

Computing Knowledge and Skills Progression Map

EYFS Handbook

Understanding of The World:

Guiding children to make sense of their physical world and their community through opportunities to explore, observe and find out about people, places, technology and the environment.

KS1

COMPUTER SCIENCE			INFORMATION TECHNOLOGY	DIGITAL LITERACY	
Algorithms/ Problem solving	Programming	Logical thinking	Creating content	Using IT beyond school	E-safety
Pupils should be taught to understand: → what algorithms are → how algorithms are implemented as programs on digital devices → that programs execute by following precise and unambiguous instructions	Pupils should be taught to create and debug simple programs	Pupils should be taught to use logical reasoning to predict the behaviour of simple programs	Pupils should be taught to use technology purposefully to create, organise, store, manipulate and retrieve digital content	Pupils should be taught to recognise common uses of information technology beyond school	Pupils should be taught to: → use technology safely and respectfully → keep personal information private → identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.

KS2

COMPUTER SCIENCE			INFORMATION TECHNOLOGY		DIGITAL LITERACY
Problem solving	Programming	Logical thinking	Creating content	Searching	E-safety
Pupils should be taught to: → design, write and debug programs that accomplish specific goals → control or simulate physical systems → solve problems by decomposing them into smaller parts	Pupils should be taught to: → use sequence, selection, and repetition in programs and to work with variables → work with various forms of input and output	Pupils should be taught to: → use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs → understand computer networks including the internet → understand how networks can provide multiple services, such as the world wide web.	Pupils should be taught to: → select, use and combine a variety of software (including internet services) on a range of digital devices → design and create a range of programs, systems and content that accomplish given goals → collect, analyse, evaluate and present data and information	Pupils should be taught to: → use search technologies effectively → appreciate how search results are selected and ranked	Pupils should be taught to: → use technology safely, respectfully and responsibly → recognise acceptable/unacceptable behaviour → know a range of ways to report concerns and inappropriate behaviour → be discerning in evaluating digital content → understand the opportunities networks offer for communication and collaboration

		Year 1					
KS1 End Points <u>Algorithms/Problem solving</u> understand: -what algorithms are -how algorithms are implemented as programs on digital devices -that programs execute by following precise and unambiguous instructions <u>Programming</u> create and debug simple programs <u>Logical thinking</u> use logical reasoning to predict the behaviour of simple programs <u>Creating content</u> use technology purposefully to create, organise, store, manipulate and retrieve digital content <u>Using IT beyond school</u> Recognise common uses of information technology beyond school <u>E-safety</u> Use technology safely and respectfully, keeping personal information private. Identify where to go for help and support when they have concerns about content or contact on	Term	Autumn		Spring		Summer 1	
	½ Term Coverage	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Topic			1.1 We are treasure hunters (Programmable robots) Computer Science	1.3 We are digital artists (Creating work inspired by great artists) Information Technology Note: additional coverage of e-safety knowledge and skills occurs this term through Safer Internet Day activities.		1.4 We are publishers (Multimedia eBook about achievements) -BookCreator on chromebooks/PC Digital Literacy
Key Knowledge	<ul style="list-style-type: none"> An algorithm is a set of step-by-step instructions to solve a problem or complete a task. A computer program is a sequence of instructions that can be followed by a computer.* A programmable toy (or robot*) can be made to move by <u>inputting</u> the algorithm as button presses. It is then stored as a program. Input is data supplied to a computer (in this case pressing buttons on the robot) Output is information produced by a computer (in this case movements of the robot, like moving forwards). A computer (for example a Beebot) is a device with inputs, outputs and the ability to store programs. A robot is a computer that can move. A bug is an error or mistake in a program. Debugging means finding and correcting mistakes in a computer program algorithm. The term was made popular by Grace Hopper. 	<ul style="list-style-type: none"> Analogue media is real-world traditional media like paint and paper, and digital media is media on a computer (stored as numbers).* Different brushes and brushstrokes can be used for different effects, for example choosing a thick brush and creating broad, horizontal strokes to paint in the style of Rothko. To closely match a pencil mark, you should choose a brush with a small size and clear edge. The undo tool can be used to correct mistakes. Bitmap digital images are images made up of lots of dots called pixels. A layer is one of a virtual pile (or stack) of images on top of one another that make up the whole picture. Layering in a painting app means making a stack of images. Saving your image means storing it (as numbers) in the iPad's memory. 	<ul style="list-style-type: none"> Multimedia means that the material has a combination of words (written or spoken) and pictures (still or moving). Multimedia eBooks are different from printed books, because they can include audio and video. The font is the design of the letters used for the writing. It is important to keep personal information private. How much information we can share depends on the audience of the eBook. For example, if your eBook was going to be published on a website for the world to see, you would not want to include a picture of yourself or your friends.* You do not have to have your photo taken if you do not want to, and you should ask before you take photos of other people.* You also need permission from the person who took the photo if you want to include it in your eBook. Schools ask for parents'/carers' permission to take and share photos. 				
Cross Curricular Links	Unit is taught just prior to literacy topic on information (non-fiction) texts in which children learn about different machines and invent their own robots. Links to future literacy and maths topics - instruction writing and position and direction.	Art link - the children will be studying the work of famous artists including Van Gogh in summer 2 and can make links. The brushes redux app used in this unit was notably used by David Hockney for work shown at the Royal Academy in 2012.	Literacy - spoken and written language skills are practised while planning and writing the text for the eBooks. The use of speech synthesis links to phonics. PSHE - Opportunity to emphasise sense of achievement/talents/interests.				

