

**GCSE Computer Science Paper 1 Curriculum intent**

Provide students with the opportunity to develop a broad knowledge and understanding of the inner workings of a computer. Students will also develop an understanding of the social, ethical, legal, and environmental impacts of using computer systems.

GCSE Computer Science Paper 1 Curriculum Overview

Topic 1	Topic 2	Topic 3	Topic 4	Topic 5
Computational Thinking	Data	Computers	Networks	Issues and Impacts
Key Question				
How does a computer think and solve problems?	How can a computer represent data and with only operate in 2 conditions on and off?	How does a computer effectively transfer data?	What is the best way to set up a network for a business and how can you keep it safe?	What are the legal, ethical and environmental impacts of computers within society?
Key Vocabulary				
1. Abstraction 2. Decomposition 3. Sub-program 4. Trace Table 5. Function 6. Error	1. Binary 2. Hexadecimal 3. Two's Complement 4. Bitmap 5. Analogue Sound 6. Digital Sound	1. CPU 2. Main Memory 3. Secondary Storage 4. Operating System 5. Utility Software 6. Translator	1. LAN 2. WAN 3. IP address 4. Protocols 5. TCP/IP Model 6. Network Security	1. Environmental Issues 2. Ownership 3. Data Protection Act 4. Algorithmic Bias 5. Artificial Intelligence 6. Malware

	The knowledge you will need to recall:	How you will apply this knowledge:	This links to:
1	- There are four key components of computational thinking being decomposition, abstraction, pattern recognition and algorithms. - Understand the importance and uses for all arithmetic, logical and relational operators and how to use and identify them. - Identifying the types of errors that can happen within a programme and how to identify them. - The use of truth tables to record the outcomes of a logical operation.	- The key components of computation thinking will be used to apply to long answer questions around each component. - You will be given snippets of code to analyse and be able to identify all the key features of programming. - You will use your knowledge of all types of operators to improve and dissect pieces of code. - You will use truth tables to record every possible outcomes of a logical operation along to solve problems.	Year 7 topic 3 introduces the concepts to the students. GCSE Computer Science Paper 2 uses the same concepts but applies them to practical programming to solve problems. BTEC Level 3 Computing continues to expand the knowledge of the key concepts in more detail.
2	- Understand the concept of binary and how convert between denary and binary numbers as well as other binary concepts (two's complement, shifts, hexadecimal and addition). - how different types of data are represented inside of a computer system. - Data storage units and compression of data within a computer.	- You will use the concept of binary conversions to convert between binary/denary/hexadecimal/ASCII values. - You will complete binary addition questions for both 4-bit and 8-bit values and be able to identify which equations result in an overflow - You will explain and visualise how images and sounds are stored on a computing system and what factors can affect them. - You will learn how to convert between the different data storage units for the requirement of a question.	Year 8 topic 3 introduces the concept of binary and how to use bit value tables to convert between binary and denary. Year 8 topic 4 introduces the concept of binary addition and the overflow concept if the binary addition exceeds the number of available bits. It also covers the hexadecimal topic and how to convert from binary or denary to hexadecimal.
3	- Understand the hardware that is inside of a computer systems and how they all communicate and work together to process information using the von Neumann stored programme concept.. - Understand the software that is used on a computer system including the purpose of an operating system and the functionality of utility software.	- You will be able to explain in detail how a computer systems processes data as well as being able to identify the missing parts of a system in a diagram. - You will be able to complete questions surrounding the function of each component and what role it plays in the overall process of information. - You will be able to explain in detail the purpose and function of operating systems. You will explain in detail the functionality of all 5 key utility software's and their role inside of a computer to improve functionality.	In Year 7 the basics hardware and software components of a computer system are introduced and developed a basic knowledge of their function.
4	- Understand how networks are set up and the differences between network selection. Including all the Protocols and factors that affect a network. - Understand the importance of network security and methods of preventing/protecting networks.	- You will be able to identify and complete diagrams of different network topologies and explain components that are unique to their functionality. - You will be able to explain the role of the TCIP/IP stack and all of the protocols that are used inside of each layer for it to function correctly. - You will identify vulnerabilities within a network and explain what types of malware could attack the system.	Year 7 topic 2 covers the basics of protocols and how networks are set up within an organisation or home.
5	- Understand environmental issues associated with the use of digital devices. - Understand the ethical and legal issues associated with the use of AI, machine learning and robotics. Also, the storage and use of personal data - Understand the threats to digital systems and how their flaws are exploited.	- You will explain the environmental damage the manufacture, use and disposal of digital technologies have on the environment. - You will be able to analyse legal and ethical issues, the use of different digital devices have on individuals, organisations and society. - You will understand the threats to modern digital systems and what damage could be caused from a data breach.	Year 7 topic 4 looks at the range of malware and social engineering techniques that can be used to disrupt a system.

**GCSE Computer Science Paper 2 Curriculum intent**

Provide students with the skills to be able to define, analyse, solve and document problems. Students will be taught the Python programming language and learn to apply their knowledge to solve a variety of problems using it.

