Year 7 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

Year 7 Curriculum Overview

Autumn 1	**Spring 1**	**Summer 1**
Digital Context and Literacy (6)	Computational Thinking (6)	Modelling (6)
Autumn 2	**Spring 2**	**Summer 2**
Building a Computer (6)	Visual Programming inc. Scratch (6)	Python (6)

Year 7 Assessment Plan

Autumn Term	**Spring Term**	**Summer Term**
1 Class Assignment – Baseline Test	1 Class Assignment	1 Class Assignment
1 Class Assignment	1 Class Assignment	1 Class Assignment
CWA 1		
1 Class Assignment	1 Class Assignment	1 Class Assignment
1 Exam Assessment (Autumn 1)	1 Exam Assessment	1 EoY Assessment
CWA 2	CWA 3	CWA 4

Lesson Outline

Autumn 1	
• Using the school network (Lesson 1)- Class Expectations, Logging-on to the school network safely, Logging on to ePraise, locate and organise files/folders sensibly on the network, create a timetable on word doc.	
• E-Safety (Lesson 2) – Understand how to stay safe online, communicate online, setting up email account and social networking sites	
• Presenting Information (Lesson 3) – Design and create a presentation for a particular audience and purpose, apply colour schemes and multimedia content	
• Cyberbullying (Lesson 4) - Develop an understanding of a range of potential threats when using the Internet, Mobile technologies especially; Sexting, Online grooming, social networking. Create a PowerPoint presentation on the dangers of cyber bullying.	
• Formal Letter writing (Lesson 5) – Design and create formal letters for a particular audience and purpose through appropriate layout and formatting on Microsoft Word.	
• Collate and format data in an organised way using Excel.	
• Create, label and explain graphs from a range of data provided	
• Assessment- Online Assessment	
• Feedback (Think Pink Go Green)	
Half Term	
Autumn 2	
Computer System 1 Lesson 1 - Understand the purpose and functions of a computer system. Define hardware and explain what are the 4 types of hardware	
Computer System 1 Lesson 2 – Input/output devices -Identify some input and output devices.	
Computer System 1 Lesson 3 - Name and explain different parts of a computer system how they communicate with one another. **Purchase** compatible components required to build a complete computer system for a purpose.	
Computer System 1 Lesson 4 – The CPU- Know and explain the purpose of a processor in computers. Discuss how common characteristics of CPUs affect their performance: clock speed, cache size, number of cores	
Computer System 1 Lesson 5 –Operating Systems- Understand the role played by operating systems. Compare different operating systems	
Computer System 1 Lesson 6 –Assessment- Cumulative Assessment of Unit 1 & 2	
Computer System 1 Feedback (Think Pink Go Green)	
Christmas Holidays	
Spring 1	
Computational Thinking Lesson 1 - Know and understand what computational thinking is and means. Use computational thinking to solve a problem.	
Computational Thinking Lesson 2 - Spot patterns in a given problem and write down vague rules which can be used to solve the problem	
Computational Thinking Lesson 3- Algorithms- Create algorithms using flowchart- Sequence, Selection	
Computational Thinking Lesson 4 –Algorithms- Iteration	
Computational Thinking Lesson 5 -Assessment	

Feedback (Think Pink Go Green)	
Half term	
Spring 2	
Visual Programming Lesson 1 (Scratch) - Understand the purpose of Control Systems. Know what is meant by Input and Output.	
Visual Programming Lesson 1 (Scratch) –Create simple shapes using scratch- sequence, then iteration(loops)	
Visual Programming Lesson 2 - Experimenting with the scratch user interface; using the keyboard to make sprites move based on a flowchart; animating sprite costumes; consolidation exercise. Interpret Flowcharts to solve problems.	
Visual Programming Lesson 3 - Create Pacman. Use coordinates to identify specific locations on the Scratch stage.	
Visual Programming Lesson 4 - Use Variables and interactions to keep score.	
Visual Programming Lesson 5 –Design and Create a game of their choice	
Visual Programming Lesson 6 -Assessment	
Easter Holidays	
Summer 1	
Python Turtle 1 - Turtle basics- Learning how to make a Turtle draw on a GUI.	
Python Turtle 2 – Loops-Repeating Instructions	
Python Turtle 3 – Inputs to add User Interaction	
Python Turtle 4 - Programming Conditions and Functions	
Python Turtle 5 –Importing and Using Random function	
Python Turtle 6 – Functions/Subprocedure	
Python Turtle 7 - Programming Assessment Activity	
Summer 2	
My Digital World 1- Investigate and discuss the Impact technologies on our lives while considering: Ethical issues	
End of Year Assessment	
Feedback	
My Digital World 1- Stakeholders	
My Digital World 1- Environmental Issues	
My Digital World 1- Privacy	
My Digital World 1- Data Protection	
My Digital World 1- Legal Issues –Computer Misuse	
End of Year 7	