the internet or other online technologies.	Key Skills	<ul style="list-style-type: none"> Give and follow instructions to move around. Program the Beebot to follow an algorithm - initially using step-by-step programming and progressing to inputting entire sequences.** Give examples of input, program and output. Create a program to move a toy to a particular location** Debug a program (spot and correct mistakes in a program). Begin to predict where a set of instructions will take a Beebot or a person. Look for ways to make a program work better. Take and store images using Seesaw. 	<ul style="list-style-type: none"> Create blocks of colour. Use the undo tool to correct mistakes Select and set brushes and colours. Use multiple layers in digital artwork, and transform layers. Digitally paint on top of photographs. Zoom, move and resize images and the canvas. 	<ul style="list-style-type: none"> Plan a small multimedia eBook Choose and import images* Record audio commentary Add and format titles and other text Think carefully about protecting privacy* Respect other people's copyright* Revise and improve work
	School Context			
	<p>Children identify computers and digital devices they are familiar with at school, home and beyond.</p> <p>Chn consider algorithms for familiar tasks e.g. getting ready for school, local directions. Children 'program' one another to physically reach different locations in school playground.</p> <p>Following this programming unit, children will participate in our school-wide Hour of Code during CSEd week, and will be able to build or revisit what they have learned</p>	<p>Children think about different contexts for greeting cards in their community - depending on recent events children can design invitations for an event at school or create thank you cards for a visitor.</p> <p>Digital cards can be created for penpals in the partner school in Spain.</p> <p style="text-align: center;">Additional coverage of e-safety knowledge and skills through Safer Internet Day activities.</p>	<p>Children explore photos collected by the school and consider the school's policy, including parent/guardian consent.</p> <p>Children reflect on the activities they enjoy at school and what they have achieved, reflecting on the school context including learning outside the classroom.</p>	

Year 2							
KS1 End Points	Term	Autumn		Spring		Summer 1	
	½ Term Coverage	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Algorithms/Problem solving understand: -what algorithms are -how algorithms are implemented as programs on digital devices -that programs execute by following precise and unambiguous instructions Programming create and debug simple programs Logical thinking use logical reasoning to predict the behaviour of simple programs Creating content use technology purposefully to create, organise, store, manipulate and	Topic		2.3 We are photographers Information Technology	2.1 We are astronauts Computer Science		2.4 We are safe researchers Digital Literacy
Key Knowledge	<ul style="list-style-type: none"> Digital cameras and digital devices that take photographs are a common use of information technology beyond school. Digital cameras have a sensor. The sensor measures the amount of light and stores this information as a number. A pixel is a picture element - one of the small, square dots that make up a digital image. A camera roll is a directory on an iPad where all images are stored. The Photos app uses image recognition to work out what a photo is of. You should turn the screen off, close the laptop lid or turn over the ipad if you see an image you are concerned about. You should tell a teacher straight away.* Three techniques for sharp, clear images are: focus (on iPads tap the screen), keep the device steady, and ensure the subject is well lit (naturally or with flash). A rule for taking a good photograph is to position the horizon one-third or two-thirds of the way up the photograph. 	<ul style="list-style-type: none"> An algorithm is a sequence of instructions to complete a task. Sets of directions or movements are an example of an algorithm. Programs are sequences of code. These are precise instructions (or a set of rules) that can be understood and followed by a computer.* Scratch is a simple block-based programming language in which programs for characters are built by snapping together code blocks.** Sprites are on-screen characters that can be given their own sequence of instructions to produce outputs. Examples of outputs that sprites can produce in ScratchJr are the sprite moving, the sprite saying something (displaying text), or playing a sound. In ScratchJr, Yellow triggering blocks, e.g. 'start on green flag', cause code to be run after a certain event.* Computers can be programmed to run the same code repeatedly. This is called repetition. Using repetition makes programs quicker to write.* 	<ul style="list-style-type: none"> A URL is a web page address (location) for a particular page on a website.* A mind map is a visual representation of connected ideas. Google's search engine lists web pages containing the keywords that were searched for. A Google custom search searches only a specific list of sites.* Simple Wikipedia is an online encyclopaedia that can be searched. Articles are written and edited by ordinary people and some of the content can be wrong or unhelpful.* Anyone can publish anything on the internet, so when using search engines there is a risk of accidentally finding content that can concern you. You should turn your screen off if you see something online that you are concerned about. You should report the content to the teacher (if at school) or a parent (at home). 				

