



Our Lady's Catholic College

Computer Science – Key Stage 3 Curriculum Overview

Our Lady's Catholic College, Morecambe Road, Lancaster, LA1 2RX

Key Stage 3 Curriculum Overview for Computing

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 7						
Unit	7.1 Intro to Computing	7.2 Data, Information & Spreadsheets	7.3 Online Safety	7.4 Computer Networks	7.5 Scratch	7.6 Creating Media - Webpage Creation
Big Question	How do I use a computer?	How do I organise & format data?	How do I stay safe online?	How does the internet work?	How do I program a computer?	How do I design for the Web?
Summary	Using the keyboard and mouse, signing in, choosing a strong password, accessing our files, using Office and Teams	Using the basic features of Excel. Cell referencing, ranges, formulas and simple ways to present data in the form of charts.	Respecting others online, spotting strangers, and the effects of cyberbullying. Presentation software is used effectively to present to an audience.	Connecting computers together, breaking data into packets, how Wifi works, what's my IP? How the internet is not the WWW!	Basic programming with blocks of code. Writing sequences, selection and iteration. Putting it all together in a game.	We focus on what features make a good website and creating a site for a specific purpose.
Rationale of Sequencing	7.1 Intro to Computing This unit has been designed as the first unit in Y7 to ensure that our students at Our Lady's are given sufficient time to familiarise themselves with the school network and Microsoft Teams. It also allows us to discuss appropriate use of the school network, and to update and remind them of important online safety issues. Online safety is covered in more depth later in the year but we make no apology for making sure students are aware of online dangers associated with the use of computers enabling them to use computers responsibly. 7.2 Data, Information & Spreadsheets Once students become familiar with basic Microsoft Office packages following unit 7.1, we move on to looking at spreadsheet modelling in Excel. Modelling makes up a large percentage of the ICT Technical award which we offer and deliver at KS4, so we build knowledge and skills right across KS3. Learning how to use a spreadsheet in Y7 can help students develop vital computer skills, such as typing, using keyboard shortcuts, and navigating software interfaces. These skills are important not just for computing, but also for other subjects and for the workplace.		7.3 Online Safety In this unit we revisit some elements of unit 7.1 in greater detail. Warning Y7 students about the dangers of cyberbullying is incredibly important because it is a prevalent and harmful issue that can have long-term effects on individuals and their mental health. Our Y7 students are at an age where they may be starting to explore social media and online platforms more frequently, and they may not fully understand the impact of their online actions. By warning them about the dangers of cyberbullying, they can learn to identify it, prevent it from happening, and support others who may be experiencing it. 7.4 Computer Networks This unit builds on issues of privacy and security introduced in Unit 7.3. We also develop a deeper understanding of how we communicate using network technology. This unit links with future units in Y8 - 8.2 Cyber Security and 8.5 Computing Systems. This unit begins by defining a network and addressing the benefits of networking, before covering how data is transmitted across networks using protocols. The types of hardware required are explained, as is wired and wireless data transmission. Students will develop an understanding of the terms 'internet' and 'World Wide Web', and of the key services and protocols used.		7.5 Scratch Unit 7.5 is the first programming unit of KS3. It is important to start to embed some of the programming skills and knowledge early at KS3. The aim of this unit is to build students' confidence and knowledge of the key programming constructs. Importantly, this unit does not assume any previous programming experience, but it does offer students the opportunity to expand on their knowledge throughout the unit. The main programming concepts covered in this unit are sequencing, variables, selection, and count-controlled iteration. 7.6 Creating Media - Webpage Creation We have chosen to include this unit here to progress from the Scratch programming units in Y7 and as a bridge towards text-based programming in Year 9. In this unit, students will explore the technologies that make up the internet and World Wide Web building upon their unit 7.4 knowledge. Starting with an exploration of the building blocks of the World Wide Web, HTML, and CSS, they will investigate how websites are catalogued and organised for effective retrieval using search engines. By the end of the unit, students will have a functioning website.	

