Year 12

Curriculum Overview: A-Level Computer Science

RESPECT
COURAGE
RESPONSIBILITY
KINDNESS
RESILIENCE

	Topics/ content outline:	Powerful Knowledge (key concepts, skills)	What will you be assessed on?	How can you help at home?
Autumn Term	1. Components of a Computer System 2. Input, output and storage 3. Software Development 4. Application Generation 5. System Analysis 6. Algorithms 7. Compression and encryption 8. Hashing 9. Databases 10. Python challenges (1-20)	Define, explain and give examples of: • Structure and function of different processors • The need for, function and purpose of operating systems, memory management and scheduling • The nature of applications, justifying suitable applications for a specific purpose. • Procedural programming language techniques • How data is exchanged between different systems • Identify the inputs and outputs for a given situation and determine the order of the steps needed to solve a problem. • Identify sub-procedures necessary to solve a problem. • Programming constructs, variables and modularity • How to de-bug a program.	All elements of Powerful knowledge Recall of facts Application of theory within a scenario Topics 1-9 (Autum Term) via practice exam questions Topic 10 (Autum Term) via practical exercises	Encourage your child to: Recall key concepts from lessons Work through practice papers from 2018-2022 Engage with on-line learning material / videos Practice python programming every week (a minimum of 3 hours per week) Review and complete the revision Year 12 CS revision plan.
Spring Term	1. Networking 2. Data structures 3. Binary Manipulation 4. Computation thinking 5. Little Man Computer 6. Web Technologies 7. Boolean Algebra 8. Python challenges (21-30)	Define, explain and give examples of: • The need and nature of abstraction and decomposition • Characteristics of networks, protocols and standards. • Internet structure, including The TCP/IP stack, DNS, Protocol layering, LANs and WANs, Packet and circuit switching. • Client-server and peer to peer • HTML, CSS and JavaScript • Karnaugh maps to simplify Boolean expressions • Primitive data types • Use of sign and magnitude and two's complement • Converting integers between binary, hexadecimal and denary. • The properties of stacks and queues.	All elements of Powerful knowledge Recall of facts Application of theory within a scenario Topics 1-9 (Autum Term) via practice exam questions Topics 1-7 (Spring Term) via practice exam questions Topic 10 (Autum Term) via practical exercises Topic 8 (Spring Term) via practical exercises	Encourage your child to: Recall key concepts from lessons Work through practice papers from 2018-2022 Engage with on-line learning material / videos Practice python programming every week (a minimum of 4 hours per week) Review and complete the revision Year 12 CS revision plan.
Summer Term	1. Ethical and moral issues 2. Computing related legislation 3. Python challenges (31-40) 4. Preparation for the Year 12 mock exam. 5. Looking ahead to Year 13 project.	Define, explain and give examples of: • The Data Protection Act 1998. • The Computer Misuse Act 1990. • The Copyright Design and Patents Act 1988. • The Regulation of Investigatory Powers Act 2000. • 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 & character sets	All elements of Powerful knowledge Recall of facts Application of theory within a scenario Topics 1-9 (Autum Term) via exam questions Topics 1-7 (Spring Term) via exam questions Topics 1- 2 (Summer Term) via exam questions Topics 9- 10 (Autum Term) via practical exercises Topics 7- 10 (Spring Term) via practical exercises Topics 7 (Summer Term) via practical exercises All of H406 Exam 1 via the Year 12 Mock Exam	Encourage your child to: Recall key concepts from lessons Work through practice papers from 2018-2022 Engage with on-line learning material / videos Practice python programming every week (a minimum of 4 hours per week) Review and complete the revision Year 12 CS revision plan.

Year 13

Curriculum Overview: A-Level Computer Science

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	Topics/ content outline:	Powerful Knowledge (key concepts, skills)	What will you be assessed on?	How can you help at home?
Autumn Term	1. Computer System Part 2 (CISC and RISC processors) 2. Input, output and storage 3. Software Development 4. Application Generation Part 2 (Stages of compilation) 5. System Analysis 6. Object-oriented languages 7. Modes of addressing memory 8. Encryption 10. Coursework preparation	Define, explain and give examples of: • Structure and function of different processors • Stages of compilation (lexical analysis, syntax analysis, code generation and optimisation) • Modes of addressing memory (immediate, direct, indirect and indexed). • Object-oriented languages, understanding of classes, objects, methods, attributes, inheritance, encapsulation & polymorphism. • Run length encoding, dictionary coding, lossless compression Demonstrate: • Analysis of coursework scenario • Develop prototype, iterative development / testing	All elements of Powerful knowledge Recall of facts Application of theory within a scenario Topics 1-9 (Autum Term) via practice exam questions Topic 10 (Autum Term) via practical exercises	Encourage your child to: Recall key concepts from lessons Work through practice papers from 2018-2022 Engage with on-line learning material / videos Work through the Year 13 project every day (a minimum of 7 hours per week) Review and complete the revision Year 12 CS revision plan.
Spring Term	Recap and revision of: 1. Networking Part 2 2. Data structures 3. Binary Manipulation Part 2 4. Computation thinking 5. Little Man Computer 6. Web Technologies Part 2 7. Boolean Algebra Part 2 Coursework preparation:	Define, explain and give examples of: • Packet and circuit switching. • Characteristics of networks, protocols and standards. • PageRank algorithm. • Server and client side processing. • Representation and normalisation of floating point numbers in binary. • Floating point arithmetic, positive and negative numbers, addition and subtraction. • Bitwise manipulation and masks: shifts, combining with AND, OR, and XOR • Demonstrate the design of prototype, testing and evolution.	All elements of Powerful knowledge Recall of facts Application of theory within a scenario Topics 1-9 (Autum Term) via practice exam questions Topics 1-7 (Spring Term) via practice exam questions Topic 10 (Autum Term) via practical exercises Topic 8 (Spring Term) via practical exercises	Encourage your child to: Recall key concepts from lessons Work through practice papers from 2018-2022 Engage with on-line learning material / videos Work through the Year 13 project every day (a minimum of 7 hours per week) Review and complete the revision Year 12 CS revision plan.
Summer Term	1. Ethical and moral issues 2. Computing related legislation 3. Algorithmic complexity 4. Preparation for the external examination.	Define, explain and give examples of: • Measures and methods to determine the efficiency of different algorithms, Big O notation (constant, linear, polynomial, exponential and logarithmic complexity). • Comparison of the complexity of algorithms. • Algorithms for the main data structures, (stacks, queues, trees, linked lists, depth-first (post-order) and breadth-first traversal of trees). • Standard algorithms (bubble sort, insertion sort, merge sort, quick sort, Dijkstra's shortest path algorithm, A* algorithm, binary search and linear search).	All elements of Powerful knowledge Recall of facts Application of theory within a scenario Topics 1-9 (Autum Term) via exam questions Topics 1-7 (Spring Term) via exam questions Topics 1- 2 (Summer Term) via exam questions Topics 9- 10 (Autum Term) via practical exercises Topics 7- 10 (Spring Term) via practical exercises Topics 7 (Summer Term) via practical exercises All of H406 Exam 1 via the Year 12 Mock Exam	Encourage your child to: Recall key concepts from lessons Work through practice papers from 2018-2022 Engage with on-line learning material / videos Work through the Year 13 project every day (a minimum of 7 hours per week) Review and complete the revision Year 12 CS revision plan.