<p>retrieve digital content <u>Using IT beyond school</u> Recognise common uses of information technology beyond school <u>E-safety</u> Use technology safely and respectfully, keeping personal information private. Identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.</p>		<ul style="list-style-type: none"> To reframe an image, you can use the crop tool. 	<ul style="list-style-type: none"> Computer programmers often make mistakes, which they call bugs, and fixing these mistakes (debugging) is a big part of their work.* 	<ul style="list-style-type: none"> Safe search is a tool provided by search engines to remove inappropriate content from results. Images with a Creative Commons license can be reused without getting extra permission.
<p>Cross Curricular Links</p>	<p>Art - photography, thinking about composition. Exploring portrait and landscape orientation.</p>		<p>English - children use language associated with giving instructions Maths - position and movement</p>	<p>History - this topic reinforces the reliability of evidence, and changes throughout history (holidays). English - pupils practise effective note-taking.</p>
<p>Key Skills</p>	<ul style="list-style-type: none"> Search online photo collections (flickr - with safe search on, swiggle.org.uk) to find pictures related to a theme. Take digital photographs and use the iPad camera app. Review and reject/pick photos. Retrieve stored photographs on a digital device. Edit and enhance photographs, including cropping and straightening. Follow the e-safety rules (see key knowledge) and tell a teacher if they see an image that concerns them. 	<ul style="list-style-type: none"> Plan a return route in the playground. Create sequences of move instructions.* Implement algorithms as programs using block-based programming (Scratch).* Add instructions to display a sequence of texts. Use different events to launch code. Give logical explanations for what programs will do when run. Create costumes for multiple sprites. Record audio and add instruction to play audio. Test and debug programs for sprites in ScratchJr Work with input and output in ScratchJr Use repetition in a program. 	<ul style="list-style-type: none"> Use mind-mapping software to organise ideas.* Visit websites to find information online.** Use search engines (including custom search engines) to find information.** Create a presentation, including images.* Begin to use URLs to show sources (where researched information has come from).* Follow the e-safety rules (see key knowledge) and tell a teacher if they see an image that concerns them. Present findings to an audience. 	
School Context				
<p>Children will take photographs in the school grounds, e.g. edible garden, roof garden, etc. Possible trip - photography at the Museum of London.</p>			<p>Learning outside the classroom - children will practise creating algorithms for journeys within the playground. Prior to this programming unit, children will benefit from participating in our school-wide Hour of Code during CSEd week, which is in the autumn term.</p>	<p>Option to invite parents and carers for final presentations. Additional coverage of e-safety knowledge and skills through Safer Internet Day activities (spring term)</p>

Year 3							
KS2 End Points: <u>Problem solving</u> -design, write and debug programs that accomplish specific goals -control or simulate physical systems -solve problems by decomposing them into smaller parts <u>Programming</u> -use sequence, selection, and repetition in programs and to work with variables -work with various forms of input and output <u>Logical thinking</u> -use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs -understand computer networks including the internet -understand how networks can provide multiple services, such as the world wide web. <u>Creating content</u> -select, use and combine a variety of software (including internet services) on a range of digital devices -design and create a range of programs, systems and content that accomplish given goals -collect, analyse, evaluate and present data and information <u>Searching</u> -use search technologies effectively -appreciate how search results are selected and ranked <u>E-safety</u> -use technology safely, respectfully and responsibly recognise acceptable/ unacceptable behaviour -know a range of ways to report concerns and inappropriate behaviour -be discerning in evaluating digital content	Term	Autumn		Spring		Summer 1	
	½ Term Coverage	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Topic		3.3 We are presenters <u>Information Technology</u>		3.1 We are programmers <u>Computer Science</u>	3.5 We are co-authors <u>Digital Literacy/Information Technology</u>	
Key Knowledge	<ul style="list-style-type: none"> Some common mistakes when shooting video are: camera shake, excessive zooming or panning, not keeping the camera level and pressing stop too soon. Camera techniques include different shots, for example close-ups and cut-aways. Recording video and commentary and sourcing images and effects are examples of working with digitised forms of images and sounds (inputs). A Movie Maker project file is a sequence of instructions to assemble media into a final set of output audio and images shown as video. Movie Maker is a computer program, so it works according to algorithms written by programmers in computer code. It is important to behave respectfully and responsibly while filming one another. 	<ul style="list-style-type: none"> There are different programming languages, and Scratch is a block-based language in which sequencing blocks creates a program.* A storyboard is a way of expressing an algorithm for an animation. The storyboard is the sequence of stages in the animation. Each step in the storyboard must be implemented as a sequence of blocks to program the animation.* Creating a Sprite or backdrop on Scratch is creating output from the computer in the form of images.* Know how the <i>wait</i>, <i>glide</i>, <i>say</i> and <i>think</i> blocks function in a program. To begin to understand the function of <i>broadcast</i> and <i>when I receive</i>.* Order control - e.g. send forward - can be done using Scratch blocks if needed to make one Sprite appear in front of or behind other Sprites.** Inappropriate content or contact can be reported to those running websites e.g. comment and content concerns on Scratch can be reported to community moderators. Children should turn their screen off or close the laptop lid if they see an image they are concerned about. They should then tell a teacher straight away. 	<ul style="list-style-type: none"> A wiki is a website (part of the World Wide Web) that can be easily added to and edited by its users. E.g. Wikipedia/Simple English Wikipedia. An article can be searched for on Wikipedia/Simple Wikipedia by typing in the top-right search box. The pages that show up in the search results will contain the words that were typed into the search box - this is how search engines select results. Wikipedia is collaborative because anybody with access can edit it. When you make a change in wikipedia, the previous version of the article is kept.* *Wikipedia's five pillars are: -Wikipedia is an encyclopedia -Wikipedia's editors should treat each other with respect. -Wikipedia is free content -Wikipedia has a neutral point of view (which means both sides of an argument should be presented.) -As well as these principles, Wikipedia has guidelines (as opposed to firm rules). Examples of corrections you might make on Simple Wikipedia are: spelling mistakes, missing information and use of copyrighted material. Correcting content on Wikipedia is an example of how we use networks to collaborate. 				
Cross Curricular Links	<p>Geography - UK research and presentation on topic work has been used as the focus of this unit in the past. However, pupils could also talk about books studied in literacy, retell a familiar story in their own words or speak about a famous author. They could equally research a topic/subtopic related to other curriculum subjects.</p>	<p>Geography - animation will link in to previous topic and enable children to show what they have learnt.</p> <p>Literacy - links to the study of character, dialogue and narrative. The use of a storyboard to plan myths and legends extended writing piece.</p> <p>P.E - outdoor and adventure activities, giving and following directions</p> <p>Reading - using predictions skills.</p>	<p>This topic works best when linked explicitly with a topic being studied in another subject area. This will depend on the needs and interest of the cohort.</p> <p>For example, the pupils could work together to create a mathematical vocabulary wiki, or a wiki that shows their understanding of climate zones (geography) or key historical figures.</p>				

