Computer Science Scheme of Work

The national curriculum for computing aims to ensure that all pupils:

- can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
- can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems
- can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems
- are responsible, competent, confident and creative users of information and communication technology.

In Key stage 3

Pupils should be taught to:

- 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 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
- 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, re-use, revise and re-purpose 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 concerns.

Computing programmes of study: Key stages 3 and 4, National curriculum in England, DFE-00191-2013
[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239067/SECONDARY_national_curriculum_-_Computing.pdf]

Computer Science Scheme of Work

Overview of the Year 7:

Term	Topic	
1	• E-safety, Security and Ethics	With the continuing growth and use of the Internet, social networking sites and texting as a means of communication, it is essential that students are aware of potential risks to their safety and well-being and of the steps that they can follow to reduce these risks.
	• Introduction to binary and a Computer System	Understand the hardware and software components that make up computer systems, and how they communicate with one another
2	• File management and Animation Pivot	Students are going to learn about different methods of animation. During the course of this project they will use different software including Pivot Stick Figure Animator, Scratch Animation. They will create outputs which demonstrate these different methods.
	• Introduction to flowcharts	Flowcharts to represent real life situations.
3	• Introduction to Programming environment • Sequencing Instructions (MS LOGO)	Sequencing Instructions During this unit, pupils will learn how to write sequenced instructions in order to control a computer program called LOGO. They will learn to write simple procedures which will control tasks. They will use their knowledge in order to replicate early 8-bit computer game images.
4	• Computer hardware and Moores' law	Although they might have heard of the term, 'transistor', very few will know their role or how their development has been predicted by Moores' Law.
	• Programming 1 Scratch	The first 4 lessons are about skill-building
5	• Programming 1 Scratch	The last 3 lessons allow students to apply their knowledge and build a project from *scratch*. Students create animations and games using control software.
	• Introduction 2 to Just Basic	We will use *Just BASIC* and then moving onto *Visual Basic* once we've mastered the basics. I chose BASIC because it's doesn't have confusing syntax with braces and semi-colons, but it still has some variable typing and standard programing structures such as loops, decisions and arrays. Unlike *Python*, progressing to *Visual Basic* allows you to create normal-looking form-based *Windows* applications with ease, and also allows you to create *Office* macros in VBA or program web-pages using ASP.
6	• Introduction 2 to Just Basic	
	• Cryptography	During this unit, pupils will learn about the use and purpose of cryptography and encryption of data. They will learn about the purpose and use of cryptography in everyday society and understand how the use of computers has enabled ever more secure and sophisticated methods of cryptography to be developed.

Computer Science Scheme of Work

Term	Theme	Week	Topic	Learning Objectives	
1	E-safety, Security and Ethics	01/09/2014			
		08/09/2014	E-safety 1	*Know:* What to do if they are ever the victim of text bullying *Understand:*. Understand how text bullying can make a person feel *Be able to:* Work with a group to create a short advert highlighting the issues surrounding text bullying.	
		15/09/2014	E-safety 2	*Know:* That bullying can happen through other media such as chatrooms, IM and social networking sites *Understand:* How a young person can be tricked by someone pretending to be a friend of a similar age *Be able to:* Identify measures that they can use to keep themselves safe whilst chatting online.	
	Introduction to binary and a Computer System	22/09/2014	Introduction to Computer System Input process output	To understand the function and purpose of a computer To understand that not every computer looks like a PC and that many everyday devices contain computers To explain what is meant by binary data and to understand why a computer uses binary data	
		29/09/2014	Introduction to Input & Output /Storage	Identify input devices Identity output devices Identity storage devices (primary and secondary storage)	
		06/10/2014	Binary to Denary	Be able to recognise binary code (3) Be able to convert denary numbers into binary numbers and denary to binary (4) Be able to convert characters into binary numbers (5)	
		13/10/2014	Denary to Binary and ASCII	Be able to add binary numbers (5) Be able to subtract binary numbers (5/6) Be able to multiple and divide binary numbers (6/7)	
		22/10/2014	Review and CAT assessment		
	Half Term				
2	File management and animation	03/11/2014	File Management	Introduction to the school network and file management skills How to create folders How filename management	

