

### Progression of Skills In Computing

| KEY SKILLS                  | YEAR 3  | YEAR 4  | YEAR 5  | YEAR 6  |
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| Algorithms                  | <p>Design solutions (algorithms) that use repetition and two way selection (i.e if, then, else.)</p> <p>Use diagrams to express solutions.</p> <p>Use logical reasoning to predict outputs, showing some awareness of inputs.</p> <p>Design solutions (algorithms) that use repetition and two way selection (i.e if, then, else.)</p> <p>Use diagrams to express solutions.</p> <p>Use logical reasoning to predict outputs, showing some awareness of inputs.</p> <p>Begin to show an awareness of tasks best completed by humans or computers.</p> | <p>Know which tasks are best completed by human or computers, giving examples.</p> <p>Design solutions by decomposing a problem and creates a sub-solution for each part of the problem (decomposition).</p> <p>Recognise that there are several solutions to the same problem and various algorithms exist for different purposes.</p>                   | <p>Explain confidently which tasks are best completed by human or computers.</p> <p>Design solutions by decomposing a problem and creates a sub-solution for each part of the problem (decomposition).</p> <p>Recognise that there are several solutions to the same problem.</p> <p>Understand that various algorithms exist for different functions.</p> <p>Identify patterns in algorithms that help to solve specific problems.</p> | <p>Understand that iteration is the repetition of a process such as a loop.</p> <p>Recognise that different algorithms exist for the same problem.</p> <p>Detect errors in algorithms.</p> <p>Rewrite and test own sequences.</p> <p>Is able to identify similarities and differences in situations and can use these to solve problems (pattern recognition.)</p> <p>Begin to recognise that some problems share the same characteristics and use the same algorithms to solve both (generalisation)</p> |
| Programming and Development | <p>Create programs that implement algorithms to achieve given goals.</p> <p>Identify and assign variables in programs.</p> <p>Uses loop commands “until” and sequences of selection statements in programs, including if, then, else statements.</p>  | <p>Understand differences between and appropriately uses ‘if’ and ‘if’, then and else statements.</p> <p>Use variable and relational operators within a loop to control ‘endings’ in programs.</p> <p>Design, write and debug (modular) programs using procedures (algorithms).</p> <p>Know that a procedure can be used to hide details in programs.</p> | <p>Understands that programming bridges the gap between algorithmic solutions and computers.</p> <p>Has practical experience of high level textual languages e.g. standard libraries when programming.</p> <p>Uses a range of operators and expressions e.g. Booleam.</p>   | <p>Understands that programming bridges the gap between algorithmic solutions and computers.</p> <p>Has practical experience of high level textual languages e.g. standard libraries when programming.</p> <p>Uses a range of operators and expressions e.g. Booleam and applies them in the context of</p>   |

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|                                |  | Begin to recognise that programming bridges the gap between algorithms and computers.   | Starts to apply these in the context of program control ( e.g. input/process/output.)  | program control ( e.g. input/process/output.)<br>Starts to select the appropriate data types.<br>Starts to appreciate the need for and writes their own “custom” functions to improve programs.<br>Starts to detect and correct syntactical errors.   |
| Data and Data Representation   | Understands and can explain the difference between data and information.<br>Knows why sorting data in a ‘flat file’ can improve searching for information.<br>Uses filters or can perform single criteria searches for information.<br>Start to perform more complex searches for information e.g. relational operators. | Clearly explain the difference between data and information, giving examples.<br>Knows why sorting data in a ‘flat file’ can improve searching for information.<br>Performs more complex searches for information e.g. using Boolean and relational operators.<br>Analyses and evaluates data and information and recognises that poor quality data leads to unreliable results and inaccurate conclusions.<br>Starts to understand key vocabulary e.g. binary and bit patterns | Knows why sorting data in a ‘flat file’ can improve searching for information.<br>Performs more complex searches for information e.g. using Boolean and relational operators.<br>Analyses and evaluates data and information and recognises that poor quality data leads to unreliable results and inaccurate conclusions.<br>Knows that digital computers use binary to represent all data.<br>Understands how bit patterns represent numbers and images. | Knows that digital computers use binary to represent all data.<br>Understands how bit patterns represent numbers and images.<br>Knows that computers transfer data in binary (code).<br>Recognises the relationship between binary and file size (uncompressed)<br>Defines data types: real numbers and Boolean.<br>Queries data on one table using typical query language.<br>Begins to understand how numbers, images, sounds and character sets use the same bit patterns. |
| <b>Hardware and Processing</b> | Recognise that computers collect data from various input devices e.g. sensors and application software.<br>Understand the difference between hardware and application  | Understand why and when computers are used.<br>Understand the main functions of the operating systems.<br>Know the difference between physical, wireless and mobile networks. Look at examples e.g.   | Recognise and understand the function of the main internal parts of basic computer designs (architecture.)<br>Understand the concepts behind the fetch-execute cycle.  | Recognise and understand the function of the main internal parts of basic computer designs (architecture.)<br>Understand the concepts behind the fetch-execute cycle.   |