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 8						
Unit	8.1 Modelling data - Spreadsheets	8.2 Cybersecurity	8.3 Computer Control & Sequencing	8.4 Clear messaging in digital media	8.5 Computer Systems	8.6 Representations from Clay to Silicone
Big Question	How can data help me make decisions?	How do we ensure our online lives are positive?	How can I solve problems with flowcharts?	How can IT help us convey clear messages?	How do computers really work, "under the hood"?	What are all these "0s&1s"?
Summary	Becoming a party planner! More complex formula, conditional formatting and analysing techniques.	This unit takes the students on an eye-opening journey of discovery about techniques used by cybercriminals to steal data, disrupt systems, and infiltrate networks.	We look at systems that use simple loops and basic outputs, and then move on to look at systems that have multiple inputs and outputs.	This unit looks at working between different applications to create digital products that convey a clear message.	The CPU, RAM, ROM and storage. Operating systems and logic gates. How does it all fit together to make a "thinking machine"?	This unit focuses on the fundamental concepts around binary representations.
Rationale of Sequencing	8.1 Modelling data – Spreadsheets Students further develop their knowledge of Excel from unit 7.2 with an emphasis on formulas and using conditions to analyse data. This unit enables students to develop skills in data analysis and visualisation, which are increasingly important in many fields. Students can learn how to sort, filter, and analyse data using spreadsheet functions and tools, and use charts and graphs to visualise their findings.		8.3 Computer Control & Sequencing Students are introduced to Flowol, a computer control and robotics software which allows students to explore the world of automatic systems through the virtual world of Mimics (controllable on-screen pictures) and the real world of models operated by connected Interface Hardware. Computational thinking as a skill which underpins all the learning students do in Computing lessons. This unit explicitly covers computational thinking by exploring the algorithms behind scenarios. The problem-solving skills and programming concepts developed in unit 7.5 Scratch are taken further here as they apply those skills in a different context.		8.5 Computer Systems This unit builds on some knowledge gained in Y7 Computer Networks. It is important that students start to develop an understanding of the fundamentals of how computers work before they are introduced to more challenging concepts delivered later in Y9 and if they choose GCSE Computer Science in Y10. The aim is to provide a concise overview of how computing systems operate, conveying the essentials and abstracting away the technical details that might confuse students.	
	8.2 Cybersecurity This unit builds upon issues of privacy and security from unit 7.3 Online safety and 7.4 Computer networks. We have chosen to put this unit at this point as we believe that students should now begin to develop a greater understanding of the threats and dangers in an online world. This unit takes them on a journey of discovery of techniques that cybercriminals use to steal data, disrupt systems, and infiltrate networks. The students will start by considering the value their data holds and what organisations might use it for. They will then learn about social engineering and other common cybercrimes, and finally look at methods to protect against these attacks.		8.4 Clear messaging in digital media This unit is designed to build upon students' experience in Y7 unit 7.3. It requires students to use a range of different skills across several pieces of software. They will work between different applications to create a poster and slides on a given theme. The unit is designed so that they can concentrate on applying skills that they may have previously learnt as well as those learnt in the unit. Students are given clear tasks for which they need to first plan and then implement a solution. This unit is sequenced here to break up two computer science based units.		8.6 Representations from Clay to Silicone The concepts in this unit are linked to practical applications and problems that the students are familiar with such as that in programming topics and is a logical progression from unit 8.5 Computer Systems. This unit conveys essential knowledge relating to binary representations. The activities gradually introduce students to binary digits and how they can be used to represent text and numbers.	

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 9						
Unit	9.1 Graphic Design – part 1	9.1 Graphic Design – part 2	9.2 Databases	9.3 Advanced Spreadsheets	9.4 Python programming	9.5 Ethical, Environmental and Legal
Big Question	How can we design vector graphics?	How can we create digital graphics for a purpose?	How do IT systems help us store & retrieve large amounts of data?	How can real life scenarios be modelled using spreadsheets?	How can I write code like Computer Scientist?	How does the use of technology affect the world around us?
Summary	An opportunity to design graphics using vector graphic editing software. The lessons are tailored to Inkscape.	Image manipulation using layers to create a digital graphic using a suitable graphics package such as Adobe Fireworks or Photoshop.	We explore the power of databases to store and analyse large amounts of data and learn about creating tables, running searches and queries	Using Excel we explore more advanced functions and features of the software that help us model and help solve real life problems.	We take the leap into text coding, with input, variables, "if", "for" and "while", and put it all together in a quiz game.	We explore ethical issues surrounding social media as well as the environmental issues surrounding new technology.
Rationale of Sequencing	9.1 Graphic Design In this unit we introduce media skills that will become vital if students chose the KS4 ICT Technical Award as one of their option choices. Vector graphics can be used to design anything from logos and icons to posters, board games, and complex illustrations. Through this unit, students will be able to better understand the processes involved in creating such graphics and will be provided with the knowledge and tools to create their own. This unit is placed here to offer variety in the curriculum following units that are geared towards GCSE Computer Science at the end of Y8.		9.2 Databases We follow the graphics unit with another practical unit covering the basic theory, creation and use of a single-table database and a simple relational database involving two tables in a one-to-many relationship. students start by looking at an existing single-table database, learning how to add records and make queries. The first lesson is designed to engage students in the concept of databases using a number of "Unsolved Crimes" and a database of suspects, from which they must use queries to find the culprit for each of the cases they have been allocated. In subsequent lessons they will create a flat-file or two-table relational database of their own, using suitable data types and adding in appropriate validations. They will create an input form, queries, a report and a front end menu for their own application. This unit is crucial for the Y10 ICT Technical Award.		9.4 Python programming Following two more traditional IT units we now start to build on block coding units delivered in Y7 and 8. We have included this here as students will have a foundation to push onto the more challenging text-based programming. The lessons start with simple programs involving input and output, and gradually move through arithmetic operations, randomness, selection, and iteration. Emphasis is placed on tackling common misconceptions and elucidating the mechanics of program execution. A range of pedagogical tools are employed throughout the unit, with the most prominent being pair programming, live coding, and worked examples. This unit will prepare students for the more challenging programming units in the GCSE Computer Science course.	
			9.3 Advanced Spreadsheets This unit builds on knowledge and skills taught in units 7.2 and 8.1. Students will use spreadsheets to track and calculate income, make predictions, and answer "what if...?" questions. More complex features and functions of Excel are explored such as validation, IF statements, LOOKUPS and macros. Again as with unit 9.2 this is crucial for the Y10 ICT Technical Award.		9.5 Ethical, Environmental and Legal We purposely leave this unit until the end of Y9 because it is relevant for students taking either the IT or Computer Science course in Y10. Ethical, environmental, and legal issues of information technology are important as it helps students to develop a critical understanding of the social, economic, and political implications of IT. Students are taught about the ethical implications of using and sharing personal data, the importance of respecting intellectual property rights and the effects of the Digital Divide. We look at issues such as e-waste, energy consumption and sustainability as well as legal frameworks that governs IT, including copyright, trademark, and patent law and data protection.	

