

Toynbee Curriculum

KS4 Topic Summaries

COMPUTER SCIENCE

Personal Best

Toynbee School



Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

The main focus of the first three lessons of this unit is searching and sorting algorithms, though other topics are covered, such as computational thinking, flow charts, and tracing algorithms. Lessons 4 to 10 of the unit is on searching and sorting algorithms, though other topics are covered such as computational thinking, flowcharts and tracing algorithms. Learners will have opportunities to analyse, interpret, modify, and implement a range of algorithms.

Links:

GCSE Computing Topic 1

Lesson Sequence:

Lesson 1 Computational Thinking: Learners are introduced to three computational thinking techniques: decomposition, abstraction, and algorithmic thinking.

Lesson 2 Representing algorithms: The focus of this lesson is developing flow charts to illustrate algorithms.

Lesson 3 Tracing algorithms: The focus of this lesson is mainly on using a trace table to understand how the algorithm works. Learners will use trace tables for in the coding, searching, and sorting algorithms. They will also revisit flowcharts from the previous lesson.

Lesson 4 Linear search: Learners are introduced to one of the two searching algorithms they need to know about: linear search. They will go over the steps of carrying out a linear search and perform a linear search in real life and with a sample of data.

Lesson 5 Binary search: Learners are introduced to binary search, the second and final searching algorithm they need to know about. They will go over the steps of carrying out a binary search and perform a binary search with playing cards and with a sample of data.

Lesson 6 Comparing searching algorithms: Learners will compare the features of linear search and binary search and the suitability of each algorithm in different contexts. This lessons acts as a revision lesson for the two sorting algorithms from Lessons 4 & 5.

Lesson 7 Bubble sort: This lesson introduces learners to the first sorting algorithm in this unit: bubble sort. They will discuss why and where sorting is used in real life, become familiar with performing a bubble sort on a set of data, and investigate the efficiency of bubble sort.

Lesson 8: Insertion sort: Learners will explore another sorting algorithm: insertion sort and compare the efficiency to bubble sorts.

Lesson 9 Coding sorting algorithms: Learners will analyse and evaluate code for bubble sort and insertion sort in Python, as well as comparing different implementations of the bubble sort algorithm.

Lesson 10 Merge sort: Learners will explore the final sorting algorithm in this unit: merge sort. They will start by considering how they might go about combining two groups of sorted items into one sorted group. They will then compare the efficiency to Bubble and Insertion sort.

This unit

National curriculum links

Develop their capability, creativity, and knowledge in computer science, digital media, and information technology

Develop and apply their analytic, problem-solving, design, and computational thinking skills

Sequence of Lessons:

1	1.1 Computational Thinking
2	1.2 Representing Algorithms
3	1.3 Tracing Algorithms
4	1.4 Linear Search
5	1.5 Binary Search
6	1.6 Compare Searching
7	1.7 Bubble Sort
8	1.8 Insertion Sort
9	1.9 Coding Sorts
10	1.10 Merge Sort

Topic Resources:

Knowledge Map:	Computational Thinking 1-3	Any other Resources:	
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Assessment:

Knowledge:	2 Assessments (1 after lesson 3 and 1 after lesson 10)
Application of Knowledge:	Mastery Books

Supportive Reading:

Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 2A Binary - YouTube
	GCSE (1CP2) EDEXCEL: Topic 2B Data representation & compression - YouTube
BBC Bitesize	Algorithms - Algorithms - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: 9781292374000: Books

Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

Data can be represented in many different forms. You can see this happening throughout time, for example, in the use of cave paintings and clay tablets, through to the use of Morse code. Data and instructions in a computer are formed using a series of 1s and 0s. In this unit, learners will discover how numbers, letters, images, and sound are represented with 1s and 0s. They will also learn about the factors that impact on the quality of those representations, such as bit depth. Finally, learners will be introduced to the concept of compression and discover how to perform run length encoding and Huffman coding as forms of lossless compression.

Links:

GCSE Computing Topic 2

Lesson Sequence:

Lesson 1 Number bases: Learners will discuss examples of representation from storytelling to clay etchings. They will then be introduced to how data is represented in computers.

Lesson 2 Binary addition: Learners will discover how to count in binary so that they can establish an understanding of the patterns that occur when numbers increase by 1 in binary.

Lesson 3 Binary shifts: Learners will be introduced to binary shifting that can be used for multiplication and division of binary numbers.

Lesson 4 Signed binary integers: Learners will be introduced to the concept of signed and unsigned integers. They will find out how to identify the least significant and most significant bits. They will learn how to identify a positive and negative integer using sign and magnitude. Finally, they will discover two's complement.

Lesson 5 Hexadecimal: Learners will be reminded about base 2 and base 10, then they will be introduced to hexadecimal, which is base 16. They will be shown methods for converting between base 2 and base 16.

Lesson 6 ASCII: Learners will be introduced to the ASCII character set. They will learn that it traditionally used 7 bits, but now uses 8 bits. They will calculate the maximum number of characters that can be represented using 7 bits, then they will be introduced to the ASCII table.

Lesson 7 Representing bitmap images: learners will investigate what a pixel is by looking at a pixelated image. They will then discover how colour depth and resolution are used to determine the number of available colours and the image size.

Lesson 8 Bitmap file size calculation: Learners will recap their understanding of bitmap images. They will then discover how to calculate the file size of a bitmap image using different examples.

Lesson 9 Representing sound: Through examples and demonstrations, learners will find out about the key terms: sampling, sample rate, and sample resolution.

Lesson 10 Sound file size calculation: Learners will recap their understanding of how sound is interpreted digitally. They will then learn how to calculate the file size of a sound file through demonstrations and examples

Lesson 11 Measurements of storage: Learners will already be familiar with the terms 'bit', 'nibble', and 'byte'. They will now learn about other types of storage capacity, and they will practise converting between units of measurement.

Lesson 12 Lossy and lossless compression: Learners will be introduced to the concept of data compression and learn about why it is needed, and that it comes in different forms. They will be introduced to the terms 'lossy' and 'lossless'.

