device. I know how to model a simple process.	I know how to create an effective flip book-style animation. I know how to draw a sequence of pictures. I know how to create an effective stop frame animation. I know how to improve my animation based on feedback. I know how to use onion skinning to help me make small changes between frames. I know how to add other media to my animation. I know how to evaluate my final film. I know how to explain why I added other media to my animation.	I know how to create a program following a design. I know how to create a sequence of connected commands. I know how to start a program in different ways. I know how to combine sound commands. I know how to order notes into a sequence. I know how to build a sequence of commands. I know how to decide the actions for each sprite in a program. I know how to make design choices for my artwork. I know how to identify and name the objects I will need for a project. I know how to implement my	I know how to create two groups of objects separated by one attribute. I know how to investigate questions with yes/no answers. I know how to make up a yes/no question about a collection of objects. I know how to arrange objects into a tree structure. I know how to create a group of objects within an existing group. I know how to select an attribute to separate objects. I know how to group objects using my own yes/no questions. I know how to prove my branching database works.	I know how to change font style, size, and colours for a given purpose. I know how to edit text. I know how to create a template for a particular purpose. I know how to choose the best locations for my content. I know how to make changes to content after I've added it. I know how to paste text and images to create a magazine cover. I know how to match a layout to a purpose. I know how to choose a suitable layout for a given purpose.	I know how to choose which keys to use for actions and explain my choices. I know how to choose a character for my project. I know how to choose a suitable size for a character in a maze. I know how to program movement. I know how to choose blocks to set up my program. I know how to consider the real world when making design choices. I know how to use a programming extension. I know how to build more sequences of commands to make my design work. I know how to choose suitable keys to turn on

			algorithm as code.	I know how to select objects to arrange in a branching database. I know how to create questions and apply them to a tree structure. I know how to select a theme and choose a variety of objects. I know how to use my branching database to answer questions.		additional features. I know how to identify additional features (from a given set of blocks). I know how to evaluate my project. I know how to implement my design. I know how to make design choices and justify them.
E Safety	Children recognise the need to keep personal information and passwords private. They recognise the need for a secure password	Copyright and ownership. Managing online information.	Children understand that an adult needs to know what they are doing online and understand how to report concerns, including cyberbullying.	Children understand that any personal information they put online can be seen and used by others.	Copyright and ownership. Managing online information.	Safety features of different apps and games.
KEY VOCABULARY (see Glossary)	Password, internet, blog, username, website, webpage, spoof website, PEGI rating	Animation, audio, design templates, entrance animation, font, media, presentation, presentation programme, slide, slideshow, stock image, text box, text formatting, transition		Questioning, database, construct, contribute, recording, data, data logger, present data data.	Template, layout, font, purpose, paste, text, images, publishing.	Action, algorithm, bug, code block, code design, command, debug/ debugging, design mode, event, If, input, output, repeat, object, properties, timer, computer

					simulation, selection, variable.

YEAR 4	Unit 1 – The Internet	Unit 2 –Audio Editing	Unit 3 –Repetition in Shapes	Unit 4 – Data Logging	Unit 5 – Photo Editing	Unit 6 – Repetition in Games
SUBSTANTIVE KNOWLEDGE	I can describe the internet as a network of networks. I can discuss why a network needs protecting. I can describe the different networked devices and how they connect. I can explain how the internet allows us to	I can identify digital devices that can record sound and play it back. I can identify the inputs and outputs required to play audio or record sound. I can recognise the range of sounds that can be recorded. I can discuss what other people include	I can explain the effect of changing a value of a command. I can identify everyday tasks that include repetition as part of a sequence, eg brushing teeth, dance moves. I can identify patterns in a sequence, eg 'step 3 times' means the same as 'step, step, step'.	I can choose a data set to answer a given question. I can identify data that can be gathered over time. I can suggest questions that can be answered using a given data set. I can explain that sensors are input	I can explain the effect that editing can have on an image. I can explore how images can be changed in real life. I can identify changes that we can make to an image. I can consider why someone might want to change the	I can list an everyday task as a set of instructions including repetition. I can predict the outcome of a snippet of code. I can recognise that some programming languages enable more than one process to be run at once.

view the World Wide Web.

I can recognise that the World Wide Web is the part of the internet that contains websites and web pages.

I can describe how to access websites on the WWW.

I can describe where websites are stored when uploaded to the WWW.