Half Term 1

7.1 Intro to Computing

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Functional IT Skills <ul style="list-style-type: none">• Getting to know the Computer Lab• File management• Keeping your data safe• Email and collaborating online respectfully.• Searching the web E-Safety <ul style="list-style-type: none">• E- Safety – Social Media• Keeping your data safe• Phishing Scams	Functional IT Skills <ul style="list-style-type: none">• Know the structure of the OLCC Computer Network.• Know what the Directory Folder Structure is• Know why passwords need to be secure.• Know the importance of respectful email communication.• Know what MS Teams is.• Know the structure and layout of MS Teams to find assignments.• Know their user name and password.• Know what a Search Engine is.• Know the importance of reliable and accurate information online. E-Safety <ul style="list-style-type: none">• Know the possible dangers of social media sites• Know the dangers associated with Phishing.	Functional IT Skills <ul style="list-style-type: none">• Students know how to Login and change their password.• Students know how to create folders for each subject in their user area.• Students know how to create a secure, memorable password.• Students know how to use Teams and be able to find assignments from Computing.• Students know how to Turn-in their work via Teams from a set assignment.• Students know how to log into the Office 365 email system.• Students know how to send, respond to and forward emails.• Students know how to search their old emails for a sender, subject and attachments.• Students know how to attach/embed documents to emails.• Students know how to save and open their work to their Computing Folder on their user area.• Students know how to use a search engine efficiently. E-Safety <ul style="list-style-type: none">• Students know how to respond to threats on the Internet.• Students know how to keep their identity secure on the Internet.• Students know how to protect their identity online.• Students know how to avoid being a victim of an email scam.

8.1 Modelling data – Spreadsheets

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Modelling Data - Spreadsheets <ul style="list-style-type: none"> Getting to know a Spreadsheet – Data and information, Cell references and identifying range of cells. Quick calculations – Formulas, Autofill. Collecting Data – Sources of Data, Primary and Secondary data. Become a Data Master – Graphs, Charts, MAX, MIN, COUNT. Level up your data skills – Sorting, Filters, AVERAGE, COUNT IF, Conditional Formatting. Spreadsheet deliberate practice 	Modelling Data - Spreadsheets <ul style="list-style-type: none"> Pupils to know what data is and what the difference is between data and information. Pupils to know what a cell and cell reference is and the difference between a row and column. Pupils will know how to name a range of cells. To know the simple formatting tools such as borders. Pupils learn how a formula works and how to construct a formula. Pupils know what the different comparison operators are, including addition, subtraction, divide and multiply and the special symbols used in spreadsheets for these. Pupils know what the auto fill function does. Pupils will know the difference sources of data, whether it be primary or secondary data. Pupils know the different sorts of ways that data can be represented using graphs and charts. Pupils will be will know how to analyse data using these functions: MAX, MIN, SUM, COUNTA, AVERAGE, COUNTIF, IF. Pupils will know different chart types (Line graph, pie chart, bar chart, scatter graph) what the series and labels are and the x and y axes. Pupils will learn how to sort data and filter data. Pupils will know what conditional formatting is and how this can help with data analysis. 	Modelling Data - Spreadsheets <ul style="list-style-type: none"> Students to be able explain the difference between data and information with examples. Students to be able to construct a cell reference. Students to know that rows are on the left of a spreadsheet and columns are along the top of the spreadsheet. Students will be able to name a range of cells, for example A2: E6. Students can show they can use simple formatting tools, for example using borders around a spreadsheet. Students will show they can construct a formula using = at the start of the formula. Show they can construct a formula using different comparison operators - + - * / Show they can add a list of numbers using the auto fill function. Students will show that they know the difference between primary and secondary data, giving examples of where this is used. Be able to show they can create different sorts of graphs, including pie chart, bar chart, line and scatter graph. To show they can use different functions on a practical spreadsheet task including: MAX, MIN, SUM, COUNTA, AVERAGE, COUNTIF, IF. Students will be able to sort and filter data on a spreadsheet. Students will be able to explain what conditional formatting is And how this is beneficial.

9.1 Graphic Design

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Digital Graphics - Vectors <ul style="list-style-type: none">• Get into shapes• Working with multiple objects• Paths & Nodes• What will you make?• Behind the scenes• Showcase	Digital Graphics - Vectors <ul style="list-style-type: none">• Pupils to know that vector graphics are created using paths• Pupils to know an image can be created by combining shapes.• Pupils to know that z-order describes the layer an object is in.• Pupils to know that union, difference, and intersection are useful tools when combining objects.• Pupils to know the differences between bitmap and vector graphics.• Pupils to know that vectors can be scaled without impacting the quality.• Pupils to know and be able to identify where using vector graphics would be appropriate.• Pupils to know the data used in a vector file format.	Digital Graphics - Vectors <ul style="list-style-type: none">• Students to be able to create objects and change their properties• Students to be able to manipulate groups of objects• Students to be able to align and distribute objects• Students to be able to combine paths by applying operations• Students to be able to draw paths• Students to be able to convert objects to paths• Students to be able to change the form of an object by adjusting nodes• Students to be able to use tools and techniques to create a digital graphic for a given purpose• Students to be able to review and improve vector graphics.