Unit 1 – Digital Context and Literacy

Year Group	7
Objectives of the unit	In this unit, students will have an introduction to using the school network and includes aspects of folders and files, and graphics, all in a fun and enjoyable way. As with many schemes, e-safety is included within the unit. Students will learn how to use a blogging service, and e-mail. They develop an understanding of a range of potential threats when using the Internet and mobile technologies and how to deal with such threats. To add variety and interest to their learning, pupils subsequently work in small groups to create a piece of drama work relating to viruses in the 22nd century, and present this back to the class.
Assessment outcomes from the unit	**Grade 1** •I logged on to my e-mail account and sent an e-mail. •I understand the risks of online and mobile technology threats •I can create folders. **Grade 2** •I can communicate digitally by formatting and sending e-mails using contact lists, and am able to reply to the e-mails I get. I can also post files and images to a blog. •I can explain the harm virus cause and know what to do to prevent them. •I can explain why more are at risk are in 2015. Why is sexting increasing? •I was able to design suitable folder structures (including subfolders) and am able to move files into and out of the folders. **Grade 3** •I can communicate digitally by formatting and sending e-mails using contact lists, and am able to reply to the e-mails I get. •I can explain the harm virus cause and know what to do to prevent them. •I can devise strategies to counteract online and mobile threats •I was able to design suitable folder structures (including subfolders) and am able to move files into and out of the folders.
National Curriculum	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.
Literacy curriculum content	• Plan, draft, edit and proofread through considering how their writing reflects the audiences and purposes for which it was intended, amending the vocabulary, grammar and structure of their writing to improve its coherence and overall effectiveness, paying attention to accurate grammar, punctuation and spelling.

	• Consolidate and build on their knowledge of grammar and vocabulary through using Standard English confidently in their own writing and speech. • Speak confidently and effectively, including through using Standard English confidently in a range of formal and informal contexts, including classroom discussion, giving short speeches and presentations, expressing their own ideas and keeping to the point.

Lesson	Objectives and outcomes	Activities	Homework	Assessment opportunities
1	Students will learn: • How to log on to the school network • How to use the school network safely and appropriately	• Logging-on to the school network; • Creating and organising folders on the network. • Logging on to ePraise • Computing Class expectations. • Learn to format Font and use shift key.	Create a poster on Computing Rules	
2	E-Safety- Students will learn: • How to stay safe online. • Understand the dangers of communication online • Setting up email accounts and social networking sites	•		
3	Presentations -Students will learn how: • Design presentations according to a particular audience or purpose. • Create presentations utilising colour schemes and multimedia content.	• Design a presentation on E-Safety and how to stay safe. • Employ formatting and animation techniques within the presentation.	Evaluate their presentation and action three improvements.	Peer assessment- groups will grade each group performance
4	Cyberbullying - Students will: • Understand the importance of online conduct and behaviour • Develop an understanding of a range of potential threats when using the Internet and mobile technologies. • Evaluate their use of technology including the use of email, social	• Cyberbullying, Mobile technologies especially; Sexting • Watching BBC sexting news – answering some comprehension questions • Think pair share why people ask for images and why people actually create them	Research to get some information, images for your presentation of how to be safe online	

Lesson	Objectives and outcomes	Activities	Homework	Assessment opportunities
	networking, online gaming and mobile phones and consider how they present themselves online.			
5	Formal letter writing. Students will learn • The importance of being aware of the target audience when starting a letter. • Understand the formatting • Design and create a formal letter to the head teacher on how to tackle cyber bullying.	• Evaluate different types of formal letters and how they target their prescribed audience. • Design a letter on how to tackle cyber bullying.	Letter on cyber bullying	
6/7	Assessment and Feedback	•		

