



GCSE MARKING SCHEME

SUMMER 2025

COMPUTER SCIENCE - UNIT 1
3500U10-1

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

WJEC GCSE COMPUTER SCIENCE
UNIT 1 - UNDERSTANDING COMPUTER SCIENCE
SUMMER 2025 MARK SCHEME

Guidance for examiners

Positive marking

It should be remembered that learners are writing under examination conditions and credit should be given for what the learner writes, rather than adopting the approach of penalising him/her for any omissions. It should be possible for a very good response to achieve full marks and a very poor one to achieve zero marks. Marks should not be deducted for a less than perfect answer if it satisfies the criteria of the mark scheme.

For questions that are objective or points-based the mark scheme should be applied precisely. Marks should be awarded as indicated and no further subdivision made.

For band marked questions mark schemes are in two parts.

Part 1 is advice on the indicative content that suggests the range of computer science concepts, theory, issues and arguments which may be included in the learner's answers. These can be used to assess the quality of the learner's response.

Part 2 is an assessment grid advising bands and associated marks that should be given to responses which demonstrate the qualities needed in AO1, AO2 and AO3. Where a response is not credit worthy or not attempted it is indicated on the grid as mark band zero.

Banded mark schemes

Banded mark schemes are divided so that each band has a relevant descriptor. The descriptor for the band provides a description of the performance level for that band. Each band contains marks.

Examiners should first read and annotate a learner's answer to pick out the evidence that is being assessed in that question. Once the annotation is complete, the mark scheme can be applied.

This is done as a two-stage process.

Stage 1 – Deciding on the band

When deciding on a band, the answer should be viewed holistically. Beginning at the lowest band, examiners should look at the learner's answer and check whether it matches the descriptor for that band. Examiners should look at the descriptor for that band and see if it matches the qualities shown in the learner's answer. If the descriptor at the lowest band is satisfied, examiners should move up to the next band and repeat this process for each band until the descriptor matches the answer.

If an answer covers different aspects of different bands within the mark scheme, a 'best fit' approach should be adopted to decide on the band and then the learner's response should be used to decide on the mark within the band. For instance if a response is mainly in band 2 but with a limited amount of band 3 content, the answer would be placed in band 2, but the mark awarded would be close to the top of band 2 as a result of the band 3 content. Examiners should not seek to mark candidates down as a result of small omissions in minor areas of an answer.

Stage 2 – Deciding on the mark

Once the band has been decided, examiners can then assign a mark. During standardising (marking conference), detailed advice from the Principal Examiner on the qualities of each mark band will be given. Examiners will then receive examples of answers in each mark band that have been awarded a mark by the Principal Examiner. Examiners should mark the examples and compare their marks with those of the Principal Examiner.

When marking, examiners can use these examples to decide whether a learner's response is of a superior, inferior or comparable standard to the example. Examiners are reminded of the need to revisit the answer as they apply the mark scheme in order to confirm that the band and the mark allocated is appropriate to the response provided.

Indicative content is also provided for banded mark schemes. Indicative content is not exhaustive, and any other valid points must be credited. In order to reach the highest bands of the mark scheme a learner need not cover all of the points mentioned in the indicative content but must meet the requirements of the highest mark band. Where a response is not creditworthy, that is contains nothing of any significance to the mark scheme, or where no response has been provided, no marks should be awarded.

Q	Answer	Marks	AO1	AO2	AO3	Total
1.(a)	Award one mark for each of the following up to a maximum of three marks: - Stores data and instructions that the CPU can quickly access during program execution – Registers - Manages the execution of instructions, directing data flow within the CPU – Control unit - Performs mathematical operations for executing the instructions in a computer program – ALU	1 1 1		1b		3
(b)	Award one mark for the following:	1	1b			1
(i)	A counter that keeps track of the memory address of the instruction which is to be executed next.					
(ii)	Award one mark for each of the following up to a maximum of two marks: Expected: - Memory Address Register (MAR) - Current Instruction Register (CIR) Accepted but not expected. - Memory Buffer Register (MBR) - Accumulator (ACC) - Index Register - Stack Pointer (SP) - Base Register (BR) - Data Register (DR) - Status Register (SR or FLAGS) NOT Program Counter	2	1a			2
(c)	Award one mark for each of the following up to a maximum of two marks: RISC processors: - can process a limited number of relatively simple instructions - break the problem down into a longer list of simpler instructions - are able to process these simpler instructions quickly - require less circuitry to decode and execute these instructions - consume less power and therefore generate less heat. Accept opposites above from a CISC perspective.	2	1b			2

