PENSBY HIGH SCHOOL
J277 Cycle Sheets

Cycle_____J277 Unit 1: Systems Architecture Recommended Reading: PG Online OCR GCSE J277 Computer Science Chapter 1							
Name:						**Mid-Unit Result:**	/
End of Unit Result:	/	**Re-sit Result (if necessary):**	/	**Student Workbooks Completed**	**Yes / No**	**COG in this unit: TARGET:**	

KEYWORDS		
Fetch-Execute	CPU	ALU
Control Unit	Cache	Von Neumann
MAR	MDR	Program Counter
Accumulator	Clock Speed	Cache Size
Cores	RAM/ROM	Embedded System
Virtual Memory	Volatile	Non- Volatile
Storage	Capacity	Durability
Portability	Reliability	Cost

Unit Description

The unit is subdivided into three topics and an end-of-unit assessment. The unit covers Section 1.2.1 and 1.2.2 of the OCR J277 specification for GCSE Computer Science. Primary storage and secondary storage are both covered.

Homework is given across 2 lessons. These consist of a mixture of short, factual questions assessing knowledge in isolation and longer questions in which students are asked to analyse a situation or justify their answer to questions.

The **Mid-Unit Assessment** and **Final-Unit Assessment,** assesses student's knowledge of the current unit.

Previous Learning:

No prior knowledge is essential with this unit. However, students should have a basic understanding of computer systems from lessons delivered as part of the Key Stage 3 national curriculum.

	Unit 1: Systems Architecture	✓
7-9	Describe how virtual memory is used	
	Accurately evaluate the differences in characteristics between different devices	
	Describe the Von Neumann architecture including: MAR, MDR, Program counter, accumulator	
6 - 7	Describe common CPU components and their function: ALU, CU, Cache, Registers	
	Describe the advantages and disadvantages of different storage devices and media relating to the following characteristics: capacity, speed, portability, durability, reliability, cost	
	Understand the purpose of ROM	
	Be able to state the differences between RAM and ROM	
	Describe the characteristics of CPUs that affect their performance including clock speed, cache size, number of cores	
	Choose suitable storage devices and storage media for a given application	
	Understand the purpose of the CPU including the fetch-execute cycle	
5	Understand the purpose of RAM	
	Understand the need for virtual memory	
	Understand the need for secondary storage	
	Understand the need for primary storage	
	Understand the purpose and characteristics of embedded systems	
4	Be able to list the common types of storage: optical, magnetic, solid state	
	List various secondary storage devices and storage media	
	Give examples of embedded systems	

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Cycle_____J277 Unit 2: Data Representation Recommended Reading: PG Online OCR GCSE J277 Computer Science Chapter 2							
Name:						**Mid-Unit Result:**	/
End of Unit Result:	/	**Re-sit Result (if necessary):**	/	**Student Workbooks Completed**	**Yes / No**	**COG in this unit: TARGET:**	

KEYWORDS					
Bit	Nibble	Kilo	Byte	Mega	Giga
Tera	Peta	Binary		Bit Depth	
Sample Rate		Colour Depth		Pixel	
Binary Shift (left/right)		Most / Least Significant			
Character Set		ASCII		Unicode	
Meta Data		Hertz		Compression	
Lossy		Lossless			

Unit Description

The unit is subdivided into six topics and an end-of-unit assessment. The unit covers Section 1.2.3 and 1.2.4 of the OCR J277 specification for GCSE Computer Science. Units and data storage are both covered.

Homework is given across 2 lessons. These consist of a mixture of short, factual questions assessing knowledge in isolation and longer questions in which students are asked to analyse a situation or justify their answer to questions.

The **Mid-Unit Assessment** and **Final-Unit Assessment,** assesses student's knowledge of the current unit.

Previous Learning:

No prior knowledge is essential with this unit. However, students should have a basic understanding of computer systems from lessons delivered as part of the Key Stage 3 national curriculum.