Unit 2 –Computer System 1

Year Group	7
Objectives of the unit	They will spend this module studying different pieces of hardware and finish the unit by building a PC. This unit is very hands-on and it is important students understand the potential risks of handling electronic equipment. Understand the hardware and software components that make up computer systems, and how they communicate with one another
Assessment outcomes from the unit	**PAL -Grade 1.0-1.8** • **Define** the term hardware. • **Name** the four different types of hardware. • **Identify** different input, output and storage devices • **Know** that a computer is made up of a range of components. • **Know** the purpose of a processor in computers • **Name** the 3 stages in the Fetch Execute cycle of the processor. • **Understand** the role of an Operating System **PAM- Grade 2.0 -3.0** • **Explain** the purpose of the four types of hardware. • **Explain** the purpose / function of a range of components

	• **Produce and annotate** a diagram to show how the Input & Output devices, CPU, RAM and Hard Drive work together. • **Distinguish** between hardware and software • **Explain** the purpose of the processor • **Explain** the relationship between the speed of the processor and the running of a computer. • **Discuss** how different characteristics of the CPU affect the performance of the CPU; clock speed, cache, number of cores **PAH- Grade 3.2-4.0** • **Recommend** a suitable piece of hardware for a given purpose and audience. • **Interpret** information in various hardware specifications • **Combine** different pieces of hardware components together to create a computer system for a purpose. • **Analyse and make conclusions** about the performance of a CPU given a specification.
National Curriculum	Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems.
Keywords	Hardware, Software, Input and Output device, Storage device, ROM, RAM, CPU, Processor, Power Supply, Operating Systems, Memory
Literacy curriculum content	• Plan, draft, edit and proofread through considering how their writing reflects the audiences and purposes for which it was intended, amending the vocabulary, grammar and structure of their writing to improve its coherence and overall effectiveness, paying attention to accurate grammar, punctuation and spelling. • Consolidate and build on their knowledge of grammar and vocabulary through using Standard English confidently in their own writing and speech. • Speak confidently and effectively, including through using Standard English confidently in a range of formal and informal contexts, including classroom discussion, giving short speeches and presentations, expressing their own ideas and keeping to the point.

Lesson	Objectives and outcomes	Activities	Homework	Assessment opportunities
1	Students will: • **Understand** the purpose and functions of a computer system • **Define** hardware • **Explain** what are the 4 types of hardware	• Identify the different computer systems • Watch video on hardware https://www.youtube.com/watch?v=30dg1YqFS9U&list=PL346DCEEBFAA0BE57&index=3 • Use Google draw to design a new mobile phone • Designs should be labelled to identify input, processing, storage and output devices	Homework planner	

Lesson	Objectives and outcomes	Activities	Homework	Assessment opportunities
2	Students will: • Be able to **identify** some input and output devices • **Understand** that different input and output devices are suitable for different purposes and audience • **Relate** this to a specific hardware device that helps overcome a disability	• Hardware quiz • Research input and output device that helps overcome a disability •		
3	Students will: • Be able to **Name and Identify** different parts of a computer system. • **Explain** the different parts of the computer system and how they communicate with one another and with other systems. • Apply knowledge to **Purchase** compatible components required to build a complete computer system for a purpose.	• Research the main components of a computer; Motherboard, Processor • RAM, ROM, Hard drive, Power Supply, Monitor, Keyboard and Mouse • Students label the different components of a Computer in groups	• Building a Computer Project	• Peer assessment- Students will present their presentation to the class.
4	Students will: • **Know** the purpose of a processor in computers • **Explain** the purpose of the processor • **Discuss** how common characteristics of CPUs affect their performance: ○ clock speed	• Explain the purpose and function of a CPU • Students research online to Compare the different characteristic of different computers AMD, Intel Processors	•	•