I can explain the types of media that can be shared on the World Wide Web (WWW).

I can explain that new content can be created online.

I can recognise that I can add content to the WWW.

I can explain that there are rules to protect content. | when recording sound for a podcast.

I can suggest how to improve my recording.

I can discuss why it is useful to be able to save digital recordings.

I can discuss ways in which audio recordings can be altered.

I can discuss sounds that other people combine.

I can use editing tools to arrange sections of audio.

I can discuss the features of a digital recording I like.

I can explain that digital recordings need to be exported to share them.

I can suggest improvements to a digital recording. | I can identify the effect of changing the number of times a task is repeated.

I can predict the outcome of a program containing a count-controlled loop.

I can explain that a computer can repeatedly call a procedure. | devices.

I can identify that data from sensors can be recorded.

I can plan how to collect data using a data logger.

I can explain the benefits of using a data logger. | composition of an image.

I can explain what has changed in an edited image.

I can talk about changes made to images.

I can explain why my choices fit a scenario.

I can talk about changes made to images.

I can give examples of positive and negative effects that retouching can have on an image.

I can identify how an image has been retouched.

I can sort images into 'fake' or 'real' and explain my choices.

I can talk about fake images around me.

I can compare the original image with my | I can explain what the outcome of the repeated action should be.

I can explain the effect of my changes.

I can identify which parts of a loop can be changed. |

						completed publication.	
	I can explain that websites and their content are created by people. I can suggest who owns the content on websites.					completed publication.	
DISCIPLINARY KNOWLEDGE	I know how to create media which can be found on websites. I know how to demonstrate how information is shared across the internet.	I know how to use a device to record audio and play back sound. I know how to plan and write the content for a podcast. I know how to save a digital recording as a file. I know how to edit sections of an audio recording. I know how to open a digital recording from a file. I know how to choose suitable sounds to include in a podcast.	I know how to create a code snippet for a given purpose. I know how to program a computer by typing commands. I know how to test my algorithm in a text-based language. I know how to use a template to create a design for my program. I know how to write an algorithm to produce a given outcome. I know how to use a count-controlled loop to produce a given outcome.	I know how to interpret data that has been collected using a data logger. I know how to use a data logger to collect data. I know how to propose a question that can be answered using logged data. I know how to draw conclusions from the data that I have collected. I know how to use data from a sensor to answer a given question. I know how to identify a suitable place to	I know how to change the composition of an image by selecting parts of it. I know how to consider the effect of adding other elements to my work. I know how to evaluate the impact of my publication on others through feedback. I know how to combine parts of images to create new images. I know how to choose appropriate tools to retouch an image. I know how to choose effects to make my	I know how to modify a snippet of code to create a given outcome. I know how to choose when to use a count-controlled and an infinite loop. I know how to modify loops to produce a given outcome. I know how to choose which action will be repeated for each object. I know how to evaluate the effectiveness of the repeated sequences used in my program.

				I know how to choose which values to change in a loop.	collect data.	image fit a scenario.	I know how to re-use existing code snippets on new sprites.
					I know how to identify the intervals used to collect data.	I know how to explain why my choices fit a scenario.	I know how to develop my own design explaining what my project will do.
				I know how to identify 'chunks' of actions in the real world.	I know how to talk about the data that I have captured.		I know how to evaluate the use of repetition in a project.
				I know how to use a procedure in a program.	I know how to import a data set.		I know how to select key parts of a given project to use in my own design.
				I know how to design a program that includes count-controlled loops.	I know how to use a computer program to sort data.		I know how to build a program that follows my design.
				I know how to develop my program by debugging it.	I know how to use a computer to view data in different ways.		I know how to evaluate the steps I followed when building my project.
				I know how to make use of my design to write a program.			I know how to refine the algorithm in my design.

