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Curriculum Plan

KS5 – Computer Science

Year 12

Golden Threads

How to use computational methods to create algorithms solve problems
How to use a high-level programming language to turn algorithms into runnable code
What are the fundamental principles behind how computers operate?
How to analyse, design, develop, test and evaluate a project

Enrichment

Supporting KS3 computing club
After school NEA support

Review and Evaluation

Summer 2026

	Topics & Substantive Knowledge	Disciplinary Knowledge	Assessment	Misconceptions	Key Vocabulary	Knowledge Tracking
Term 1	2.1.1 Thinking abstractly (a) The nature of abstraction (b) The need for abstraction. (c) The differences between an abstraction and reality	(d) Devise an abstract model for a variety of situations. (a) Identify the inputs and outputs for a given situation	Week 7 - Exam question based assessment		Abstraction Algorithm Composition Computational thinking Decomposition Flowchart Pseudocode	Links to: 1.2.3 1.2.4 1.4.2 2.2 2.3
	2.1.2 Thinking ahead (b) Determine the preconditions for devising a solution to a problem (c) The nature, benefits and drawbacks of caching. (d) The need for reusable program components.					
	2.1.3 Thinking procedurally	(a) Identify the components of a problem. (b) Identify the components of a solution to a problem. (c) Determine the order of the steps needed to solve a problem (d) Identify sub-procedures necessary to solve a problem				
	2.1.4 Thinking logically	(a) Identify the points in a solution where a decision has to be taken. (b) Determine the logical conditions that affect the outcome of a decision. (c) Determine how decisions affect flow through a program				

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	Topics & Substantive Knowledge	Disciplinary Knowledge	Assessment	Misconceptions	Key Vocabulary	Knowledge Tracking
Term 1 (continued)	1.5.1 Computing related legislation (a)The Data Protection Act 1998 (b) The Computer Misuse Act 1990. (c) The Copyright Design and Patents Act 1988. (d) The Regulation of Investigatory Powers Act 2000.		Week 4 - Exam question based assessment	There are no laws on the Internet	Artificial Intelligence Artificial Neural Networks Computer Misuse Act Copyright, Designs and Patents Act Creative Commons Data Protection Act Deep learning	Links to 1.3.1
	1.5.2 Moral and ethical Issues The individual moral, social, ethical and cultural opportunities and risks of digital technology: • Computers in the workforce. • Automated decision making. • Artificial intelligence. • Environmental effects. • Censorship and the Internet. • Monitor behaviour. • Analyse personal information. • Piracy and offensive communications. • Layout, colour paradigms and character sets.			Computers always have a negative impact on the environment Colours have the same meaning in all countries	Encryption Freedom of Information Act Hacking License agreement Machine Learning Malware Reinforcemant learning The Regulation of Investigatory Powers Act	
	1.1.1 Structure and function of the processor (a) The Arithmetic and Logic Unit; ALU, Control Unit and Registers (Program Counter; PC, Accumulator; ACC, Memory Address Register; MAR, Memory Data Register; MDR, Current Instruction Register; CIR). Buses: data, address and control: how this relates to assembly language programs (b) The Fetch-Decode-Execute Cycle; including its effects on registers. (c) The factors affecting the performance of the CPU: clock speed, number of cores, cache. (d) The use of pipelining in a processor to improve efficiency. (e) Von Neumann, Harvard and contemporary processor architecture			The speed of the computer is linearly related to the amount of cache	Accumulator ALU – Arithmetic and Logic Unit Bus Cache Clock Core CPU – Central Processing Unit CU – Control Unit CIR – Current Instruction Register FDE – Fetch Decode Execute cycle Interrupt MAR – Memory Address register MDR – Memory Data Register PC – Program Counter Pipelining Register Von Neumann architecture Word	

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Term 2	2.2.1 Programming techniques	(a) Programming constructs: sequence, iteration, branching. (b) Recursion, how it can be used and compares to an iterative approach. (c) Global and local variables. (d) Modularity, functions and procedures, parameter passing by value and by reference. (e) Use of an IDE to develop/debug a program. (f) Use of object oriented techniques.	Week 7 - Exam question based assessment	Recursion is a good approach in all situations Using global variables is a good approach	Boolean Cast Character Conditional Statement Constant Declaration Function Integer Iteration Global Local Loop Parameter Procedure Python Selection Sequence String Variable	Links to: 1.2.2 1.2.3 1.2.4 1.3.4 2.3.1
	1.1.2 Types of processor (a) The differences between and uses of CISC and RISC processors (b) GPUs and their uses (including those not related to graphics). (c) Multicore and Parallel systems.		Week 6 - Exam question based assessment	GPUs are only used for displaying graphics	Harvard Architecture Co-processor Embedded system CISC – Complex Instruction Set Computer RISC – Reduced Instruction Set Computer	Links to 1.1.1 and 1.1.3
Term 3	1.2.4 Types of Programming Language (a) Need for and characteristics of a variety of programming paradigms. (b) Procedural languages. (d) Modes of addressing memory (immediate, direct, indirect and indexed).	(c) Assembly language (including following and writing simple programs with the Little Man Computer instruction set). (e) Object-oriented languages with an understanding of classes, objects, methods, attributes, inheritance, encapsulation and polymorphism	Week 6 - Exam question based assessment	Procedural programming is the only approach	Array Assembler Assembly language Attributes Branch Class Constructor Encapsulation High level language Inheritance Low level language Machine code Method Mnemonics Object Polymorphism	Links to: 1.1.1 1.2.2 1.4.1 2.2.1

