Computer Science Curriculum Content, KS5

	HT1	HT2	HT3	HT4	HT5	HT6
Programming	Introduction to the chosen programming language	Operations and simple data types, Programming Concepts Relational operations in a programming language.	String-handling operations in a programming language Random number generation in a programming language	Constants and variables in a programming language Exception handling	Subroutines (procedures/functions) Parameters of subroutines Returning a value/values from a subroutine	Structured programming Local variables in subroutines Global variables in a programming language
Data Structure	Single- and multi-dimensional arrays (or equivalent)	Data Dictionary Boolean	Fields, records and files	Classes Objects		
Data Representation	Number systems	Number bases Bits and bytes Unsigned binary Unsigned binary arithmetic Encryption Vernam cipher with ciphers	Signed binary using two's complement. Practical Numbers with a fractional part Error checking and correction Bitmapped graphics	Analogue and digital. Analogue/digital conversion, Digital representation of sound Information coding systems ASCII and Unicode Representing images, sound and other data	Integer numbers Rational numbers Irrational numbers Real numbers Ordinal numbers	

				Bit patterns, images, sound and other data Data compression		
Theory of computation	Abstraction and automation Problem-solving Following and writing algorithms				Abstraction Information hiding Procedural abstraction Functional abstraction Data abstraction Problem abstraction/reduction Decomposition	Automation Finite state machines (FSMs) Finite state machines (FSMs) without output
Systematic approach to problem solving			Aspects of software development			
Hardware and software	Logic gates	Boolean algebra			Relationship between hardware and software Classification of software Role of an operating system (OS)	Types of program translator

Computer organisation and architecture					Internal hardware components of a computer The meaning of the stored program concept. The processor and its components. The Fetch-Execute cycle and the role of registers within it.	Addressing modes Machine-code/ assembly language operations. Factors affecting processor performance External hardware devices. Secondary storage devices
Consequences of uses of computing				Individual (moral), social (ethical), legal and cultural issues and opportunities		
Communication and Networking					Communication methods Network topology Types of networking between hosts Wireless networking	

	HT1	HT2	HT3	HT4	HT5	HT6
Programming	Arithmetic operations in a programming language	Data types,	Boolean operations in a programming language	Constants and variables in a programming language Exception handling Object-oriented programming	Subroutines (procedures/functions) Parameters of subroutines Returning a value/values from a subroutine	Role of stack frames in subroutine calls Recursive techniques Programming paradigms
Data Structure	Single- and multi-dimensional arrays (or equivalent)	Dictionaries Boolean	Fields, records and files	Abstract data types/data structures	Queues Stacks Graphs Trees	Hash tables Vectors
Fundamentals of functional programming				Functional programming paradigm Writing functional programs	Lists in functional programming	
Fundamentals of algorithms				Simple tree-traversal algorithms Reverse Polish – infix transformations	Searching algorithms Sorting algorithms, Dijkstra's shortest path algorithm	
Data Representation	Number bases Bits and bytes	Unsigned binary arithmetic Encryption Rounding errors Absolute and relative errors Range and precision Normalisation of floating point form	Signed binary using two's complement. Practical Numbers with a fractional part Error checking and correction Underflow and overflow Information coding systems	Analogue/digital conversion. Digital representation of sound Information coding systems ASCII and Unicode Representing images, sound and other data Bit patterns, images, sound and other data		

			Bitmapped graphics	Data compression		
Theory of computation	Problem-solving Following and writing algorithms	Information hiding Procedural abstraction Functional abstraction Data abstraction Decomposition	Automation Finite state machines (FSMs) Finite state machines (FSMs) without output Maths for regular expressions	Context-free languages Backus-Naur Form (BNF)/syntax diagrams Maths for understanding Big-0 notation	Order of complexity Limits of computation Classification of algorithmic problems	Computable and non-computable problems
Systematic approach to problem solving	Aspects of software development					
Hardware and software	Logic gates	Boolean algebra			Relationship between hardware and software Classification of software Role of an operating system (OS)	Types of program translator
Computer organisation and architecture					Internal hardware components of a computer The meaning of the stored program concept. The processor and its components. The Fetch-Execute cycle and the role of registers within it.	Addressing modes Machine-code/ assembly language operations. Factors affecting processor performance External hardware devices. Secondary storage devices

Consequences of uses of computing				Individual (moral), social (ethical), legal and cultural issues and opportunities		
Communication and Networking			The Internet and how it works Internet security The Transmission Control Protocol/Internet Protocol (TCP/IP) protocol		Communication methods Network topology Types of networking between hosts Wireless networking	
Fundamentals of databases	Conceptual data models and entity relationship modelling Database design and normalisation techniques	Structured Query Language (SQL)	Client server databases			
Non-exam assessment - the computing practical project		Analysis Requirements	Design Implementation	Testing Evaluation		