Whitchurch Combined School

Computing - Progression of Knowledge and Skills Grids

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Programming Planning, writing and testing computer programs for digital devices, from floor turtles to tablets					
Unit 1.1 **We are Treasure Hunters** Solving problems using programmable toys	Unit 2.1 **We are Astronaut's** Programming on screen in ScratchJr	Unit 3.1 **We are Programmers** Programming an animation	Unit 4.1 **We are Software Developers** Developing a simple education guide	Unit 5.1 **We are Game Developers** Developing an interactive guide	Unit 6.1 **We are Toy Makers** Coding and physical computing
Pupils learn: • that a programmable robot can be controlled by inputting a sequence of instructions. • to develop and record sequences of instructions as an algorithm. • to program a robot to follow their algorithm. • to debug their programs. • to predict how their programs will work.	Pupils learn to: • plan a sequence of instructions to move sprites in ScratchJr • create, test and debug programs for sprites in ScratchJr • work with input and output in ScratchJr • use repetition in their programs • design costumes for sprites	Pupils learn to: • plan and create an algorithm for animated scene in the form of a storyboard. • Write a program in Scratch to create the animation, including characters, dialogue, costumes, backdrops and sound. • Review their animation programs and correct mistakes	Pupils learn to: • Develop an educational computer game using selection and repetition. • Understand and use variables. • Start to debug computer programs. • Recognise the importance of user interface design, including consideration of input and output.	Pupils learn to: • create original artwork and sound for a game • design and create a computer program for a computer game, which uses sequence, selection, repetition and variables • detect and correct errors in their computer game • use iterative development techniques (making and testing a series of small changes) to improve their game	Pupils learn: • how computers use stored programs to connect input to output • how to generate and evaluate designs in response to a brief • to plan a complex project by decomposing it into smaller parts • to work with physical components of a system • how to design and write a program for an embedded system • to use criteria to provide others with feedback on their work.

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Computational Thinking Some of the computer science foundations – particularly algorithms, logical reasoning and decomposing problems into smaller parts.					
Unit 1.2 **We are TV chefs** Filming the steps of a recipe	Unit 2.2 **We are Games' testers** Working out the rules for games	Unit 3.2 **We are Bug Fixers** Finding and correcting bugs in programs	Unit 4.2 **We are Makers** Coding for micro:bits	Unit 5.2 **We are Cryptographers** Cracking codes	Unit 6.2 **We are Computational Thinkers** Mastering algorithms for searching, sorting and maths
Pupils learn to: • break down a process into simple, clear steps (an algorithm). • use different features of a video camera. • use a video camera to capture moving images. • use a video camera to capture moving images • develop collaboration skills. • discuss their work and think about how it could be improved.	Pupils learn to: • observe and describe carefully what happens in computer games • use logical reasoning to make predictions of what a program will do and test these predictions • think critically about computer games and their use • create sequences of instructions for a virtual robot to solve a problem • work out strategies for playing a game well • be aware of how to use games safely and in balance with other activities	Pupils learn to: • Develop a number of strategies for finding errors in programs. • Build up resilience and strategies for problem solving. • Increase their knowledge and understanding of Scratch. • Recognise a number of common types of bug in software.	Pupils learn: • about the input – process – output model of computation • about the inputs and outputs available on a BBC micro:bit • to program using the MakeCode block-based environment • to test and debug programs they write, using an on-screen simulator and the micro:bit • how to convert and transfer a program written on screen to the micro:bit.	Pupils learn to: • be familiar with semaphore and Morse code • understand the need for private information to be encrypted • encrypt and decrypt messages in simple ciphers • appreciate the need to use complex passwords and to keep them secure • have some understanding of how encryption works on the Internet.	Pupils learn to: • develop the ability to reason logically about algorithms • understand how some key algorithms can be expressed as programs • understand that some algorithms are more efficient than others for the same problem • understand common algorithms for searching and sorting a list.

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Creativity Creating and refining original content using digital tools across a range of media.					
Unit 1.3 **We are Digital Artists** Creating work inspired by great artists	Unit 2.3 **We are Photographers** Taking, selecting and editing digital images	Unit 3.3 **We are Presenters** Videoing a presentation against a green screen	Unit 4.3 **We are Musicians** Creating a piece of music in GarageBand	Unit 5.3 **We are Architects** Creating a virtual space	Unit 6.3 **We are Publishers** Creating a yearbook or magazine
Pupils learn: • how to select and set brushes and colours • to create artwork in a range of styles on iPads • to use the undo function if they make mistakes, and to encourage experimentation • to use multiple layers in their art • to transform layers • to paint on top of photographs.	Pupils learn to: • consider the technical and artistic merits of photographs • use the iPad camera app • take digital photographs • review, reject or pick the images they take • edit and enhance their photographs	Pupils learn to: • Develop their web-based research skills • Structure, prepare and deliver a talk about a given topic or subtopic studied in another curriculum area. • Record a piece to camera. • Edit a movie using static images and green screen footage. • Give constructive, critical feedback on recorded presentations.	Pupils learn to: • create a repeating percussion rhythm • play music using virtual instruments • compose or edit tunes using the piano roll (pitch and duration) tool • perform electronic music using pre-recorded loops, and create their own loops • create a multi-track composition or performance using multiple instruments • give feedback to others on their compositions and performances.	Pupils learn to: • understand the work of architects, designers and engineers working in 3-D • develop familiarity with a simple CAD (computer-aided design) tool • develop spatial awareness by exploring and experimenting with a 3-D virtual environment • develop greater aesthetic awareness.	Pupils learn to: • manage or contribute to large collaborative projects, facilitated using online tools • write and review content • source digital media while demonstrating safe, respectful and responsible use • design and produce a high-quality print document.