Q	Answer	Marks	AO1	AO2	AO3	Total
(d)	Award one mark for each system description from any of the following up to a maximum of two marks: Embedded systems • An embedded system is a combination of software and hardware • An embedded system performs a specific task • These systems have limited resources such as processing power, memory and storage capacity • They may not require human interaction and work autonomously • They will use such things as sensors and actuators • Accept a suitable example e.g. washing machine, microwave with a built-in processor.	2	1b			2
(e)	Award one mark for each of the following up to a maximum of two marks: • Improper disposal of hardware components contributes to the accumulation of e-waste • This can release toxic substances into the environment if not managed appropriately • This can pose risks to ecosystems and human health • Many electronic components contain heavy metals like lead, mercury, and cadmium, which can leak into the environment if not disposed of properly, causing soil and water contamination • Hardware components are often not biodegradable • Hardware components cannot be recycled • The recycling process for electronic components often requires significant energy inputs, and the methods used can contribute to air and water pollution if not conducted responsibly.	2	1b			2

Q	Answer	Marks	AO1	AO2	AO3	Total												
2.(a)	Award one mark for each of the following up to a maximum of three marks: <table><tr><td>☐</td><td>Solid state storage technologies offer significantly slower access speeds compared to traditional hard disk drives (HDDs).</td></tr><tr><td>☒</td><td>Solid state storage retains stored data even when power is removed.</td></tr><tr><td>☐</td><td>With more moving mechanical parts, solid state storage devices are less durable and reliable than traditional HDDs.</td></tr><tr><td>☒</td><td>Solid state storage technologies generally consume less power than other technologies.</td></tr><tr><td>☐</td><td>Since there are spinning disks and moving parts, solid state storage are less suitable for noise-sensitive applications.</td></tr><tr><td>☒</td><td>Solid state storage devices are typically smaller and lighter than traditional HDDs, making them ideal for tablets.</td></tr></table>	☐	Solid state storage technologies offer significantly slower access speeds compared to traditional hard disk drives (HDDs).	☒	Solid state storage retains stored data even when power is removed.	☐	With more moving mechanical parts, solid state storage devices are less durable and reliable than traditional HDDs.	☒	Solid state storage technologies generally consume less power than other technologies.	☐	Since there are spinning disks and moving parts, solid state storage are less suitable for noise-sensitive applications.	☒	Solid state storage devices are typically smaller and lighter than traditional HDDs, making them ideal for tablets.	3		1b		3
☐	Solid state storage technologies offer significantly slower access speeds compared to traditional hard disk drives (HDDs).																	
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Q	Answer	Marks	AO1	AO2	AO3	Total
2.(b)	Award one mark for each of the following up to a maximum of four marks: • The surface of the optical disc contains one long spiral track of data • Along the track, there are flat reflective areas and non-reflective lands / pits • The optical disc drive shines a laser at the surface of the disc and can detect the reflective areas • The drive converts the reflections into 1s and 0s to read digital data from the disc • A flat reflective area represents a binary 1, while a non-reflective lands represents a binary 0 • Some optical discs cannot be modified - they are read-only devices • A writable optical disc needs to allow the drive to write data onto the disc • For a writable optical disc to work, there must be a way for a laser to create a non-reflective area on the disc • A writable optical disc therefore has an extra layer that the laser can modify.	4	1b			4