National curriculum links

Develop their capability, creativity and knowledge in computer science, digital media and information technology

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Sequence of Lessons:		Topic Resources:		
1	Storage Units & Binary numbers	Knowledge Map:	Data Representations	Any other Resources:
2	Binary Arithmetic		Data-Images-Sound-Compression	
3	Binary Shifts	Assessment:		
4	2's Complement	Knowledge:	Interim assessment after lesson 5 Full assessment after lesson 12	
5	Hexadecimal	Application of Knowledge:	Mastery Book	
6	ASCII	Supportive Reading:		
7	Representing bitmap images	Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 2A Binary – YouTube	
8	Bitmap file size calculation		GCSE (1CP2) EDEXCEL: Topic 2B Data representation & compression - YouTube	
9	Representing sound	BBC Bite Size	Units - Data - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize	
10	Sound file size calculation			
11	Measurements of storage	Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: 9781292374000:	
12	Compression			

Scheme of Learning: GCSE Computing

Topic Sequence:

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Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

In this unit, learners will gain an understanding and knowledge of how computer systems work. Starting with the building blocks of the microprocessor — logic gates — learners will discover how a computer system works and executes instructions.

Links:

GCSE Computing Topic 3

Lesson Sequence:

Lesson 1 Computer systems and system software: It will introduce learners to the two types of computer systems: general purpose and embedded systems. They will explore the characteristics of these systems and will learn how to identify embedded systems through practical activities.

Lesson 2 Introduction to the CPU: In this lesson the learners are introduced to the CPU and von Neumann architecture. They will learn about the individual components of the CPU and their roles in computation.

Lesson 3 The FDE cycle: In this lesson, the learners' knowledge about the components that make up the CPU and main memory will be furthered with the introduction of the fetch-decode-execute cycle (FDE).

Lesson 4 Main memory: In this lesson learners will be introduced to main memory, RAM and ROM, as well as cache. This lesson builds on the core knowledge from the previous lesson about CPU components.

Lesson 5 Secondary storage: Learners will be introduced to secondary storage and take an in-depth look at solid-state storage. They will discover the need for secondary storage, through assessing the devices they have learnt about already.

Lesson 6 Optical and magnetic storage: This lesson builds on from the first secondary storage lesson; it involves exploring optical and magnetic storage devices. Learners will need to be aware of how each type of storage operates, and to explain how data is written and read from each device.

Lesson 7 Selecting a storage device: This is the last of three lessons on secondary storage. The previous two lessons have equipped the learners with the knowledge they need to systematically select and justify a device for a given use.

Lesson 8 Computer specifications: This lesson will teach your learners how to evaluate a computer based on its specifications. They will discover the factors that limit a CPU's performance: clock speed, cache, and the number of cores. Learners will then use a computer component website to build computer systems of their own.

Lesson 9 Logic gates: In this lesson, learners will discover logic gates — the building blocks of processors at the heart of a computer system. Through the activities they will build an understanding of how logic gates are used to address real-world problems.

Lesson 10 Logic problems: In this lesson, learners will be introduced to the concept of three-input logic problems, and will be taught how to construct a three-input logic diagram, truth table, and expression

National curriculum links

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Sequence of Lessons:

1	Computer systems and system software
2	Introduction to the CPU
3	The FDE cycle
4	Main memory
5	Secondary storage
6	Optical and magnetic storage
7	Selecting a storage device
8	Computer specifications
9	Logic Gates
10	Logic Gate Problems

Topic Resources:

Knowledge Map:	Computer Systems	Any other Resources:	
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Assessment:

Knowledge:	Interim assessment after lesson 3 Full assessment after lesson 10
Application of Knowledge:	Mastery Book

Supportive Reading:

Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 3A Hardware – YouTube
	GCSE (1CP2) EDEXCEL: Topic 3B Software & programming languages - YouTube
BBC Bite Size	General purpose computers - Computers - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia:

Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

Computer networks have become an integral part of our daily lives. This unit allows learners to explore how a computer network works from the hardware required to the protocols used for communication

Links:

GCSE Computing Topic 4 - Networks

Lesson Sequence:

Lesson 1 LANs and WANs: Learners will give reasons why computers are connected on a network and be able to differentiate between a LAN and a WAN. Learners will also be able to explain why protocols are needed on a network and describe the purpose of an IP address.

Lesson 2 Network Speed: Learners will define the meanings of the terms 'bandwidth' and 'latency' and explain how bandwidth and latency affect the performance of a network. Learners will use bits per second (bps) to describe network speed.

Lesson 3 Connectivity: Learners will differentiate between wired and wireless connectivity and be able to explain how data are transmitted along copper and fibre-optic cables.

Lesson 4 Wired v Wireless: Learners will describe how devices are connected on a wireless network and will learn how to compare the performance of wired and wireless LANs and give examples of situations where one is preferable to the other.

Lesson 5 Network topologies: Learners will define the term 'topology' and they will describe the characteristics of bus, star and mesh network topologies.

Lesson 6 Malware & anti-malware: Learners will define what is meant by the term 'cyberattack'. They will also be able to describe the financial, reputational and legal damage that a cyberattack can cause. Learners will investigate the characteristics of and threat posed by different types of malware.

Lesson 7 Hackers: Learners will learn why unpatched software is a target for hackers and investigate the function of a firewall. Learners will also be able to explain how ethical hacking and penetration testing help identify vulnerabilities

Lesson 8 Social engineering: Learners will be able to define what is meant by the term 'social engineering' and describe commonly used social engineering tactics (phishing, pretexting, baiting, quid pro quo) used by hackers.

Lesson 9 Data-level protection: Learners can explain how data are protected by encryption and describe how backup and recovery procedures protect against data loss. They will also be able explain how access control helps to protect systems and data.

Lesson 10 Robust software: Learners will learn how a hacker can exploit a code vulnerability and they will be able to describe examples of bad coding practices and secure coding practices.

National curriculum links

Develop their capability, creativity and knowledge in computer science, digital media and information technology

Develop and apply their analytic, problem-solving, design, and computational thinking skills

Sequence of Lessons:

1	LANs and WANS
2	Network Speed
3	Connectivity
4	Wired v. wireless
5	Network topologies
6	Malware & anti-malware
7	Hackers
8	Social engineering
9	Data level protection
10	Robust software

Topic Resources:

Knowledge Map:	Computer Networks Security Protocols Cyber Security	Any other Resources:	
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Assessment:

Knowledge:	Interim assessment after lesson 5 Full assessment after lesson 10
Application of Knowledge:	Mastery Book

Supportive Reading:

Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 4 Networks & network security - YouTube
BBC Bite Size	Networks - Networks - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: 9781292374099: Book

Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

This unit has been designed to enable students to gain knowledge and understanding of the impact of technology on individuals, organisations, and the planet. Through a range of real-world examples, they will learn how to identify the specific type of impact, ie legal, cultural, privacy, environmental, and ethical. They will then progress to identifying stakeholders who are impacted by technology, and learn how these impacts are experienced, negated, or adapted to.

