

## Key Stage 3 Subject Timeline Year 7 to 8

### Subject: ICT & Computer Science

| Year 7                  |   |   |  |  |   |  |
|-------------------------|---|---|--|--|---|--|
|                         | Autumn 1  | Autumn 2  | Spring 1   | Spring 2   | Summer 1  | Summer 2   |
| Topic                   | “Exploring ICT”   | “Game Design in Scratch”  | “Big Data”   | “Writing algorithms”   | “Spreadsheet models”  | “Game design in game lab”  |
| Key skills and Concepts | <p>Safe, responsible use of the Marlborough network in line with the home-school technology agreement.</p> <p>Ensure all students are able to access and use their Chromebooks effectively, and to create a range of documents.</p> <p>There are a wide range of risks associated with the use of digital technology.</p> <p>Online risks can be reduced with careful use of technology.</p> <p>Support can be sought if personal problems are encountered when using digital technology.</p> | <p>Use block-based programming languages to solve a variety of computational problems.</p> <p>Understand the format and use of variables within programming languages.</p> <p>Combining different tools and skill sets to create a single solution to a problem.</p> <p>Application of the software development life cycle to develop, test and evaluate a solution to a problem.</p> <p>Understanding of all three key programming concepts (sequencing, selection and iteration).</p> | <p>Understanding of the features of basic data types and data structures.</p> <p>Use computational abstractions that model real-world problems.</p> <p>Searching large data existing data sets using queries and filters to find data that meets specific requirements.</p> <p>Understand simple Boolean logic [for example, AND, OR and NOT].</p> | <p>Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems.</p> <p>Use 2 or more programming languages, at least one of which is textual, to solve a variety of computational problems.</p> <p>Understanding of the programming concepts of sequencing and iteration.</p> | <p>Understanding of how to create spreadsheet models which can analyse and present data effectively.</p> <p>Design, use and evaluate computational abstractions that model real-world problems.</p> <p>Creation of formulas, functions and queries to analyse and interpret data.</p> | <p>Understanding of the use of parameters as an introduction to modular programming.</p> <p>Use of variables within parameters to enable more dynamic and flexible programming.</p> <p>Understanding of the programming concepts of selection, sequencing and iteration.</p> <p>Use of programming techniques for animation.</p> |
| Threshold Concepts      | <p>Students should arrive from primary school with a basic knowledge of common-sense approaches to managing online safety.</p>  | <p>Building on experience of block-based programming from KS2 curriculum.</p>   | <p>Unit draws on basic Mathematics skills.</p> <p>Understanding that computers can enable effective data analysis.</p>   | <p>Computers work by following programs of instructions.</p> <p>Computers can be used to model real world situations.</p>  | <p>This unit draws on unit 3 in which they used existing files to analyse data and developed familiarity with spreadsheet software.</p>   | <p>This unit draws and units 2 and 4, developing knowledge of programming paradigms and the use of variables.</p>  |

