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Computer Science KS5 Curriculum Map 2022-23

Yr12 (KS5)	Topic Area	Knowledge/Skills that are taught	Knowledge/Skills revisited	What does good look like?	Resources/support at home
Autumn 1	Unit 1: Fundamentals of programming	Topic 1: Programming basics Topic 2: Selection Topic 3: Iteration Topic 4: Arrays Topic 5: Subroutines Topic 6: Files and exception handling	KS3 Introduction to coding through Kodu Games programming in Scratch Introduction to Python AI and machine learning Computational thinking and logic Python: Next steps Y7 Spring 2 Y7 Summer 2 Y8 Aut1 Y8 Spring 1 Y8 Spring 2 Y9 Aut2 Y9 Spring1 KS4 CS Programming KS5 CS Programming	• **explain the difference between a variable and a constant** • **write a pseudocode solution for a simple problem involving iteration and selection** • **use nested selection and iteration statements** • **use arithmetic operations and Boolean operations NOT, AND and OR** • **use functions and library subroutines including random number generation** • **know how to define and call a subroutine in a**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/ Replit https://replit.com/ AQA AS and A Level Computer Science Textbook PM Heathcote and RSU Heathcote ISBN: 978-1-910523-07-0

				• **program**	
				• **construct algorithms using one-dimensional arrays**	
				• **read from and write to a simple text file**	
Autumn 2	Unit 3: Data representation	Topic 1: Number systems Topic 2: Bits, bytes and binary Topic 3: Binary arithmetic Topic 4: Bitmapped graphics Topic 5: Representation of sound Topic 6: Compression and encryption algorithms	KS3 Understanding computers Graphics Sound KS4 Systems architecture	• **convert between decimal, binary and hexadecimal number systems** • **define bits and bytes, and use names, symbols and prefixes appropriately** • **know how to use the ASCII table** • **use arithmetic operations and Boolean operations NOT, AND and OR** • **know how simple error checking methods are used in transmission** • **know how to add and multiply two unsigned binary numbers** • **convert between signed binary and decimal**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/ Replit https://replit.com/ AQA AS and A Level Computer Science Textbook PM Heathcote and RSU Heathcote ISBN: 978-1-910523-07-0

				• **explain how images are represented in terms of pixels, resolution and colour depth** • **know the function of an analogue to digital convertor** • **know what MIDI and event message are used for** • **use basic encryption to create ciphertext**	
Spring 1	Unit 2: Problem solving and theory of computation	Topic 1: Solving logic problems Topic 2: Structured programming Topic 3: Writing and interpreting algorithms Topic 4: Testing Topic 5: Abstraction and automation Topic 6: Finite state machines	Building on KS2 knowledge Y7 Spring 2 Y7 Summer 2 Y8 Aut1 Y8 Spring 1 Y8 Spring 2 Y9 Aut2 Y9 Spring1 KS4 CS Programming KS4 CS Fundamentals of algorithms	• **check solutions to simple logic problems** • **interpret a hierarchy chart for a given problem** • **list three basic programming structures** • **list two benefits of structured programming techniques** • **interpret simple algorithms to describe their purpose** • **list two features of a good algorithm** • **describe how a bubble sort works**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/ Replit https://replit.com/ AQA AS and A Level Computer Science Textbook PM Heathcote and RSU Heathcote ISBN: 978-1-910523-07-0

				• **describe how a binary search works** • **describe what is meant by normal, boundary and invalid data and use them in a test plan** • **Give examples of some types of abstraction, e.g. information hiding, procedural and functional abstraction** • **identify the symbols used in an automaton and say whether a string is accepted by it**	
Spring 2	Unit 4: Hardware and software	Topic 1: Hardware and software Topic 2: Role of an operating system Topic 3: Programming language classification Topic 4: Programming language translators Topic 5: Logic gates Topic 6: Boolean algebra	KS3 Understanding computers KS4 Systems architecture	• **define the terms hardware and software and explain the relationship between them** • **Explain what is meant by system software and application software** • **Describe some of the functions of operating systems and utility programs** • **State with examples what is meant by high- and low-level**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/ Replit https://replit.com/ AQA AS and A Level Computer Science Textbook PM Heathcote and

				languages • **Identify machine code and assembly code as low-level languages** • **Explain why program translators are needed** • **Explain the difference between source and object code** • **Interpret simple assembly code programs** • **construct truth tables for a variety of logic gates** • **draw and interpret logic gate circuit diagrams involving multiple gates** • **write a Boolean expression for a given logic gate circuit** • **draw an equivalent logic gate circuit for a given Boolean expression**	RSU Heathcote ISBN: 978-1-910523-07-0
Summer 1	Unit 5: Computer organisation and architecture	Topic 1: Internal computer hardware Topic 2: The processor Topic 3: The processor instruction set Topic 4: Assembly language	KS3 Understanding computers KS4 Systems architecture	• **list the basic internal components of a computer system** • **describe the concept**	Google classroom PG Online https://www.pgonline