	Unit 2: Data Representation	✓
7-9	Convert between binary, denary and hexadecimal equivalents of the same number	
	Understand that the number of bits per pixel determines the number of available colours for an image	
	Explain how sampling (Sample rate & Bit depth) intervals and resolution affect the size of a sound file	
	Explain the relationship between file size and image resolution	
6 - 7	Add two 8-bit binary integers and explain overflow errors which may occur	
	Explain the trade-off between file size and the quality of playback	
	Understand the use of binary codes to represent characters	
	Be able to represent a short sound file in binary	
	Understand how sound is sampled and stored in digital form	
5	Understand the use of binary shifts	
	Convert positive denary whole numbers (0-255) into 2-digit hexadecimal numbers and vice versa	
	Convert positive denary whole numbers (0-255) into 8-bit binary numbers and vice versa	
	Add two 8-bit binary integers	
4	Define the terms nibble, terabyte and petabyte	
	Define the terms bit, byte, kilobyte, megabyte, gigabyte	
	Understand the term 'character set'	
	Understand how a bitmap graphic is made up of individual pixels	
	Explain how each pixel is represented in binary	
	Understand that data needs to be converted into a binary format to be processed by a computer	

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Cycle_____J277 Unit 3: Networks Recommended Reading: PG Online OCR GCSE J277 Computer Science Chapter 3							
Name:						**Mid-Unit Result:**	/
End of Unit Result:	/	**Re-sit Result (if necessary):**	/	**Student Workbooks Completed**	**Yes / No**	**COG in this unit: TARGET:**	

KEYWORDS							
LAN	WAN	Latency		Bandwidth			
Wireless Access Points			Routers		Switches		
Network Interface Card			DNS		Transmission Media		
Hosting		The Cloud			Web Server		
Client Server		Star Network			Mesh Network		
Topology		IP Addressing			MAC Addressing		
TC/IP		FTP	POP3		IMAP		
SMTP		Layers			IPv4		IPv6

Unit Description

The unit is subdivided into six topics and an end-of-unit assessment. The unit covers Section 1.3.1 and 1.3.2 of the OCR J277 specification for GCSE Computer Science. Networks and topologies, wired and wireless networks, protocols, layers are all covered

Homework is given across 2 lessons. These consist of a mixture of short, factual questions assessing knowledge in isolation and longer questions in which students are asked to analyse a situation or justify their answer to questions.

The **Mid-Unit Assessment** and **Final-Unit Assessment,** assesses student's knowledge of the current unit.

Previous Learning:

No prior knowledge is essential with this unit. However, students should have a basic understanding of computer systems from lessons delivered as part of the Key Stage 3 national curriculum.

	Unit 3: Networks	✓
7-9	Explain the concept of layers in the TCP/IP protocol stack	
	Describe the uses of communications protocols including: TCP/IP	
	Explain the advantages and disadvantages of various transmission media	
6 - 7	Describe the uses of communications protocols including: FTP, POP, IMAP & SMTP	
	Explain the advantages and disadvantages of client-server and peer-to-peer networks	
	Explain the advantages and disadvantages of various transmission media	
	Explain the use of Ethernet standards to transmit data over a wired network	
	Explain the role of computers in client-server and peer-to-peer networks	
5	Understand how encryption is used to secure data across network connections	
	Explain the need for IP addressing of resources on the Internet and how this can be facilitated by the role of DNS services	
	Understand the need for Network Interface Cards and the uses of MAC addressing	
	Explain packet switching	
	Describe routers and switches needed to connect stand-alone computers into a Local Area Network	
	Describe the difference between a Local Area Network and a Wide Area Network	
	Define a Wide Area Network	
4	Describe the nature of the Internet as a worldwide collection of computer networks	
	Explain the need for Wireless Access Points to create wireless hotspots	
	Describe star and mesh network topologies & what is meant by: Hosting & The Cloud	
	Describe the uses of communications protocols including: HTTP &HTTPS	
	Understand wireless modes of connection, including: Wi-Fi & Bluetooth	
	Describe the factors that affect network performance	

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Cycle_____J277 Unit 4: Network security and systems software OCR GCSE COMPUTER SCIENCE Recommended Reading: PG Online OCR GCSE J277 Computer Science Chapter 4							
Name:						**Mid-Unit Result:**	/
End of Unit Result:	/	**Re-sit Result (if necessary):**	/	**Student Workbooks Completed**	**Yes / No**	**COG in this unit: TARGET:**	

