Share Multi Academy Trust

Curriculum Plan

Subject:	**OCR GCSE Computer Science**	**Year**	**11**	**Ability**	**All**

Term / Date(s)	**Topic 1 (25 weeks – 1h/pw min ongoing)**	**Topic 2 6-8 weeks**	**Topic 2 (3-4)**	**Topic 7 2-3 weeks**
Topic	Programming Fundamentals and Producing robust programs	Computational Thinking	Ethical, legal, cultural and environmental impacts of digital technology	SQL
Topic overview **Pupils will learn…**	In this topic, students will learn how to formulate programs in order to solve problems. They will use the computational thinking fundamentals to analyse problems and create programs to meet the needs of these using common programming fundamentals, data types and additional programming techniques using Python.	In this topic students will learn how computational thinking is used to solve complex problems and how computers use this in everyday tasks.	In this topic, students will learn that the use of technology introduces a number of issues surrounding ethical, environmental, privacy and legal and that considerations must be made to ensure all these are covered when developing new technologies.	In this topic students will learn how to extract specific data from a database using SQL commands.

Components	Students will learn, understand about and demonstrate:
	Programming fundamentals
	• Their ability to identify and use variables, constants, operators, inputs, outputs and assignments, random number generation, alongside the programming constructs, sequence, selection and iteration in order to create effective programs.
	• Their ability to identify and use common arithmetic, comparison and Boolean operators and practically data types in a high-level language in order to choose suitable data types for data in a given scenario and understand that data types may be temporarily changed through casting, and where this may be useful.
	• Their ability to identify and use basic string manipulation and file handling operations in order to accurately alter and amend data within a program.
	• Their ability to identify and use arrays (or equivalent) when solving problems, including both one-dimensional and two-dimensional arrays, in order to understand that data can be stored as larger sets of data that relate to each other.
	• Their ability to identify and use sub programs (functions and procedures), within larger programs in order to produce more structured code.
	Maintainability
	• Their ability to identify and use sub programs, naming conventions, indentation and commenting in order to create efficient, effective and easier to maintain programs.
	Defensive Design
	• Their ability to identify and use programming validation and verification techniques in order to show understanding of the issues a programmer should consider to ensure that a program caters for all likely input values and how to deal with invalid data in a program.
	Testing
	• Their ability to identify and correct program syntax and logic errors in order to produce correctly working systems for a given scenario.
	Programming task
	• Their ability to design, write, test and refine high-level, text-based programming language programs, in order to undertake a programming task during the course of their study. Practical Programming skills will then be assessed in Component 2 of the qualification.
		Students will learn to understand about:
		Computational thinking
		• Principles of computational thinking using Abstraction, Decomposition and Algorithmic thinking in order to solve complex problems
		Designing, creating and refining algorithms
		• Identify the inputs, processes, and outputs for a problem.
		• How to create and follow Structure diagrams for a given problem.
		• Create, interpret, correct, complete, and refine algorithms using:
		  ○ Pseudocode
		  ○ Flowcharts
		  ○ Reference language/high-level programming language
		• Identify common logic and syntax errors
		• Be able to complete trace tables for given scenarios.
		Searching and sorting algorithms
		• Standard searching algorithms:
		  ○ Binary search
		  ○ Linear search
		• Standard sorting algorithms:
		  ○ Bubble sort
		  ○ Merge sort
		  ○ Insertion sort
			Students will learn and understand about:
			Ethical, legal, cultural, environmental and privacy issues
			• How technology introduces ethical, legal, cultural, environmental and privacy issues, including knowledge of a variety of examples of digital technology and how this impacts on society, in order to discuss the impact of technology based around the issues and understand the purpose of each piece of legislation and the specific actions it allows or prohibits.
			Legislation
			The need to license software and the purpose and features of a open source and proprietary software licences, in order to recommend a type of licence for a given scenario including benefits and drawbacks.
				Students must learn and understand about:
				• The use of records to store data, in order to understand how data is structured and how it can be manipulated and found.
				• The use of SQL to search for data, in order to accurately search for and find specific data within a database using SQL commands:
				  • SELECT
				  • FROM
				  • WHERE

