SUBJECT: GCSE COMPUTER SCIENCE

Year Group	YEAR 10					
Rational	Pupils will begin to explore new subject content, tackling more challenging concepts at a greater depth than previously done. Pupils will develop confidence in their programming abilities through gaining a greater understanding of the theory behind it and the constant practical application. The year 10 curriculum continues to equip pupils to solve problems and use logic with resilience and determination					
	Autumn Term 1	**Autumn Term 2**	**Spring Term 1**	**Spring Term 2**	**Summer Term 1**	**Summer Term 2**
Topic/Unit	**Data Represen-tation and Computational Logic**	**Programming Concepts and Algorithms**	**Python Programming Project**	**Computer Systems**	**Systems Security and ethics**	**Programming theory and programming on paper**
Knowledge	**Data Repre-sentation** Pupils develop the knowledge built in KS3 by exploring the following number systems: base 2, base 10 and base 16 in more depth. Further to this pupils will learn about the different forms of binary arithmetic including addition and shift. Finally pupils will develop knowledge of how different types of data including: text, images and sound are represented and stored on computer systems **Computational Logic** Pupils will develop knowledge further of Boolean logic (AND, OR and NOT) gates including how these can be combined and how to complete truth tables.	**Programming Concepts** Pupils will build up on their KS3 knowledge of programming by looking at the main programming techniques: sequence, selection and iteration. Pupils will enhance their theoretical understanding of these concepts in addition to develop their knowledge of data structures in more depth including variables, arrays, records and 2d arrays. Additionally pupils will develop knowledge of how to organise their code to produce a more structured program through the use of sub programs and the use SQL. Finally pupils will develop knowledge of basic file operations. This topic will focus on both python and pseudocode **Algorithms** Pupils will build up their knowledge of algorithms from KS3 focussing on key algorithms: binary search,	**Programming project** Pupils will develop knowledge of the software development life cycle by undertaking a advanced programming project. They will develop knowledge of what happens during design, implementatio n, testing and evaluation stages. In addition to this they will enhance their knowledge of python programming by gaining a sound understanding of how to use all the programming concepts visited in autumn term 2 correctly with the python language syntax. Pupils will develop knowledge of programming theory concepts as they undertake this project such as defensive design and testing principles.	**Computer Systems** Pupils will enhance their KS3 knowledge of computer systems by gaining understanding of how the key components of the computer work including: the CPU, RAM & ROM. In addition to the different factors that impact the performance of the computer. An in-depth knowledge of the CPU and Von Neumann architecture will be developed. Also pupils will develop knowledge of different secondary storage components and the use of virtual memory. Finally developing knowledge of embedded systems and systems software. **Networks** pupils will enhance their knowledge of networks gained at KS3 including how they work, the positives and negatives, types of network (LAN & WAN), peer 2 peer vs client server, the different network	**Security** In this unit pupils will develop their knowledge of a range of different cyber/systems security issues such as malicious code, social engineering, brute force, data interception, SQL injection and DOS. They will develop knowledge of what they are, how they happen, consequences the cyber security issues and finally how to detect and prevent the system security issues. **Ethics:** Pupils will develop a basic knowledge of ethical, legal, cultural and environmental concerns associated with computer science technologies.	**Programming Theory** Programming theory concepts: defensive design, input sanitisation/vali dation. planning for contingencies, anticipating misuse, authentication, maintainability, comments, indentation, the purpose of testing, types of testing: iterative final/terminal, how to identify syntax and logic errors and selecting and using suitable test data. **Programming on paper** Pupils will develop knowledge of decomposing problems and creating solutions to them using python and pseudocode without the assistance of computer software.

		linear search, bubble sort, merge sort and insertion sort. Flowcharts will also be a focus including how to produce and interpret them.		topologies, Wi-Fi vs wired connections, the internet and networking protocols		