## Key Stage 3 Subject Timeline Year 7 to 8

### Subject: ICT & Computer Science

|                         |  |   |  |  |   |   |
|-------------------------|--|---|--|--|---|---|
| <b>Endpoints</b>        | <p>Students confident in navigating the folder structures on the network. Students competent in the use of their Chromebooks and Google Classroom. Students to have used appropriate strategies to save and retrieve work on the network. Students able to describe and discuss a range of online risks and how to reduce these risks. Students able to identify internal and external sources of support to deal with a range of challenges they could face (Raccoon, Shout, Kooth, CEOP, etc).</p> | <p>Students will have created a program incorporating user input to control movement of sprites. Students have used iteration to create animations. Students have used selection to detect different scenarios within the game. Students have incorporated variables into their program. Students will have created a substantial program using block-based programming. Students have applied the product development cycle to test, develop and evaluate their program.</p> | <p>Students are able to use spreadsheet and database files to filter and query data. Students are able to add, edit and delete data from a database. Students are able to analyse datasets in both spreadsheet and database software to identify trends in data and to solve problems.</p> | <p>Students will have used Logo to create simple shapes using step by step programming. Students will have used Logo to create simple shapes using single lines of code. Students will have used iteration to create more complex shapes using minimal lines of code. Students will be able to create flowcharts to model simple real-world computer systems such as traffic lights. Students will be able to create flowcharts incorporating the used of decisions to alter pathways through the program.</p> | <p>Students are able to create spreadsheet models which carry out simple mathematical operations to model real-world scenarios in order to make decisions. Students have used a range of functions (SUM, AVERAGE, IF, etc) to make spreadsheets efficient. Students have created graphical representations of data. Students are able to explain the benefits of using functions and formulae in a spreadsheet to perform calculations automatically.</p> | <p>Students are able to use parameters to generate different outcomes programmatically. Students will be able to use the generation of random numbers in their coding, and be able to explain the benefit of such practice within game design. Student have used and adapted sprites to generate appropriate visual content for their games, adding animations where appropriate through the use of loops and counter patterns.</p> |
| <b>Assessment</b>       | <p>Students to be assessed on the following topics:</p> <ul style="list-style-type: none"> <li>- Cyber-security</li> <li>- Online bullying</li> <li>- Grooming</li> <li>- Live streaming</li> <li>- Digital Citizenship</li> <li>- Seeking support</li> </ul> <p>Assessments to take form of on-screen tests.</p>  | <p>Students will self- and peer-assess final games created against set success criteria.</p>  | <p>Students are assessed through a data analysis task in which they need to analyse an existing data set and draw conclusions.</p>   | <p>Students to be assessed on their ability to create code to draw specific shapes in Logo. Students will undertake an end-of-unit test assessing their knowledge of coding in Logo and the creation of control system flowcharts.</p>   | <p>Students are assessed through a data analysis task in which they need to create a spreadsheet to analyse and present data, drawing conclusions on any patterns identified.</p>   | <p>Students are assessed through a mini-project in which they have the opportunity to demonstrate the full range of skills introduced through the module.</p>   |
| <b>Cultural capital</b> | <p>This half term provides students with an intensive introduction to the digital literacy skills important in education and future lives. After school clubs in coding and VFX provide opportunities to experience a more varied curriculum.</p>  | <p>Coding and programming develop logical and problem-solving skills which can be applied in many different areas of learning and life.</p>   | <p>Learning this unit focuses on skills commonly used in office environments to improve employability.</p>   | <p>Continuation of extra-curricular clubs in coding and VFX. Lunchtime KS3 Minecraft club to develop creative and team-building skills and experience.</p>   | <p>Learning this unit focuses on skills commonly used in office environments to improve employability. It enhances the skills covered in unit 3 so that they are able to create their own solutions in addition to using existing ones.</p>   | <p>Game design is a topic that is both of great interest to many children, but also a major industry in the UK with lots of employment and higher education opportunities.</p>  |

### Key Stage 3 Subject Timeline Year 7 to 8

#### Subject: ICT & Computer Science

|                            |  |  |  |   |  |  |
|----------------------------|--|--|--|---|--|--|
| Equality,<br>Inclusion and | Online safety unit investigates the need to show respect and tolerance to different groups online. | Launch of coding club for girls using 'Dress Code' charity website <a href="https://dresscode.org.uk/">https://dresscode.org.uk/</a> . |  | Encourage attendance of different groups to Minecraft Club to engender an eagerness to be involved in the subject area. |  | Consideration of different cultures and different social groups when planning solutions to meet client requirements. |
|----------------------------|--|--|--|---|--|--|

## Key Stage 3 Subject Timeline Year 7 to 8

### Subject: ICT & Computer Science

| Year 8                  |   |   |   |   |   |   |
|-------------------------|---|---|---|---|---|---|
|                         | Autumn 1  | Autumn 2  | Spring 1  | Spring 2  | Summer 1  | Summer 2  |
| Topics                  | "The Chatbot"   | "Presenting information"  | "Binary 101"  | "Producing bitmap graphics"   | "Game design in Stencyl"  | "Coding in Python"  |
| Key skills and Concepts | <p>Understand the benefits and application of modular programming using subroutines.</p> <p>Application of the software development life cycle to develop, test and evaluate a solution to a problem.</p> <p>Understanding of all three key programming concepts (sequencing, selection and iteration).</p> <p>Coding in a text-based programming language.</p> | <p>Use of a range of research skills to investigate a given topic.</p> <p>Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users.</p> | <p>Understand how instructions are stored and executed within a computer system.</p> <p>Understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits.</p> <p>Understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example conversion between binary and decimal]</p> | <p>Create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability.</p> <p>Features, benefits and drawbacks of bitmap vs vector graphics.</p> <p>Key skills include:</p> <ul style="list-style-type: none"> <li>- Use of layers and transparencies</li> <li>- Clone stamp tool</li> <li>- Selection tools including magic wand</li> </ul> | <p>Use two programming languages to solve a variety of computational problems.</p> <p>Develop skills in using an unfamiliar software application.</p> <p>Develop an understanding of key game design concepts including:</p> <ul style="list-style-type: none"> <li>- Sprite design and manipulation</li> <li>- Controlling sprites programmatically</li> <li>- Detecting and responding to events</li> </ul> | <p>Use of text-based programming to solve a variety of computational problems. Key skills and knowledge covered include:</p> <ul style="list-style-type: none"> <li>- Accepting inputs</li> <li>- Generating outputs</li> <li>- Debugging</li> <li>- Use of variables</li> <li>- Use of parameters</li> <li>- Use of procedures</li> <li>- Iteration</li> <li>- Mathematical calculations</li> <li>- Concatenation and casting</li> </ul> |
| Threshold Concepts      | <p>Students need to be aware of block-based programming using Scratch, including the creation of variables and sequencing of instructions. They also need experience of basic text-based programming from Y7 Unit 4.</p>  | <p>Students need to be able to use spreadsheets to perform basic calculations and to present data in graphical form.</p>  | <p>Students need to understand that computers store data, and the data must be stored in a format that makes sense to the computer, not to people.</p>  | <p>Effective graphic design for the creation of advertising materials.</p>  | <p>Students will be familiar with block based programming through the use of Scratch and code.org. This will aid the transition to Stencyl which is a more complex and powerful tool.</p>   | <p>Students should be aware of variables, procedures and iteration through previous work, mainly in block-based programming.</p>  |