Computer Science Scheme of Work

Term	Theme	Week	Topic	Learning Objectives	
	Introduction to flowcharts	10/11/2014	File Management	*Know:* How computer viruses are spread *Understand:* Why it is important to update their anti-virus software at home on a regular basis *Be able to:* To use the search facility to find a missing document	
		17/11/2014	Animation - Pivot Stickfigure	*Know:* What animation means *Understand:* That there are different methods which can be used to create animations *Be able to:* Write a plan that they can follow in order to create a short animation sequence	
		24/11/2014	Animation - Pivot Stickfigure	Use the features of an Animation software package called Pivot Stick Figure Animator Create/Implement an animation sequence for their plan	
		01/12/2014	Animation - Pivot Stickfigure	Make improvements to the animation sequence and evaluate your work	
		08/12/2014	Flowcharts 1	Introduction	
		15/12/2014	Review and catch up		
	Christmas Break				
3	Introduction to Programming environment Sequencing Instructions (LOGO)	05/01/2015	Sequencing Instructions (LOGO) Skills	To be able to break a task down into its component steps To be able to correctly sequence the steps in a task To understand the consequences of not identifying all of the steps required or getting them in the incorrect order	
		12/01/2015	Sequencing Instructions (LOGO) Skills	To be able to write simple instructions in order to control the movement of a turtle on the screen To be able to write simple procedures which make use of a sequence of instructions To understand the importance of writing the exact instructions required by the computer program	
		19/01/2015	Sequencing Instructions (LOGO) Implement design 1	To be able to write simple instructions in order to control the movement of a turtle on the screen To be able to write simple procedures which make use of a sequence of instructions To understand the importance of writing the exact instructions required by the computer program	

Computer Science Scheme of Work

Term	Theme	Week	Topic	Learning Objectives	
		26/01/2015	Sequencing Instructions (LOGO) Implement design 2	To be able to write a sequenced set of instructions in order to recreate an image they are given To be able to consider the efficiency of their instructions and write procedures where appropriate. To be able to design their own sprite for which they will write the sequence of instructions required to recreate it using a computer program.	
		02/02/2015	Sequencing Instructions (LOGO) Implement design 3	To be able to follow a set of sequenced instructions which they have written themselves in order to create a sprite To be able to identify possible improvements which could be made to their written instructions	
		09/02/2015	Sequencing Instructions (LOGO) Evaluation	Complete an evaluation To be able to identify possible improvements which could be made to their written instructions	
	Half Term				
4	Computer hardware and Moores' law	23/02/2015	Microprocessor Moores' Law.	To explain the purpose and use of a transistor in computing terms To understand that computers are getting faster all the time (Moore's Law)	
		02/03/2015	Computer hardware and software	To be able to identify the main component parts of a computer To be able to explain the role of the main components within a computer	
4	The first 3 lessons are about skill-building.	09/03/2015	Scratch 1 – Skill 1	Select control blocks to create animations Experiment by modifying "blocks" - Use blocks appropriately Create your own sequence of instructions **-** Use blocks efficiently	
		16/03/2015	Scratch 2 – Skill 2	Define what 'selection' means Define what 'selection' and 'iteration' mean (Select blocks appropriately) Create your own sequence of instructions to include 'selection' and 'iteration' blocks	
		23/03/2015	Scratch 3 – Skill 3	Give an example of a logical operator - Use 'operator' and 'broadcast' blocks Explain how logical operators can be used Explain how to broadcast an event Explain why event broadcasting is useful Develop your own game idea	

Computer Science Scheme of Work

Term	Theme	Week	Topic	Learning Objectives	
	Easter Break				
5	The last 3 allow students to apply their knowledge and build a project from *scratch*. Students create animations and games using control software.	13/04/2015	Scratch 4 Project task	Explain the term 'iteration' Select a suitable project Produce an outline project plan Begin to make your project Devise success criteria for your project	
		20/04/2015	Scratch 5 Project task	Create sequences for your project Comment on the success of your project Refine and adapt your sequences Explain how your sequences work Use a combination of software tools (e.g. graphics software to make sprites) Develop efficient sequences	
5	Programming Introduction to Just Basic	27/04/2015	Numbers and Arithmetic		
		04/05/2015	Selection & Writing Algorithms		
		11/05/2015	While loops		
		18/05/2015	Test a program		
6	Programming 2 Introduction Just Basic	01/06/2015			
		08/06/2015			
6	Cryptography project	15/06/2015	Create their own cipher code	To understand the term 'cryptography' To be able to identify two of the earliest methods of encrypting messages To be able to create their own cipher code	
		22/06/2015	Application of cryptography	To understand how cryptography was used during the second World War To understand how the codes from the Enigma Machine were 'cracked' To understand the role that Bletchley Park played in the deciphering of the Enigma codes	
		29/06/2015	How different types of data used to code.	To understand what kind of information is coded onto a barcode To understand the purpose and use of check digits To understand other methods of coding data pictorially, for example data matrix codes	

