Year 12 Topics Computing

Each topic develops and deepens the Core knowledge that will underpin all areas of the curriculum at KS4 and KS5. Within some units some topics are not covered until Year 13.

Topic	Rationale	Knowledge acquisition	Key vocabulary	Skills and enrichment
Fundamentals of programming	Learn the basic operation of a typical programming language, becoming familiar with programming terms and capability	Programming	Data types Programming concepts Arithmetic operations in a programming language Constants and variables in a programming language Boolean operations in a programming language String-handling operations in a programming language Random number generation in a programming language Subroutines-procedures/functions Parameters and subroutines Object-oriented programming	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills
Fundamentals of data structures	Understand the concept and application of a data type and data structures	Data structures and abstract data types	Abstract data types/data structures Queues Stacks Graphs Trees Vectors Dictionaries	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills
Fundamentals of algorithms	Develop programming ability through an introduction to a range of algorithms and notation and the limits of computation	Searching algorithms Sorting algorithms	Linear search Binary search Binary tree search Bubble sort Merge sort	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills

Topic	Rationale	Knowledge acquisition	Key vocabulary	Skills and enrichment
Theory of computation	Develop approach to problem solving, testing and evaluation	Abstraction and automation Regular languages Context-free languages Classification of algorithms	Problem-solving Following and writing algorithms Abstraction Information hiding Procedural abstraction Functional abstraction Data abstraction Decomposition Composition Automation	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills
Fundamentals of data representation	Recognise different representations of data such as graphics, sound and number	Number systems Number bases Units of information Binary number systems Information coding systems Representing images, sound and other data	Natural numbers Rational numbers Real numbers two's complement Absolute error Relative errors Underflow and overflow ASCII Unicode Error checking and correction Musical instrument digital interface (MIDI) Data compression Encryption	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills
Fundamentals of computer systems	Acknowledge there are a range of programming languages and understand the mathematics behind logic gates and boolean	Hardware and software Classification of programming languages Types of program translator Logic gates Boolean algebra	System software operating system assembler compiler interpreter • NOT • AND • OR • XOR • NAND • NOR	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills

Topic	Rationale	Knowledge acquisition	Key vocabulary	Skills and enrichment
Fundamentals of computer organisation and architecture	Understand the internal components of the computer and associated hardware	Internal hardware components of a computer The stored program concept Structure and role of the processor and its components External hardware devices	Internal computer hardware processor Process instruction set Assembly language Input-output devices Secondary storage devices	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills
Consequences of uses of computing	Recognise the impact computing has on the world	Individual (moral), social (ethical), legal and cultural issues and opportunities	Communication Privacy Digital age	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills
Fundamentals of communication and networking	Understand the possible formation of networks	Networking The TCP/IP protocol The Internet Communication	Standard application layer protocols TCP/IP Dynamic host configuration protocol (DHCP) Network address translation (NAT) Port forwarding Client server model Thin / thick-client computing	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills
Fundamentals of database	Understand the structure of a database and the reasons for database design	Database design and normalisation techniques Structured Query Language (SQL)	Entity relationship diagram Entity & Attribute Primary key & foreign key Relational database (one-to-one, one-to-many, many-to-many) Normalisation First, second and third normal form SQL Updating, selecting, extracting, deleting client-server	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills

Topic	Rationale	Knowledge acquisition	Key vocabulary	Skills and enrichment
Systematic approach to problem solving	Further develop approach to problem solving	Aspects of software development	Analysis Prototyping Agile modelling Design Data requirements Implementation Testing Acceptance testing Evaluation Effectiveness Usability Maintainability	Independence Evaluation Analysis Literacy Oracy Research skills Note taking skills