## Key Stage 3 Subject Timeline Year 7 to 8

### Subject: ICT & Computer Science

|  |  |   |   |  |  |   |
|--|--|---|---|--|--|---|
| <b>Endpoints</b>                         | <p>Students will have created a functioning chatbot in Scratch and a more developed one in Python using modular programming techniques.</p> <p>In completing the chatbot they will have demonstrated working within the fully project development cycle.</p> | <p>Students have combined their research and data analysis to create a detailed brochure / itinerary for the holiday.</p>   | <p>Students will be able to convert between positive binary and denary numbers (up to 8 bits).</p> <p>They will have applied this understanding of binary numbers to the creation of denary numbers representing graphical sprites.</p> <p>They will have applied ASCII table to decode and encode between text and binary.</p> | <p>Students have been able to use skills in Fireworks to create a range of bitmap graphics demonstrating the key skills and concepts listed.</p> <p>They will have considered aim and target audience when applying their skills to the creation of marketing materials.</p> | <p>Students will have used Stencyl to create a functional game including:</p> <ul style="list-style-type: none"> <li>- User control</li> <li>- Use of subroutines, parameters and variables</li> <li>- Event detection</li> <li>- Scoring systems</li> </ul> | <p>Students will have completed several short programming tasks which cover all of the key skills and concepts in this module.</p>  |
| <b>Assessment</b>                        | <p>Students will self- and peer-assess final chatbots created against set success criteria.</p>  | <p>Final brochure will be assessed against success criteria.</p>  | <p>Assessment on use of binary, including use of binary to represent text and images, and simple binary operations.</p>   | <p>Assessment with two parts – one an on-screen theory test of key information from the unit, the other a practical task requiring application of skills covered in the unit.</p>  | <p>Students will self- and peer-assess final games created against set success criteria.</p>   | <p>The unit ends with an on-screen theory test of key knowledge relating to text-based programming in Python. It will also include a practical task to undertake to demonstrate skills developed.</p> |
| <b>Cultural capital</b>                  | <p>After school clubs in coding and VFX provide opportunities to experience a more varied curriculum.</p> <p>Lunchtime KS3 Minecraft club to develop creative and team-building skills and experience</p>  | <p>After school club to attempt the 'Cyber Security Challenge UK'. This fun activity provides students with the chance to learn about key roles in the cyber security industry, and how to reduce cyber security risks.</p> | <p>This unit is aimed at ensuring students are well prepared for tackling the rigorous challenge of undertaking GCSE Computer Science.</p>  | <p>Students undertake more creative and artistic work in this unit to ensure the broadest possible curriculum. Career paths within creative industries is discussed.</p>   | <p>Game design industry investigated and discussed to develop understanding of career opportunities. Students will self- and peer-assess final chatbots created against set success criteria.</p>  | <p>Coding and programming develop logical and problem-solving skills which can be applied in many different areas of learning and life.</p>   |
| <b>Equality, Inclusion and Diversity</b> | <p>Consideration of the role of chatbots to include discussion on the possible benefits in relation to equality and inclusion.</p>   |   | <p>Launch of coding club for girls using 'Dress Code' charity website <a href="https://dresscode.org.uk/">https://dresscode.org.uk/</a>.</p>  | <p>Consideration of inclusion and diversity when discussing target audience for creative tasks.</p>  |  |   |