Links:

GCSE Computing Topic 5 – Ethical Issues

Lesson Sequence:

Lesson 1 How does technology impact us?: This lesson gives you time to introduce the subject of the impact of technology to learners. They will learn the significance of the five broad areas of impact, ie law, environment, culture, ethics, and privacy.

Lesson 2 The law, data protection, and copyright: This lesson will further emphasise the different categories of impact. It will enable learners to further exercise their knowledge about data protection and clarify the definition of the word 'stakeholder'.

Lesson 3 The FIA and the CMA: In this lesson, learners will review the plenary mini quiz about the Data Protection Act and copyright from Lesson 2. In addition, they will be introduced to the Freedom of Information Act and given the opportunity to experience genuine examples. Finally, they will learn about the Computer Misuse Act and categorise case studies by the different levels of offence.

Lesson 4 Cultural impacts: In this lesson, learners will understand what the term 'cultural impact' means. They will learn about downtime and its effect on businesses and individuals. In addition, they will closely examine the concept of 'digital divide' and work through examples of its impact.

Lesson 5 Environmental impact: In this lesson, learners will review the cultural impact of globalisation, which will build on concepts that they started to explore in Lesson 4. In addition, they will discover the reality of technology's impact on the environment.

Lesson 6 Ethical impact: In this lesson, learners will review what the word 'ethical' means generally. They will then be introduced to the main ethical impacts of technology, and engage in activities to help them become more aware of how important acting ethically is.

Sequence of Lessons:

1	How Does Technology impact us?
2	The Law, Data Protection & Copyright
3	Freedom of Info and Computer Misuse
4	Cultural Impacts
5	Environmental Impacts
6	Ethical Impacts

Topic Resources:

Knowledge Map:	Ethical Issues	Any other Resources:	
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Assessment:

Knowledge:	Assessment after lesson 6
Application of Knowledge:	Mastery Book

Supportive Reading:

Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 5 Issues & impact - YouTube
BBC Bite Size	Environmental issues - Environmental, ethical and legal concerns - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: 9781292374000: Book

Scheme of Learning: Year 10 Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

This extensive programming unit takes learners from being complete novices to having the confidence to tackle any GCSE-level programming challenge. Essential programming theory is also interleaved into the practical elements of programming to provide tangible links between required knowledge and skills. The latest pedagogical research has been used to ensure that learners are appropriately scaffolded and challenged as they move through the lessons.

Links:

GCSE Computing Topic 6 - Programming

Lesson Sequence:

Lesson 1 Translators: In this lesson, learners will be introduced to the notion that humans interpret instructions differently to computers. This is to help them understand that computers need clear and precise instructions in order to perform the expected task.

Lesson 2 Sequence: In this lesson, learners will be introduced to Thonny. They will learn about the function of an IDE and why programmers use these to write programs. Learners will be given some simple code to predict, run, investigate, and modify

Lesson 3 Variables: Learners will find out about variables during this lesson. They will learn about the purpose of variables, but also the technical aspects of creating variables to a uniform standard.

Lesson 4 Input: During this lesson learners will start to add interactivity to their programs by introducing the input() function. Learners will be given a demonstration of how input() is used in Python and then asked to add this feature in their silly stories that were created last lesson.

Lesson 5 Randomisation: . In this lesson, learners will be introduced to the concept of random numbers using Python documentation. Learners will determine what the random module is capable of, and how random numbers can be generated in Python.

Lesson 6 Arithmetic Expressions: This lesson has been designed to ensure that learners understand the rules of operator precedence when evaluating arithmetic expressions. They will be reminded of BIDMAS, before investigating code that uses various arithmetic expressions.

Lesson 7 Selection: This lesson moves learners on to the next big programming construct: selection. They will be introduced to it initially through a flowchart that demonstrates how a condition can be used to control the flow of execution in a program. They will then learn about definitions for logical expressions and conditions.

Lesson 8 Selection Challenge: This lesson is an extension of Lesson 8, in which learners completed a PRIMM activity that introduced them to selection.

Lesson 9 Logical Expressions: This lesson will deepen learners' understanding of logical expressions by introducing the operators AND and OR.

Lesson 10 Nested Selection: This lesson introduces learners to the concept of nesting if statements. Learners will walk through some basic nested statements to check their understanding.

Lesson 11 While loops: This lesson allows learners to find out about using iteration in their programs. It will define iteration, give a code walkthrough of a while loop, and then use a 'guess the number' game as a practical example for using iteration.

Lesson 12 Trace Tables: This lesson has been designed to deepen learners' understanding of a while loop whilst introducing trace tables. Trace tables are a valuable part of programming because they allow learners to walk through code and detect errors.

Lesson 13 For Loops: This lesson is designed to introduce learners to the concept of a for loop. They will learn about the definition, and be shown how the range function can be used with a for loop

Lesson 14 Data Validation: Learners will spend this lesson finding out how to effectively add data validation techniques to their programs. They will learn why they are important, and how to incorporate them.

Lesson 15/16 Pseudocode: The next two lessons have been created to introduce learners to pseudocode, whilst giving them the opportunity to design a program. It has been designed over two lessons to give learners the time to get stuck into solving a problem

Sequence of Lessons:

1	6.1 Translators
2	6.2 Sequence
3	6.3 Variables
4	6.4 Input
5	6.5 Randomisation
6	6.6 Arithmetic Expressions
7	6.7 Selection
8	6.8 Selection Challenge
9	6.9 Logical Expressions
10	6.10 Nested Selection
11	6.11 While Loops
12	6.13 Trace Tables
13	6.13 For Loops
14	6.14 Data Validation
15/16	6.15/6.16 Pseudocode

Topic Resources:

Knowledge Map:	Programming	Any other Resources:	
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Assessment:

Knowledge:	Assessments after lessons: 4, 10 and 16
Application of Knowledge:	Mastery booklet Practical Programming Evidence

Supportive Reading:

Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 6A Developing code – YouTube GCSE (1CP2) EDEXCEL: Topic 6B Programming fundamentals - YouTube
BBC Bite Size	Programming constructs - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: 9781292374000: Books

Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

This extensive programming unit takes learners from being complete novices to having the confidence to tackle any GCSE-level programming challenge. Essential programming theory is also interleaved into the practical elements of programming to provide tangible links between required knowledge and skills. The latest pedagogical research has been used to ensure that learners are appropriately scaffolded and challenged as they move through the lessons.