Computer Science Scheme of Work

		06/07/2015	E-commence and security	Understand the term, 'E-commerce' Be able to explain how personal information is securely transmitted over the internet by using encryption methods Understand how public and private keys are used as part of the encryption and decryption process	
		13/07/2015	Learn about DRM encryption. The advantages and disadvantages of DRM.	Understand the term DRM Be able to explain how DRM makes use of encryption and authentication techniques Be able to explain why so many people are against DRM technology	

Computer Science Scheme of Work

Overview of the Year 8:

Term	Topic	Comments
1	• E-safety, Security and Ethics	With the continuing growth and use of the Internet, social networking sites and texting as a means of communication, it is essential that students are aware of potential risks to their safety and well-being and of the steps that they can follow to reduce these risks.
	• Introduction to binary and a Computer System	Understand the hardware and software components that make up computer systems, and how they communicate with one another
2	• File management and Animation Pivot	Students are going to learn about different methods of animation. During the course of this project they will use different software including Pivot Stick Figure Animator, Scratch Animation. They will create outputs which demonstrate these different methods.
	• Introduction to flowcharts	Flowcharts to represent real life situations.
3	• Introduction to Programming environment Sequencing Instructions (LOGO)	Sequencing Instructions During this unit, pupils will learn how to write sequenced instructions in order to control a computer program called LOGO. They will learn to write simple procedures which will control tasks. They will use their knowledge in order to replicate early 8-bit computer game images.
4	• Introduction to programming Scratch	The first 3 lessons are about skill-building. The last 3 allow students to apply their knowledge and build a project from *scratch*. Students create animations and games using control software.
5	• Programming 2: Just Basic	We will use *Just BASIC* and then moving onto *Visual Basic* once we've mastered the basics. I chose BASIC because it's doesn't have confusing syntax with braces and semi-colons, but it still has some variable typing and standard programing structures such as loops, decisions and arrays.
6	• Cryptography	During this unit, pupils will learn about the use and purpose of cryptography and encryption of data. They will learn about the purpose and use of cryptography in everyday society and understand how the use of computers has enabled ever more secure and sophisticated methods of cryptography to be developed.

Computer Science Scheme of Work

Term	Theme	Week	Topic	Learning Objectives	
1	E-safety, Security and Ethics	01/09/2014			
		08/09/2014	E-safety 1	*Know:* What to do if they are ever the victim of text bullying *Understand:*. Understand how text bullying can make a person feel *Be able to:* Work with a group to create a short advert highlighting the issues surrounding text bullying.	
		15/09/2014	E-safety 2	*Know:* That bullying can happen through other media such as chatrooms, IM and social networking sites *Understand:* How a young person can be tricked by someone pretending to be a friend of a similar age *Be able to:* Identify measures that they can use to keep themselves safe whilst chatting online.	
	Introduction to binary and a Computer System	22/09/2014	Introduction to Computer System Input process output	To understand the function and purpose of a computer To understand that not every computer looks like a PC and that many everyday devices contain computers To explain what is meant by binary data and to understand why a computer uses binary data	
		29/09/2014	Introduction to Input & Output /Storage	Identify input devices Identity output devices Identity storage devices (primary and secondary storage)	
		06/10/2014	Binary to Denary	Be able to recognise binary code (3) Be able to convert denary numbers into binary numbers and denary to binary (4) Be able to convert characters into binary numbers (5)	
		13/10/2014	Denary to Binary and ASCII	Be able to add binary numbers (5) Be able to subtract binary numbers (5/6) Be able to multiple and divide binary numbers (6/7)	
		22/10/2014	Review and CAT assessment		
	Half Term				
2	File management and animation	03/11/2014	File Management	Introduction to the school network and file management skills How to create folders How filename management	

Computer Science Scheme of Work

Term	Theme	Week	Topic	Learning Objectives	
	Introduction to flowcharts	10/11/2014	File Management	*Know:* How computer viruses are spread *Understand:* Why it is important to update their anti-virus software at home on a regular basis *Be able to:* To use the search facility to find a missing document	
		17/11/2014	Animation - Pivot Stickfigure	*Know:* What animation means *Understand:* That there are different methods which can be used to create animations *Be able to:* Write a plan that they can follow in order to create a short animation sequence	
		24/11/2014	Animation - Pivot Stickfigure	Use the features of an Animation software package called Pivot Stick Figure Animator Create/Implement an animation sequence for their plan	
		01/12/2014	Animation - Pivot Stickfigure	Make improvements to the animation sequence and evaluate your work	
		08/12/2014	Flowcharts 1	Introduction	
		15/12/2014	Review and catch up		
	Christmas Break				
3	Introduction to Programming environment Sequencing Instructions (LOGO)	05/01/2015	Sequencing Instructions (LOGO) Skills	To be able to break a task down into its component steps To be able to correctly sequence the steps in a task To understand the consequences of not identifying all of the steps required or getting them in the incorrect order	
		12/01/2015	Sequencing Instructions (LOGO) Skills	To be able to write simple instructions in order to control the movement of a turtle on the screen To be able to write simple procedures which make use of a sequence of instructions To understand the importance of writing the exact instructions required by the computer program	
		19/01/2015	Sequencing Instructions (LOGO) Implement design 1	To be able to write simple instructions in order to control the movement of a turtle on the screen To be able to write simple procedures which make use of a sequence of instructions To understand the importance of writing the exact instructions required by the computer program	