Golden Knowledge				This is the first time students will have used SQL.
What pupils should already know (prior learning components)	Students have covered elements of Python Programming in Year 8 and 9, so should have some initial knowledge and understanding of Python programming language.	In key stage 3, students will have briefly looked at computational thinking as part of programming.	In key stage 3 students have learnt about a number of these areas, including environmental issues, copyright and computer misuse.	This is the first time students will have used SQL.
Transferrable knowledge (skills)	Their ability to design, write, test and refine high-level, text-based programming language programs, in order to undertake a programming task during the course of their study. They must also be able to use these skills during the exam to design, write, test and refine algorithms written in pseudocode, flow diagrams and high-level programming language. **Programming fundamentals:** • The use of variables, constants, operators, inputs, outputs and assignments. • The use of the programming constructs used to control the flow of a program • The common arithmetic operators • The common Boolean operators AND, OR and NOT • The use of data types (Integer, Real, Boolean, Character and string, Casting) • The use of basic string manipulation. • The use of basic file handling operations (Open, Read, Write, Close) • The use of arrays (or equivalent) when solving problems, including both one-dimensional and two-dimensional arrays. • How to use sub programs (functions and procedures) to produce structured code. • Random number generation **Defensive design** • Considerations (Anticipating misuse, Authentication, Input validation) **Maintainability:** • Use of sub programs • Naming conventions • Indentation • Commenting **Testing** • Identify syntax and logic errors IDEs and Facilities of Language •	Understanding of the principles of computational thinking and how they are used to define and refine problems. Students must be able to produce simple diagrams to show the structure of a problem, subsections and their links to other subsections, complete, write or refine an algorithm using the techniques listed, identify syntax/logic errors in code and suggest fixes, create and use trace tables to follow an algorithm. When searching and sorting, students must be able to understand the main steps of each algorithm, understand any pre-requisites of an algorithm, apply the algorithm to a data set and identify an algorithm if given the code for it	Students must be able to discuss the impact of technology based around the issues and understand the purpose of each piece of legislation and the specific actions it allows or prohibits. They must also be able to discuss and recommend different licences for software based around a given scenario.	Select Query Language (SQL), Select, From, Where, Order by, ASC, DEC, Table, Record, Field, Key field, *, Like “”
Key vocabulary pupil will know and learn	Python, Programming, syntax, variables, constants, operators, inputs, output, assignments, Sequence, Selection, Iteration, operators, data types, string, integer, float, Boolean, array, sub, syntax error, logic errors		Ethical, Digital divide, Genetic screening, Whistleblowers, Drones, Self-driving cars, Legal, Cultural, Anonimity issues, Use of social media, Health issues arising, Citizen journalism, Making popular videos, Environmental E-waste, Sustainability, Recycling, Energy, Earth monitoring, The stakeholders, Privacy, DNA profiling, National ID cards, CCTV, Electronic tracking, Earth monitoring, Personal data, Stakholder perspective, legislation, Data Protection Act 2018, Computer Misuse Act 1990, Copyright Designs and Patents Act 1988, Software licence, open source, proprietary.	Starter and plenary mini assessments End of unit tests (40mins at the end of each unit) Use of online assessments (forms, Kahoot, quizizz) Content covered is used within the PPG assessments in the form of an exam style paper using past exam questions from the exam board.

Assessment activities	Starter and plenary mini assessments
	Python Challenge activities.
	Programming assignment (old spec scenarios)
	Use of online assessments (forms, Kahoot, quizizz)
	Content covered is used within the PPG assessments in the form of an exam style paper using past exam questions from the exam board.
		Starter and plenary mini assessments
		End of unit tests (40mins at the end of each unit)
		Use of online assessments (forms, Kahoot, quizizz)
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			Starter and plenary mini assessments
			End of unit tests (40mins at the end of each unit)
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			Content covered is used within the PPG assessments in the form of an exam style paper using past exam questions from the exam board.
				• Lesson Resources: I:\Maths and Computing\ICT\OCR Computer Science
				• SOW: I:\Maths and Computing\ICT\Curriculum
				• CGP Revision Guide - 178908556X
				• Online:
				  ○ BBC Bitesize
				  ▪ Programming techniques
				  ○ Teach-ICT.com
				  ▪ SQL and Databases

Resources available	• Lesson Resources: I:\Maths and Computing\ICT\OCR Computer Science • SOW: I:\Maths and Computing\ICT\Curriculum • CGP Revision Guide - 178908556X • Online: ○ BBC Bitesize	Content covered from all unit 1 content is used within the Year 11 Mock assessment in the form of an exam style paper using past exam paper from the exam board. • Lesson Resources: I:\Maths and Computing\ICT\OCR Computer Science • SOW: I:\Maths and Computing\ICT\Curriculum • CGP Revision Guide - 178908556X	• Lesson Resources: I:\Maths and Computing\ICT\OCR Computer Science • SOW: I:\Maths and Computing\ICT\Curriculum • CGP Revision Guide - 178908556X • Online:	• Structured Query Language, known as SQL or simply “sequel”, is essentially a language that communicates through databases. If you want to pull, add, delete or edit information on a database, then SQL is the most powerful tool to use and the cornerstone of pretty much every modern business.

	▪ Programming constructs ▪ Programming techniques ▪ Producing robust programs ○ Teach-ICT.com ▪ Variables and others ▪ Arrays ▪ Sequence, Selection, Iteration ▪ Data types ▪ String manipulation ▪ File handling ▪ SQL ▪ Functions and subroutines ▪ Random numbers ▪ Defensive design ▪ Maintainable code ▪ Spotting errors	• Online: ○ BBC Bitesize – Systems Software ○ Teach-ICT.com	○ BBC Bitesize – Ethical, legal, cultural and environmental concerns ○ Teach-ICT.com ▪ Ethical ▪ Environmental ▪ Privacy ▪ Cultural • Legislation	
Notes **Why this topic is important…**	Computer programming has become a sought-after skill even for positions that aren't involved directly in computer science. Those who can talk to machines—even just a little—will find their resumes stand out in the job field, like language skills or communication skills. Students entering a job field will find computer programming skills necessary to maintain and troubleshoot these automation tools. Computer programming ensures that students have access to the creative, fast-paced world that relies on machine connections. Students can apply these skills to many different industries and disciplines.	Computational thinking runs through every aspect and function of a modern business. It has become more crucial in the 21st century workplace where so much is now data-driven - analysing consumer behaviour, the movement in financial markets and the performance of public services, like health or policing, are just a few job roles that require individuals to be able to think through problems in a way that a computer could understand.	The use of computers has brought about ethical, legal and environmental impacts. These issues increasingly affect people's daily lives. Ethics are moral principles, or rules, which govern a person's attitudes and behaviour, Environmental concerns are those where the manufacturing and use of computers has had a negative impact on the environment, and legislation is in place to protect those who create programs and misuse computer systems. Understanding these issues is fundamental to technology development and use today.	