<p>-understand the opportunities networks offer for communication and collaboration</p>	<p>Key Skills</p>	<ul style="list-style-type: none"> Analyse existing footage to learn how it is shot. Design and create content (in the form of an edited video) that will accomplish a specific goal. Operate a video camera or digital camera to shoot video (input)* Import and edit video including selecting and trimming clips.* Record and include audio commentary* Export the finished movie and evaluate the result. 	<ul style="list-style-type: none"> Use the sprite editor and background editor to draw characters and create backgrounds. Know how to change brush size and use the undo button. Design an animation with a specific purpose in mind, including creating an algorithm in the form of a storyboard, and using a search engine to find images for an animation. Create the storyboard by breaking the scene that will be animated down into small sections of action and dialogue. Explain the connection between the storyboard and the scene being animated. Program an animation in Scratch, by putting Scratch blocks into order (make use of sequence in programs.)* Run scripts in Scratch and debug a program, using logical thinking to detect and correct errors in the animation program Combine various forms of output, such as graphics, text and sound.* 	<ul style="list-style-type: none"> Use internet services safely, respectfully and responsibly, including understanding the conventions for collaborative online work (particularly in wikis).* Create content for a wiki, including writing for a target audience. Edit content on Wikipedia (own and others content) and be aware of responsibilities when editing other people's work.* Use search technologies to research a topic by finding and reading articles on Wikipedia. Evaluate an article's trustworthiness. Work with others to plan and undertake a project (including developing collaboration and proofreading skills) Identify the sources I have used.* Become familiar with Wikipedia including potential problems
<p>School Context</p>				
	<p>Depending on permissions, final footage can be shared in the Patten Pages, enabling the children to make links between the content they have created and commercial/media content.</p>	<p>Teachers may wish to arrange for children to present finished animations in an assembly to other classes to make the purpose of presenting information clear and motivating.</p> <p>Additional coverage of e-safety knowledge and skills through Safer Internet Day activities this term.</p> <p>Prior to this topic, children will also benefit from using the Scratch interface during our school-wide Hour of Code during Computer Science Education Week which takes place in the autumn term.</p>	<p>Final website to be shared with the wider school community and sharing this using internet services further emphasises the opportunity that networks offer for communication.</p>	

