**Progression of Skills and Knowledge in Computing**

**KNOWLEDGE, SKILLS AND UNDERSTANDING**

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|  | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| **Programming** | **Using programmable toys** | **Programming on screen** | **Programming an animation** | **Developing and Producing a simple game** | **Developing an interactive game** | **Making a text-based adventure game** |
| Understand that toys can be controlled by entering a sequence of instructions  Develop and record sequences of instructions as an algorithm  Program a toy to follow an algorithm  Predict how programs will work | Clear understanding of algorithms as sequences of instructions  Convert simple algorithms to programs  Predict what a simple program will do  Spot and fix errors in their program | Create an algorithm for an animated scene in the form of a storyboard  Write a program in scratch to create the animation  Correct mistakes in their animation program | Develop an educational computer game using selection and repetition  Understand and use variables  Debug computer programs  Recognise the importance of user interface design | 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  Use iterative development techniques to improve their game | Learn some of the syntax of a text-based programming language  Use commands to display text on screen, accept typed user input, store and retrieve data using variables and select from a list  Plan a text based adventure with multiple ‘rooms’ and user interaction  Thoroughly debug the program |
| **Computational Thinking** | **Filming the steps of a recipe** | **Exploring how computer games work** | **Finding and correcting bugs in programs** | **Prototyping an interactive toy** | **Cracking codes** | **Mastering algorithms for searching, sorting and mathematics** |
| Break down a process into simple steps as an algorithm  Use different features of a video camera  Use a video camera to capture moving images  Develop collaborative skills  Discuss work and think about how it can be improved | Describe what happens in computer games  Use logical reasoning to make predictions on what a program will do  Test predictions  Think critically about a game  Be aware of how to use games safely | Develop strategies for finding errors in programs  Build up resilience and strategies for problem solving  Increase knowledge and understanding of Scratch  Recognise a number of common types of bug in software | Design and make an on screen prototype of a computer controlled toy  Understand different forms of input and output  Design, write and debug the control and monitoring program for their toy | 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 web | 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 are more efficient than others of the same problems  Understand common algorithms for sorting and searching  Appreciate algorithmic approaches to problems in mathematics |
|  | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| **Creativity** | **Illustrating an eBook** | **Taking, selecting and editing digital images** | **Videoing performance** | **Producing digital music** | **Fusing geometry and art** | **Creating short television ads** |
| Use the web safety to find ideas for an illustration  Select and use appropriate painting tools to create and change images on the computer  Create an illustration for a particular purpose  Know how to save and retrieve and change their work  Reflect on work | Consider the technical and artistic merits of photographs  Use a digital camera or camera app  Take digital photographs  Edit and enhance their photographs | Gain skills in shooting live video  Edit video clips  Understand the qualities of effective video | Use one or more program to edit music  Create and develop a musical composition  Develop an awareness of how music can enhance work in other media | Develop an appreciation of the links between geometry and art  Become familiar with the tools and techniques of a vector graphics program  Develop an understanding of turtle graphics  Experiment with tools and refine and develop their work  Develop awareness of computer generated are | Think critically about how video is used to promote a cause  Storyboard an effective advert for a cause  Work collaboratively to shoot audible original footage and source additional content, acknowledging intellectual property rights  Work collaboratively to edit the assembled content to make an effective advert |
| **Computer Networks** | **Finding images using the web** | **Researching a topic** | **Making and sharing a short screencast presentation** | **Editing and Writing HTML** | **Creating a web page** | **Exploring computer networks including the internet** |
| Find and use pictures on the web  Know what to do if they find a picture that causes concern  Group images based on binary (yes/no)  Organise images into two groups  Sort images according to a criteria  Ask questions about images | Search the internet for information  Improve note taking through mapping  Develop presentation skills through creating and delivering a short multimedia presentation | Understand the physical hardware connections necessary for computer networks to work  Understand some features of internet protocols  Understand some diagnostic tools for investigating network connections  Develop a basic understanding of how domain names are converted to IP addresses | Understand how the internet makes the web possible  Use HTML tags for elementary mark up  Use hyperlinks to connect ideas and sources  Understand the risks of using the web | Develop research skills to know what information is appropriate  Understand some elements of how search engines select and rank ideas  Question the plausibility and quality of information  Develop and refine ideas and text  Show their understanding of safety and responsible use of technology | Appreciate that computer networks transmit and receive information digitally  Understand the basic hardware needed for computer networks to work  Understand key features of internet communications protocols  Develop a basic understanding of how domain names are converted to numerical IP addresses |
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| **Communication & Collaboration** | **Producing a talking book** | **Communication clues** | **Communicating safely on the internet** | **Producing a wiki** | **Sharing experiences and opinions** | **Create a Yearbook** |
| Use sound recording to record sounds  Develop skills in saving and storing sounds on the computer  Understand how a talking book differs from a paper book  Share recordings with an audience | Understand that email can be used to communicate  Develop skills in opening, composing and sending emails  Opening and listening to audio files  Use appropriate language in emails  Develop skills in editing and formatting text in emails  Be aware of e-safety when using email | Develop a basic understand of how email works  Gain skills in using email  Be aware of issues surrounding emails, including ‘netiquette’ and safety  Work with a remote partner  Experience video conferencing | Understand the conventions for collaborative online work, particularly in wikis  Become familiar with Wikipedia, including potential problems with its use  Use a wiki too to write for a target audience | Become familiar with blogs as a medium and a genre of writing  Create a sequence of blog posts on a theme  Incorporate additional material in a blog  Comment on the posts of others  Develop a critical, reflective view of a range of media | 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 a high-quality print document |
| **Productivity** | **Creating a card electronically** | **Recording Bug Hunt data** | **Collecting and analysing data** | **Presenting the weather** | **Creating a virtual space** | **Using media and mapping to document a trip** |
| Develop basic keyboard skills through typing and formatting text  Develop basic mouse skills  Use the web to find and select images  Develop skills in storing and retrieving files  Develop sills in combining text and images | Sort and classify a group of items by answering questions  Collect data using tick charts or tally charts  Use simple charting software to produce pictograms and other basic charts  Take, edit and enhance photographs  Record information on a digital map | Understand some elements of survey design  Understand some ethical and legal aspects of online data collection  Use the web to facilitate data collection  Gain skills in using charts to analyse data  Gain skills in interpreting results | Understand different measurements techniques for weather both analogue and digital  Use computer based data logging to automate the recording of some weather data  Use spread sheets to create charts  Analyse data, explore inconsistencies in data and make predictions  Practise using presentation software | Understand the work of architects, designers and engineers working in 3D  Develop familiarity with a simple CAD tool  Develop spatial awareness by exploring and experimenting with a 3D virtual environment | Research a location online using a range of resources appropriately  Understand the safe use of mobile technology, including GPS  Capture images, audio and video while on location  Showcase shared media content through a mapping layer |