		Topic 5: Input - output devices Topic 6: Secondary storage devices		- of addressable memory and the stored program concept - define the term 'processor instruction set' - describe an instruction as consisting of an opcode and an operand, where an operand could be a value, a memory address or a register - interpret simple assembly code instructions with immediate and direct addressing modes - be able to use given assembly language instruction formats to write instructions to perform simple tasks - understand the main characteristics and purpose of a range of input and output devices - explain the need for secondary storage within a computer system	.co.uk/resources/computer-science/a-level-aqa/ Replit https://replit.com/ AQA AS and A Level Computer Science Textbook PM Heathcote and RSU Heathcote ISBN: 978-1-910523-07-0
Summer 2	Unit 6:	Topic 1: Communication methods	KS3	Define serial and	Google classroom

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	Communication: Technology and consequences	Topic 2: Network topology Topic 3: Client-server and peer-to-peer Topic 4: Wireless networking, CSMA and SSID Topic 5: Communication and privacy Topic 6: The challenges of the digital age	Networks KS4 Computer networks and connections	**parallel transmission methods** • **Define synchronous and asynchronous data transmission** • **Define: baud rate, bit rate, bandwidth, latency, protocol** • **Draw diagrams of star and bus network topologies and give advantages and disadvantages of each** • **Give examples of where peer-to-peer and client-server networking might be used** • **Give examples of organisations that amass and analyse personal information** • **Explain, with examples, how some software applications have resulted in great benefits but also caused great harm** • **Give examples of algorithms that embed moral and cultural values, and that may cause harm or injustice**	PG Online https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/ Replit https://replit.com/ AQA AS and A Level Computer Science Textbook PM Heathcote and RSU Heathcote ISBN: 978-1-910523-07-0

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Computer Science KS5 Curriculum Map 2022-23

Yr13 (KS5)	Topic Area	Knowledge/Skills that are taught	Knowledge/Skills revisited	What does good look like?	Resources/support at home
Autumn 1	Unit 7: Data structures	Topic 1: Queues Topic 2: Lists Topic 3: Stacks Topic 4: Hash tables and dictionaries Topic 5: Graphs Topic 6: Trees Topic 7: Vectors	KS3 Control system with Flowol Introduction to Python Computational thinking and logic Python: Next steps AI and machine learning Games programming in Scratch Introduction to coding through Kodu KS4 Fundamentals of algorithms Programming	● **describe the concept and uses of a queue, stack, list, graph, tree, hash table, dictionary and vector** ● **describe typical uses of these data structures** ● **define a rooted tree and a binary tree** ● **be able to apply a simple hashing algorithm** ● **describe what is meant by a collision and how collisions are handled using rehashing** ● **perform vector addition and scalar multiplication**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/ Replit https://replit.com/ AQA AS and A Level Computer Science Textbook PM Heathcote and RSU Heathcote ISBN: 978-1-910523-07-0
Autumn 1	Non-exam assessment - the computing practical project	Analysis (9) Design (12) Technical Solution (42) Testing (8) Evaluation (4) Total (75)	KS3 Control system with Flowol Introduction to Python Computational thinking and logic Python: Next steps AI and machine learning Games programming in	**The project allows students to develop their practical skills in the context of solving a realistic problem or carrying out an investigation. The project is intended to be as**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/

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			Scratch Introduction to coding through Kodu KS4 Fundamentals of algorithms Programming KS5 Units 1, 2, 7, 8, 9, 11, 12	much a learning experience as a method of assessment; students have the opportunity to work independently on a problem of interest over an extended period, during which they can extend their programming skills and deepen their understanding of computer science.	Replit https://replit.com/ AQA AS and A Level Computer Science Textbook PM Heathcote and RSU Heathcote ISBN: 978-1-910523-07-0 Zig Zag A level AQA NEA Companion Tackling A Level projects in Computer Science AQA 7517 ISBN: 978-1-910523-20-9
Autumn 1	Unit 8: Algorithms	Topic 1: Recursive algorithms Topic 2: Big-O Notation Searching and sorting Topic 3: Searching and sorting Topic 4: Graph traversal algorithms Topic 5: Optimisation algorithms	KS3 Control system with Flowol Introduction to Python Computational thinking and logic Python: Next steps AI and machine learning Games programming in Scratch Introduction to coding through Kodu KS4 Fundamentals of algorithms	• state the essential characteristics of a recursive algorithm • insert items into a binary search tree • state the order in which nodes are visited in pre-order, in-order and post-order tree traversals • give examples of linear, polynomial, exponential and logarithmic functions	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/ Replit https://replit.com/ AQA AS and A Level Computer Science Textbook

				Programming	• **compare two algorithms in terms of efficiency**	PM Heathcote and RSU Heathcote ISBN: 978-1-910523-07-0
					• **explain the principles of a linear and binary search**	
					• **state a possible order in which nodes are visited in depth first and breadth first graph traversals**	
					• **state applications of each graph traversal**	
					• **state the purpose and applications of Dijkstra's shortest path algorithm**	
					• **Describe the Travelling Salesman problem**	
					• **Explain what is meant by a tractable or intractable problem**	
Autumn 2	Unit 9: Regular languages	Topic 1: Mealy machines Topic 2: Sets Topic 3: Regular expressions Topic 4: The Turing machine Topic 5: Backus-Naur form Topic 6: Reverse Polish notation		KS3 Control system with Flowol Introduction to Python Computational thinking and logic Python: Next steps AI and machine learning Games programming in Scratch Introduction to coding through	• **Interpret finite state machines with and without output** • **Define a set by listing its members** • **Calculate a subset, membership, union, intersection, and difference of given sets**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/ Replit https://replit.com/