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|  | <p>software and their roles within a computer system.<br/>Begin to understand why and when computers are used</p>  | <p>internet: how they provide multiple services such as the world wide web.<br/>Begin to recognise the function of the main internal parts of basic computer designs (architecture.)</p>   | <p>Start to appreciate that there is a range of operating systems and application software for the same hardware.</p>  | <p>Tests, contrasts and evaluates a range of operating systems and application software that is often used for the same hardware.<br/>Begin to understand the Von Neuman architecture in relation to the fetch-execute cycle, including how data is stored in memory.<br/>Understand the basic function and operation of location addressable memory.</p>   |
| <p><b>Communication and Networks</b></p> | <p>Understand the difference between the internet and internet services e.g. world wide web.<br/>Show awareness of, and can use some internet services such as VOIP.<br/>Recognise what is acceptable and unacceptable behaviour when using technologies and online services.<br/>Understand the difference between the internet and internet services e.g. world wide web.<br/>Show awareness of, and can use some internet services such as VOIP.<br/>Recognise what is acceptable and unacceptable behaviour when using technologies and online services.</p> | <p>Understand how to effectively use search engines and knows how search results are selecting including that search engines are 'web crawler programs'<br/>Selects, combines and uses internet services.<br/>Demonstrate responsible use of technologies and online services and knows a range of ways to report concerns.<br/>Begin to understand how search engines rank results.</p> | <p>Understand how search engines rank search results and test and evaluate some of these systems.<br/>Understand how to construct static web pages using HTML and CSS.<br/>Understand data transmission between digital computers over networks including the internet i.e. IP addresses and packet switching.</p> | <p>Understand how search engines rank search results.<br/>Clearly evaluate these systems.<br/>Understand how to construct static web pages using HTML and CSS.<br/>Design and create own web pages for a purpose.<br/>Understand data transmission between digital computers over networks including the internet i.e. IP addresses and packet switching.<br/>Know key names of hardware e.g. hubs, routers, switches and the names of protocols e.g. SMTP, IMAP, POP, FTP, TCP/IP associated with computer systems</p> |

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|                               | Produces safety guidance on viruses, cyber bullying and stranger danger.  |  |  |   |
| <b>Information Technology</b> | <p>Collect, organise and present data and information in digital content. Create digital content to achieve a given goal through combining software packages and internet services to communicate with a wider audience e.g blogging. Make effective improvements to solutions based on feedback received and can comment on the success of the solution. Make judgements about the effectiveness and suitability of the digital content for the targeted audience.</p> | <p>Make sound judgements about digital content when evaluating and assigning it for a given audience. Recognise the audience when designing and creating digital content. Understand the potential of information technology for collaboration when computers are networked. Use criteria to evaluate the quality of solutions. Can confidently identify improvements, making some refinements to the solution and future solutions.</p> | <p>Evaluate the appropriateness of digital services, internet services and application software to achieve given goals. Recognise ethical issues surrounding the application of information technology beyond school. Design criteria to critically evaluate the quality of solutions. Use the criteria to identify effective improvements, and can make appropriate some refinements to the solution.</p> | <p>Justify the choice of, and independently combines and uses multiple digital devices, internet services and application software to achieve given goals. Evaluate the trustworthiness of digital content and considers the usability of visual design features when designing and creating digital artefacts for a known audience. Identify and explain how the use of technology can impact on society. Design criteria for users to evaluate the quality of solutions and uses the feedback to identify some improvements and can make appropriate refinements to the solution.</p> |

### Computing Topic Map

|               | <b>Autumn 1</b>   | <b>Autumn 2</b>   | <b>Spring 1</b>  | <b>Spring 2</b>  | <b>Summer 1</b>  | <b>Summer 2</b>  |
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| <b>Year 3</b> | <p><b>Getting Started</b><br/>log on and log off using a school computer<br/>find 'my computer'<br/>open 'my documents'<br/>and open a document</p> | <p><b>Multimedia</b><br/>acquire, store and combine images from cameras or the internet for a purpose. select certain areas of an image</p> | <p><b>E Safety</b><br/>understand the importance of protecting personal information.<br/><b>Safer Internet Day Data Handling</b></p> | <p><b>Multimedia</b><br/>change the colour, style and font size of text.<br/>insert a text box<br/>add a picture from clipart.</p> | <p><b>E-Safety</b><br/>understand what cyber bullying can look like<br/>know what to do if ever feeling uncomfortable whilst online.</p> | <p><b>Online</b><br/>edit work using spell checker<br/>add paragraphs using the enter key.<br/><b>Touch Typing</b></p> |