Links:

GCSE Computing Topic 6 - Programming

Lesson Sequence:

Lesson 17 Subroutines: Learners will discover the advantages of using subroutines, and how they are used for decomposition. They will also modify a subroutine that uses parameters.

Lesson 18 Functions: During this lesson, learners will be introduced to functions. They have already used built-in functions when programming, but haven't actually written their own yet.

Lesson 19 Scope: Learners will be introduced to the concept of scope in this lesson. They will be briefed on the definitions, before being given example programs that show how local and global scope work in Python.

Lesson 20 Structured programming: This lesson introduces learners to the structured approach to programming. They will learn to describe structured programming through a series of exercises.

Lesson 21/22 Create a Program: This lesson begins with an exploration of the different ways to test programs, followed by a few example tests to complete. Learners will be introduced to their project, which will be used to check their understanding of all the concepts covered up to this point.

Lesson 23 GUI's: This lesson provides learners with a tour of the world of GUIs (graphical user interfaces). It uses the third-party module `guizero` to create GUI apps.

Lessons 24/25/26 String Handling: This lesson introduces learners to a number of string-handling techniques.

Lesson 27 Lists: This lesson introduces learners to the data structures: arrays and lists. It defines them, and explains the differences between the two. It then moves on to focus on lists in Python.

Lesson 28 List Methods: This lesson introduces learners to the many other list methods that can be used in programming. These were briefly introduced at the end of the last lesson.

Lesson 29 2d Lists: Learners are introduced to two-dimensional arrays and lists during this lesson. They will be defined, and then learners will be shown how to access lists and single items in those lists, before they complete an activity to practise these skills

Lesson 30/31 2d List Challenge: This lesson begins with reminding learners about iterative and final testing. Learners are then introduced to their challenge, which is to create a noughts and crosses game

Sequence of Lessons:		Topic Resources:			
17	6.17 Subroutines	Knowledge Map:	Programming	Any other Resources:	
18	6.18 Functions				
16	6.19 Scope	Assessment:			
20	6.20 Structured Programming	Knowledge:	Assessments after Lesson 26 and Lesson 31		
21/22	6.21/6.22 Create a Program	Application of Knowledge:	Lessons 21/22 Create a program Lesson 30/31 2d List Challenge Mastery Book		
23	6.23 GUIs	Supportive Reading:			
24/25/26	6.24 / 6.25 / 6.26 String Handling	Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 6A Developing code – YouTube GCSE (1CP2) EDEXCEL: Topic 6B Programming fundamentals - YouTube		
27	6.27 Lists		BBC Bite Size	Programming constructs - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize	
28	6.28 List Methods	Revision Guide		Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia:	
29	6.29 2d Lists				
30/31	6.30/6.31 2d List Challenge				

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Topic Overview:

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Links:

GCSE Computing Topic 6 - Programming

Lesson Sequence:

Lesson 32 Records and dictionaries : This lesson introduces learners to two new data structures. A record and a dictionary. The focus of this lesson is on records and how these can be created and used in Python to form a database.

Lesson 33 Dictionary challenge: This lesson gives learners the opportunity to use a dictionary data structure in a new context. Learners will create a Caesar cipher encryption program using a dictionary as the cipher wheel.

Lesson 34/35 Test Files: Learners will be introduced to text files in this lesson. The focus will be on reading text files, and how the data from a text file can be used within a program. This lesson continues the exploration of text files with the addition of writing and appending to files.

Lesson 36 CSV Files: Learners are already familiar with text files and how to read the data from them. A CSV file is still a text file and you can use the same methods and modes that you can with a standard file.

Lesson 37 Write to a CSV: Building on from the last three lessons, learners will discover how to write to CSV files. They work with 1D and 2D lists, before converting them to string and writing them to CSV files.

Lesson 38 Being a Programmer: Learners will discuss the good habits of a programmer before being reminded of why some of the key aspects are good habits.

Lesson 39 Turtle Introduction: Learners re-visit how to decompose a problem and learn how to use turtle graphics to draw lines and basic shapes

Lesson 40 Turtle Lesson 2: Learners revisit how to incorporate selection, repetition, and iteration into turtle graphics and revise how to use subprograms

Lesson 41: Turtle Lesson 3: Learners will use turtle pens of different colours and sizes to create more complex patterns. They will also use turtle to fill in closed shapes

Lesson 42 Turtle Lesson 4: Learners will combine subprograms to produce different turtle generated graphic images

Lesson 43: Turtle Lesson 5: Learners will be given a problem that they will decompose into smaller parts and then combine subprograms to create a solution

Sequence of Lessons:		Topic Resources:	
32	6.32 Records and Dictionaries	Knowledge Map:	Programming
33	6.33 Dictionary Challenge		
34/35	6.34 / 6.35 Text Files	Assessment:	Any other Resources:
36	6.36 CSV files		
37	6.37 Write to CSV	Knowledge:	Assessment after Lesson 43
38	6.38 Being a Programmer	Application of Knowledge:	Evidence from classwork, Lesson 37 and Mastery book
39	6.39 Turtle Introduction	Supportive Reading:	
40	6.40 Turtle Lesson 2	Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 6A Developing code – YouTube
41	6.41 Turtle Lesson 3		GCSE (1CP2) EDEXCEL: Topic 6B Programming fundamentals - YouTube
42	6.42 Turtle Lesson 4	BBC Bite Size	Programming constructs - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
43	6.43 Turtle Lesson 5	Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia:

Scheme of Learning: GCSE Computing

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1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

The main focus of the first three lessons of this unit is searching and sorting algorithms, though other topics are covered, such as computational thinking, flow charts, and tracing algorithms. Lessons 4 to 10 of the unit is on searching and sorting algorithms, though other topics are covered such as computational thinking, flowcharts and tracing algorithms. Learners will have opportunities to analyse, interpret, modify, and implement a range of algorithms.