Half Term 2

7.2 Data, Information & Spreadsheets

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Data, Information & Spreadsheets <ul style="list-style-type: none">• Collecting Data• Formatting a model• Working with formula• Calculate & Duplicate• Event Planning• Presenting Data	Data, Information & Spreadsheets <ul style="list-style-type: none">• Pupils to know that scenarios can be modelled and questions can be answered using spreadsheets.• Pupils to know what an item of data is in a spreadsheet model.• Pupils to know that data types determine how a spreadsheet can process the data.• Pupils to know that formulas can be used to produce calculated data.• Pupils to know that functions can be used to produce new data.• Pupils to know that a cell's value automatically updates when a value in a linked cell is changed.	Data, Information & Spreadsheets <ul style="list-style-type: none">• Students to be able to collect data, structure it and enter it into a spreadsheet model• Students to be able to choose and apply an appropriate format for a cell• Students to be able to construct a formula• Students to be able to recognise which outputs have altered based on inputs• Students to be able to create a formula based on a range of cells• Students to be able to apply a formula to a number of cells by duplicating it• Students to be able to produce a chart to show the solution to a problem or answer to a question• Students to be able to suggest when to use the most appropriate chart or graph.

8.2 Cybersecurity

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Cybersecurity <ul style="list-style-type: none"> You and your data – The difference between data and information. The DPA Act. Social engineering – Shouldering, Name generator attacks, phishing, blagging. Script kiddies – Hacking, hackers, Dos, DDos, Brute force attack, Computer Misuse Act. Rise of the bots – Virus, Trojans, Worms, Adware, Spyware, Ransomware. There's no place like 127.0.0.1 – Cyber threats, Firewall, Anti-malware, User authentication and permissions. 	Cybersecurity <ul style="list-style-type: none"> Pupils will know the difference between data and information. Pupils will know what information social media companies keep about them. Pupils also understand the legislation to keep data safe, in particular the Data Protection Act. Pupils will know what social engineering is. They will know what shouldering name generator attacks, phishing attacks and blagging are. To know what script kiddies are and how they hack into companies' websites. To know the difference between ethical and unethical hacking To know what a hacker does. To know what a denial-of-service attack is and a distributed denial of service attack. To know what a brute force attack is. Pupils will also know about the legislation designed to protect against hacking, in particular the Computer Misuse Act 1990. They will know about the different sorts of malware and what malware does to a computer. They will learn about the six categories of malware, which are viruses, adware, Trojans, spyware, worms and ransomware. Pupils will know what an Internet bot is Pupils know the different protection methods that can be used to keep safe on the Internet. These include firewalls, anti-malware, auto updates, user authentication, user permissions and user security. 	Cybersecurity <ul style="list-style-type: none"> Students will be able to articulate the difference between data and information. People will be able to identify all the different information that a social media company might keep about them. Students will know how data is protected according to the Data Protection Act and their rights as the data subject. Students will be able to explain what social engineering is and the different types of social engineering attacks, for example phishing and blagging. Students will be able to identify what a script kiddie is and say how they attack companies' websites. Students will be able to give examples of ethical and unethical hacking. Students will understand what a hacker is and why these people might want to expose companies. Students will be able to explain the difference between a DOS attack, denial of service and also a DDoS attack, distributed denial of service. Students will know what a brute force attack is and what can be done to prevent these sorts of attacks on computer systems. Students show knowledge of the offences under the Computer Misuse Act 1990. Students will be able to describe what the different sorts of malware are and how they operate. For example, viruses, adware, Trojans, spyware, worms and ransomware. Students should be able to explain what an Internet bot is. Students will be able to explain what the different protection methods are and how they operate. For example, firewalls, anti-malware, user authentication. Students will show understanding of this and be able to answer questions about different types of Internet protection methods.

Half Term 3

7.3 Online Safety

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Online Safety <ul style="list-style-type: none">• Communicating Online• Cyberbullying• Presenting Information to an audience.	Online Safety <ul style="list-style-type: none">• Pupils know how to be respectful when communicating online.• Pupils know cyberbullying is when someone uses technology, like smartphones, computers, or social media, to hurt, harass, or embarrass another person.• Pupils know the different types of cyberbullying.• Pupils know the consequences of cyberbullying.• Pupils know the prevention and coping strategies.• Pupils know about where to seek help.• Pupils know the importance of being empathic and respectful.• Pupils know the importance of encouraging responsible and ethical behaviour online.• Pupils know that each presentation slide should focus on one main point or idea.• Pupils know the importance of bullet points and keeping the text concise.	Online Safety <ul style="list-style-type: none">• Students know how to describe cyberbullying.• Students know how to explain the effects of cyberbullying.• Students know how to plan effective presentations.• Students know how to choose a design theme that matches the topic of their presentation and make sure it's visually appealing and easy to read.• Students know how to add clear titles and headings that are relevant to slide content.• Students know how to add and source relevant images to add to their presentations.• Students know how to add new slides with the appropriate slide layouts.• Students know how to ensure media is age appropriate and adds value to the text.• Students know how to add transition and animation.• Students know how to ensure fonts, colours, and styles are consistent throughout the presentation.• Students know how to check for spelling and grammar errors.• Students know how to save their presentations to their home drives or their OneDrive accounts.• Students know how to seek help and report incidents.