KEYWORDS		
Malware	Virus	Worm
social engineering	Trojan horse	phishing
brute-force attack	data interception	SQL injection
denial of service attack	data theft	penetration testing
anti-malware software	anti-virus software	firewalls
encryption	physical security	operating system
user interface	utility software	drivers,
graphical user interface (GUI)	multitasking	defragmentation
command line interface (CLI)	peripheral management	memory management

Unit Description

The unit is subdivided into four topics and an end-of-unit assessment. The unit covers Section 1.4 and 1.5 of the OCR J277 specification for GCSE Computer Science. Threats to computer systems and networks, identifying and preventing vulnerabilities, operating systems and utility software are all covered.

Homework is given across 2 lessons. These consist of a mixture of short, factual questions assessing knowledge in isolation and longer questions in which students are asked to analyse a situation or justify their answer to questions.

The **Mid-Unit Assessment** and **Final-Unit Assessment,** assesses student's knowledge of the current unit.

Previous Learning:

No prior knowledge is essential with this unit. However, students should have a basic understanding of computer systems from lessons delivered as part of the Key Stage 3 national curriculum.

	Unit 4: Network Security & Systems Software	✓
7-9	Explain the need for the following functions of an operating systems including memory management and multitasking	
	Identify and understand the prevention of vulnerabilities with the use of firewalls such as Denial of Service Attacks & SQL injection	
	Describe the purpose and functionality of common utility software including: Encryption software, Defragmentation software & data compression software.	
6 - 7	Explain the need for the following functions of an operating system such as User interface, Memory management and multitasking, Peripheral management and drivers, User management & File management	
	Understand forms of attack and threats posed to a network including: Denial of service attacks & SQL injection	
	Identify and understand the prevention of vulnerabilities including the use of: penetration testing, user access levels & encryption	
5	Understand the following forms of attack and threats to a network including Social engineering, Brute force attacks & Data interception and theft	
	Identify and understand the prevention of vulnerabilities including the use of: anti-malware software, passwords & physical security	
4	Understand forms of attack and threats posed to a network such as Malware	
	Explain the need for the User interface for an operating system	
	Understand a variety forms of attach and threats the pose at a basic level such as phishing	

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Cycle_____J277 Unit 5: Impacts of Digital Technology Recommended Reading: PG Online OCR GCSE J277 Computer Science Chapter 5							
Name:						**Mid-Unit Result:**	/
End of Unit Result:	/	**Re-sit Result (if necessary):**	/	**Student Workbooks Completed**	**Yes / No**	**COG in this unit: TARGET:**	

KEYWORDS		
Ethical	Cultural	Environmental
Legislation	Manufacture	Disposal
Upgrade	Replace	E-Waste
Privacy	Legal	Data Protection
Computer Misuse	Copyright	Copyright Designs & Patents Act
Open Source	Proprietary	

Unit Description

The unit is subdivided into three topics and an end-of-unit assessment. The unit covers Section 1.5 of the OCR J277 specification for GCSE Computer Science. Different computer technologies and applications and the ethical, environmental and legal considerations surrounding them are described.

Homework is given across 2 lessons. These consist of a mixture of short, factual questions assessing knowledge in isolation and longer questions in which students are asked to analyse a situation or justify their answer to questions.

The **Mid-Unit Assessment** and **Final-Unit Assessment,** assesses student's knowledge of the current unit.

Previous Learning:

No prior knowledge is essential with this unit. However, students should have a basic understanding of computer systems from lessons delivered as part of the Key Stage 3 national curriculum.