Year 4							
KS2 End Points: Problem solving -design, write and debug programs that accomplish specific goals -control or simulate physical systems -solve problems by decomposing them into smaller parts Programming -use sequence, selection, and repetition in programs and to work with variables -work with various forms of input and output Logical thinking -use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs -understand computer networks including the internet -understand how networks can provide multiple services, such as the world wide web. Creating content -select, use and combine a variety of software (including internet services) on a range of digital devices -design and create a range of programs, systems and content that accomplish given goals -collect, analyse, evaluate and present data and information Searching -use search technologies effectively -appreciate how search results are selected and ranked E-safety -use technology safely, respectfully and responsibly recognise acceptable/unacceptable behaviour -know a range of ways to report concerns and inappropriate behaviour -be discerning in evaluating digital content	Term	Autumn		Spring		Summer 1	
	½ Term Coverage	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Topic		4.1. We are makers (Coding for micro:bit) Computer Science		4.3 We are bloggers Digital Literacy	4.5 We are meteorologists Information Technology (data)	
Key Knowledge		<ul style="list-style-type: none"> Know and understand the definitions of the unit's key vocabulary, particularly: computer, input, output, variable, simulator, source code and object code. * A micro: bit is a small programmable <u>computer</u> which <u>stores</u> and runs simple programs. The micro: bit has different <u>inputs</u> and <u>outputs</u> that the children should develop an awareness of. *<u>Input and output devices</u> An <u>accelerometer</u> is an input on the micro:bit that detects and provides information about changes in motion (motion sensor).* To become familiar with the MakeCode block editor and the micro:bit, including knowing the function of different blocks, predicting how a micro:bit program will work, detecting errors and understanding how to transfer code to the micro:bit.* 		<ul style="list-style-type: none"> To become familiar with blogs as a medium and a genre of writing.* Understand that there are two ways of viewing a blog post while editing its content: the WYSIWYG view (what you see is what you get - how the post will look as a web page) and the HTML view. Blog posts are stored as HTML (HyperText Markup Language) data. Blogs need the internet and a web server to work. A web server is a computer that stores the HTML data of a web page, and sends it back in response to a request so that the page can be viewed. A URL is the location of a resource, such as a web page or image, on the internet. Hyperlinks are texts or images that link (open or move to) other content when clicked. When searching for images and other content online, search engines select results based on the keywords that are typed in. Creative Commons is a copyright licensing scheme in which content (like images and video) can be re-used without additional permission. Criteria for writing an effective blog post includes: <ul style="list-style-type: none"> having a specific audience in mind. focusing on a key topic. writing well, with good spelling and punctuation. using engaging language. varying content when writing a series of posts, to keep the blog interesting. It is important to think carefully before posting anything online, and to think carefully about what you write, including not posting personal details such as surnames or photographs, and not posting content that is personally critical of others e.g. personal attacks on friends/teachers/the school. Examples of unacceptable comments include deliberately mean/upsetting comments sent to get a reaction ('trolling') and spam comments which offer sales or link sales to your post. Concerns about content or contact on blog posts and comments can be reported privately to childline and/or CEOP. 	<ul style="list-style-type: none"> Know and understand the definitions of the unit's key vocabulary, particularly: data, field, dataset, record, sensor. To gain awareness/become more familiar with equipment for measuring weather, such as anemometers and barometers. A table is a data structure representing records as rows and fields as columns. This means that when making a database table for weather data, each date/day (record) has its own row, and each type of information recorded (field), such as temperature or rainfall, has its own column. When collecting weather data, it is important to take your daily reading/measurement at the same time each day. This is for consistency as the weather changes throughout the day. Bar charts and line charts can be used to show changes in variables (like temperature) over time. A scatter chart or scatterplot can explore the relationship between two variables over time. For example, you would use a scatterplot to show whether there is a link between the amount of sunshine and temperature each day. 		

<p>-understand the opportunities networks offer for communication and collaboration</p>	<p>Cross Curricular Links</p>	<p>There is a strong maths link in this unit, particularly when children investigate which total is the most common when rolling 2 dice (7 - which has 6 possible combinations). There is the opportunity to link the open-ended project to other curriculum areas.</p>	<p>English - Pupils plan, draft and evaluate their own and others' writing in this unit.</p> <p>Teachers and pupils will be able to choose which other curriculum link to focus the blogs around, for example writing about science experiments or history topics. If writing about children's experience of life/school in the UK, teachers may wish to link up with our Spanish partner school to share the blog.</p>	<p>Geography and Science links - measuring weather Maths - data collection English - presentation skills</p>
	<p>Key Skills</p>	<ul style="list-style-type: none"> ● Identify the inputs and outputs for the micro:bit.* ● Program using the MakeCode block-based environment.* ● Test and debug programs, using the online simulator/emulator or the microbit** ● Convert and transfer a program written on-screen to the microbit. ● Predict and explain what a MakeCode program does. ● Create an algorithm and design for a program, and then create this program using MakeCode.** 	<ul style="list-style-type: none"> ● Become familiar with blogs as a medium and a genre of writing.** ● Create a sequence of blog posts on a theme. ● Comment on the blog posts of others, showing an understanding of how to do so safely and responsibly** ● Incorporate additional media into a blog post, such as images, audio or video. ● Use search technologies to find relevant and appropriately licensed media for a blog post. ● Develop a critical reflective view of a range of media, including text.* 	<ul style="list-style-type: none"> ● Understand different measurement techniques for weather - both analogue and digital ● Use weather measurement equipment safely and with increasing accuracy.* ● Describe the weather. ● Enter data into spreadsheets. ● Take digital photographs and add additional information to these, such as measurements and descriptions. ● Create simple charts from spreadsheets. ● Analyse data and make predictions about the weather.* ● Practise using presentation and video software.
<p>School Context</p>				
	<p>This project makes use of the 2 sets of Micro:bits available in school. Using the battery packs, the micro:bits can be taken and used away from the computing suite, so that other children can experience the games and programs that Y4 have created.</p> <p>This unit's learning can be built upon or shared during this term's Hour of Code during Computer Science Education Week.</p>	<p>Additional coverage of e-safety knowledge and skills through Safer Internet Day activities.</p> <p>Teachers may wish to use this opportunity to link up with our partner school in Barcelona, using blogging as an opportunity to learn about each other and our cultures.</p>		<p>Pupils can use the LGFL weather monitoring system (https://weather.lgfl.org.uk/Default.aspx) to access a range of nearby weather data readings (nearest location is Bow).</p> <p>We are looking in to setting up our own digital and/or analogue weather station on the roof garden (www.metlink.org/fieldwork-resource/a-weather-station-for-your-school/) If installed, the children will use the station to collect the data for this topic.</p>