E Safety	I can explain that not everything on the World Wide Web is true. I can explain why I need to think carefully before I share or reshare content. I can explain why some information I find online may not be honest, accurate, or legal.	Copyright and ownership.	Copyright and ownership. Managing online information.	Keeping data safe. Confidentiality.	Self-image and identity Children understand that any personal information they put online can be seen and used by others. They recognise that they can use online tools to collaborate and communicate with others and the importance of doing this responsibly, choosing age-appropriate websites. Children recognise the effect their writing or images might have on others.	Staying safe when gaming online.
KEY VOCABULARY (see Glossary)	Computer virus, cookies, copyright, digital footprint, email, identity theft, malware, phishing, plagiarism, spam, motherboard, CPU, RAM, Graphics Card, Network, Card, monitor, speakers keyboard and mouse.	Pitch, rhythm, pulse, tempo, dynamics, melody, rippler, texture.	Logo, BK, FD, RT, LT, REPEAT, SETPC, SETPS, PU, PD	Average, copy and paste, columns, cells, charts, equals tool, formula, formula wizard, move cell tool, random tool, rows, spin tool, spreadsheet, timer.	Edit, retouch, effect, image, composition,	Action, alert, algorithm, code design, control, command, debug/ debugging, design mode, event, flowchart bug, get input, If, If/Else, input, object, repeat, selection, computer simulation, simulation, timer, variable

YEAR 5	Unit 1 – Sharing Information	Unit 2 – Video Editing	Unit 3 –Selection in Physical Computing	Unit 4 – Flat file Databases	Unit 5 – Vector Drawing	Unit 6 – Selection in Quizzes

| SUBSTANTIVE KNOWELDGE | I can describe that a computer system features inputs, processes, and outputs.

I can explain that computer systems communicate with other devices.

I can explain that systems are built using a number of parts.

I can explain the benefits of a given computer system.

I can identify tasks that are managed by computer systems.

I can identify the human elements of a computer system.

I can explain that data is transferred over networks in packets.

I can explain that networked digital devices have unique addresses. | I can explain that a video can include both visual and audio media.

I can explain the benefits of adding audio to a video.

I can explain why lighting and angle are important in creating an effective video.

I can list some of the features of an effective video.

I can explain how to improve a video by reshooting and editing. | I can explain why I used an infinite loop.

I can explain that a condition is something that can either be true or false (eg whether a value is more than 10, or whether a button has been pressed).

I can explain that a condition being met can start an action.

I can identify a condition and an action in my project.

I can create a detailed drawing of my project.

I can describe what my project will do (the task).

I can identify a condition to start an action (real world). | I can explain how information can be recorded.

I can explain what a 'field' and a 'record' is in a database.

I can explain how information can be grouped.

I can explain the benefits of using a computer to create graphs. | I can discuss how a vector drawing is different from paper-based drawings.

I can identify the main drawing tools.

I can recognise that vector drawings are made using shapes.

I can explain that each element added to a vector drawing is an object.

I can identify the shapes used to make a vector drawing.

I can explain how alignment grids and resize handles can be used to improve consistency

I can identify that each added object creates a new layer in the drawing.

I can identify which objects are in the front layer or in the back layer of a drawing. | I can identify conditions in a program.

I can recall how conditions are used in selection.

I can identify the condition and outcomes in an if..then… else statement.

I can explain that program flow can branch according to a condition. |

	I can recognise that data is transferred using agreed methods. I can explain that the internet allows different media to be shared. I can recognise that connected digital devices can allow us to access shared files stored online. I can compare working online with working offline. I can make thoughtful suggestions on my group's work. I can suggest strategies to ensure successful group work. I can explain how the internet enables effective collaboration. I can identify different ways of working together online.					

	I can recognise that working together on the internet can be public or private.					
DISCIPLINARY KNOWLEDGE	I know how to send information over the internet in different ways.	I know how to plan a video project using a storyboard. I know how to choose the most suitable digital device for recording my project. I know how to identify and name digital devices that can record video and sound.	I know how to build a simple circuit to connect a microcontroller to a computer. I know how to program a microcontroller to light an LED. I know how to connect more than one output device to a microcontroller.	I know how to create multiple questions about the same field. I know how to order, sort, and group my data cards. I know how to navigate a flat-file database to compare different views of information. I know how to choose which field to sort data	I know how to move, resize, and rotate objects I have duplicated. I know how to apply what I have learned about vector drawings. I know how to suggest improvements to a vector drawing. I create alternatives to vector drawings.	I know how to modify a condition in a program. I know how to create a program with different outcomes using selection. I know how to use selection in an infinite loop to check a condition. I know how to design the flow of a program

| | | I know how to locate and identify the working features of a digital device that can record video.

I know how to demonstrate suitable methods of using a digital device to capture my video.

I know how to demonstrate the safe use and handling of devices.

I know how to select a suitable device and software to capture my video.

I know how to record a video that demonstrates some of the features of an effective video.

I know how to select the correct tools to make edits to my video.