	Unit 5: Impacts of Digital Technology	✓
7 - 9	List the clauses of the Data Protection Act and Computer Misuse Act and give examples of situations in which they are relevant	
	Evaluate the impact of and issues related to the use of computers in society	
6 - 7	Discuss the impacts of digital technology on the wider society including ethical issues, cultural issues and environmental issues	
	Discuss the impact of manufacture, disposal, upgrading and replacing digital technology	
	Discuss the impact of digital technology regarding legal issues and privacy issues	
	Discuss the impact of e-waste	
5	Describe legislation relevant to Computer Science including: • The Data Protection Act 2018 • Computer Misuse Act 1990 • Copyright Designs and Patents Act 1988	
	Describe the features of open source and proprietary software licences	
4	List ethical issues, cultural issues and environmental issues in relation to a given scenario	
	List items of legislation that relate to digital technology	

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Cycle____J277 Unit 6: Algorithms Recommended Reading: PG Online OCR GCSE J277 Computer Science Chapter 6							
Name:						**Mid-Unit Result:**	/
End of Unit Result:	/	**Re-sit Result (if necessary):**	/	**Student Workbooks Completed**	**Yes / No**	**COG in this unit: TARGET:**	

KEYWORDS		
Computational thinking	reference language	decomposition
algorithmic thinking	inputs	processes
outputs	structure diagrams	pseudocode
flowcharts	abstraction	trace tables
syntax error	logical error	algorithm
decision	terminal	sub program
process	binary search	linear search
bubble sort	merge sort	insertion sort
variables	constants	operators
assignments	sequence	selection
iteration	Boolean operators	arithmetic operators
modulus	quotient	exponentiation

Unit Description

The unit covers Section 2.1 of the OCR J277 specification for GCSE Computer Science. Computational thinking, pseudocode, flowcharts, trace tables, searching algorithms and sorting algorithms are all covered in this unit.

Homework is given across 2 lessons. These consist of a mixture of short, factual questions assessing knowledge in isolation and longer questions in which students are asked to analyse a situation or justify their answer to questions.

The **Mid-Unit Assessment** and **Final-Unit Assessment,** assesses student's knowledge of the current unit.

Prior Learning:

Prior knowledge is desirable with this unit. Students should have a basic understanding of computer systems, algorithms and programming from lessons delivered as part of the Key Stage 3 national curriculum. Knowledge can be taken from the following: Scratch programming, Algorithms and Flowol, Python programming, Computational thinking and Algorithm design and Understanding Computers.

	Unit 6: Algorithms	✓
7 - 9	Understand how to determine the correct output of an algorithm for a given set of data	
	Be able to Identify an algorithm if given the code for it	
	Understand the Merge Sort and be able to apply it	
6 - 7	Create and use of trace tables to follow an algorithm	
	Understand how to identify and correct errors in algorithms	
	Create, interpret, correct, complete and refine algorithms using flowcharts	
	Write algorithms in pseudocode involving sequence, selection and iteration	
	Understand the sort algorithms such as bubble & insert sort	
5	Understand the principles of computational thinking such as Abstraction, decomposition & algorithmic thinking	
	Be able to apply each algorithm to a data set	
	Be able to produce structure diagrams to show: The structure of a problem & Subsections and their links to other subsections	
4	Understand flowchart symbols	
	Understand and use the Linear search	
	Understand arithmetic operators and variables	
	Define the data types integer, real, Boolean, character, string	

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Cycle_____J277 Unit 7 Programming Recommended Reading: PG Online OCR GCSE J277 Computer Science Chapter 7							
Name:						**Mid-Unit Result:**	/
End of Unit Result:	/	**Re-sit Result (if necessary):**	/	**Student Workbooks Completed**	**Yes / No**	**COG in this unit: TARGET:**	

KEYWORDS		
Variables	==, !=, <, <=, >, >=,	open
Constants	+, -, *, /,	read
Operators	MOD, DIV, ^,	write
Inputs	Exponentiation	close
Outputs	data types	records
Assignment	integer	SQL
Sequence	real	Arrays
Selection	Boolean	one-dimensional array
Iteration	Character	two-dimensional array
Arithmetic operators	String	sub program/subroutine
Boolean operators	Casting	functions
AND	string manipulation	procedures
OR	file handling	random numbers
NOT	Concatenation	SQL
SELECT	FROM	WHERE

Unit Description

The unit covers Section 2.2 of the OCR J277 specification for GCSE Computer Science. Programming fundamentals, data types and additional programming techniques are all covered in this unit.

Homework is given across 2 lessons. These consist of a mixture of short, factual questions assessing knowledge in isolation and longer questions in which students are asked to analyse a situation or justify their answer to questions.