8.3 Computer Control & Sequencing

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Computer Control & Sequencing <ul style="list-style-type: none"> Flowchart Symbols and Notation Variables Conditions and Decision Making Loops Input and Output Devices Subroutines and Functions 	Computer Control & Sequencing <p>Flowchart Symbols and Notation:</p> <ul style="list-style-type: none"> Know the basic flowchart symbols like start/end, process, decision, input/output, and connectors. Know the meaning and function of each symbol in the context of creating algorithms. <p>Variables:</p> <ul style="list-style-type: none"> Know what variables are and how they are used to store data. Understanding different data types (e.g., integers, floats, strings) and how they affect variable behaviour. <p>Conditions and Decision Making:</p> <ul style="list-style-type: none"> Know what conditional statements are (e.g., if-else) and how they control the flow of a program. Know how to use decision symbols to create branching logic. <p>Loops:</p> <ul style="list-style-type: none"> Know the concept of loops and how they allow for repetitive tasks in a program. Know about different types of loops (e.g., while loops, for loops) and when to use them. <p>Input and Output Devices:</p> <ul style="list-style-type: none"> Know various input devices (e.g. sensors) and understand their functions. Know how output devices (e.g. motors, displays) interact with the program. <p>Events and Actions:</p> <ul style="list-style-type: none"> Know how events trigger actions in a program. <p>Subroutines and Functions:</p> <ul style="list-style-type: none"> Know the concept of subroutines (or functions) and how they allow for modular programming. 	Computer Control & Sequencing <p>Creating Flowcharts:</p> <ul style="list-style-type: none"> Students know how to use the Flowol software to create flowcharts. Students know how to add, connect, and arrange flowchart symbols to represent algorithms. <p>Setting Symbol Properties:</p> <ul style="list-style-type: none"> Students know how to set properties for each symbol, including variables, conditions, and actions. <p>Programming Sensors and Actuators:</p> <ul style="list-style-type: none"> Students know how to interface with various input devices (sensors) and output devices (actuators) within the simulation. Students know how to program sensors to respond to environmental conditions. <p>Implementing Conditions and Decision Making:</p> <ul style="list-style-type: none"> Students know how to add conditional statements to control the flow of the program based on certain criteria. <p>Utilising Loops:</p> <ul style="list-style-type: none"> Students know how to apply loops to perform repetitive tasks, such as iterating through a set of instructions. <p>Debugging and Troubleshooting:</p> <ul style="list-style-type: none"> Students know how to identify and correct errors or bugs in the program. Students know effective debugging techniques to ensure the program functions as intended. <p>Creating Subroutines or Functions:</p> <ul style="list-style-type: none"> Students know how to define and use subroutines to organise and reuse sections of the flowchart. <p>Interfacing with External Devices:</p>

- Know how to define and call functions in a program.

Debugging and Troubleshooting:

- Know the importance of identifying and fixing common errors or issues in a program.
- Know strategies for debugging effectively.

Safety and Ethical Considerations:

- Know the importance of safety protocols when working with physical systems or simulating real-world scenarios.
- Know ethical implications related to automation and control systems.

- Students know how to connect Flowol to physical hardware (e.g. microcontrollers) for real-world applications.

9.2 Databases

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Databases <ul style="list-style-type: none"> • Creating Databases – Tables, fields, records, data types, primary keys. • Validation – Input masks, format, currency, yes/no, date and time, number. • Populating a Database – Data entry, checking validation works. • Sorting and filtering data – Ascending and descending sorts, filtering data. • Searching databases using queries – Creating queries, using comparison operators. • Database reports – Generating reports from queries. 	Databases <ul style="list-style-type: none"> • To know what a database is, what they're used for and the advantages of using databases. • To know which organisations would use the database and what they use them for. • Pupils to know that a database is made-up tables with fields and records. • Pupils should know that a database also needs a primary key as a unique identifier in every table. • Know that data types are needed for every piece of data in the database, these could be text, number, Boolean or date and time for example. • Pupils should know what validation does and how it's useful in database design to reduce errors. • To know what an input mask is and how this can help with data validation. • Pupils to know that date and time fields can be formatted in specific ways. • To know that currency fields can be set to a variety of different currencies. • To be able to know the difference between design view and data sheet view when looking at the database. • To know that populating a database means entering data into each record in the database. • To know that data in a database can be sorted either alphabetically or numerically Z to A or A to Z. • To know that data can also be filtered to hide certain types of data from the database to make data analysis easier. • To know how to create a query to search for data in the database. • To know how to create a report based on a query in a database. 	Databases <ul style="list-style-type: none"> • To be able to explain what a database is and answer questions on the advantages of using Databases. • To be able to create a database using fields, records and a primary key. • To be able to add validation to the database to reduce data entry errors. • To use an input mask to format the data that goes into the database. • Use a variety of data types across the database. These could include text, number, Boolean, date and time, and currency. • To be able to switch between design view and data sheet view easily to either see the data entered in the database or the design of the database. • To be able to populate the database with records. This can be evidenced through completing the exercise in the booklet. • To be able to sort data in the database Either alphabetically or numerically ascending or descending. • To be able to use a filter on the database to hide certain types of data. • To be able to design a query and the database to search for specific data. • To generate reports based on queries for specific searches that have been done on the database.

