Years 12 & 13 Curriculum
A Level: Computer Science

Year 12	Term 1 (Autumn)		Term 2 (Spring)		Term 3 (Summer)	
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic	**Abstraction & Automation** **Fundamentals of Number Systems** **Fundamentals of Data Representation** **Fundamentals of Computer Systems** **Fundamentals of Programming**	**Theory of Computation** **Fundamentals of Data Representation** **Fundamentals of Computer systems** **Consequences of Uses of Computing**	**Fundamentals of Computer systems** **Classification of Programming Languages & Translation**	**Fundamentals of Communication & Networking** **Databases** **Java Practice**	**Revision** **Fundamentals of Programming**	**Mock Examinations** **Continuing with mini programming project**

Key Concepts	• Abstraction, Information hiding, Procedural abstraction, Functional abstraction, Data abstraction, Problem abstraction/reduction, Decomposition, Composition, and Automation
	• Finite state machines
	• Number types
	• Number Bases
	• Units of information
	• External Hardware devices including secondary storage devices
		• Finite state machines
		• Number types
		• Information Coding Systems
		• Representing images, sound and other data
		• Data Compression and Encryption
		• Logic gates
		• Boolean Algebra
		• Types of program translator
		• Internal hardware components of a computer
		• The stored program concept
		• Structure and role of the processor and its components
		• The Fetch-Execute cycle and the role of registers within it
		• Factors affecting processor performance
		• Individual (moral), social (ethical), legal and cultural issues and opportunities
			• The processor instruction set
			• Addressing modes
			• Machine-code/assembly language operations
			• The processor instruction set
			  • Addressing modes
			  • Machine-code/assembly language operations
			• Conceptual data models and entity relationship modelling
			• Relational databases
			• Database design and normalisation techniques
				• Communication methods
				• Working through past exam code and completing practice tests.
				• Structured Query Language (SQL)
				• Client server databases
					• Object orientated programming
					  - Class
					  - Object
					  - Instantiation
					  - Encapsulation
					  - Inheritance
					  - Aggregation
					  - Composition
					  - Polymorphism
					  - Overriding.
					• Java FX
					• Abstract Data Structures
					• Introduction to the NEA	

Years 12 & 13 Curriculum *(continued)*

A Level: Computer Science

Year 13	Term 1 (Autumn)		Term 2 (Spring)		Term 3 (Summer)	
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Topic	**Fundamentals of Data Structures** **Fundamentals of Algorithms** **NEA and Exam Code Preparation**	**Fundamentals of Data Representation** **Theory of Computation** **Searching & Sorting Algorithms** **Fundamentals of Algorithms** **NEA & Exam Code Preparation**	**Theory of Computation** **Fundamentals of Data Representation** **Fundamentals of Computer Organisation & Architecture** **Logic Gates** **The Internet** **NEA & Exam Code Preparation**	**Fundamentals of Communication & Networking** **Big Data** **NEA & Exam Code Preparation**	**Fundamentals of Functional Programming** **Exam Code Preparation**	
Key Concepts	• Trees – Binary Trees • Hash Tables • Vectors • Graph Traversal	• Real Numbers - Numbers with a fractional part • Reverse Polish – infix transformations • Finite state machines (FSMs) with and without output • Regular expressions and maths for regular expressions • Backus-Naur Form (BNF)/syntax diagrams • Linear and Binary Search • Bubble and Merger Sort • Comparing algorithms • Maths for understanding Big-0 notation • Order of complexity • Limits of computation • Classification of algorithmic problems • Computable and non-computable problems • Halting problem	• Turing Machines • Vector graphics • Vector graphics versus bitmapped graphics • Interrupts • D-Type Flip flop • The Internet and how it works • Internet security • TCP/IP • Standard application layer protocols	• IP address structure • Subnet masking • IP standards • Public and private IP addresses • Public and private IP addresses • Network Address Translation (NAT) • Port forwarding • Client server model • Thin- versus thick-client computing • Big Data – volume, velocity and variety • Be familiar with the: - Fact-based model for representing data - Graph schema for capturing the structure of the dataset - Nodes, edges and properties in graph schema	• Function type • First-class object • Function application • Partial function application • Composition of functions • Writing functional programs • Functional language programs • List processing	

NEA = Non-examined assessment

Years 12 & 13 Assessment
A Level: Computer Science

All students will sit an assessment and a mock examination in Year 12 and two mock examinations in Year 13.

	Year 12		Year 13		
	Assessment	**Mock Exam**	**Mock Exam**	**Mock Exam**	**Revision Resources**
	Autumn Term	**Summer Term**	**Autumn Term**	**Spring Term**	
Style of Assessment	Programming computer based *(Paper 1)* Written theory questions *(Paper 2)*	Programming computer based *(Paper 1)* Written theory questions *(Paper 2)*	Written theory questions Programming exam	Written theory questions Programming exam	*Kennet Resources* • Core Questions • Knowledge Organisers • Learning Habits *External Resources* • www.isaaccomputerscience.org • www.aqa.org.uk • www.physicsandmathstutor.com
Topics Assessed	• Data representation fundamentals • Computer systems fundamentals • Computer organisation and architecture fundamentals • Consequences of uses of computing • Theory of computation	• Programming fundamentals • Data structures fundamentals • Systematic approach to problem solving • Theory of computation • Abstraction and automation • Data representation & FSMs	Fundamentals of: • Programming • Data representation • Computer systems • Computer organisation and architecture • Data structured and algorithms • Consequences of uses of computing • RPE, RegEx and BNF	Fundamentals of: • Programming • Data representation • Computer systems • Computer organisation and architecture • Databases • Data structured and algorithms • Consequences of uses of computing • RPE, RegEx and BNF	

Exam Board: AQA

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