Year 5							
KS2 End Points: <u>Problem solving</u> -design, write and debug programs that accomplish specific goals -control or simulate physical systems -solve problems by decomposing them into smaller parts <u>Programming</u> -use sequence, selection, and repetition in programs and to work with variables -work with various forms of input and output <u>Logical thinking</u> -use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs -understand computer networks including the internet -understand how networks can provide multiple services, such as the world wide web. <u>Creating content</u> -select, use and combine a variety of software (including internet services) on a range of digital devices -design and create a range of programs, systems and content that accomplish given goals -collect, analyse, evaluate and present data and information <u>Searching</u> -use search technologies effectively -appreciate how search results are selected and ranked <u>E-safety</u> -use technology safely, respectfully and responsibly recognise acceptable/unacceptable behaviour -know a range of ways to report concerns and inappropriate behaviour -be discerning in evaluating digital content -understand the opportunities networks offer for communication and collaboration	Term	Autumn		Spring		Summer 1	
	½ Term Coverage	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Topic	5.1 We are game developers Computer Science		5.2 We are cryptographers Information Technology / Computer Science		5.4 We are web developers Digital Literacy	
Key Knowledge	<ul style="list-style-type: none"> Know and understand the definitions of the unit's key vocabulary, and in particular: background, code, bug, debug, sprite, algorithm. Bitmap graphics are images where each dot (pixel) is specified, whereas vector graphics are images made of lines and curves. Game 'assets' are the sound and images for the game, such as backgrounds, costumes, music and sound effects. The music blocks in Scratch can be accessed by using the extension tool to add music blocks. Creating multiple costumes and switching between costumes for a sprite allows realistic movement to be animated. 'Point towards mouse' and 'when key pressed' blocks can be used with a repeat to allow control of the player's sprite with the mouse or keyboard. 'if/then/else' and 'sensing' blocks (like 'touching') can be used to allow the player's sprite to interact with other elements in a game. All games have rules, and games usually have a way of tracking progress or building challenge, like scores, levels, lives or countdown timers. In Scratch, 'variables' can be used to achieve this. There are different techniques that can be used to detect and correct errors in code, such as explaining what the code does, isolating the bit of code that is causing a problem, changing variables or rewriting code. It is important to be logical and to persevere.* 		<ul style="list-style-type: none"> Know and understand the definitions of the unit's key vocabulary, and in particular: encode, encrypt, decrypt, cipher, cryptography.** A good password should not be easy to guess (by people or computers). To make passwords harder to guess a typical approach is to use symbols, numbers and different cases. Another (better) approach which makes passwords <u>harder</u> to guess is to use longer passphrases made up of (for example) four random words from the dictionary. Passwords are often the only way that we can prove our identity to a web server so if anyone else uses your password the web server will assume it is you. Semaphore is a way to transmit messages over short (line-of-sight) distances using flags. Messages are broken down into individual letters and sent using a flag code.** To communicate with semaphore over longer distances where the sender and recipient cannot see each other, you would need a chain of people to watch for messages and pass them on.** Morse code is a binary code (a code that only uses two symbols - on and off) in which each letter is represented by a particular sequence of pulses of light or sound.** Samuel Morse designed the code to be as efficient as possible by assigning the shortest codes to the most common letters - e.g. E is one dot.* A caesar cipher is a cipher where each letter of a message is shifted a certain number of positions along the alphabet. Substitution ciphers are more secure encryptions because they use a mixed-up alphabet and so it is harder to test all the possibilities.* HTTP stands for hypertext transfer protocol. HTTPS stands for hypertext transfer protocol <u>secure</u>. You can check the security certificates of encrypted web pages by clicking on the padlock in the address bar and then clicking 'Certificate'. 		<ul style="list-style-type: none"> Name and describe the function of hardware used to connect computers.* <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  Ethernet port </div> <div style="text-align: center;">  Wi-Fi router </div> <div style="text-align: center;">  Network switch </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;">  Wi-Fi manager </div> <div style="text-align: center;">  School server </div> </div> <ul style="list-style-type: none"> The Internet and the World Wide Web are different - the web is many pages of information linked together (the pages you see when you're at a device and you're online) and the internet is the global <u>network</u> of computers and local networks that the web works on, as well as what emails and files travel across.* <p>[The Internet is the network (hardware, infrastructure and protocols) that connect computers all over the world, and the <u>World Wide Web</u> is the HTML and other documents (the web pages that you see) which are stored on web servers and connected via the internet. Both are about making connections, but the World Wide Web connects documents to similar documents stored on different computers, and the internet connects computers together across the world.]</p> <ul style="list-style-type: none"> Web pages are written and transmitted in HTML. HTML (HyperText Markup Language) is the language used for the content and structure of a web page. The HTML tag adds a hyperlink and the HTML tag adds an image.* Explain how data is transmitted via the Internet (https://www.bbc.co.uk/bitesize/topics/z7wtb9q/articles/z3tbgk7) including how packets of data go through many different <u>routers</u> between the sender's switch and the recipient's one.* URL stands for uniform resource locator. The parts of a URL are the http (or https), the domain name and the directory name. (example) HTTP stands for hypertext transfer protocol. HTTPS stands for hypertext transfer protocol <u>secure</u>. 		