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|  | <p>log on and log off using a school computer<br/>log into their LGFL account<br/>navigate LGFL</p> <p><b>E Safety</b><br/>recognise online behaviours that would be unfair.<br/>understand what an AUP policy is<br/>recognise the importance of logging out of an activity where you have entered a password.<br/>use an ipad safely by closing all apps when finished</p> | <p>and resize, rotate an image.<br/>edit pictures using various tools using photo-manipulation software.<br/>use different fonts sizes, colours and effects to communicate meaning.<br/>align text left, right and centre. save a document</p> <p><b>Programming</b><br/>develop and debug a logical sequence of instructions to control a floor robot<br/>understand that the word algorithm means ‘a set of instructions’<br/>write a program that will accomplish a specific goal<br/>begin to plan more complex sequences or instructions, using repetition where appropriate.<br/>be able to give examples of everyday algorithms<br/>construct algorithms for use in a computer program.</p> | <p>analyse data in a bar chart<br/>create simple bar charts and analyse data.<br/>take a screen shot of work and copy and paste it</p> | <p>add a photo from the internet</p> <p><b>Programming</b><br/>identify how a program benefits from commands being grouped for efficiency<br/>use a repeat command.<br/>explore the similarities and differences between programming languages<br/>write the code to move an object<br/>use a repeat loop<br/>use a forever loop</p> | <p>understand when it is ok to give personal details and when it is not.<br/>give safety tips to others about how to stay safe online.</p> <p><b>Multimedia</b><br/>edit my work using spell checker<br/>add paragraphs using the enter key.</p> | <p>place fingers on the keyboard correctly to be able to touch type<br/>start to be able to use the keys without looking down at the keyboard every time.<br/>type story whilst keeping fingers in the correct positions and try to touch type</p> |
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| <p><b>Year 4</b></p> | <p><b>E Safety</b><br/>recognise when something online is too good to be true<br/>begin to recognise the SMART rules for online safety.</p> <p><b>Multimedia</b><br/>take a series of pictures to form an animation.<br/>Provide voices for the characters using the recording function.<br/>Move items within an animation to create movement on playback.<br/>Edit/improve an animation.<br/>save a photo from a search engine<br/>Select certain areas of an image and resize, rotate an image.<br/>edit and improve first version of work.<br/>save final version of work on Ipad.</p> | <p><b>Online</b><br/>know where to believe information from on the internet.<br/>use the print screen function<br/>start a portfolio of work.</p> <p><b>Programming</b><br/>write an algorithm for someone else to follow (unplugged)<br/>design and write a program to create an output<br/>use sequence, selection, and repetition in programs; work with variables and various forms of input and output<br/>express movement as a series of commands<br/>order movement commands as sequential steps in a program<br/>create a program to complete an image using sequential steps<br/>identify the benefits of using a loop structure instead of manual repetition</p> | <p><b>E-Safety</b><br/>understand the importance of protecting personal information.<br/>know that we are respectful and polite to people online.</p> <p><b>Multimedia</b><br/>open a new document<br/>save a new document<br/>manipulate text in order to present it attractively.<br/>animate slides<br/>edit and improve work using spell checker</p> | <p><b>Online</b><br/>evaluate the quality of a website and whether or not it is giving true information.<br/>identify an email address.<br/>type an email address.<br/>open an email account.<br/>add a contact into my contacts list.</p> <p><b>Handling Data</b><br/>create bar chart and pictogram using a program.</p> | <p><b>E-Safety</b><br/>be confident with what to do if something upsets online.<br/>explain what the SMART rules stand for<br/>recognise how they can help us</p> <p><b>Multimedia</b><br/>insert boxes and include text<br/>present the text in a clear and eye catching way.<br/>edit work and correct spellings.<br/>insert a photo on each page.<br/>copy and paste a photo into word and save it.<br/>have accurate mouse control for the finer details when using a specific programme</p> | <p><b>Online</b><br/>know how to create safe searches in a search engine</p> <p><b>Programming</b><br/>identify what devices require an input or produce an output.<br/>label the parts of a computer<br/>write an algorithm.<br/>compare values using the = operator<br/>translate spoken language conditional statements into a program<br/>match blocks with the appropriate event handler<br/>create a game using event handlers</p> |
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|               |  | <p>create a program for a given task which loops a single command</p> <p>predict where a program will fail</p> <p>modify an existing program to solve errors</p> <p>identify an algorithm that is unsuccessful when the steps are out of order</p> |  |  |   |   |
| <b>Year 5</b> | <p><b>E-Safety</b></p> <p>recognise the SMART rules for online safety</p> <p>know that anything posted online can be seen, used and may affect others</p> <p><b>Multimedia</b></p> <p>add effects to all text on each slide</p> <p>Use the print screen and camera functions to capture an image.</p> <p>insert a hyperlink into a slide</p> <p>solve any issues by editing and improving slides</p> <p>Select certain areas of an image and resize, rotate an image</p> | <p><b>Programming</b></p> <p>write code to perform a specific action or series of events</p> <p>use the If statement</p> <p>problem solve coding issues to improve work</p>  | <p><b>E-Safety</b></p> <p>explain the importance of communicating kindly and respectfully</p> <p>know what a safe email looks like</p> <p>know what to do with an unsafe email</p> <p><b>Online</b></p> <p>open an outlook account</p> <p>write an email and send it for a purpose</p> <p>add a subject line</p> <p>attach a word document to an email and send it</p> <p>open an attachment from someone else</p> <p>use search engines effectively</p> <p>decide if a website is reliable or not</p> | <p><b>Handling Data</b></p> <p>create a table of information in excel</p> <p>use the SUM function to add totals</p> <p>create a bar graph from a table of information in excel</p> <p>write basic formula for adding and subtracting</p> <p>write formula for times/dividing</p> <p><b>Programming</b></p> <p>write code using shortened language e.g. FD for forward</p> <p>write code to create different outcomes e.g. shapes or letters.</p> | <p><b>Multimedia</b></p> <p>open a new document and save it in a specified folder</p> <p>add text to a powerpoint and change the fonts/styles/sizes</p> <p>custom animations for each slide to allow smooth transitions and appropriate text or sound effects</p> <p>hyperlink photos or images to link to videos or websites</p> | <p><b>E-Safety</b></p> <p>understand what an online chat room or forum is</p> <p>recognise the positives and negatives of chat rooms and forums</p> <p><b>Programming</b></p> <p>design, write and debug own program</p> <p>explore the effect of changing the values in an algorithm</p> <p>explain why changing a value changes the outcome</p> |