I know how to store, retrieve, and export my | I know how to decide which output devices I control with a count-controlled loop.

I know how to design sequences for given output devices.

I know how to program a microcontroller to respond to an input.

I know how to experiment with a 'do until' loop.

I know how to use selection (an 'if… then…' statement) to direct the flow of a program.

I know how to test and debug my project.

I know how to use selection to produce an intended outcome.

I know how to write an algorithm to control lights and a motor. | by to answer a given question.

I know how to choose multiple criteria to answer a given question.

I know how to choose which field and value are required to answer a given question.

I know how to outline how 'AND' and 'OR' can be used to refine data selection.

I know how to combine grouping and sorting to answer more specific questions.

I know how to group information to answer questions.

I know how to refine a chart by selecting a particular filter.

I know how to select an appropriate chart to visually compare data. | I know how to copy part of a drawing by duplicating several objects.

I know how to group to create a single object.

I know how to reuse a group of objects to further develop my vector drawing.

I know how to modify objects to create different effects.

I know how to use the zoom tool to help me add detail to my drawings.

I know how to change the order of layers in a vector drawing. | which contains 'if… then… else…'.

I know how to show that a condition can direct program flow in one of two ways.

I know how to identify the outcome of user input in an algorithm.

I know how to outline a given task.

I know how to use a design format to outline my project.

I know how to implement my algorithm to create the first section of my program.

I know how to share my program with others.

I know how to test my program.

I know how to extend my program further. |

		recording to a computer. I know how to evaluate my video and share my opinions. I know how to make edits to my video and improve the final outcome. I know how to recognise that my choices when making a video will impact on the quality of the final outcome.		I know how to ask questions that will need more than one field to answer. I know how to present my findings to a group. I know how to refine a search in a real-world context.		I know how to identify ways the program could be improved. I know how to identify what setup code my project needs.
E Safety	Online relationships. Copyright and ownership.	Managing online information Online relationships Online reputation Self-image & identity.	Copyright and ownership.	Trusted sources of data.	Using social media apps safely.	Staying safe when on different apps.
KEY VOCABULARY (see Glossary)	System, hub, information, device, component, collaboration.	Video, moving images, sound / audio, camera, lens, record, zoom, angle / movement / pan, effects, transitions, edit.	Logic, command, input, output, variable, control, algorithm, program.	Spreadsheet, graph, chart, record, data, order, sort, field	Vector, shape, drawing, image, rotate, resize, colour, layer, effect, pixel.	Condition, outcome, flow, control, If..., else...

YEAR 6	Unit 1 – Communication	Unit 2 – Web Page Creation	Unit 3 –Variables in Games	Unit 4 – Introduction to Spreadsheets	Unit 5 – 3D Modelling	Unit 6 - Sensing
SUBSTANTIVE KNOWELDGE	I can explain why we need tools to find things online. I can recognise the role of web crawlers in creating an index. I can relate a search term to the search engine's index. I can explain that a search engine follows rules to rank relevant pages. I can explain that search results are ordered. I can suggest some of the criteria that a search engine checks to decide on the order of results.	I can discuss the different types of media used on websites. I can explore a website. I know that websites are written in HTML. I can recognise the common features of a web page. I can describe what is meant by the term 'fair use'. I can say why I should use copyright-free images. I can describe why navigation paths are useful. I can explain what a navigation path is.	I can explain that the way that a variable changes can be defined. I can identify examples of information that is variable. I can identify that variables can hold numbers or letters. I can explain that a variable has a name and a value. I can identify a program variable as a placeholder in memory for a single value. I can recognise that the value of a variable can be changed.	I can explain the relevance of data headings. I can explain what an item of data is. I can explain the relevance of a cell's data type. I can identify that changing inputs changes outputs. I can recognise that data can be calculated using different operations. I can explain why data should be organized.	I can discuss the similarities and differences between 2D and 3D shapes. I can explain why we might represent 3D objects on a computer. I can identify how graphical objects can be modified. I can identify the 3D shapes needed to create a model of a real-world object.	I can identify examples of conditions in the real world. I can explain that if you read a variable, the value remains. I can explain the importance of the order of conditions in else if statements.

	I can describe some of the ways that search results can be influenced.	I can explain the implication of linking to content owned by others.	I can recognise that the value of a variable can be used by a program.			
	I can explain how search engines make money.					
	I can recognise some of the limitations of search engines.					
	I can choose methods of communication to suit particular purposes.					
	I can explain the different ways in which people communicate.					
	I can identify that there are a variety of ways of communicating over the internet.					
	I can compare different methods of communicating on the internet.					
	I can explain that communication on the internet may not be private.					