Links:

GCSE Computing Topic 1

Lesson Sequence:

Lesson 1 Computational Thinking: Learners are introduced to three computational thinking techniques: decomposition, abstraction, and algorithmic thinking.

Lesson 2 Representing algorithms: The focus of this lesson is developing flow charts to illustrate algorithms.

Lesson 3 Tracing algorithms: The focus of this lesson is mainly on using a trace table to understand how the algorithm works. Learners will use trace tables for in the coding, searching, and sorting algorithms. They will also revisit flowcharts from the previous lesson.

Lesson 4 Linear search: Learners are introduced to one of the two searching algorithms they need to know about: linear search. They will go over the steps of carrying out a linear search and perform a linear search in real life and with a sample of data.

Lesson 5 Binary search: Learners are introduced to binary search, the second and final searching algorithm they need to know about. They will go over the steps of carrying out a binary search and perform a binary search with playing cards and with a sample of data.

Lesson 6 Comparing searching algorithms: Learners will compare the features of linear search and binary search and the suitability of each algorithm in different contexts. This lessons acts as a revision lesson for the two sorting algorithms from Lessons 4 & 5.

Lesson 7 Bubble sort: This lesson introduces learners to the first sorting algorithm in this unit: bubble sort. They will discuss why and where sorting is used in real life, become familiar with performing a bubble sort on a set of data, and investigate the efficiency of bubble sort.

Lesson 8: Insertion sort: Learners will explore another sorting algorithm: insertion sort and compare the efficiency to bubble sorts.

Lesson 9 Coding sorting algorithms: Learners will analyse and evaluate code for bubble sort and insertion sort in Python, as well as comparing different implementations of the bubble sort algorithm.

Lesson 10 Merge sort: Learners will explore the final sorting algorithm in this unit: merge sort. They will start by considering how they might go about combining two groups of sorted items into one sorted group. They will then compare the efficiency to Bubble and Insertion sort.

This unit

National curriculum links

Develop their capability, creativity, and knowledge in computer science, digital media, and information technology

Develop and apply their analytic, problem-solving, design, and computational thinking skills

Sequence of Lessons:

1	1.1 Computational Thinking
2	1.2 Representing Algorithms
3	1.3 Tracing Algorithms
4	1.4 Linear Search
5	1.5 Binary Search
6	1.6 Compare Searching
7	1.7 Bubble Sort
8	1.8 Insertion Sort
9	1.9 Coding Sorts
10	1.10 Merge Sort

Topic Resources:

Knowledge Map:	Computational Thinking 1-3	Any other Resources:	
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Assessment:

Knowledge:	2 Assessments (1 after lesson 3 and 1 after lesson 10)
Application of Knowledge:	Mastery Books

Supportive Reading:

Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 2A Binary - YouTube
	GCSE (1CP2) EDEXCEL: Topic 2B Data representation & compression - YouTube
BBC Bitesize	Algorithms - Algorithms - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: 9781292374000: Books

Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

Data can be represented in many different forms. You can see this happening throughout time, for example, in the use of cave paintings and clay tablets, through to the use of Morse code. Data and instructions in a computer are formed using a series of 1s and 0s. In this unit, learners will discover how numbers, letters, images, and sound are represented with 1s and 0s. They will also learn about the factors that impact on the quality of those representations, such as bit depth. Finally, learners will be introduced to the concept of compression and discover how to perform run length encoding and Huffman coding as forms of lossless compression.

Links:

GCSE Computing Topic 2

Lesson Sequence:

Lesson 1 Number bases: Learners will discuss examples of representation from storytelling to clay etchings. They will then be introduced to how data is represented in computers.

Lesson 2 Binary addition: Learners will discover how to count in binary so that they can establish an understanding of the patterns that occur when numbers increase by 1 in binary.

Lesson 3 Binary shifts: Learners will be introduced to binary shifting that can be used for multiplication and division of binary numbers.

Lesson 4 Signed binary integers: Learners will be introduced to the concept of signed and unsigned integers. They will find out how to identify the least significant and most significant bits. They will learn how to identify a positive and negative integer using sign and magnitude. Finally, they will discover two's complement.

Lesson 5 Hexadecimal: Learners will be reminded about base 2 and base 10, then they will be introduced to hexadecimal, which is base 16. They will be shown methods for converting between base 2 and base 16.

Lesson 6 ASCII: Learners will be introduced to the ASCII character set. They will learn that it traditionally used 7 bits, but now uses 8 bits. They will calculate the maximum number of characters that can be represented using 7 bits, then they will be introduced to the ASCII table.

Lesson 7 Representing bitmap images: learners will investigate what a pixel is by looking at a pixelated image. They will then discover how colour depth and resolution are used to determine the number of available colours and the image size.

Lesson 8 Bitmap file size calculation: Learners will recap their understanding of bitmap images. They will then discover how to calculate the file size of a bitmap image using different examples.

Lesson 9 Representing sound: Through examples and demonstrations, learners will find out about the key terms: sampling, sample rate, and sample resolution.

Lesson 10 Sound file size calculation: Learners will recap their understanding of how sound is interpreted digitally. They will then learn how to calculate the file size of a sound file through demonstrations and examples

Lesson 11 Measurements of storage: Learners will already be familiar with the terms 'bit', 'nibble', and 'byte'. They will now learn about other types of storage capacity, and they will practise converting between units of measurement.

Lesson 12 Lossy and lossless compression: Learners will be introduced to the concept of data compression and learn about why it is needed, and that it comes in different forms. They will be introduced to the terms 'lossy' and 'lossless'.

National curriculum links

Develop their capability, creativity and knowledge in computer science, digital media and information technology

Develop and apply their analytic, problem-solving, design, and computational thinking skills

Sequence of Lessons:		Topic Resources:		
1	Storage Units & Binary numbers	Knowledge Map:	Data Representations	Any other Resources:
2	Binary Arithmetic		Data-Images-Sound-Compression	
3	Binary Shifts	Assessment:		
4	2's Complement	Knowledge:	Interim assessment after lesson 5 Full assessment after lesson 12	
5	Hexadecimal	Application of Knowledge:	Mastery Book	
6	ASCII	Supportive Reading:		
7	Representing bitmap images	Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 2A Binary – YouTube	
8	Bitmap file size calculation		GCSE (1CP2) EDEXCEL: Topic 2B Data representation & compression - YouTube	
9	Representing sound	BBC Bite Size	Units - Data - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize	
10	Sound file size calculation			
11	Measurements of storage	Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: 9781292374000:	
12	Compression			

Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

In this unit, learners will gain an understanding and knowledge of how computer systems work. Starting with the building blocks of the microprocessor — logic gates — learners will discover how a computer system works and executes instructions.