Half Term 4

7.4 Computer Networks

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Computer Networks <ul style="list-style-type: none">• Computer networks and protocols. History of communication and the importance of protocols in networking.• Networking hardware: Hub's, servers, routers and cabling.• Wired and wireless networks. Wi-fi, bandwidth and buffering.• The internet – Data transmission, packets, IP addresses and Transmission control protocols.• Internet services – Worldwide wide, VOIP, internet of things.• The world wide web – Web Browser, Web Server, HTTP, HTTPS, HTML.	Computer Networks <ul style="list-style-type: none">• Pupils to know the different types of historic communication methods, semaphore, telegrams, telephone.• Know how computer networks have evolved• Pupils to know why protocols are important for computers to communicate across a network.• To know types of Network hardware, cables, hub, server, router and network cabling.• Know about wired and wireless data transmission, Bluetooth, Bandwidth and buffering.• Pupils to know the internet is the huge worldwide network of connected computers.• Know how data is transmitted across continents.• Pupils to know what data packets are and how they are used to transmit data.• Know about an IP address is and how packets of data are routed and ordered.• Know about protocols are and why they are used – TCP, IP.• Pupils to know who invented to internet, and internet services, e-mail, VOIP (Voice over internet protocol) and the Internet of Things IoT.• Pupils to know about the Internet, Web Browsers, Web Servers, HTTP, HTTPS, HTML and URL's.	Computer Networks <ul style="list-style-type: none">• Describe how people communicated over long distances over time and the impact computing has made on communication as networks have evolved over time.• Pupils can explain what protocols are and that old data sent has to use the same protocol to be understood. For example, using the @ symbol in an email address.• Pupils can explain the different types of network hardware that I needed to connect to a network? People should be able to know what a hub or a switch does, what a router is and what a server does.• Pupils can describe the different types of wired and wireless networks. Peoples can also describe what Bluetooth is and how bandwidth works as a way of sending data. They should also be able to make the analogy of bandwidth being a large pipe that you send data through.• Pupils will be able to explain what buffering is and how that impacts download speeds.• Pupils will share. They know what the Internet is and what it's used for. They will also be able to explain how data is transmitted across continents.• Pupils will show that they know what a packet of data is and IP addresses and how these are used to send data.• Pupils will show understanding of an Internet Protocols and a transmission control protocols and how these are used to transmit data.• Pupils will show they know who invented the Internet and who Sir Tim Berners Lee is.• Pupils will be able to explain a different range of Internet services including e-mail, voice over Internet Protocol and the Internet things.• Pupils will be able to explain the different sorts of Internet hardware that are required. A web browser, a web server, HTTP and HTTPS.

- Pupils will be able to explain that HTML is the language of the internet.
- Pupils will be able to give examples of search engines.
- People will also be able to show they understand what a URL is by dissecting an IP address.

8.4 Clear Messaging in Digital Media

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Clear Messaging in Digital Media <ul style="list-style-type: none"> • Get the message across • Poster development • Brand • Creating a brand • Adding appropriate content • Presenting 	Clear Messaging in Digital Media <ul style="list-style-type: none"> • Know and understand the needs of the intended audience. • Know how design choices address a specific task. • Know that content should be modified to suit different digital artefacts. • Know that existing digital artefacts can be modified. • Know that media can be copied between applications. • Know the need for the consistent styling within a multi-page digital artefact. 	Clear Messaging in Digital Media <ul style="list-style-type: none"> • Students know how to choose suitable search terms to find relevant content on the web. • Students know how to identify features that help visually communicate the message. • Students know how to plan a digital artefact to include features identified as good. • Students know how to use a combination of applications to create a digital artefact. • Students know how to use digital tools to provide feedback on a document. • Students know how to plan a multi-page digital artefact with consistent styling. • Students know how to modify content to suit the purpose of a different digital artefact. • Students know how to create a multi-page digital artefact applying consistent styling.

9.3 Advanced Spreadsheets

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Advanced Spreadsheets <ul style="list-style-type: none">• Spreadsheet warm-up• The RSC Live event• RSC merchandise• RSC data visualisation• RSC stock control	Advanced Spreadsheets <ul style="list-style-type: none">• Pupils know the different sorts of ways that data can be represented using graphs and charts.• Pupils will be will know how to analyse data using these functions: MAX, MIN, SUM, COUNTA, AVERAGE, COUNTIF, IF.• Pupils will know different chart types (Line graph, pie chart, bar chart, scatter graph) what the series and labels are and the x and y axes.• Pupils will know the importance of sorting and filter data.• Pupils will know what conditional formatting is and how this can help with data analysis.• Pupils will know that data validation reduces user error on entry.• Pupils will know how macros can automate a repetitive task.• Pupils will know that a LOOKUP function can retrieve data.• Pupils will know the importance of an IF function to give the user feedback.	Advanced Spreadsheets <ul style="list-style-type: none">• Students to be able to choose and apply an appropriate format for a cell• Students to be able to construct a formula• Students to be able to recognise which outputs have altered based on inputs• Students to be able to create a formula based on a range of cells• Students to be able to apply a formula to a number of cells by duplicating it• Students to be able to produce a chart to show the solution to a problem or answer to a question• Students to be able to suggest when to use the most appropriate chart or graph.• Students to be able to recognise the importance of clear chart titles and labels.• Students to be able to utilise data validation when entering data in order to reduce user error.• Students to be able to implement and test a macro to carry out a repetitive task.• Students to be able to implement a LOOKUP function that can retrieve data.• Students to be able to implement an IF function to give the user feedback.• Students to be able to apply their developed skills to scenarios with different contexts.

Half Term 5

7.5 Scratch

Core Knowledge And Cultural Knowledge (KNOW)

Scratch

- Introduction to Scratch: Sprite, Scripts, Block coding.
- Movement: Algorithms, sequencing, coding.
- Stage: Creating a stage (background) in scratch to use for the maze game.
- Enemies and Objects: Using Scratch to code iteration, For Loop, While Loop and Forever Loop.
- Variables and Objects: Variables in Scratch and use these with Selection, If, Then, Else within the coding blocks to code the lives counter.
- Broadcasts: Coding responses to events and display messages on screen.