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|               | add text/voice recording to each slide<br>edit and improve first version of work  |   | teach others how to use search engines effectively and give tips for choosing reliable websites   |  |  |   |
| <b>Year 6</b> | <p><b>E-Safety</b><br/>explain how to report anything that upsets you online<br/>know how to protect my password and other personal information<br/>explain the consequences of sharing too much about oneself online</p> <p><b>Multimedia</b><br/>change font/colour/size of text to suit article<br/>align text left/right and align text boxes<br/>add other features to the document e.g. bullet points etc.<br/>edit and improve word document<br/>insert page numbers<br/>spell check work<br/>set up a portfolio of work<br/>insert graphics (format the graphics – tight, square, etc.)</p> | <p><b>Programming</b><br/>Decompose a problem into smaller parts to design an algorithm for a specific outcome and use this to write a program<br/>Keep testing a program and recognise when it needs to be debugged<br/>Use key vocabulary to demonstrate knowledge and understanding in this strand: flowchart, algorithm, control, output, symbol, start, stop, delay, process, decision, loop, backdrop, script, block, repeat, commentary, sequence, consequence, debug, program, Kodu, world, object, tool palette, program environment, smooth, flatten, raise.<br/>Use conditional statements and edit variables;</p> | <p><b>E-Safety</b><br/>know the signs of cyber bullying<br/>know what to do if I was being cyberbullied.<br/>judge what sort of privacy settings might be relevant to reducing different risks<br/>know what could happen if I took an inappropriate photo of myself on a device that uses the internet.<br/>understand that social media doesn't represent people's real lives</p> <p><b>Multimedia</b><br/>create a quiz and test it works.</p> | <p><b>Online</b><br/>begin to understand how search engines actually work<br/>understand the features of an internet browser<br/>understand computer networks, including the internet.</p> | <p><b>E-Safety</b><br/>know what details can be shared online and what should never be shared<br/>know how to keep my computer safe from viruses and malware</p> <p><b>Multimedia</b><br/>take images and film on a device<br/>add music and effects<br/>edit/improve work ready for viewing</p> | <p><b>Handling Data</b><br/>enter data and formulae into a spreadsheet<br/>order and present data based on calculation<br/>add, edit and calculate data</p> <p><b>Programming</b><br/>problem solve coding problems in order to reach an end goal</p> |

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|  | use the printscreen button and paste function.<br>edit and improve word document | offer technical advice on how to improve another person's game. |  |  |  |  |
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