	Cross Curricular Links	Music - most children will create music for their game Art and design - pupils create artwork for their games.	Maths - encryption and decryption use mathematical functions. Frequency tables play a role in cracking substitution ciphers. PSHE - privacy, safety and identity History - links to use of cryptography throughout history.	Literacy - pupils write informatively and persuasively for a known audience. PSHE - Pupils learn/revise the key online safety messages that they want to communicate through their site.
	Key Skills	<ul style="list-style-type: none"> ● Design and create a computer game program to accomplish a given goal. ● Describe algorithms that games are based on. ● Create an algorithm for a simple game (as a storyboard, flow chart or story). ● Convert an algorithm into code using Scratch blocks in sequence.* ● Create content for use in a game, for example images, sounds, music. ● Add instructions to a game. ● Detect and correct errors in the game using logical reasoning.* ● Use selection and repetition when creating a game. ● Improve a game based on feedback. 	<ul style="list-style-type: none"> ● To send and receive messages using semaphore and Morse code.** ● Understand the need for private information to be encrypted. ● Encrypt and decrypt messages in simple ciphers, for example a caesar cipher.** ● Understand how frequency analysis can be used to crack a substitution cipher.** ● Understand the need to use complex passwords and to always keep them secret. ● Have some understanding of how encryption works on the internet, for example recognising the need for encryption and knowing how to check if a web page is encrypted. 	<ul style="list-style-type: none"> ● Understand the hardware used to connect computers.* ● Understand how the internet works and the difference between the internet and the web.* ● View and edit the HTML for a web page. ● Create a web page that includes images. ● Add links to a web page. ● Use search technologies effectively, including to search for Creative Commons* images and if needed to research information for a web page.
School Context				
	<p>Opportunities to share Scratch work with the wider school as part of 'Hour of code' which we usually celebrate in December. Children will also be able to use their Hour of Code to develop their work further if they wish.</p> <p>'Play a game while you wait' - QR codes linking to the students work can be printed to be displayed in the reception area or other waiting area, sharing and celebrating this programming with the wider school community.</p>	<p style="text-align: center;">Additional coverage of e-safety knowledge and skills through Safer Internet Day activities.</p> <p>This unit's work on password security and encrypting private information ties in to learning on Safer Internet Day.</p> <p>Pupils could talk to their peers and parents/carers about the importance of secure and secret passwords, as well as of using (and checking) for https:// when entering passwords or personal information.</p>	<p>Learning from the previous unit (cryptographers) and input from last term's Safer Internet Day will support the pupils in creating their website without much additional research.</p> <p>At the end of this unit and after review by senior staff, the website can be published to be viewed by all other members of WP.</p> <p>The site can then be used by teachers in other year groups to reinforce learning from Safer Internet Day.</p>	

Year 6							
KS2 End Points:	Term	Autumn		Spring		Summer 1	
	½ Term Coverage	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Topic		6.1 We are toy makers (coding for micro:bit) Computer Science	6.4 We are connected Digital Literacy		6.3 We are publishers - creating a magazine Information Technology	
<p>Problem solving -design, write and debug programs that accomplish specific goals -control or simulate physical systems -solve problems by decomposing them into smaller parts</p> <p>Programming -use sequence, selection, and repetition in programs and to work with variables -work with various forms of input and output</p> <p>Logical thinking -use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs -understand computer networks including the internet -understand how networks can provide multiple services, such as the world wide web.</p> <p>Creating content -select, use and combine a variety of software (including internet services) on a range of digital devices -design and create a range of programs, systems and content that accomplish given goals -collect, analyse, evaluate and present data and information</p> <p>Searching -use search technologies effectively -appreciate how search results are selected and ranked</p> <p>E-safety -use technology safely, respectfully and responsibly recognise acceptable/unacceptable behaviour -know a range of ways to report concerns and inappropriate behaviour -be discerning in evaluating digital content -understand the opportunities networks offer for communication and collaboration</p>	Key Knowledge	<ul style="list-style-type: none"> Know and understand the definitions of the unit's key vocabulary, particularly: input, output, accelerometer, edge connector, decomposition, simulator.* Programs can be transferred onto a micro:bit by USB or by bluetooth.* Know all of the different inputs and outputs on the micro:bit, and what each of them can do, for example that the magnetometer detects magnets (and also magnetic north - for use as a compass)Input and output devices* The MakeCode program simulator provides a quicker and easier way to test and debug programs.* Know the function of different blocks in MakeCode, for example that the <i>Music</i> blocks can be used to create a tune on the micro:bit.* Additional components can be connected to the micro:bit edge connectors to achieve a design. 	<ul style="list-style-type: none"> Understand how to have a civil discussion online - online discussion works best with clear ground rules about how the discussion should be conducted. Typically, these rules include avoidance of personal attacks and a climate of mutual respect and tolerance, even when people disagree. Google (and other search engines) select results based on the keywords typed in. Search engines also select results based on the number and quality of inbound links. Hyperlinks are a central part of the World Wide Web, as they connect pages to each other. They are very important because they provide visitors with a wealth of related information and because of the role they play in the ranking of sites by search engines. Fake news (a fictional, or partly fictional, story presented as news) is a common problem due to the ease of creating online content and the amplifying effect of social media. People pass on fictional stories without realising they have been made up. Due to fake news, a critical perspective is important when reading online content, including checking for evidence, questioning credibility/reliability of sources and plausibility of a story. If there is no evidence to support a claim this is a strong indication that it could be fake news. [Children should know the definitions of plausible and reliable from the key vocabulary] A neutral point of view (as opposed to a biased view) is a balanced perspective where all sides of an argument are presented fairly. Deleting comments from people that disagree would be an example of bias. Many people linking to a site will result in a higher ranking on Google and can make a site seem more reliable, when it could still be 'fake news'.* The minimum age for many social media accounts is 13. This is because there is special legal protection for the personal data of children under 13. 	<ul style="list-style-type: none"> A magazine has a target audience. For a school magazine, this would be parents/carers, other members of the school community and pupils themselves. Images in a magazine (as opposed to text) may be photographs, illustrations or diagrams. It is best to use high-resolution images in a magazine, so that the quality is as good as possible. Creative Commons is a copyright licensing scheme in which content (like images and video) can be re-used without additional permission. Templates can be used in desktop publishing software. Templates have defined font styles and help to keep the font consistent across many pages.* Shared folders should be well organised, for example with files named to indicate the content within. It is important to work respectfully and responsibly when using shared resources. Documents can be exported as PDF files ('Portable Document Format' files). A PDF file can be used to review a magazine as it enables you to see what a printed magazine would look like and can be shared easily online while allowing comments to be managed easily. Some corrections and feedback marked onto the magazine might require discussion (for example wanting an author to add an extra paragraph to fill space) and others would not (for example spelling mistakes). ePub is an example of an eBook format. 			