Computer Science Scheme of Work

Term	Theme	Week	Topic	Learning Objectives	
		26/01/2015	Sequencing Instructions (LOGO) Implement design 2	To be able to write a sequenced set of instructions in order to recreate an image they are given To be able to consider the efficiency of their instructions and write procedures where appropriate. To be able to design their own sprite for which they will write the sequence of instructions required to recreate it using a computer program.	
		02/02/2015	Sequencing Instructions (LOGO) Implement design 3	To be able to follow a set of sequenced instructions which they have written themselves in order to create a sprite To be able to identify possible improvements which could be made to their written instructions	
		09/02/2015	Sequencing Instructions (LOGO) Evaluation	Complete an evaluation To be able to identify possible improvements which could be made to their written instructions	
	Half Term				
4	The first 3 lessons are about skill-building. The last 3 allow students to apply their knowledge and build a project from *scratch*. Students create animations and games using control software.	23/02/2015	Scratch 1 – Skill 1	Select control blocks to create animations Experiment by modifying "blocks" - Use blocks appropriately Create your own sequence of instructions - Use blocks efficiently	
		02/03/2015	Scratch 2 – Skill 2	Define what 'selection' means Define what 'selection' and 'iteration' mean (Select blocks appropriately) Create your own sequence of instructions to include 'selection' and 'iteration' blocks	
		09/03/2015	Scratch 3 – Skill 3	Give an example of a logical operator - Use 'operator' and 'broadcast' blocks Explain how logical operators can be used Explain how to broadcast an event Explain why event broadcasting is useful Develop your own game idea	
		16/03/2015	Scratch 4 Project task	Explain the term 'iteration' Select a suitable project Produce an outline project plan Begin to make your project Devise success criteria for your project	

Computer Science Scheme of Work

Term	Theme	Week	Topic	Learning Objectives	
		23/03/2015	Scratch 5 Project task	Update your project plan Make your project by creating sequences Refine and adapt your sequences Explain how your sequences work Use a combination of software tools (e.g. graphics software to make sprites) Develop efficient sequences	
			Extension: Project task	Create sequences for your project Comment on the success of your project Refine and adapt your sequences Explain how your sequences work Use a combination of software tools (e.g. graphics software to make sprites) Develop efficient sequences	
5	Programming 2 Introduction to Just Basic	13/04/2015	Introduction to Python or Just Basic		
		20/04/2015	Numbers and Arithmetic		
		27/04/2015	Selection & Writing Algorithms		
		04/05/2015	While loops		
		11/05/2015	Test a program		
		18/05/2015	Extension		
	Easter Break				
Term	Theme	Week	Topic	Learning Objectives	Homework
6	Programming 2 Introduction to Just Basic	01/06/2015			
		08/06/2015			
	Cryptography project	15/06/2015	Create their own cipher code	To understand the term 'cryptography' To be able to identify two of the earliest methods of encrypting messages To be able to create their own cipher code	
		22/06/2015	Application of cryptography	To understand how cryptography was used during the second World War To understand how the codes from the Enigma Machine were 'cracked' To understand the role that Bletchley Park played in the deciphering of the Enigma codes	
		29/06/2015	How different types of data used to code.	To understand what kind of information is coded onto a barcode To understand the purpose and use of check digits To understand other methods of coding data pictorially, for example data matrix codes	

Computer Science Scheme of Work

		06/07/2015	E-commence and security	Understand the term, 'E-commerce' Be able to explain how personal information is securely transmitted over the internet by using encryption methods Understand how public and private keys are used as part of the encryption and decryption process	
		13/07/2015	Learn about DRM encryption. The advantages and disadvantages of DRM.	Understand the term DRM Be able to explain how DRM makes use of encryption and authentication techniques Be able to explain why so many people are against DRM technology	