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Computer networks Using and understanding the internet, the web and search engines, effectively and safely					
Unit 1.4 **We are Publishers** Creating a multimedia eBook about our achievements	Unit 2.4 **We are Safe Researchers** Researching a topic	Unit 3.4 **We are Who We Are** Creating presentations about ourselves	Unit 4.4 **We are Bloggers** Sharing experiences and opinions	Unit 5.4 **We are Web Developers** Making sense of the Internet and building a website	Unit 6.4 **We are Connected** Developing skills for social media
Pupils learn to: • plan a small multimedia eBook • choose and import images record audio commentary • add and format titles and other text • think carefully about protecting their privacy • respect other people's copyright • revise and improve their work.	Pupils learn to: • develop collaboration skills through working as part of a group • develop research skills through searching for information on the Internet • think through privacy implications of their use of search engines • be more discerning in evaluating online information • improve note-taking skills through the use of mind mapping • develop presentation skills through creating and delivering a short multimedia presentation.	Pupils learn to: • Create a number of structured presentations. • Narrate presentation's • Consider issues on trust and privacy when sharing information.	Pupils learn to: • become familiar with blogs as a medium and a genre of writing • create a sequence of blog posts on a theme • incorporate additional media • comment on the posts of others • develop a critical, reflective view of a range of media, including text.	Pupils learn: • the name and function of components making up the school's network • how information is passed between the components that make up the Internet • what the source code for a web page looks like, and how it can be edited • how a website can be structured • how to add content to a web page.	Pupils learn: • about appropriate rules or guidelines for a civil online discussion • how search results are selected and ranked • how to argue their point effectively, supporting their views with sources • how to counter someone else's argument while showing respect and tolerance • how to judge the reliability of an online source • some strategies for dealing with online bullying.

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Communication/Collaboration Making the most of computers and the internet for communicating with one or many, and working together on projects.					
Unit 1.5 **We are Rhythmic** Creating sound patterns in Scratch Jr and GarageBand	Unit 2.5 **We are Animators** Creating a stop motion animation	Unit 3.5 **We are Co-Authors** Producing a wiki	Unit 4.5 **We are Artists** Fusing geometry and art	Unit 5.5 **We are Adventure Gamers** Creating an interactive adventure using presentation software	Unit 6.5 **We are Advertisers** Creating a short television advert
Pupils learn to: • record audio on an iPad • program sprites to playback recorded audio in ScratchJr • program ScratchJr to create repeating rhythms using recorded audio • explore different effects that can be applied to audio • create a repeating percussion pattern using a virtual drum machine • experiment with a range of virtual instruments	Pupils learn to: • understand how animation works • use storyboards to plan an animation • create their own original characters, props and backgrounds for an animation • film, review and edit a stop-motion animation • record audio to accompany their animation • provide constructively critical feedback to their peers.	Pupils learn to: • Understand the conventions for collaborative online work, particularly in wikis. • Be aware of their responsibilities when editing other people's work. • Become familiar with Wikipedia, including potential problems associated with its use. • Practise research skills. • Write for a target audience using a wiki tool. • Develop collaboration skills. • Develop proofreading skills.	Pupils learn to: • develop an appreciation of the links between geometry and art • become familiar with the tools and techniques of a vector graphics package • develop an understanding of turtle graphics • experiment with the tools available, refining and developing their work as they apply their own criteria to evaluate it and receive feedback from their peers • develop some awareness of computer generated art.	Pupils learn: • how to plan a non-linear presentation • to create text as part of a presentation • to add and edit images in a presentation • to use hyperlinks for navigation between the slides of a presentation • to record and add audio narration to a presentation • to use commenting tools to give feedback on a presentation.	Pupils learn to: • think critically about how video is used to promote a cause • storyboard an effective advert for a cause • work collaboratively to shoot original footage and source additional content • acknowledge intellectual property rights • work collaboratively to edit the assembled content to make an effective advert.

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Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Productivity Collecting and analysing data and information using computers; organising, manipulating and presenting this to an audience					
Unit 1.6 **We are Detectives** Using data to solve clues	Unit 2.6 **We are Zoologists** Collecting data and bugs	Unit 3.6 **We are Opinion Pollsters** Collecting and analysing data	Unit 4.6 **We are Meteorologists** Presenting the weather	Unit 5.6 **We are VR Designers** Experimenting with virtual and augmented reality	Unit 6.6 **We are AI developers** Learning about artificial intelligence and machine learning
Pupils learn: • how data can be structured as records with fields for information • how data can be organised into groups and subgroups • how data can be structured as a tree • how data can be organised into a table • how data in a table can be filtered and searched.	Pupils learn to: • sort and classify a group of items by answering questions • collect data using tick charts or tally charts • take, edit and enhance photographs • use Google Sheets or Microsoft Excel to produce basic charts • record information on a digital map • summarise what they have learned in a presentation.	Pupils learn to: • Understand some elements of survey design. • Understand some ethical and legal aspects of online data collection. • Use the internet to facilitate data collection. • Use charts to analyse data. • Interpret results.	Pupils learn to: • understand different measurement techniques for weather – both analogue and digital • use computer-based data logging to automate the recording of some weather data • use spreadsheets to create charts • analyse data, explore inconsistencies in data and make predictions • practise using presentation and video software.	Pupils learn to: • explore real-world and imagined locations in VR (if possible) • create 360° photosphere images • link physical objects to digital content using QR codes • create their own VR scene • program objects and interactions in VR.	Pupils learn: • how decision trees can be trained automatically to classify data • how speech recognition works • how a neural net recognises images • to train a neural net to classify images • to train a machine learning system to identify sentiments • to consider some ethical principles in designing AI systems.