Links:

GCSE Computing Topic 3

Lesson Sequence:

Lesson 1 Computer systems and system software: It will introduce learners to the two types of computer systems: general purpose and embedded systems. They will explore the characteristics of these systems and will learn how to identify embedded systems through practical activities.

Lesson 2 Introduction to the CPU: In this lesson the learners are introduced to the CPU and von Neumann architecture. They will learn about the individual components of the CPU and their roles in computation.

Lesson 3 The FDE cycle: In this lesson, the learners' knowledge about the components that make up the CPU and main memory will be furthered with the introduction of the fetch-decode-execute cycle (FDE).

Lesson 4 Main memory: In this lesson learners will be introduced to main memory, RAM and ROM, as well as cache. This lesson builds on the core knowledge from the previous lesson about CPU components.

Lesson 5 Secondary storage: Learners will be introduced to secondary storage and take an in-depth look at solid-state storage. They will discover the need for secondary storage, through assessing the devices they have learnt about already.

Lesson 6 Optical and magnetic storage: This lesson builds on from the first secondary storage lesson; it involves exploring optical and magnetic storage devices. Learners will need to be aware of how each type of storage operates, and to explain how data is written and read from each device.

Lesson 7 Selecting a storage device: This is the last of three lessons on secondary storage. The previous two lessons have equipped the learners with the knowledge they need to systematically select and justify a device for a given use.

Lesson 8 Computer specifications: This lesson will teach your learners how to evaluate a computer based on its specifications. They will discover the factors that limit a CPU's performance: clock speed, cache, and the number of cores. Learners will then use a computer component website to build computer systems of their own.

Lesson 9 Logic gates: In this lesson, learners will discover logic gates — the building blocks of processors at the heart of a computer system. Through the activities they will build an understanding of how logic gates are used to address real-world problems.

Lesson 10 Logic problems: In this lesson, learners will be introduced to the concept of three-input logic problems, and will be taught how to construct a three-input logic diagram, truth table, and expression

National curriculum links

Develop their capability, creativity and knowledge in computer science, digital media and information technology

Develop and apply their analytic, problem-solving, design, and computational thinking skills

Sequence of Lessons:

1	Computer systems and system software
2	Introduction to the CPU
3	The FDE cycle
4	Main memory
5	Secondary storage
6	Optical and magnetic storage
7	Selecting a storage device
8	Computer specifications
9	Logic Gates
10	Logic Gate Problems

Topic Resources:

Knowledge Map:	Computer Systems	Any other Resources:	
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Assessment:

Knowledge:	Interim assessment after lesson 3 Full assessment after lesson 10
Application of Knowledge:	Mastery Book

Supportive Reading:

Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 3A Hardware – YouTube GCSE (1CP2) EDEXCEL: Topic 3B Software & programming languages - YouTube
BBC Bite Size	General purpose computers - Computers - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia:

Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

Computer networks have become an integral part of our daily lives. This unit allows learners to explore how a computer network works from the hardware required to the protocols used for communication

Links:

GCSE Computing Topic 4 - Networks

Lesson Sequence:

Lesson 1 LANs and WANs: Learners will give reasons why computers are connected on a network and be able to differentiate between a LAN and a WAN. Learners will also be able to explain why protocols are needed on a network and describe the purpose of an IP address.

Lesson 2 Network Speed: Learners will define the meanings of the terms 'bandwidth' and 'latency' and explain how bandwidth and latency affect the performance of a network. Learners will use bits per second (bps) to describe network speed.

Lesson 3 Connectivity: Learners will differentiate between wired and wireless connectivity and be able to explain how data are transmitted along copper and fibre-optic cables.

Lesson 4 Wired v Wireless: Learners will describe how devices are connected on a wireless network and will learn how to compare the performance of wired and wireless LANs and give examples of situations where one is preferable to the other.

Lesson 5 Network topologies: Learners will define the term 'topology' and they will describe the characteristics of bus, star and mesh network topologies.

Lesson 6 Malware & anti-malware: Learners will define what is meant by the term 'cyberattack'. They will also be able to describe the financial, reputational and legal damage that a cyberattack can cause. Learners will investigate the characteristics of and threat posed by different types of malware.

Lesson 7 Hackers: Learners will learn why unpatched software is a target for hackers and investigate the function of a firewall. Learners will also be able to explain how ethical hacking and penetration testing help identify vulnerabilities

Lesson 8 Social engineering: Learners will be able to define what is meant by the term 'social engineering' and describe commonly used social engineering tactics (phishing, pretexting, baiting, quid pro quo) used by hackers.

Lesson 9 Data-level protection: Learners can explain how data are protected by encryption and describe how backup and recovery procedures protect against data loss. They will also be able explain how access control helps to protect systems and data.

Lesson 10 Robust software: Learners will learn how a hacker can exploit a code vulnerability and they will be able to describe examples of bad coding practices and secure coding practices.

National curriculum links

Develop their capability, creativity and knowledge in computer science, digital media and information technology

Develop and apply their analytic, problem-solving, design, and computational thinking skills

Sequence of Lessons:

1	LANs and WANS
2	Network Speed
3	Connectivity
4	Wired v. wireless
5	Network topologies
6	Malware & anti-malware
7	Hackers
8	Social engineering
9	Data level protection
10	Robust software

Topic Resources:

Knowledge Map:	Computer Networks Security Protocols Cyber Security	Any other Resources:	
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Assessment:

Knowledge:	Interim assessment after lesson 5 Full assessment after lesson 10
Application of Knowledge:	Mastery Book

Supportive Reading:

Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 4 Networks & network security - YouTube
BBC Bite Size	Networks - Networks - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: 9781292374099: Book

Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

This unit has been designed to enable students to gain knowledge and understanding of the impact of technology on individuals, organisations, and the planet. Through a range of real-world examples, they will learn how to identify the specific type of impact, ie legal, cultural, privacy, environmental, and ethical. They will then progress to identifying stakeholders who are impacted by technology, and learn how these impacts are experienced, negated, or adapted to.