		<ul style="list-style-type: none"> There are different forms of cyberbullying or online bullying, for example harassment (sending threatening messages), trolling, gossip/rumours/lies, impersonation, and 'outing'. There are charities that you can speak to if you are experiencing online bullying – these include Childline and CEOP. You can also contact the site on which the bullying is taking place to inform them. Always speak to your parents/carers, teachers or another trusted adult about what you are experiencing. 	
Cross Curricular Links	<p>Design and technology - this unit is essentially an integrated D&T unit in which children apply their understanding of computing to program, monitor and control their products as well as using D&T tools, resources and skills as they work on their toys.</p> <p>Pupils are also likely to draw on skills, knowledge and understanding from art, science and maths as they work on their toys.</p>	<p>English - Persuasive writing and debate links, proofreading work, correcting GPS errors. The emphasis on giving reasons, evaluating sources and providing a clear, logical argument can also be reinforced during English lessons.</p> <p>History/Geography/RE - evaluating sources for plausibility and reliability is important in history, geography and RE. The unit takes a current, controversial topic on which pupils might have different opinions.</p>	<p>English - this provides a meaningful experience in which pupils write for a specific audience while honing spelling, punctuation and grammar skills.</p> <p>Art and design - the design elements of the project can draw on pupils' own talents developed in art and design.</p> <p>The magazine could include space for pupils to discuss their subject work in detail and to reflect on their learning in these areas.</p>
Key Skills	<ul style="list-style-type: none"> Name inputs and outputs of the micro:bit.* Design an interactive toy, including identifying inputs and outputs that a toy will need Add interactivity to a toy. Design a program to control a toy.* Connect the micro:bit to an interactive toy. Find and fix bugs in a program and toy.* Predict what a program will do on the micro:bit. 	<ul style="list-style-type: none"> Use search technologies to find information on a topic. Write a post on a topic. Add hyperlinks to a post.* Recognise the importance of respect and tolerance in online discussions. Comment on others' posts, respectfully and responsibly.* Argue effectively, including using credible sources to evidence and support views. Counter an argument respectfully.* Judge the reliability of an online source.* Know how to deal with online bullying, including who to go to. 	<ul style="list-style-type: none"> Help plan and develop pages for a magazine. Use collaborative software to plan and create a magazine. . Word-process text to a good standard. Find and add images and other media to my pages. Spot and correct errors in content. Understand the principles of good design. Provide constructive feedback to others. Compare the cost of printing options.
School Context			
	<p>There may be opportunities for children to share their MakeCode/micro:bit work with the wider school as part of 'Hour of code' which we usually celebrate in December. Children will also be able to use their Hour of Code to develop their work further if they wish, or do broaden their experience of other programming languages/software such as Scratch.</p>	<p>Additional coverage of e-safety knowledge and skills through Safer Internet Day activities.</p> <p>This unit can be used as starting point for pupils to discuss social media with their parents and carers.</p>	<p>The real time collaborative editing tools such as Google Docs provide the children with experience that will support them working on projects in KS3 and beyond.</p> <p>London-based trips are available, such as to the Guardian education centre.</p>

		<p>The blog posts about cyber bullying should be shared across the year group to emphasise the messages about what children can do if they are experiencing bullying.</p>	
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