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Term 3 (continued)	1.1.3 Input, output and storage (a) How different input, output and storage devices can be applied to the solution of different problems. (b) The uses of magnetic, flash and optical storage devices (c) RAM and ROM. (d) Virtual storage.		Week 5 - Exam question based assessment		Analogue ADC – Analogue Digital Convertor DAC – Digital Analogue Convertor LCD – Liquid Crystal Display OCR – Optical Character RAM – Random Access Memory ROM – Read Only Memory Recognition Pixel QR code Register Resolution RFID – Radio Frequency ID Sample rate Transistor Volatile	Links to 1.1.1 and 1.1.2
Term 4	2.3.1 Algorithms Standard algorithms (bubble sort, insertion sort, binary search and linear search). Standard algorithms (quick sort, binary search).	Implement bubble sort, insertion sort. Implement binary and linear search.	Week 6 - Exam question based assessment	Bubble sort is a useful sorting algorithm	Binary search Bubble sort Divide and conquer Linear search Insertion sort Quick sort	Links to 1.4.2 2.2.1
	1.2.1 Systems Software (a) The need for, function and purpose of operating systems. (b) Memory Management (paging, segmentation and virtual memory). (c) Interrupts, the role of interrupts and Interrupt Service Routines (ISR), role within the Fetch-Decode-Execute Cycle. (d) Scheduling: round robin, first come first served, multi-level feedback queues, shortest job first and shortest remaining time (e) Distributed, embedded, multi-tasking, multi-user and Real Time operating systems. (f) BIOS. (g) Device drivers. (h) Virtual machines, any instance where software is used to take on the function of a machine, including executing intermediate code or running an operating system within another.		Week 5 - Exam question based assessment		Application software CLI – Command Line Interface Device Driver GUI – Graphical User Interface Interrupt Multitasking Operating System Page Peripheral Process Scheduler Segmentation Swapping System software Virtual machine Virtual memory Windows	Links to 1.1.1

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Term 5	1.4.3 Boolean Algebra (a) Define problems using Boolean logic. (d) Using logic gate diagrams and truth tables. (e)The logic associated with D type flip flops, half and full adders.	(b) Manipulate Boolean expressions, including the use of Karnaugh maps to simplify Boolean expressions. (c) Use the following rules to derive or simplify statements in Boolean algebra: De Morgan's Laws, distribution, association, commutation, double negation.	Exam question based internal assessments for all Y12 content	Boolean logic and simplifying Boolean expressions has no real world use	AND Boolean algebra Flip-flop Full address Half adder Integrated circuit Logic gate Logic circuit NAND NOR NOT OR Truth table XOR	Links to 1.4.1
	1.2.2 Applications Generation (a) The nature of applications, justifying suitable applications for a specific purpose. (b)Utilities. (c) Open source vs closed source. (d) Translators: Interpreters, compilers and assemblers. (e)Stages of compilation (lexical analysis, syntax analysis, code generation and optimisation). (f) Linkers and loaders and use of libraries.		Exam question based internal assessments for all Y12 content	Open source always means that the software is free	Bytecode Compiler Dynamic Link Library Interpreter Java Virtual Machine Linker Loader Machine code Parsing Translator	Links to 1.2.4 and 2.2.1
Term 6	1.2.3 Software Development (a) Understand the waterfall lifecycle, agile methodologies, extreme programming, the spiral model and rapid application development. (b) The relative merits and drawbacks of different methodologies and when they might be used. (c) Writing and following algorithms. (d) Different test strategies, including black and white box testing and alpha and beta testing (e) Test programs that solve problems using suitable test data and end user feedback, justify a test strategy for a given situation.		Week 6 - Exam question based assessment		Agile model Alpha testing Beta testing Beta version Black box testing Extreme Programming RAD – Rapid Action Development Spiral model Software development lifecycle System testing Testing Unit testing Waterfall model White box testing	Links to 2.1 and 2.2.1

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Term 6 (continued)	1.3.2 Databases (a) Relational database, flat file, primary key, foreign key, secondary key, entity relationship modelling, normalisation and indexing. (b) Methods of capturing, selecting, managing and exchanging data (e) Referential integrity. (f) Transaction processing, ACID (Atomicity, Consistency, Isolation, Durability), record locking and redundancy.	(c) Normalisation to 3NF (d) SQL – Interpret and modify.	Week 5 - Exam question based assessment		Atomicity Attribute Boolean Composite primary key Consistency Database Database management system Deadlock Durability Electronic Data Interchange Entity Field First Normal Form Flat-file database Foreign key INT Isolation Non-key dependency Normalisation Operators Partial dependency Primary key Query Record Record locking Redundancy Referential integrity Relational database Second Normal Form Serialisation SQL Structured data Table Third Normal Form Transaction Unstructured data Varchar Wildcard characters	