Links:

GCSE Computing Topic 5 – Ethical Issues

Lesson Sequence:

Lesson 1 How does technology impact us?: This lesson gives you time to introduce the subject of the impact of technology to learners. They will learn the significance of the five broad areas of impact, ie law, environment, culture, ethics, and privacy.

Lesson 2 The law, data protection, and copyright: This lesson will further emphasise the different categories of impact. It will enable learners to further exercise their knowledge about data protection and clarify the definition of the word 'stakeholder'.

Lesson 3 The FIA and the CMA: In this lesson, learners will review the plenary mini quiz about the Data Protection Act and copyright from Lesson 2. In addition, they will be introduced to the Freedom of Information Act and given the opportunity to experience genuine examples. Finally, they will learn about the Computer Misuse Act and categorise case studies by the different levels of offence.

Lesson 4 Cultural impacts: In this lesson, learners will understand what the term 'cultural impact' means. They will learn about downtime and its effect on businesses and individuals. In addition, they will closely examine the concept of 'digital divide' and work through examples of its impact.

Lesson 5 Environmental impact: In this lesson, learners will review the cultural impact of globalisation, which will build on concepts that they started to explore in Lesson 4. In addition, they will discover the reality of technology's impact on the environment.

Lesson 6 Ethical impact: In this lesson, learners will review what the word 'ethical' means generally. They will then be introduced to the main ethical impacts of technology, and engage in activities to help them become more aware of how important acting ethically is.

Sequence of Lessons:

1	How Does Technology impact us?
2	The Law, Data Protection & Copyright
3	Freedom of Info and Computer Misuse
4	Cultural Impacts
5	Environmental Impacts
6	Ethical Impacts

Topic Resources:

Knowledge Map:	Ethical Issues	Any other Resources:	
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Assessment:

Knowledge:	Assessment after lesson 6
Application of Knowledge:	Mastery Book

Supportive Reading:

Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 5 Issues & impact - YouTube
BBC Bite Size	Environmental issues - Environmental, ethical and legal concerns - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: 9781292374000: Books

Scheme of Learning: Year 10 Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

This extensive programming unit takes learners from being complete novices to having the confidence to tackle any GCSE-level programming challenge. Essential programming theory is also interleaved into the practical elements of programming to provide tangible links between required knowledge and skills. The latest pedagogical research has been used to ensure that learners are appropriately scaffolded and challenged as they move through the lessons.

Links:

GCSE Computing Topic 6 - Programming

Lesson Sequence:

Lesson 1 Translators: In this lesson, learners will be introduced to the notion that humans interpret instructions differently to computers. This is to help them understand that computers need clear and precise instructions in order to perform the expected task.

Lesson 2 Sequence: In this lesson, learners will be introduced to Thonny. They will learn about the function of an IDE and why programmers use these to write programs. Learners will be given some simple code to predict, run, investigate, and modify

Lesson 3 Variables: Learners will find out about variables during this lesson. They will learn about the purpose of variables, but also the technical aspects of creating variables to a uniform standard.

Lesson 4 Input: During this lesson learners will start to add interactivity to their programs by introducing the input() function. Learners will be given a demonstration of how input() is used in Python and then asked to add this feature in their silly stories that were created last lesson.

Lesson 5 Randomisation: . In this lesson, learners will be introduced to the concept of random numbers using Python documentation. Learners will determine what the random module is capable of, and how random numbers can be generated in Python.

Lesson 6 Arithmetic Expressions: This lesson has been designed to ensure that learners understand the rules of operator precedence when evaluating arithmetic expressions. They will be reminded of BIDMAS, before investigating code that uses various arithmetic expressions.

Lesson 7 Selection: This lesson moves learners on to the next big programming construct: selection. They will be introduced to it initially through a flowchart that demonstrates how a condition can be used to control the flow of execution in a program. They will then learn about definitions for logical expressions and conditions.

Lesson 8 Selection Challenge: This lesson is an extension of Lesson 8, in which learners completed a PRIMM activity that introduced them to selection.

Lesson 9 Logical Expressions: This lesson will deepen learners' understanding of logical expressions by introducing the operators AND and OR.

Lesson 10 Nested Selection: This lesson introduces learners to the concept of nesting if statements. Learners will walk through some basic nested statements to check their understanding.

Lesson 11 While loops: This lesson allows learners to find out about using iteration in their programs. It will define iteration, give a code walkthrough of a while loop, and then use a 'guess the number' game as a practical example for using iteration.

Lesson 12 Trace Tables: This lesson has been designed to deepen learners' understanding of a while loop whilst introducing trace tables. Trace tables are a valuable part of programming because they allow learners to walk through code and detect errors.

Lesson 13 For Loops: This lesson is designed to introduce learners to the concept of a for loop. They will learn about the definition, and be shown how the range function can be used with a for loop

Lesson 14 Data Validation: Learners will spend this lesson finding out how to effectively add data validation techniques to their programs. They will learn why they are important, and how to incorporate them.

Lesson 15/16 Pseudocode: The next two lessons have been created to introduce learners to pseudocode, whilst giving them the opportunity to design a program. It has been designed over two lessons to give learners the time to get stuck into solving a problem

Sequence of Lessons:

1	6.1 Translators
2	6.2 Sequence
3	6.3 Variables
4	6.4 Input
5	6.5 Randomisation
6	6.6 Arithmetic Expressions
7	6.7 Selection
8	6.8 Selection Challenge
9	6.9 Logical Expressions
10	6.10 Nested Selection
11	6.11 While Loops
12	6.13 Trace Tables
13	6.13 For Loops
14	6.14 Data Validation
15/16	6.15/6.16 Pseudocode

Topic Resources:

Knowledge Map:	Programming	Any other Resources:	
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Assessment:

Knowledge:	Assessments after lessons: 4, 10 and 16
Application of Knowledge:	Mastery booklet Practical Programming Evidence

Supportive Reading:

Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 6A Developing code – YouTube GCSE (1CP2) EDEXCEL: Topic 6B Programming fundamentals - YouTube
BBC Bite Size	Programming constructs - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: 9781292374000: Books

Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

This extensive programming unit takes learners from being complete novices to having the confidence to tackle any GCSE-level programming challenge. Essential programming theory is also interleaved into the practical elements of programming to provide tangible links between required knowledge and skills. The latest pedagogical research has been used to ensure that learners are appropriately scaffolded and challenged as they move through the lessons.

