

**Year 7 and 8 Computing Curriculum Explained**

Our computing curriculum intends to train excellent computing students who are computer scientists, digitally literate and are creative contributors. This means that they will be able to:

1. Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
2. Understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem
3. Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions
4. Understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal]
5. Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
6. Understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits
7. 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
8. Create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability
9. Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct and know how to report concerns

The curriculum teaches the fundamental ideas which are the building blocks of computer science understanding, and we sequence these in the best order so that students can see how these fundamental ideas link together.

**List of Topics**

KS3 Scheme of Work for Computing Q:\ICT\KS3

This scheme of work shows overall curriculum intent, timings and sequencing of projects and lessons, links to the National Curriculum Programme of Study

**Year 7**

I am a Cyber Security Expert

It is felt that the most important subject to start year 7 with is I am a Cyber Security Expert. As students join secondary school and are starting to be exposed to social media and having to work across more devices and applications. They need to be equipped with the correct skills to keep E-safe, retain integrity when working online and how to be aware of other online threats and dangers

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| **Topic** | **Fundamental ideas****Linked to KS3 National Curriculum Programme of Study for Computing** | **Intent and Sequencing** | **Common Misconceptions** |
| E-safety Concerns and other Online threats | understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct and know how to report concerns. | Students will start by discovering what the current E-Safety concerns are to them and then what the other online threats are. Once these are understood students will learn about how they can safeguard against them. Students will then develop at this point to understand technical measures which can be taken to help them stay safe online | Key E-Safety and Threat DefinitionsCyberbullying, Cyber predators (Grooming/Fake Profile/Pressure), Posting Private Information, Social engineering (blagging/phishing/pharming/shouldering), Falling for Scams, Identity Theft, Stealing Digital information (Hacking), Accidentally Downloading Malware (computer virus/trojan/spyware/adware), Posts that Come Back to Haunt a Child Later in Life (Digital Footprint)Biometric measures (particularly for mobile devices), Password systems, CAPTCHA (or similar), Using email confirmations to confirm a user’s identity, Automatic software updates |
| How we connect online and what hardware and software is used | understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems | Students explore what it is to go online? Once they understand the E-safety concerns and other online threats cross comparisons can be made between what going online is and the dangers that exist | Students will need to learn what hardware and software is and other terms around the difference between the www and the internet and then what it actually is to connect and go online and the different levels of hardware which is needed |
| Students plan and create a digital graphic | 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 userscreate, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability | Students will develop a graphic for Primary Schools which will include primary and secondary assets. The brief of the graphic will be to give an insight to what going online is and the associated E-Safety and other concernsStudents will have a set brief and will need to make sure their graphic meets the client requirements and is suitable for the target audience | Students will learn what a Mood board is and then what a Visualisation Diagram is. Students will not how to draw these at firstOnce produced, students will then create their graphic in 3D PaintStudents will be taught skills and this will be first time learning  |

I am an Animator

Students are exposed to the KS2 Programme of Study in KS2 but the teaching of this contains variety. In Year 7 this is picked up and taught at a deeper level. Year 7 Students start their coding using a block-based language called Scratch. They have already had some exposure to block-based programming in KS2 and this allows then to develop an understanding of the key concepts without being over whelmed with having to code in text and commands (syntax)

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| **Topic** | **Fundamental ideas****Linked to KS3 National Curriculum Programme of Study for Computing** | **Intent and Sequencing** | **Common Misconceptions** |
| Introduction of I am an animator based around creating a ‘six-word story’ | design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems | Students first of all need to understand their given brief, from there they abstract the key success criteria which they need to develop into an algorithm | Key terms of AbstractionDecompositionAlgorithm |
| Designing a six-word story to meet the given brief, students at this point are asked to write this out and design this as a story board. Students are also asked to think about what is going to happen (processing/movement) and what user inputs and outputs to the user there are on screen  | 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 create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability | Once students have developed their key success criteria and algorithm, it becomes clear what the inputs, processes and outputs are for the 6-word story. From there students are able to plan this as a creative story board and show clearly what processing, movement, inputs and outputs there areThis will involve combining multiple applications and some primary asset designThe creative element is especially important here as students will use a block based programming language of scratch which involves them having a creative display | InputProcessOutputAre terms which students some times do not understand at first, especially in the context of an algorithm |
| Creating representations of their ‘six-word story’ Algorithm | understand several key algorithms that reflect computational thinking, using logical reasoning to compare the utility of alternative algorithms for the same problem | Students cannot create representations of their algorithm until their algorithm has been decided upon. They will learn representation through the use of a Flow Chart and then this is developed into the idea of Pseudo Code. Students find it easier to write their Pseudo Code if they can refer back to their Flow Charts | Students sometimes mix up the symbols for use in a flowchart, but once practiced and used this becomes embeddedStudents can find the process of using selection and iteration complex in Pseudo Code, but again once practiced become more familiar with this |
| Learning Block Based Programming Skills (Scratch)Creating an ‘Six Word Story’ in Scratch | use a block-based programming language, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions | Once students have developed their Pseudo Code, they will be taught programming skills in a block-based programming language. They will then implement these to create their own solution of a ‘six-word story’ | Students will need to practice the skills taught for Scratch, once they are understood they will then be able to implement them in Scratch to create their solutionStudents sometimes mix up the different sections in which the blocks are contained. Students will learn that the colour coded sections represent different blocks |
| Testing and Reviewing created Solution of a ‘Six word story’ | create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability | Students can not test their solution until it has been created. Although they will be encouraged to test as they progressOnce the solution has been tested and is fully functional they will be able to compare their solution to the original success criteria and algorithm | Students in year 7 tend to use terms for testing which are not technically correct. Such as ‘bugged out’ They will be taught the correct terms of Syntax error, logical errors and runtime error. And will be shown examples of each and will be helped to categorise these during testing |