Scratch

- To know what a Block coding environment is.
- To know what the different coloured coding blocks do in Scratch and how they can be used to code the maze game
- Know what a Sprite is and how to change a Sprite
- Know what the Stage is and how to change, modify or adapt the Stage.
- Understand the concept of sequencing is when coding.
- To know what an Algorithm is and how they are used in coding.
- To know what Iteration and how the different types of loops can be used when coding a game (For Loop, While Loop and Forever Loop).
- To know the difference between a variable and a constant.
- To know what selection is in coding and when to use selection in the maze game – If, Then, Else.
- To know what a Broadcast is in Scratch to respond to events.

Know How (SHOW)

Scratch

- Students know how to code a maze game in Scratch using Block coding.
- Students know how to use Sprites and Scripts to code the maze game.
- Students know how to include a scoring function for their game.
- Students know how to code the game to use Iteration (for loops, while loops and forever loops) for the enemies and objects.
- Students know how to use a stage to design the Scratch maze game.
- Students know how to use Iteration (for loops, while loops and forever loops) to code a lives counter in their Scratch game.
- Students know how to include Broadcasts in their game to respond to events and display messages on screen using Selection statements (If, Then, Else).

8.5 Computer Systems

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Computer Systems <ul style="list-style-type: none"> • Get in gear – Overview of the earliest computing machines. • What is inside a computer – Processor, Memory, Storage, RAM, ROM input and output devices. • Operating system – Multi-core processors, operating system, • Logic Gates – AND, OR and NOT Gates, Truth Tables. • Artificial Intelligence –AI and Machine Learning, Advantages / concerns of AI in society. • Open source and proprietary software – Advantages/ disadvantages. 	Computer Systems <ul style="list-style-type: none"> • Know what the earliest computing machines looked like including the Antikythera mechanism, the Pascaline stepped reckoner and Babbage's Analytical engine. • To know that a computer is the only appliance that can do more than one thing. To know that a general-purpose computer can be programmed to do hundreds of tasks. Just as Alan Turing described it. • To know how a computer works on the main components of a computer system. To know that all computing systems consist of processor, memory and storage. To know that storage consists of ROM read only memory and RAM random access memory. To know the difference between volatile and non-volatile memory. • To know difference types of storage medium. For example, hard disc drives, solid-state drives and USB flash drives. To know how main memory works and that it's a RAM component. • To know that the processor is a brain of the computer and it fetches, decodes and executes each instruction. • To know what input devices are for example, mice, keyboards, cameras and microphones. To know what output devices are for example screens, speakers, projectors and printers? • To understand what the operating system does and be able to give examples of them. • To understand the difference between a single core processor and a multi core processor. • To know Boolean Logic and the different types of logic gates and why they are used. (AND, OR, NO) And be able to construct a truth table for each type of logic gate. • Pupils to know what artificial intelligence is, how it is used and be able to give examples of artificial intelligence in real world situations. Pupils to be able to understand what machine learning is in artificial intelligence and how it is used to program a computer. 	Computer Systems <ul style="list-style-type: none"> • Students can explain what the earliest computing machines were and what they were used for. • Students can answer questions about what a computer does and how it can be programmed for many tasks. • Students will show they know the difference between volatile and non-volatile memory. • Be able to explain the difference between RAM and ROM memory. • To show they are able to know the difference between different input and output devices. • Students can identify a range of storage devices. • Students can explain what the processor does as the brain in the computer. • Students will show that understanding of operating systems by being able to give examples of them and also identify the tasks that they do. • Students can construct different logic gates based on truth tables for AND, OR and NOT gates. • Students will be able to share that understanding of artificial intelligence by naming where it is used in real world situations identifying advantages and disadvantages. • Students can also identify how machine learning works. • Students will be able to identify proprietary software and its advantages.

- Pupils know the difference between open source and proprietary software and the advantages and disadvantages of each.

9.4 Python programming

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Python programming <ul style="list-style-type: none"> • First steps in Python – Algorithms, Programs, Syntax and Input. • Arithmetic operators – Assignments, expressions, arithmetic operators in Python. • Variables and data types – What is a variable, string, INT, FLOAT, BOOLEAN & Integers. • Selection – IF, ELSE . Comparison operators - >, < >=, <=, =, !=. • Selection – ELIF. IF ELSE statements and how to code and why used • Selection – Nested IF Statements 	Python programming <ul style="list-style-type: none"> • To know what an Algorithm is. • To know the difference between an Algorithm and a Program and why precise syntax is important. • To know that to run a Python program needs a Python interpreter. • To know how a block programming language is different to a text-based programming language. • To know what an assignment statement is. • To know what a variable is and an input function. • To know what assignments are. • To know what an expression is. • To know core arithmetic operators in Python - + - * / • To know what a variable is and where it is used in coding. • To know what a Selection statement is using IF, ELSE, ELIF. • To know comparison operators: = , >, <, !=, >=, <= • To know what a Nested IF statement is. 	Python programming <ul style="list-style-type: none"> • Students know how to explain that an Algorithm is a set of precise instructions. • Students are able to show an understanding that a program is the translation of an Algorithm into a programming language with precise syntax. • Students know how to demonstrate a working python program using precise syntax. • Students know how to use an assignment statement in Python. • Students know how to demonstrate what a variable is and use input and variables in working Python programs • Students know how to demonstrate the use of assignments using expressions in a Python program. • Students know how to use arithmetic operators in a python program. • Students know how to use data types being used in a Python program. • Students know how to create working Python programs using Selection Statements. • Students know how to create a working Python Program using a nested IF Statement.