Lesson	Objectives and outcomes	Activities	Homework	Assessment opportunities
	○cache size ○number of cores			
5	Students will: ❖ **Explain** the difference between hardware and software. ❖ **Understand** the role played by operating systems. ❖ **Compare** different operating systems	• What is the difference between Hardware and Software • Look at different Operating systems for computers, phones-Apple, Android • Students create a news article for	•	•

Unit 3 – Problem Solving/Computational Thinking

Year Group	7
Objectives of the unit	In this unit students will through challenging, creative activities and using well established game authoring software create a computer game. Students will be lead through the development of a standalone maze game including keyboard sprite control, following algorithms, flowcharts, coordinates and documentation. Students will learn the fundamentals of algorithmic thinking, using their knowledge to design and build an engaging two player game.
Assessment outcomes from the unit	**Grade 2** • I worked out what a flowchart wanted me to do and wrote a sequence of instructions to do something. •I produced a customised background for a task. **Grade 3** • I understand the purpose of variables and set up variables to keep score. •I was able to write accurate scripts to move sprites to specific coordinates, such as (150, -150), by understanding a flowchart. •I thoroughly tested all of my different scripts and made any changes. •I can explain how to write scripts so that a sprite can be controlled using a keyboard. **Grade 4** • I produced a fully working solution as required for the Mission Escape task and can explain what all scripts do. •I set up interactions so that the secret agent sprites could collect other secret agents, and different items of equipment.

	•I am familiar with the three basic logic structures (sequence, selection and loop) in computing and can explain where and why all three were used in my work. •I was able to work out the coordinates of specific location on the Scratch stage. I can produce accurate scripts to move sprites to specific coordinates.
National Curriculum	• Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems; • Use two or more programming languages, [at least one of which is textual], to solve a variety of computational problems; • Design and develop modular programs that use procedures or functions;
Literacy curriculum content	• Writing for a wide range of purposes and audiences including notes; • Summarising and organising material; • Applying their [growing] knowledge of vocabulary, grammar and text structure to their writing; • Paying attention to accurate grammar, punctuation and spelling;
Numeracy curriculum content	• Move freely between different numerical, [algebraic], graphical and diagrammatic representations; • Identify variables; • Begin to model situations mathematically; • Order positive and negative integers, decimals and fractions; • Use the number line as a model for ordering of the real numbers; • Work with coordinates in all four quadrants;

Lesson	Objectives and outcomes	Activities	Homework	Assessment opportunities
1	Students will learn: • To be able to know and understand what computational thinking is and means. • To be able to use computational thinking to solve a problem.	• Introduction to computational thinking methods. • Use computational think methods to solve the problem of surviving in on Desert Island		
2	Students will learn: • Be able to spot patterns in a given problem and write down vague rules which can be used to solve the problem. (*Grade 2)*	• Use towers of Hanoi to identify patterns and make rules on how to solve a problem		

Lesson	Objectives and outcomes	Activities	Homework	Assessment opportunities
	• Be able to express patterns as a set of rules *(Grade 3)* • Use rules to solve increasingly difficult versions of the same problem. *(Grade 4)*			
3	Students will learn: • Know and understand what an algorithm is and means. *(Grade 2)* • Explain how algorithms can be used for problem solving.*(Grade 3)* • Apply this knowledge by creating a an algorithm that describe the solution to a problem.*(Grade 4)* • .	• Write an algorithm on how to make a jam sandwich • Learn the flowchart symbols • Use flowchart to control a control system(Zebra crossing)		•
	Students will learn: • Understand what a control system is and the how control software is used in real life simulations *(Grade 2)* • Be able to identify the different parts of a control system *(Grade 3)* • Apply this knowledge by creating a sequence to control a traffic management control system in Flowol	•		•
5	Students will learn: • Use input to control output • Create a Subroutine	•	Create a song or Poem about what you have learned in this topic so far. It will need to include at least 3 verses and have a chorus.	•

Lesson	Objectives and outcomes	Activities	Homework	Assessment opportunities
			Cover every topic, keyword, use etc. You may have to recite or sing it in class, so do your best to impress!	