The **Mid-Unit Assessment** and **Final-Unit Assessment,** assesses student's knowledge of the current unit.

Prior Learning:

Students will benefit from having studied programming concepts with a programming language prior to undertaking this unit. Students should have a basic understanding of computer systems from lessons delivered as part of the Key Stage 3 national curriculum.

	Unit 7: Programming	✓
7-9	Learn how to write simple procedures and functions	
	Understand and use parameters to pass data to procedures and functions	
	Know that subroutines may use local variables which are accessible only within the subroutine	
6 - 7	Use local variables and explain why it is good practice to do so	
	Explain the advantages of using subroutines in programs	
	Read from and write to a text file	
	Use arithmetic operators including MOD and DIV	
	Use string handling and conversion functions	
	Understand the concept of subroutines	
	Use SQL (Structured Query Language) statements to search for data: i.e. Formulate criteria involving AND, OR and LIKE / Use SELECT, FROM, WHERE, ORDER BY statements / Use the wildcard *	
5	Understand and use basic file handling operations: open / read / write / close	
	Use selection and nested selection statements	
	Use NOT, AND and OR when creating Boolean expressions	
	Understand and use iteration in an algorithm	
	Write algorithms in pseudocode involving sequence, selection and iteration	
	Use one- and two-dimensional arrays in the design of solutions to simple problems	
4	Understand and use data types: integer, real, Boolean, character and string	
	Declare and use constants and variables	
	Use input, output and assignment statements	
	Use random number generation	
	Write algorithms in pseudocode involving sequences	

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Cycle_____J277 Unit 8: Logic & Languages Recommended Reading: PG Online OCR GCSE J277 Computer Science Chapter 8							
Name:						**Mid-Unit Result:**	/
End of Unit Result:	/	**Re-sit Result (if necessary):**	/	**Student Workbooks Completed**	**Yes / No**	**COG in this unit: TARGET:**	

KEYWORDS		
erroneous	syntax error	logic gates
syntax	logic error	logic diagrams
authentication	test data	conjunction
validation	normal	disjunction
maintainability	boundary	negation
sub programs	invalid	commenting
naming conventions	Defensive design	low-level language
indentation	test plan	translators
iterative testing	AND / OR / NOT	error diagnostics
testing	compiler	interpreter
high-level language	Run-time environment	Integrated Development Environment (IDE)
final/terminal testing	truth table	Editors
logical operators	anticipating misuse	

Unit Description

The unit covers Section 2.3, 2.4 and 2.5 of the OCR J277 specification for GCSE Computer Science. Producing robust programs, Boolean logic and Programming languages and Integrated Development Environments are all covered in this unit.

Homework is given across 2 lessons. These consist of a mixture of short, factual questions assessing knowledge in isolation and longer questions in which students are asked to analyse a situation or justify their answer to questions.

The **Mid-Unit Assessment** and **Final-Unit Assessment,** assesses student's knowledge of the current unit.

Prior Learning:

Students will benefit from having studied programming concepts with a programming language prior to undertaking this unit. Students should have a basic understanding of computer systems from lessons delivered as part of the Key Stage 3 national curriculum.

	Unit 8: Logic & Languages	✓
7-9	Explain how to make maintainable programs including: The use of Sub-Programs	
	Describe the characteristics and purpose of High-Level Languages	
	Describe the characteristics and purpose of Low-Level Languages	
	Interpret the results of truth tables	
6 - 7	Describe the characteristics of a compiler and interpreter	
	Understand the purpose of translators	
	Select and use suitable test data	
5	Understand the purpose of testing including Iterative Testing / Final Testing	
	Understand how to make maintainable programs (Use Comments)	
	Describe defensive design considerations: Input Validation	
	Describe defensive design considerations: Anticipating misuse	
	Describe defensive design considerations: Authentication	
	Identify syntax and logic errors	
4	Create, modify and interpret simple logic circuit diagrams	
	Construct truth tables for simple logic circuits	
	Understand how to make maintainable programs including: Naming Conventions & Indentation	
	Construct truth tables for the following logic gates: NOT / AND / OR	
	Draw the Logic gate for AND / OR / NOT	