Half Term 6

7.6 Creating Media – Webpage Creation

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Creating Media – Webpage Creation <ul style="list-style-type: none">• First steps in HTML – HTML Tags, HTML as the language of the World wide web.• Text sizes, font styles and colours – Heading Tags H1, H2, H3, Font styles and colours.• Text attributes and alignment - Bold, Underline, Italics, left align and right align.• Adding images – Saving images and coding images into a website.• Hyperlinks – External and internal hyperlinks.• Lists – How to code a list in HTML, benefits of using a list.	Creating Media – Webpage Creation <ul style="list-style-type: none">• Pupils to know that HTML is the language of the Internet (HyperText Mark-up Language).• Pupils to know that Tim Berners-Lee created the internet in 1989.• Pupils know what tags are in HTML.• Pupils know what text sizes are in HTML, H1, H2 and H3 and how these can be used to format text.• Pupils know how to save that work in Notepad and then open the web page in a browser.• Pupils know what text attributes are in HTML, for example bold, italics and underlined and right aligned and left aligned.• Pupils know what a hyperlink is both internal and external and know how to code these on a webpage.	Creating Media – Webpage Creation <ul style="list-style-type: none">• Students will be able to explain what HTML and correctly identify the words each letter stands for.• Students will show they understand the origins of the internet.• Students will be able to code a website for the school using HTML.• Students will show they can use Heading Tags H1, H2, & H3.• Students will be able to code a HTML website in notepad, save this to a user areas and then load the page into a web browser.• Students will show they can use text attributes of bold, italics and underlined on their website.• Students will show they can save images and code them into their HTML webpages and then show these in a web browser.• Students will show they can code different background colours into their Webpages using HTML colour codes.• Students will be able to code external and internal hyperlinks into their websites and show these working when loaded into a web browser.

8.6 Representations from Clay to Silicone

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Data Representation <ul style="list-style-type: none">• Binary digits and binary to denary conversions – Why computers count in binary.• Denary to binary conversion – Nibbles, how to convert denary to binary.• Binary addition – Addition two binary numbers together.• Hexadecimal – Binary to Hex Conversion• Hexadecimal – Hex to Binary conversion• Hexadecimal – Hex to Denary, Denary to Hex	Data Representation <ul style="list-style-type: none">• To know how representations are used to store, communicate, and process information.• Know that information can be encoded, transmitted and decoded.• Know examples of how different representations are appropriate for different tasks.• To know the difference between the Binary and Denary number systems.• To know that computers use the Binary number system and work as a series of switches and circuits with are either on or off.• To know what the Hexadecimal number system is and the numbers and letters used in the number system.	Data Representation <ul style="list-style-type: none">• Students know how to convert a Denary number to a Binary number using a binary place value table• Students know how to convert a Binary number to a Denary number using a binary place value table.• Students know how to add two binary numbers together• Students know how to convert a Binary number to a Hexadecimal number.• Students know how to convert a Hexadecimal number to a Binary number.• Students know how to convert a Hexadecimal number to a Denary number.• Students know how to convert a Denary number to a Hexadecimal number.

9.5 Ethical, Environmental and Legal

Core Knowledge And Cultural Knowledge (KNOW)		Know How (SHOW)
Ethical, Environmental & Legal <ul style="list-style-type: none"> • Privacy and Data Protection • Cybersecurity • Digital Citizenship • Ethical Dilemmas • Sustainable Computing • E-waste and Recycling • Green IT • Copyright and Licensing • Data Protection Laws • Ethical Hacking 	Ethical, Environmental & Legal <p>Ethical Factors</p> <p>Privacy and Data Protection:</p> <ul style="list-style-type: none"> • Know the importance of protecting personal information. • Know the risks associated with sharing personal data online. <p>Cybersecurity:</p> <ul style="list-style-type: none"> • Know online threats like phishing, malware, and social engineering. • Know the importance of strong passwords and safe online behaviour. <p>Digital Citizenship:</p> <ul style="list-style-type: none"> • Know the appropriate online behaviour and respect for others. • Know and avoid cyberbullying and online harassment. <p>Ethical Dilemmas:</p> <ul style="list-style-type: none"> • Know scenarios involving ethical decisions related to technology use and the Digital Divide. <p>Environmental Factors</p> <p>Sustainable Computing:</p> <ul style="list-style-type: none"> • Know the environmental impact of technology. • Know about energy-efficient hardware and practices. <p>E-waste and Recycling:</p> <ul style="list-style-type: none"> • Know the impact of electronic waste on the environment. • Know about responsible disposal and recycling practices. <p>Green IT:</p> <ul style="list-style-type: none"> • Know about initiatives and technologies designed to 	Ethical, Environmental & Legal <p>Practical Skills</p> <p>Safe Internet Usage:</p> <ul style="list-style-type: none"> • Students know how to apply safe online practices, such as using strong passwords, avoiding suspicious links, and being cautious with personal information. <p>Understanding Terms of Service and Privacy Policies:</p> <ul style="list-style-type: none"> • Students know how to read and interpret terms of service and privacy policies for online platforms and services. <p>Basic Data Protection Practices:</p> <ul style="list-style-type: none"> • Students know how to apply basic data protection measures like regular backups and encryption. <p>Responsible Use of Technology:</p> <ul style="list-style-type: none"> • Students are able to demonstrate ethical behaviour in online interactions and respect digital property.

reduce the environmental impact of IT systems.

Legislation

Copyright and Licensing:

- Know copyright laws and licensing agreements for software and digital content.

Data Protection Laws:

- Know about relevant data protection regulations (e.g. GDPR, HIPAA).
- Cybercrime and Hacking Laws:
- Know the legal consequences of cybercrimes and hacking activities.

Ethical Hacking and Security Compliance:

- Know about the concept of ethical hacking and compliance with security standards.