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Skills	**Computational thinking** skills be developed as pupils develop understanding of how computers actually work in more depth, understanding how data is stored and interpreted by them. **Numeracy** skills will be developed as pupils covert between three different number bases using their arithmetic skills and their understanding of powers. **Metacognitive** practice will be a key component of the computational logic unit.	**Programming** and **problem solving** skills will be the focus. As pupils are identifying different code samples and tracing through code **analytical** skills will be developed in addition to **debugging** skills which will be developed through identifying and fixing errors in code. As pupils work through a range of challenges they will develop their **computational thinking** skills and **numeracy** as they program solutions that use a range of arithmetic. **Metacognitive** skills will be a large focus as pupils read, interpret and trace through algorithms and solve problems in the most efficient ways.	Specific **programming** skills will be developed including the use of: variables, constant, IF statements, While loops, For loops, Sub programs, String manipulation and file handling. **Design** skills will be developed as pupils produced flow charts to represent their code. **Evaluation** skills will be developed as pupils discuss the positives and negatives of their code. **Metacognitive** practice will be a key component of this unit.	**Computational thinking** skills will be developed as pupils gain a more in depth understanding how the components of the computer work. **Evaluation** skills will be developed as pupils compare and contrast different components in terms of the positives and negatives. **Literacy** skills will be developed as pupils learn how to answer different types of extended answer questions.	**Evaluation** skills will be developed as pupils evaluate the impact that different security issues can have and as pupils evaluate the impact that a range of computer based technologies have had on society **communication , debating and oracy skills** will be developed through class discussion and debate on the impact that key computer based technologies have on society.	**Computational thinking** skills and **numeracy** as pupils writer solutions that use a range of programming techniques and arithmetic principles. **Abstraction and decomposition** As pupils read problems they will need to abstract the key information and break the problem down into more manageable steps to ensure that it is solved efficiently.

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Assessment : Formative	**Formative:** **1)** Data represent-tation exam questions homework. Conversion exercises **2)** image representation questions **3)** On screen data representation test consisting of a range of open and closed questions on data representation. **Formative:** Computational logic quiz based homework. .	**Formative:** **1)**On Screen auto marking programming concepts keywords check. **2)**Using selection and iteration to produce a solution to a problem- guess the number . **3)**100 Algorithms challenges	**Formative:** Assessment of the programming solution produced, including comments and code throughout this unit.	**Formative:** **1)**Producing/coc omplete concept maps for the CPU including architecture and characteristics that impact performance **2)**Written discussion on the best storage solution for a given scenario **3)**Systems Architecture quiz **4)**Network components quiz 5) Systems architecture and computer networks exams questions.	**Formative:** **1)**Memory challenge grid **2)**Software concept map completion **3)** Ethics written response – 8 marks **4)** Ethics written response 8 Marks	**Formative:** **1)** Programmi ng languages and IDE's retrieval grid **2)** 100 algorithm challenges **3)** Trace table exam questions
Assessmen: Summative		**Summative Assessment 1 –** Pupils will complete a 1 hour exam paper that will assess their understanding of how data is represented on computers, binary conversion and arithmetic. Logic gates and truth tables and key programming concepts. The exam will consist of a range of short answer with a few extended response questions.				**Summative Assessment 2** – pupils will complete a 1hour 30 minute paper that combines all topics study throughout year 10, the paper will be a combination of multiple choice, short answer and extended response questions.

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Homework	**Practice –** Pupils Binary, denary and hex conversions questions **Preparation and Practice –** Pupils given the task to revise for their end of topic summative assessment. Suggested revision strategies provided to pupils and a knowledge organiser to aid revision. **Preparation and Practice -** Pupils asked to produce a revision resource for each of the logic gates. To enable them to practice hand drawing each gate. **Preparation and Practice –** Pupils given the task to revise for their end of topic summative assessment. Suggested revision strategies provided to pupils and a knowledge organiser to aid revision.	**Practice –** Pupils given a Microsoft forms quiz consisting of a range of programming theory questions and basic programming challenges. **Practice –** Pupils given a booklet of programming and algorithm challenges. Pupils will be asked to complete 1 or 2 challenges each week, to enable pupils to practice programming on paper **Preparation and Practice –** Pupils given the task to revise for their summative assessment. Suggested revision strategies provided to pupils and a knowledge organiser to aid revision.	**Project –** On going project working on designs and development of solution to the programming task.	**Extension –** Pupils asked to produce a knowledge organiser on summarising all the content covered about the CPU **Practice –** Pupils given a series of past exam questions about the CPU to answer. **Practice –** Pupils set a series of assignments on Seneca learning covering systems architecture and computer networks to aid revision and practice questions. **Preparation and Practice –** Pupils given the task to revise for their end of topic summative assessment. Suggested revision strategies provided to pupils and a knowledge organiser to aid revision.	**Preparation and Practice –** Pupils given the task to revise for their end of year mock exam. Pupils provided with a revision list. **Extension –** Pupils given model answers to a series of 8 mark ethics questions and asked to use a mark scheme to score and then write a justification for the mark. **Practice –** Pupils given a 8 mark ethics question to answer.	**Practice –** 100 algorithm challenges