Links:

GCSE Computing Topic 6 - Programming

Lesson Sequence:

Lesson 17 Subroutines: Learners will discover the advantages of using subroutines, and how they are used for decomposition. They will also modify a subroutine that uses parameters.

Lesson 18 Functions: During this lesson, learners will be introduced to functions. They have already used built-in functions when programming, but haven't actually written their own yet.

Lesson 19 Scope: Learners will be introduced to the concept of scope in this lesson. They will be briefed on the definitions, before being given example programs that show how local and global scope work in Python.

Lesson 20 Structured programming: This lesson introduces learners to the structured approach to programming. They will learn to describe structured programming through a series of exercises.

Lesson 21/22 Create a Program: This lesson begins with an exploration of the different ways to test programs, followed by a few example tests to complete. Learners will be introduced to their project, which will be used to check their understanding of all the concepts covered up to this point.

Lesson 23 GUI's: This lesson provides learners with a tour of the world of GUIs (graphical user interfaces). It uses the third-party module `guizero` to create GUI apps.

Lessons 24/25/26 String Handling: This lesson introduces learners to a number of string-handling techniques.

Lesson 27 Lists: This lesson introduces learners to the data structures: arrays and lists. It defines them, and explains the differences between the two. It then moves on to focus on lists in Python.

Lesson 28 List Methods: This lesson introduces learners to the many other list methods that can be used in programming. These were briefly introduced at the end of the last lesson.

Lesson 29 2d Lists: Learners are introduced to two-dimensional arrays and lists during this lesson. They will be defined, and then learners will be shown how to access lists and single items in those lists, before they complete an activity to practise these skills

Lesson 30/31 2d List Challenge: This lesson begins with reminding learners about iterative and final testing. Learners are then introduced to their challenge, which is to create a noughts and crosses game

Sequence of Lessons:		Topic Resources:			
17	6.17 Subroutines	Knowledge Map:	Programming	Any other Resources:	
18	6.18 Functions				
16	6.19 Scope	Assessment:			
20	6.20 Structured Programming	Knowledge:	Assessments after Lesson 26 and Lesson 31		
21/22	6.21/6.22 Create a Program	Application of Knowledge:	Lessons 21/22 Create a program Lesson 30/31 2d List Challenge Mastery Book		
23	6.23 GUIs	Supportive Reading:			
24/25/26	6.24 / 6.25 / 6.26 String Handling	Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 6A Developing code – YouTube GCSE (1CP2) EDEXCEL: Topic 6B Programming fundamentals - YouTube		
27	6.27 Lists		Programming constructs - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize		
28	6.28 List Methods	BBC Bite Size	Programming constructs - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize		
29	6.29 2d Lists	Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia:		
30/31	6.30/6.31 2d List Challenge				

Scheme of Learning: GCSE Computing

Topic Sequence:

1	2	3	4	5	6
Computational Thinking	Data	Computers	Networks	Issues and Impacts	Programming

Topic Overview:

This extensive programming unit takes learners from being complete novices to having the confidence to tackle any GCSE-level programming challenge. Essential programming theory is also interleaved into the practical elements of programming to provide tangible links between required knowledge and skills. The latest pedagogical research has been used to ensure that learners are appropriately scaffolded and challenged as they move through the lessons.

Links:

GCSE Computing Topic 6 - Programming

Lesson Sequence:

Lesson 32 Records and dictionaries : This lesson introduces learners to two new data structures. A record and a dictionary. The focus of this lesson is on records and how these can be created and used in Python to form a database.

Lesson 33 Dictionary challenge: This lesson gives learners the opportunity to use a dictionary data structure in a new context. Learners will create a Caesar cipher encryption program using a dictionary as the cipher wheel.

Lesson 34/35 Test Files: Learners will be introduced to text files in this lesson. The focus will be on reading text files, and how the data from a text file can be used within a program. This lesson continues the exploration of text files with the addition of writing and appending to files.

Lesson 36 CSV Files: Learners are already familiar with text files and how to read the data from them. A CSV file is still a text file and you can use the same methods and modes that you can with a standard file.

Lesson 37 Write to a CSV: Building on from the last three lessons, learners will discover how to write to CSV files. They work with 1D and 2D lists, before converting them to string and writing them to CSV files.

Lesson 38 Being a Programmer: Learners will discuss the good habits of a programmer before being reminded of why some of the key aspects are good habits.

Lesson 39 Turtle Introduction: Learners re-visit how to decompose a problem and learn how to use turtle graphics to draw lines and basic shapes

Lesson 40 Turtle Lesson 2: Learners revisit how to incorporate selection, repetition, and iteration into turtle graphics and revise how to use subprograms

Lesson 41: Turtle Lesson 3: Learners will use turtle pens of different colours and sizes to create more complex patterns. They will also use turtle to fill in closed shapes

Lesson 42 Turtle Lesson 4: Learners will combine subprograms to produce different turtle generated graphic images

Lesson 43: Turtle Lesson 5: Learners will be given a problem that they will decompose into smaller parts and then combine subprograms to create a solution

Sequence of Lessons:		Topic Resources:	
32	6.32 Records and Dictionaries	Knowledge Map: Programming	Any other Resources:
33	6.33 Dictionary Challenge		
34/35	6.34 / 6.35 Text Files	Assessment:	
36	6.36 CSV files	Knowledge:	Assessment after Lesson 43
37	6.37 Write to CSV	Application of Knowledge:	Evidence from classwork, Lesson 37 and Mastery book
38	6.38 Being a Programmer	Supportive Reading:	
39	6.39 Turtle Introduction	Craig n Dave Videos	GCSE (1CP2) EDEXCEL: Topic 6A Developing code – YouTube
40	6.40 Turtle Lesson 2		GCSE (1CP2) EDEXCEL: Topic 6B Programming fundamentals - YouTube
41	6.41 Turtle Lesson 3	BBC Bite Size	Programming constructs - Edexcel - GCSE Computer Science Revision - Edexcel - BBC Bitesize
42	6.42 Turtle Lesson 4		
43	6.43 Turtle Lesson 5	Revision Guide	Pearson REVISE Edexcel GCSE Computer Science Revision Guide inc online edition - 2023 and 2024 Weidmann, Ann, Selby, Cynthia: