Subject: Computing and ICT

Faculty Leader	Subject Leader
DRH	DRH

National Curriculum

The Ecclesbourne School follows the National Curriculum

- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- 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
- Use 2 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
- 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]
- Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
- 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
- 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, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability
- 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

Curriculum Intent

We have mapped our curriculum content against the national curriculum and have chosen a variety of units which ensure full coverage in line with national curriculum requirements. We also strongly believe that we should develop student ability across 3 strands:
Computer Science (Algorithms, Data Structures, Data Representation and Programming.)
Information Technology (How computers are used within different sectors of society and methodologies for making digital artefacts.)
Digital Literacy (Using technology safely and with confidence.)

Digital literacy and core ICT skills as well as programming ability are all covered within our curriculum and we have included a range of topics which allow students to become competent in all areas. We have looked at GCSE ICT and GCSE Computing and have ensured that we have pulled content down from both disciplines in order to prepare our students for either route. We have also designed a spiral curriculum which builds year on year, revisiting core Information Technology and programming skills and building on digital literacy.

Choice of programming language
The National curriculum requires coverage of two programming languages, we have chosen to use Scratch as our first programming language as students coming up from Primary are familiar with this package and because it covers key programming elements in a visual manner. We then moving on to Small Basic which is a text based language which is accessible but very similar to Visual Basic which is used by us at GCSE and A Level. In year 7 we also use the HTML mark up language for Web Authoring.

Homework
We feel it is important that students are encouraged to carry out wider reading within the subject, particularly considering issues such as new developments in ICT and Computer Science, robotics, artificial intelligence, data science, diversity, ethics, E-safety and history. We will often set students **reading tasks** to complete at home and will then encourage them to **debate** these issues within class. Where we wish them to carry out completion of work, students can use the computer rooms at lunch times.
Students will also be regularly asked to learn key terms relating to topics in order to aid **knowledge retention.**

Curriculum Implementation

	Term		Content	Assessment
Year 7	Autumn Term	1	**E-Safety** In this unit, you will think about staying safe online and will also create an E-Safety Presentation using Microsoft PowerPoint. Within this unit, you will also learn how to use the school computers, logging in and making electronic folders, Using Office 365 for E-mail and Satchel One for homework. **Intent:** This unit focusses on digital literacy – being safe when using computers, computer skills such as basic operation, e-mail, web browsing and making folders in order to promote fluency in the use of technology such as saving and retrieving work, filenames and structures. IT skills of using PowerPoint to present information are also covered with students being encouraged to focus on design principles such as use of white space and simplicity of design as well as skills such as font manipulation and editing of images. When researching E-Safety, students will be encouraged to effectively use search engines with sensible use of key words, filtering of results and consideration of reliability of content. **Interleaving: Prior learning and skills to reactivate:** Students should have covered E Safety in Primary School. This will be re-**iterated in** secondary school. Logging on, making folders, using cloud-based services are all digital literacy areas that can be built on from Primary School. Students will also be used to finding information and using PowerPoint to present	The following tasks will contribute to this unit: • Folders have been produced for year 7 for all subjects • Students will be able to use Office 365, e-mail and satchel one • Students will have produced a Microsoft PowerPoint presentation on E-Safety • Students will have been involved in debate regarding E-Safety
		2	**House Play project** In this project, you will learn how to use a variety of software packages with the theme of the school house plays. You will learn how to write a letter in Microsoft Word, you will design a logo and make an animation using media editing software and will also build a model using Microsoft Excel. **Intent:** This unit continues to focus on digital literacy and ICT Skills – using computers to develop digital artefacts within the context of the school house plays. Key ICT skills of Word Processing (Microsoft Word), Spreadsheets (Microsoft Excel) and Media Editing (Wick online animation editor) will be developed. With a focus on	The following tasks will contribute to your end of unit level: • House play logo and animation • House play letter • House play spreadsheet model

			text editing and core functionality of Microsoft Word, Spreadsheet terminology and use of table formatting and simple formulas in Excel. Use of frames and tweening along with image manipulation in Wick Editor. **Interleaving (Prior learning and skills to reactivate):** Students will have a base level of IT and digital literacy skills from Primary school. This unit builds on the skills already in place and ensures that students are able to competently use the computers before moving on to the programming (Computer Science) strand after Christmas.	
	Spring Term	3	**Programming Shapes** In this unit, you will learn how to draw shapes and produce Mondrian style artwork within Scratch using the pen tool and commands such as move and turn. To make the code more efficient, we will use iteration and programming blocks. This unit will serve as an introduction to the world of programming within secondary school. **Intent:** This unit will focus on Computer Science – using a visual programming language to learn about **decomposition** - breaking the task of drawing of a shape into a **sequence** of **instructions** and also on **efficiency** by using **iteration** to repeat commands and also using blocks as **subroutines** to allow multiple shapes to be drawn with one piece of code. **Interleaving (Prior learning and skills to reactivate):** Students should have carried out simple programming tasks in primary school. We will use scratch drawing tool and use of commands in order to build Computer science skills of decomposition, use of instructions in sequence, iteration and subroutines.	The following tasks will contribute to your end of unit level: • Annotated evidence of simple shapes produced in Scratch which use iteration to repeat instructions • Annotated evidence of a more complex pattern produced in Scratch • Annotated evidence of the use of Blocks to improve efficiency • Programming test • Key terms test – **Knowledge retention**
		4	**Inside a computer and binary** You will learn about the key components and architecture of a computer system and will also learn about the way computers think using 0's and 1's, a system which is called binary and the way in which the binary system used by Computers can be used to represent numbers, text (ASCII), images and sound. The unit will also consider the use of hexadecimal to represent colour values. **Intent:** This unit will focus on core Computer Science knowledge of computer components and architecture, and the way in which the binary system used by Computers can be used to represent numbers, text (ASCII), images and sound as well as considering the use of hexadecimal to represent colour values.	The following tasks will contribute to your end of unit level: • Computer architecture and components presentation • Binary tasks using Excel • Notes on the use of binary to represent numbers, text, images and sound – although this area will be developed further in unit 6 • Key terms test – **Knowledge retention**

			Digital Literacy and ICT skills will be used to search for images of computer components and produce a presentation about key components of a computer system. This forms a core understanding which can be built upon when we cover more detailed Computer Science theory in subsequent units. **Interleaving (Prior learning and skills to reactivate):** Digital literacy and ICT skills developed at the start of the year will be re-activated – Use of PowerPoint to make notes on Architecture and components. Use of Excel to carry out binary calculations. This unit will help develop Mathematical skills and logical thinking skills.	
	Summer Term	5	**Web Authoring** In this unit, you will learn how to use HTML and CSS mark up languages to make a website. This unit will develop your programming skills but also IT and digital literacy skills required to make a website. **Intent:** This unit will focus on core Computer Science knowledge of HTML and CSS mark-up languages as well as the use of hexadecimal to represent colour values. Although strictly speaking a markup language rather than a programming language, it does introduce students to a second type of language within year 7. Digital Literacy and ICT skills will be used to consider web design aesthetics and the key presentational elements of a website. **Interleaving (Prior learning and skills to reactivate):** Breaking down a task into a series of elements has been looked at previously within the Scratch unit. This time we look at breaking down a website into component parts such as website head and body. In unit 4, students will have been made aware of how hexadecimal can be used to represent colours. ICT and digital literacy skills particularly around design and formatting considerations which have been looked at in the E Safety and house play units will also be revisited.	The following tasks will contribute to your end of unit level: • Annotated HTML and CSS code • Evidence of a completed website • Key terms test – **Knowledge retention**
		6	**Bitmaps and Sound** In this unit, you will learn how computers store images and sound using binary. You will also get to be creative and produce Pixel art using Excel and consider how bitmap images differ from Vector images. **Intent:** This unit will focus on core Computer Science knowledge of binary but this time focussing on its use in representing sound and images (vector and bitmap).	The following tasks will contribute to your end of unit level: • Notes on the use of binary to represent sound and images along with sound and image file size calculations • Notes on vectors and bitmaps • Pixel art based spreadsheet models • Key terms test – **Knowledge retention**

			Digital Literacy and ICT skills will be used to produce bitmap images and students will revisit Excel. **These skills are needed for GCSE computer science file size calculations.** **Interleaving (Prior learning and skills to reactivate):** Builds on core knowledge and understanding relating to the use of binary to represent images and sound. (First introduced in unit 4.) Digital literacy and ICT sills are developed further using Excel which has previously been used in the House Play unit and to represent binary numbers. Mathematical skills are used for sound and image calculations and in consideration of vectors.	
	Term		**Content**	**Assessment**
Year 8	Autumn Term	1	**E-Safety** In this unit, you will think about staying safe online and will also use techniques such as mind maps in PowerPoint to help you to summarise ideas and help you develop your ICT skills. You will create folders for year 8 and recap on the use of core ICT systems such as Satchel One and Office 365. **Intent:** This unit focusses on digital literacy – being safe when using computers, computer skills such as basic operation, e-mail, web browsing and making folders. IT skills of using PowerPoint to make mind maps to summarise information are also covered. **These skills are essential for KS4 BTEC ICT courses.** **Interleaving (Prior learning and skills to reactivate):** Students have covered E Safety in year 7. This will be re-iterated and built upon in year 8 with class discussion which recaps on year 7 but also which develops understanding further. Recap on logging on, making folders, using cloud based services, using PowerPoint to create mind maps.	The following tasks will contribute to your end of unit level: • Class discussion and debate on issues relating to E-Safety • Work sheets / notes relating to E-Safety • Summary mind map on E-Safety issues

		2	**Programming using Small Basic** In this project, you will learn to use a different programming language – Small Basic. Here you will learn how to use the key programming structures such as **declaration of variables** and **assignment**, **selection**, **iteration** and will learn the difference between **definite and indefinite iteration**. You will learn how to use **variables** and **arrays** as **data structures** including the use of suitable variable names. Throughout this unit, we will break down problems using **decomposition**. **Intent:** This unit will focus on Computer Science – this time using a text based programming language to learn about **decomposition, sequence** of **instructions** and also on **efficiency** by using **iteration** to repeat commands as well as selection and the use of **data structures: variables** and **arrays**. **Interleaving (Prior learning and skills to reactivate):** Students will have carried out simple programming tasks using Scratch in year 7. Here we will move on to using a second programming language (Small Basic) in order to teach core programming skills of iteration, selection, sequence, decomposition and abstraction.	The following tasks will contribute to your end of unit level: • Annotated theory notes on key programming structures • Annotated evidence of a range of programming tasks carries out using Small Basic • Some students will move on to using Subroutines to build a text based adventure • Key terms test – **Knowledge retention**

	Spring Term	3	**Networking** In this unit, you will learn about network hardware and software, key network topologies and protocols and you will write up your findings using a report. **Intent:** This unit will focus on core Computer Science knowledge of Networking. Digital Literacy and ICT skills will be used to create a professional report using Microsoft Word. This forms a core understanding which can be built upon when we cover more detailed Computer Science theory in subsequent key stages. **Interleaving (Prior learning and skills to reactivate):** Digital literacy and ICT skills relating to the use of Microsof Word which were developed in year 7 will be re-activated but this time more advanced features will be used. This unit will also help develop use of English to write up a report.	The following tasks will contribute to your end of unit level: • Formal report on implementing a network written in Microsoft Word • Networks key terms test – **Knowledge retention**

		4	**Magazine cover using a photo and graphics editor** In this project, you will learn how to use key image manipulation tools using the web based photo and graphics editor PhotoPea. You will learn how to use to transform text and images in order to produce a professional magazine cover. As well as looking at the fundamentals of photo and graphics editing, you will also revisit key design principals. **Intent:** This unit continues to focus on digital literacy and ICT Skills – using computers to develop digital artefacts within the context of a magazine cover. Key ICT skills of photo and graphics editing will be developed using the free web based tool PhotoPea. **Interleaving (Prior learning and skills to reactivate):** Students will have considered design principles in the first two year 7 units and will have had basic exposure to use of frames and image manipulation when using the Wick editor in year 7. This unit builds on the skills already in place and enhances digital literacy.	The following tasks will contribute to your end of unit level: • Screenshot evidence of preliminary work produced whilst learning the software • Final front cover of a magazine which shows off skills learnt and which considers design principles
	Summer Term	5	**Operating Systems and Ethics** In this unit, you will find out what tasks an operating system is expected to perform and will also find out about the ethical issues surrounding autonomous vehicles. **Intent:** This unit will focus on core Computer Science knowledge of operating systems and encourages to think about and debate ethical issues in the world of computer science. Digital Literacy and ICT skills will be used to produce a presentation about key learning points relating to operating systems and to weigh up the pros and cons of the ethical issue. This unit forms a core understanding which can be built upon in subsequent units and key stages. **Interleaving (Prior learning and skills to reactivate):** Digital literacy and ICT skills developed at the start of the year will be re-activated – Use of PowerPoint to make notes on Operating systems. Computer Science theory unit focussing on core knowledge and understanding. Also development of English to develop a coherent argument regarding an ethical issue.	The following tasks will contribute to your end of unit level: • Notes and test question on operating systems • Essay question on autonomous vehicles

		6	**Sorting and Searching** In this unit, you will learn about key sorting and searching algorithms and find out about how these are programmed and which of several are more efficient. We will also consider how to produce systems flow charts. **Intent:** As well as being able to program, in Computer Science it is important for students to be able to read, trace and explain programs and consider which will be more efficient. Students also learn how to represent a program visually using a systems flowchart. Interleaving: Students will have carried out simple programming tasks using Scratch in year 7 and will have considered key programming building blocks in year 8, such as iteration when working on Small Basic. Here they will be able to apply this understanding to code written by a third party and this time be able to read and trace the code to understand how it works.	The following tasks will contribute to your end of unit level: • Annotated notes and dry running of sorting and searching algorithms • Systems flow chart of an algorithm • Some students will move on to producing a programmed sorting or searching algorithm using Scratch or Small Basic • Key terms test – **Knowledge retention**
	Term		**Content**	**Assessment**
Year 9	Autumn Term	1	**Ethics and E-safety** In this unit, you will learn more about E-safety and also think again about computer ethics. You will learn about ways in which we can use social media safely and will consider your digital footprint and appropriateness of content we put online. You will create folders for year 9 and recap on the use of core ICT systems such as Satchel One and Office 365. **Intent:** This unit focusses on digital literacy – being safe when using computers, computer skills such as basic operation, e-mail, web browsing and making folders. IT skills of using PowerPoint to summarise information are also covered. **Interleaving (Prior learning and skills to reactivate):** Students have covered E Safety in year 7 and 8. This will be re-iterated and built upon in year 9 with class discussion which recaps on year 8 but also which develops understanding further. Recap on logging on, making folders, using cloud based services, using PowerPoint to create mind maps.	The following tasks will contribute to your end of unit level: • Essay / consideration of both sides of a topic relating to ethics • Notes and presentation work on social media and digital footprint

			Further development of English to develop a coherent argument regarding an ethical issue.	

		2	**Solving Programming Problems** In this unit, you will revisit the core programming structures introduced in year 7 and 8 and will learn more about programming using declaration, iteration, and selection as well as mathematical operations to help you solve problems using Small Basic. Students will also be shown Visual Basic so that they can see where the next step in the programming journey would be. **Intent:** Spiral revisiting of programming in Computer Science again using a text based programming language to continue to consider **decomposition, sequence** of **instructions** and also **efficiency** by using **iteration** to repeat commands as well as selection and the use of **data structures: variables** and **arrays**. Interleaving: Students will have carried out programming tasks using Small basic in year 8. Here we will continue to teach core programming skills using Small Basic but it is expected that students will be able to do this more independently by breaking down problems and then using the programming structures they have learnt to solve them.	The following tasks will contribute to your end of unit level: • Annotated theory notes on key programming structures • Annotated evidence of a range of programming tasks carries out using Small Basic • Annotated evidence of a Visual Basic task • End of unit test on an integrated programming task • Key terms test – **Knowledge retention**
	Spring Term	3	**Analysing data** In this project unit, you will build spreadsheet models and use them to collect and analyse data using commonly used methods such as sorting filtering and charting data as well as revising core formulas and functions. **Intent:** This unit continues to focus on digital literacy and ICT Skills – using computers to analyse data and carry out modelling using Spreadsheets. Revisiting of spreadsheet terminology but going beyond the use of table formatting and formulas covered in year 7 to include additional tools such as sorting filtering and charting. **Interleaving (Prior learning and skills to** and logical **reactivate):** Mathematical skills thinking use of Spreadsheets first covered in year 7 house play project now revisited in more detail.	The following tasks will contribute to your end of unit level: • Annotated screenshots of a range of spreadsheet tasks covering analysing, sorting, filtering and graphing of data • Key terms test – **Knowledge retention**
		4	**Data storage collection and querying** In this project unit, you will consider how large organisations such as Schools, NHS, Ebay and Amazon use databases. You will consider the ethics and legislation surrounding the holding data and will also develop practical skills of building databases and using tables forms and queries to hold, collect and find information. **Intent:**	The following tasks will contribute to your end of unit level: • Evidence of having carried out a range of database tasks • Notes which consider the data organisations hold and the laws and ethics relating to this such as data protection act • Key terms test – **Knowledge retention**

			This unit continues to focus on digital literacy and ICT Skills – using computers to store enter and query data using Databases. This unit also revisits issues relating to ethics and law touched upon already in years 8 and 9. **Interleaving (Prior learning and skills to reactivate):** Introduction to a new piece of software (MS Access) for storing, entering and querying data but also revisits ethical issues.	
	Summer Term	5	**Binary, Logic gates and the fetch decode execute cycle** You will learn more about calculations using binary, you will learn some interesting Computing theory about the way in which a computer processor functions including the fetch decode execute cycle, having considered architecture and the use of binary earlier in keystage 3. You will also look at the key logic gates: AND, OR, NOT **Intent:** This unit will focus on core Computer Science knowledge of logic gates and the fetch decode execute cycle. Digital Literacy and ICT skills will be used to produce a presentation about key learning points relating to the FDE cycle and the tool Logic.LY will be used to represent logic gates. This unit forms a core understanding which can be built upon in subsequent key stages. **Interleaving (Prior learning and skills to reactivate):** Theory unit focussing on core knowledge and understanding regarding computer processors and logic gates. Revisits Binary and consideration of architecture which was covered in year 7. Also revisits the concept of Boolean logic which has been covered within programming units and when using the internet to search.	The following tasks will contribute to your end of unit level: • Theory notes and worked examples of logic gates and logic circuits • A presentation on the Fetch, Decode, Execute cycle • Key terms test – **Knowledge retention**
		6	**Encryption, Enigma and Bletchley Park** In this unit, you will learn more about the origins of modern Computers and how the work of Alan Turing and his team at Bletchley Park were fundamental in the war. This unit also considers diversity within computer science and we think about the role of key computer scientists from history. Students will have produced examples of Caesar and transposition ciphers and produced a Poster using Photo and Graphics editing software PhotoPea. Intent: The purpose of this unit is to build on the knowledge gained from the homework reading program and in ethics units covered previously in order to think about the rich history and diversity in Computer Science. This unit will also encourage students to debate important issues. Students will carry out logical thinking encryption tasks and will reactivate Photo and Graphics editing knowledge using PhotoPea.	The following tasks will contribute to your end of unit level: • Example of Caesar Cipher and Transposition Cipher • Celebrating diversity in Computer Science – poster about the work of a Famous Computer Scientist

			Interleaving (Prior learning and skills to reactivate): Theory unit focussing on core knowledge and understanding. Consideration of the rich history and diversity within Computer Science and ethics, students will also will reactivate Photo and Graphics editing knowledge using PhotoPea.	

Extra-Curricular Opportunities

ICT Rooms are open every lunch time for additional support from staff.
Clubs run frequently throughout the year such as Microbit club, GCHQ Cyber Discovery Challenge. Watch out for specific clubs advertised during the year.
If you have a particular interest in an area of Computing, we can organise peer support from students with similar interests.

Resources

Small Basic and Scratch online tutorials

BBC Bitesize KS3 Computer Science – this resource gives a background to the theory covered throughout keystage 3: KS3 Computer Science - BBC Bitesize

Scratch – visual programming language used in year 7: Scratch - Imagine, Program, Share (mit.edu)

Small Basic – text based programming language used in year 8 and 9: Small Basic (smallbasic-publicwebsite.azurewebsites.net)

Wick Editor – Media editing software used in year 7: The Wick Editor

PhotoPea – Photo and image editing software used in year 8 and 9: Photopea | Online Photo Editor

W3Schools – Provides support with HTML and CSS used in year 7: W3Schools Online Web Tutorials

Code academy – provides additional coding tasks for students who wish to extend themselves further: Learn to Code - for Free | Codecademy

Work from home and Office 365 give free access to most common software packages with the student e-mail and password : Office 365 Login | Microsoft Office

Visual Studio Community Edition – Allows students to code in Visual Basic if they wish to prepare for Keystage 4: Visual Studio 2022 Community Edition – Download Latest Free Version (microsoft.com)

Additional resources to support studies can be made available on request