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			Kodu KS4 Fundamentals of algorithms Programming	• **Form and use simple regular expressions for string manipulation and matching** • **Explain the structure of a simple Turing machine.** • **Read BNF production rules and validate input strings.** • **Convert simple infix form to Reverse Polish Notation and vice versa**	AQA AS and A Level Computer Science Textbook PM Heathcote and RSU Heathcote ISBN: 978-1-910523-07-0
Autumn 2	Unit 12: OOP and functional programming	Topic 1: Basic concepts of Object Oriented Programming Topic 2: Object oriented design principles Topic 3: Functional programming Topic 4: Function application Topic 5: Lists in functional programming Topic 6: Big Data	KS3 Control system with Flowol Introduction to Python Computational thinking and logic Python: Next steps AI and machine learning Games programming in Scratch Introduction to coding through Kodu KS4 Fundamentals of algorithms Programming	• **draw and interpret a class diagram** • **explain what is meant by inheritance and polymorphism** • **interpret and correct a simple object-oriented program** • **explain why the object-oriented paradigm is used** • **state the meaning of the domain and co-domain of a function** • **give examples of first-class objects in a functional programming**	Google classroom PG Online https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/ Replit https://replit.com/ AQA AS and A Level Computer Science Textbook PM Heathcote and RSU Heathcote ISBN: 978-1-910523-

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				language • **write and interpret simple functions in Haskell** • **evaluate simple functions involving map, filter, reduce or fold** • describe and apply list operations such as return head or tail of a list, create/test for empty list, append and prepend an item to a list • describe what is meant by immutable data structures • state the distinguishing features of Big Data: volume, velocity and variety • identify nodes, edges and properties in graph schema	07-0
Autumn 2	Non-exam assessment - the computing practical project	See above	See above	See above	See above
Spring 1	Non-exam assessment - the computing practical project	See above	See above	See above	See above
Spring 1	Unit 11:	Topic 1: Entity relationship modelling	KS3	• **write an entity**	Google classroom

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| | Databases and software development | Topic 2: Relational databases and normalisation
Topic 3: Introduction to SQL
Topic 4: Defining and updating tables using SQL
Topic 5: Systematic approach to problem solving | Database development
KS4
Relational databases and SQL | description for each entity in a database
• define the terms attribute, primary key, composite primary key and foreign key
• produce a simple entity relationship diagram involving two or three entities
• use SQL to retrieve, update, insert and delete data from a single table
• state what is meant by a client-server database
• state a problem that can arise from concurrent access on a client-server database and name a method for overcoming it
• list tasks performed by an analyst and a designer during system design | PG Online

https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/

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https://replit.com/

AQA AS and A Level Computer Science Textbook
PM Heathcote and RSU Heathcote
ISBN: 978-1-910523-07-0 |
| Spring 2 | Unit 10: The Internet | Topic 1: Structure of the Internet
Topic 2: Packet switching and routers
Topic 3: Internet security
Topic 4: TCP/IP, standard application layer protocols
Topic 5: IP addresses
Topic 6: Client server model | KS3
Networks
KS4
Cyber security
Computer networks and connections | • Understand the structure of the Internet
• Describe the term 'Uniform Resource Locator' in the context of networking
• Explain the terms | Google classroom
PG Online

https://www.pgonline.co.uk/resources/computer-science/a-level-aqa/ |

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				'domain name' and 'IP address' **Understand the purpose and function of the Domain Name Server (DNS) system** **Understand the role of packet switching and routers** **Consider where and why routers and gateways are used** **Understand how a firewall works** **Explain symmetric and asymmetric encryption and key exchange** **Discuss worms, Trojans and viruses and the vulnerabilities that they exploit** **Discuss how improved code quality, monitoring and protection can be used against such threats** **Describe the roles of the four layers in the TCP/IP protocol stack** **Describe the role of sockets in the TCP/IP stack** **Be familiar with MAC addresses**	Replit https://replit.com/ AQA AS and A Level Computer Science Textbook PM Heathcote and RSU Heathcote ISBN: 978-1-910523-07-0

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			● **Be familiar with transferring files using FTP as an anonymous and non-anonymous user** ● **Know that an IP address is split into a network identifier and a host identifier part** ● **Know that there are currently two standards of IP address, (v4 and v6) and why v6 was introduced** ● **Distinguish between routable and non-routable IP addresses** ● **Be familiar with the client server model** ● **Compare and contrast thin- client computing with thick- client computing**	
Summer 1	Revision/Exams	Revision/Exams	Revision/Exams	Revision/Exams
Summer 2	Revision/Exams	Revision/Exams	Revision/Exams	Revision/Exams

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