Unit 4 – Visual Programming (Scratch)

Year Group	7
Objectives of the unit	In this unit students will through challenging, creative activities and using well established game authoring software create a computer game. Students will be lead through the development of a standalone maze game including keyboard sprite control, following algorithms, flowcharts, coordinates and documentation. Students will learn the fundamentals of algorithmic thinking, using their knowledge to design and build an engaging two player game.
Assessment outcomes from the unit	**Grade 2** • I worked out what a flowchart wanted me to do and wrote a sequence of instructions to do something. •I produced a customised background for a task. **Grade 3** • I understand the purpose of variables and set up variables to keep score. •I was able to write accurate scripts to move sprites to specific coordinates, such as (150, -150), by understanding a flowchart. •I thoroughly tested all of my different scripts and made any changes. •I can explain how to write scripts so that a sprite can be controlled using a keyboard. **Grade 4** • I produced a fully working solution as required for the Mission Escape task and can explain what all scripts do. •I set up interactions so that the secret agent sprites could collect other secret agents, and different items of equipment. •I am familiar with the three basic logic structures (sequence, selection and loop) in computing and can explain where and why all three were used in my work. •I was able to work out the coordinates of specific location on the Scratch stage. I can produce accurate scripts to move sprites to specific coordinates.
National Curriculum	• Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems; • Use two or more programming languages, [at least one of which is textual], to solve a variety of computational problems; • Design and develop modular programs that use procedures or functions;

Literacy curriculum content	• Writing for a wide range of purposes and audiences including notes; • Summarising and organising material; • Applying their [growing] knowledge of vocabulary, grammar and text structure to their writing; • Paying attention to accurate grammar, punctuation and spelling;
Numeracy curriculum content	• Move freely between different numerical, [algebraic], graphical and diagrammatic representations; • Identify variables; • Begin to model situations mathematically; • Order positive and negative integers, decimals and fractions; • Use the number line as a model for ordering of the real numbers; • Work with coordinates in all four quadrants;

Lesson	Objectives and outcomes	Activities	Homework	Assessment opportunities
1	Students will learn: • Understand the purpose of Control Systems. • Know what is meant by Input and Output. • How to create Flowcharts.	• Introduction to control systems Introducing control systems including; inputs and outputs challenge using Scratch; simple introduction to flowcharts, input, output, and selection; extension task - manipulating outputs in Scratch. • Introduction to flowcharts (Flowol) • Sequence for the traffic light system	Research on the internet and at least give examples of Computer control systems at home and in schools.	
2	Students will learn: • Revise the features of Scratch. • Use Flowcharts to create programs to move Sprites.	• Work through Scratch key skills card • Experimenting with the scratch user interface; using the keyboard to make sprites move based on a flowchart; animating sprite costumes; consolidation exercise.	There are literally thousands of different computer games available to buy or to play on the internet. People often prefer playing a particular style or genre of game. Try to identify as many different genres of computer games as you can think of and provide an example of each.	
	Students will learn: • How to interpret Flowcharts to solve problems. • How to write sequences of instructions.	• Interpret Flowcharts to solve problems. • Use coordinates to identify specific locations on the Scratch stage. • Plotting precise locations on a grid; using flowcharts to move sprites using given coordinates; using x and y coordinates to accurately move sprites.	Create an account on Scratch online. Play 3 games on scratch and write 3 good points about each game, suggesting possible improvements to make the game better.	• Peer assessment- Students will present their presentation to the class.

Lesson	Objectives and outcomes	Activities	Homework	Assessment opportunities
	• Use coordinates to identify specific locations on the Scratch stage.			
	Students will learn: • To create a variable to keep score	• Get Sprites to interact to create interest in a game. • 2 Use Variables and interactions to keep score. • Building a two player game; making sprites move with the arrow keys; getting sprites to interact with each other; using interactions to keep score.	Plan the design of your simulation game. Write about: the Purpose, Target Audience, Characters(Sprites), Success criteria – things they need to do in order for their game to be successful	•
	Students will learn: • How to design a simulation game based on given criteria. • How to create a game from their design.	• Design a simulation game based on given criteria. • From your designs build Sprites for your simulation style game. •	Create a song or Poem about what you have learned in this topic so far. It will need to include at least 3 verses and have a chorus. Cover every topic, keyword, use etc. You may have to recite or sing it in class, so do your best to impress!	•