



SUBJECT: GCSE COMPUTING 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 so. 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 Representation and Computational Logic	Programming Concepts and Algorithms	Programming Theory and Computer Networks	Computer Systems	Systems Security and ethics	Python Programming Project
Knowledge	<p>Data Representation Pupils develop the knowledge built in KS3 by exploring the following 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</p> <p>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.</p>	<p>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</p> <p>Algorithms Pupils will build up their knowledge of algorithms from KS3 focussing on key algorithms: binary search, linear search,</p>	<p>Programming Theory Programming theory concepts: defensive design, input sanitisation/validation. 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.</p> <p>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 topologies, Wi-Fi vs wired connections, the internet and networking protocols</p>	<p>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.</p>	<p>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.</p>	<p>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, implementation, 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.</p>



		<p>bubble sort, merge sort and insertion sort. Flowcharts will also be a focus including how to produce and interpret them.</p>				
Skills	<p>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.</p>	<p>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.</p>	<p>Computational thinking skills will be developed as pupils gain a more in depth understanding how the different types of computer networks work. Evaluation skills will be developed as pupils compare and contrast different types of networks in terms of the positives and negatives. Literacy skills will be developed as pupils learn how to answer different types of extended answer questions.</p>	<p>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.</p>	<p>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.</p>	<p>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.</p>
Assessments	<p>Formative: Data representation exam questions homework. Conversion exercises On screen formative test. Summative test: On screen data representation test consisting of a range of open and closed questions on data representation. Formative: Computational</p>	<p>Formative: On Screen auto marking programming concepts exam questions homework. Formative: programming concepts exam questions homework. Formative: Exam questions at the end of every lesson. Summative test: Programming concepts and binary exam</p>	<p>Formative: In class exam questions on programming theory. Summative: Full paper 2 exam paper sat in class – Paper based. Formative: Exam questions at the end of every lesson. Formative: Exam questions homework on computer networks basics.</p>	<p>Formative: Exam questions at the end of every lesson. Formative: Systems architecture exam questions homework. Formative: Seneca learning computer systems quiz/test. Summative test: Systems architecture and computer networks exams questions.</p>	<p>Formative: Systems Security exam question homework. Summative Test: End of year 10 mock examination during Assessment week. Full Paper 2 exam with some paper 1 questions. Formative: Ethics written report. Summative: Full paper 1 exam paper.</p>	<p>Formative: Assessment of the programming solution produced, including comments and code throughout this unit Summative Test: Test consisting of the poorly answered topics from the question level analysis conducted after the year 10 mock.</p>



	<p>logic quiz based homework. Summative test: Paper based test focussing on a range of data representation and computational logic questions.</p>	<p>questions completed on the computer. Formative: Pseudocode in class challenges. Summative: Algorithms exam questions.</p>	<p>Formative: Seneca learning computer networks quiz/test. Summative test: Computer networks on screen test.</p>			
Homework	<p>Practice – Pupils given a Microsoft forms quiz consisting of a range of binary conversion questions to practice and aid retention</p> <p>Practice – Pupils given a series of past exam questions on binary conversions, addition, shift and character sets</p> <p>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.</p> <p>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.</p> <p>Preparation and Practice – Pupils given the task to revise for their end of</p>	<p>Practice – Pupils given a Microsoft forms quiz consisting of a range of programming theory questions and basic programming challenges.</p> <p>Practice – Pupils given a series of past exam questions on basic programming constructs</p> <p>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</p> <p>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.</p>	<p>Practice and Extension – Pupils given a knowledge organiser on defensive design considerations and asked to make a quiz using blooket, kahoot or Microsoft Forms.</p> <p>Extension – Pupils given a scenario on a particular business/orga nisation and asked to produce a written report discussing how the business could implement a particular network topology with wired/wirleess transmission illustrating the benefits/limitati ons of each.</p> <p>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.</p>	<p>Extension – Pupils asked to produce a knowledge organiser on summarising all the content covered about the CPU</p> <p>Practice – Pupils given a series of past exam questions about the CPU to answer.</p> <p>Practice – Pupils set a series of assignments on Seneca learning covering systems architecture and computer networks to aid revision and practice questions.</p> <p>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.</p>	<p>Preparation and Practice – Pupils given the task to revise for their end of year mock exam. Pupils provided with a revision list.</p> <p>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.</p> <p>Practice – Pupils given a 8 mark ethics question to answer.</p>	<p>Project – On going project working on designs and development of solution to the programming task.</p>



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