DISCIPLINARY KNOWLEDGE	I know how to compare results from different search engines.	I know how to draw a web page layout that suits my purpose.	I know how to decide where in a program to change a variable.	I know how to answer questions from an existing data set.	I know how to select, move, and delete a digital 3D shape.	I know how to apply my knowledge of programming to a new environment.
	I know how to complete a web search to find specific information.	I know how to suggest media to include on my page.	I know how to make use of an event in a program to set a variable.	I know how to ask simple relevant questions which can be answered using data.	I know how to change the colour of a 3D object.	I know how to test my program on an emulator.
	I know how to refine my search.	I know how to find copyright-free images.	I know how to choose the artwork for my project.	I know how to apply an appropriate number format to a cell.	I know how to resize a 3D object.	I know how to transfer my program to a controllable device.
	I know how to decide when I should and should not share.	I know how to add content to my own web page.	I know how to create algorithms for my project.	I know how to build a data set in a spreadsheet application.	I know how to position 3D objects in relation to each other	I know how to determine the flow of a program using selection.
		I know how to evaluate what my web page looks like on different devices and suggest/make edits.	I know how to explain my design choices.	I know how to construct a formula in a spreadsheet.	I know how to rotate a 3D object.	I know how to use a variable in an if… then… else… statement to select the flow of a program.
		I know how to preview what my web page looks like.	I know how to choose a name that identifies the role of a variable.	I know how to apply a formula to multiple cells by duplicating it.	I know how to select and duplicate multiple 3D objects.	I know how to experiment with different physical inputs.
		I know how to make multiple web pages and link them using hyperlinks.	I know how to create the artwork for my project.	I know how to create a formula which includes a range of cells.	I know how to create digital 3D objects of an appropriate size.	I know how to use a condition to change a variable.
		I know how to create hyperlinks to link to other people's work.	I know how to test the code that I have written.	I know how to apply a formula to calculate the data I need to answer questions.	I know how to group a digital 3D shape and a placeholder to create a hole in an object.	I know how to modify a program to achieve a
			I know how to extend my game further using more variables.		I know how to choose which 3D objects I need to construct my model.	

		I know how to evaluate the user experience of a website.	I know how to identify ways that my game could be improved. I know how to share my game with others.	I know how to use a spreadsheet to answer questions. I know how to produce a graph. I know how to suggest when to use a table or graph. I know how to use a graph to show the answer to questions.	I know how to modify multiple 3D objects. I know how to plan my 3D model. I know how to decide how my model can be improved. I know how to evaluate my model against a given criterion. I know how to modify my model to improve it.	different outcome. I know how to use an operand (e.g. <>=) in an if… then… statement. I know how to decide what variables to include in a project. I know how to design the algorithm for my project. I know how to design the program flow for my project. I know how to create a program based on my design. I know how to test my program against my design. I know how to use a range of approaches to find and fix bugs.
E Safety	Managing online information. Online reputation. Trusting content.	Privacy. Copyright Inappropriate content.	Time spent online / gaming.	Trusted source of data.		Trusted sources of data.

KEY VOCABULARY (see Glossary)	Search, search engine, address bar, ranking, privacy, security.	Website, web pages, page, address, link, HTML, fair use / copyright, home page.	Game, variable, control, input, score, algorithm.	Spreadsheet, data set, row, column, format, calculation, formula, cell, chart / graph.	Model, 3D, size, rotate, modify, construct, position, resize.	Debug, algorithm, variables, program, input, value.

Potential literacy texts to link

how to CODE a rollercoaster
by Josh Funk
illustrated by Sara Palacios
foreword by Reshma Saujani, founder of Girls Who Code

A Computer Called Katherine
HOW KATHERINE JOHNSON HELPED PUT AMERICA ON THE MOON
written by Suzanne Slade
illustrated by Veronica Miller Jamison

Usborne
Lift-the-flap
Computers and Coding
with extra help and resources online
With over 100 flaps to lift

DOLL-E 1.0
Shanda McCloskey

MARGARET AND THE MOON
HOW MARGARET HAMILTON SAVED THE FIRST LUNAR LANDING
BY DEAN ROBBINS
ILLUSTRATED BY LUCY KNISLEY