I am a Digital Solutions Expert

Scheme of work scheduled to run between April and July 2020. This scheme of work is based around Computer Science, Digital Literacy and Creative creation and will be based around the theme of the ‘Olympic Games 2020’

Students have been working with algorithms and sequencing in the year and are used to the main constructs of coding. Sequence, Selection and Iteration. This previous computational thinking will allow students to think analytically

Students have been exposed to block based and high level programming and now students will be able to think about coding in a language which is natural to us, but then what the computer understands and how we convert between the two

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| **Topic** | **Fundamental ideas****Linked to KS3 National Curriculum Programme of Study for Computing** | **Intent and Sequencing** | **Common Misconceptions** |
| Students will learn about different number systems. Students will also learn to convert, add, subtract and multiply in binary. Students will progress to learn about Logic, truth tables and then  | understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal] | This is a layered section of work. Students will learn firstly about number systems. Once this has been mastered students will then progress to think how we can work with these and convert between them. Once students are essentially able to think about a computer system in terms of binary and machine code. They will develop to working with them and creating logic solutions | Binary and Hexadecimal understanding and conversionsLogic gates and what they do AND, OR, NOTLogic Gate truth tables |
| Once students understand Binary, students will then progress to think about how our common objects of images, text and sound are represented in binary | understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits | Students need to understand the principles of Binary before they can go on to work with them | Students will need to think about binary and the representation of images, text and sound |
| Creating a promotional material for the Olympic Games 2020 | 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 userscreate, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability | This is a cultural capital sequencing. This scheme of work will be based around the Olympic games 2020 and at this point students will be given a brief for which they need to create a promotional video for the Olympic Games 2020, this will have a set client brief and target audienceStudents will plan, design, create a moodboard and visualisation diagramStudents will create and collect and repurpose digital assets and record theseStudents will then use Fireworks, 3D paint, Movie Maker (or other) and Audacity to create the Promotional Material for the Olympic GamesThe product will then need to be tested against the original client requirements and improved as needed | Students will need to learn and then practice key skills in 3D Paint, Audacity, Adobe Fireworks and also Movie Maker to create the Olympic Games 2020 promotional material |

**Year 8**

I am a Software Engineer

This is a High-Level Language Python based Scheme of Work, Students have already learnt the concepts of Computer Science in KS2 and Year 7 using a block-based language called Scratch, in year 8 they develop this into text-based coding

Students learnt scratch in year 7 and this project has been sequenced at the beginning of the year to capitalise on that learning so that it can be continued to the next level.

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| **Topic** | **Fundamental ideas****Linked to KS3 National Curriculum Programme of Study for Computing** | **Intent and Sequencing** | **Common Misconceptions** |
| Introduction of Adventure Game | design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems | Students first of all need to understand their given brief, from there they abstract the key success criteria which they need to develop into an algorithm | Key terms of AbstractionDecompositionAlgorithm |
| Designing Adventure Game Inputs / Processes and Outputs | 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 create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability | Once students have developed their key success criteria and algorithm, it becomes clear what the inputs, processes and outputs are for the adventure game. From there students are able to research the answers for their key questions. Which involve using the internet and using this information in their answers. Once the validity has been checked  | InputProcessOutputAnd correct explanation |
| Creating representations of their Adventure Game Algorithm | understand several key algorithms that reflect computational thinking, using logical reasoning to compare the utility of alternative algorithms for the same problem | Students can not create representations of their algorithm until their algorithm has been decided upon. They will learn representation through the use of a Flow Chart and then this is developed into the idea of Pseudo Code. Students find it easier to write their Pseudo Code if they can refer back to their Flow Charts | Students sometimes mix up the symbols for use in a flowchart, but once practiced and used this becomes embeddedStudents can find the process of using selection and iteration complex in Pseudo Code, but again once practiced become more familiar with this |
| Learning Python Skills (High Level Programming Language)Creating an Adventure Game in Python | use a textual programming language, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions | Once students have developed their Pseudo Code, they will be taught programming skills in a high-level programming language. They will then implement these to create their own solution of an adventure game | Students will need to practice the skills taught for Python, once they are understood they will then be able to implement them in Python to create their solutionStudents sometimes mix up the terms of Machine Code, Low Level, Assembly and High LevelStudents sometimes mix up the definition of Complier and Interpreter |
| Testing and Reviewing created Solution of a Text based Adventure Game | create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability | Students can not test their solution until it has been created. Although they will be encouraged to test as they progressOnce the solution has been tested and is fully functional they will be able to compare their solution to the original success criteria and algorithm | Students confuse the terms of Syntax error, logical errors and runtime error. But will be shown examples of each and will be helped to categorise these during testing |

I am a Cyber Security Expert

As social media becomes more prevalent as student progress up the school, year 8 students will learn and develop the need to be equipped with the correct skills to keep E-safe, retain integrity when working online and how to be aware of other online threats and dangers

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| How we connect online and what hardware and software is used | understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems | Students explore what it is to go online? Once they understand the E-safety concerns and other online threats cross comparisons can be made between what going online is and the dangers that exist | Students will need to learn what hardware and software is and other terms around the difference between the www and the internet and then what it actually is to connect and go online and the different levels of hardware which is needed |
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