GCSE Computer Science Paper 2 Curriculum Overview

Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6
Computational Thinking	Basic Programming Constructs	Data Structures	Computer Graphics using Turtle	Using Files	Solving Problems
Key Question					
How can we analyse problems and design computer-based solutions?	What are the fundamental building blocks of computer code and how can these be put together to create programs?	How does a computer store, search and sort data? How can we do this using Python?	How are images created on a computer screen and how can we use the Turtle library to draw in Python?	How does a computer store and load information on a more long-term basis and how can we make use of this in Python?	How do we use the skills we have acquired to create solutions to problems?
Key Vocabulary					
1. Abstraction 2. Decomposition 3. Pattern Recognition 4. Algorithm 5. Flowchart 6. Trace Table	1. Program 2. Operator 3. Sequence 4. Selection 5. Repetition 6. Iteration	1. List 2. Array 3. Record 4. Search 5. Sort 6. Sub-Program	1. Pixel 2. Vector 3. Canvas 4. Coordinates 5. Heading 6. Layer	1. File 2. Open 3. Close 4. Read 5. Write Append	1. Input 2. Output 3. Process 4. Validation 5. Verification 6. Efficiency

	The knowledge you will need to recall:	How you will apply this knowledge:	This links to:
1	- There are four component parts to computational thinking, these are decomposition, abstraction, pattern recognition and algorithms. - Flowcharts are graphical representations of computer algorithms used for designing solutions to computational problems. - Trace-tables are a method for testing and debugging computer code.	- You will use the computational thinking skills to analyse a series of problems and design grammatical solutions to them. - You will complete, debug and create flowchart diagrams. You will also decipher flowcharts and create computer code that implements the algorithm described by them. - You will use trace tables to compute the state of variables during the execution of computer programs and use this information to debug and test those programs.	Year 7 topic 3 computational thinking introduces these ideas by looking at the four cornerstones of computational thinking: decomposition; pattern recognition; abstraction and algorithms. Topic 1 GCSE Paper 1 also introduces the core computational thinking skills. Further study at A-level or Level 3 will build upon your computational thinking skills further with more complex scenarios.
2	- Computer programs are made up of combinations of key programming constructs that are arranged in a particular sequence. - Computer programs make use of selection to be able to react to changes in variables and produce different outputs based on inputs. - Repetition and iteration are used to allow code to repeat itself.	- You will use the key programming constructs to create programmed solutions to a series of problems. - You will design and create programs that can handle multiple different types of input, process it and create suitably formatted output. - You will use selection to create programs with multiple different paths of execution, which they will use to “make decisions”. - You will use repetition to build code that can repeat itself or parts of itself. This will help you to create more powerful programs.	Year 7 topic 6 introduces the basic ideas of programming and the key programming constructs. Year 9 topic 2 introduces the Python programming language and these concepts are put into practice. Further study at A-level or Level 3 will build upon your programming and problem-solving skills.
3	- While they are running, computer programs store information in the form of variables. Greater amounts of information can be stored with the use of data structures. - Lists, Arrays and Records and all types of data structure that Python can use to store data. - Data structures can be searched using linear and binary searches. - Data structures can be sorted using bubble, insertion and merge sorts. - Sub-programs are one way of decomposing a program into smaller, re-usable parts.	- You will learn to use variables, lists, arrays and records to store information within the programs that you write. - You will learn to create, debug and modify the two most common search algorithms – the binary search and linear search. You will use these to search through sets of data structures. - You will learn to create, debug and modify the three most common sort algorithms – the bubble sort, the insertion sort and the merge sort. You will use these to sort sets of data structures. - You will learn to make effective use of sub-programs to create more advanced, decomposed and re-usable Python programs.	Year 7 topic 5 introduces the concept of big data and data structures using Spreadsheets. Year 9 topic 2 and year 9 topic 3 introduce the concepts of data structures and key algorithms. Further study at A-level and Level 3 increases your knowledge of Data structures and algorithms as more complex examples are considered.
4	- Images on a computer screen are made up of a grid of pixels. The Python Turtle library can be used to draw images using Python code. - Bitmap graphics are made up by specifying the colour of each pixel on a canvas whereas vector graphics are made up of points and vectors.	- You will learn to use the core tools of the Python Turtle library to create and manipulate graphics on the computer screen. - You will re-cap core computational thinking skills from topics 1, 2 and 3 and apply those skills and your knowledge to new, graphics-based, situations.	Year 8 topic 1 introduces the fundamental concepts of computer graphics, these are built upon in year 9 topic 1. Year 9 topic 3 then introduces the Python Turtle library, allowing images to be created with python code.
5	- For long-term storage, data is held in files such as Comma-Separated Value (CSV) files and Text (txt) files. - Python can open these files to read the data in them or to write and append new data to them.	- You will learn how to use Python to read (load) data from pre-saved CSV and Text files and integrate that data into the computer programs that you write. - You will learn how to use Python to write (save) data to CSV and Text files and how to correctly format the output of your computer programs so that it is suitable to write to files.	Year 7 topic 2 introduces the concepts of storing and transmitting data through files and over networks. Year 8 topic 3 gives insight into how data is stored within computer systems.
6	- Computer systems are made up of inputs, processes and outputs. - There are many ways to create programs using Python, each with their own efficiencies, strengths and weaknesses. - Solutions should be carefully designed, documented and tested. - The skills you have learned and practiced in the other topics can be brought together to be used in solving larger problems like those you will have to solve in the exam.	- You will learn how to combine all of the programming skills you have mastered to be able to analyse, design and implement grammatical solutions to complex problems. - You will learn to create elegant and efficient programs. - You will learn how to properly validate and verify that the programs you create are working correctly, as expected, and meet the requirements laid out in the problem. - You will learn how to properly and confidently tackle the questions posed in the final programming exam.	Every logical thinking, computer theory, project-based learning and programming module has led to this point. This is where you will be able to use your broad knowledge of computing to solve a wide array of problems. A-level or Level 3 study builds your knowledge and skillset further using more complex programming constructs.