Q	Answer	Marks	AO1	AO2	AO3	Total																									
3.(a)	<table><tr><th>X</th><th>Y</th><th>$\bar{X}$</th><th>$Y \oplus \bar{X}$</th><th>$(Y \oplus \bar{X}) + X$</th></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td></tr></table> Award one mark for each of the following columns up to a maximum of four marks: • X and Y • $\bar{X}$ • $Y \oplus \bar{X}$ • $(Y \oplus \bar{X}) + X$ Inputs do not have to be in the same order as above.	X	Y	$\bar{X}$	$Y \oplus \bar{X}$	$(Y \oplus \bar{X}) + X$	0	0	1	1	1	0	1	1	0	0	1	0	0	0	1	1	1	0	1	1	4		1b		4
X	Y	$\bar{X}$	$Y \oplus \bar{X}$	$(Y \oplus \bar{X}) + X$																											
0	0	1	1	1																											
0	1	1	0	0																											
1	0	0	0	1																											
1	1	0	1	1																											
(b)	Award one mark for each simplification up to a maximum of five marks: $A.\bar{B} + A.(\bar{A} + B)$ • $A.\bar{B} + A.\bar{A} + A.B$ • $A.\bar{B} + A.B$ • $A.(\bar{B} + B)$ • $A.(1)$ • A Alternative solutions accepted. DO NOT accept truth table solutions	5		1b		5																									

Q	Answer	Marks	AO1	AO2	AO3	Total
4.(a)	Award one mark for each of the following up to a maximum of three marks: - This layer is the transceiver that drives the signals on the network. Physical Layer - This layer creates frames that move across the network. Network Layer - This layer establishes the connection between applications on different hosts. Transport Layer	1 1 1		1b		3
(b)(i)	Hyper Text Transfer Protocol Allows webpages to be transferred across a network.	2	1b			2
(ii)	Simple Mail Transfer Protocol Used to send and receive email messages, Email applications typically use SMTP only for sending messages to a mail server.	2	1b			2
(c)	Award one mark for each of the following up to a maximum of two marks: - The source address - Reassembly information - The data itself Accept any suitable answer.	3	1a			3
(d)	Award one mark for each of the following up to a maximum of six marks: - The URL is typed into the address bar of a browser. - The browser checks the local (cached) host file to check if it already holds the IP address for the URL. - If not, the local (your domain) DNS server is queried for the IP address for the URL. - If the local DNS server does not hold the IP address for the URL, then the query is passed to another DNS server at a higher level until the IP address is resolved. - The address for the URL is passed on to DNS servers lower in the hierarchy. - When the full address has been resolved, the IP address is then passed to your browser. - The browser then connects to the IP address of the server and downloads the web site - If the URL isn't resolved, an error message (404) is returned.	6	1b			6

Q	Answer	Marks	AO1	AO2	AO3	Total			
5.	Award one mark for each of the following up to a maximum of six marks:	6		1b		6			
	Origin						Destination	Lowest Cost	Route
	E						F	5	E > D > F
	C						D	7	C > B > H > D
	A						B	7	A > E > D > H > B
6.(a) (i)	Award one mark for each of the following up to a maximum of two marks: 111111₂ 63₁₀ Accepted not expected.	2		1a		2			
	(ii) Award one mark for each of the following up to a maximum of two marks: - FFF₁₆ 4095₁₀	2		1a		2			
(b) (i)	Award one mark for the following: C 1000 + 1000	1		1b		1			
	(ii) Award one mark for the following: Number is too big to be stored in 4 bits	1		1b		1			
(c)	Award one mark for each of the following up to a maximum of two marks: - Arithmetic shift right - By 2 places - Replacing new numbers coming in from the left with 0 Accept example that illustrates the above.	2		1b		2			

Q	Answer	Marks	AO1	AO2	AO3	Total
7.(a)	Award one mark for each of the following up to a maximum of four marks: - Line 3 / Data type declaration of "perimeter" - Change: <code>perimeter</code> is real - Line 11 / Perimeter misspelling - Change: <code>perimeter</code> = 2 * (length * width) - Line 15 / area misspelling - Change: output "Area of the rectangle = ", <code>area</code>	4		1b		4
(b)	Award one mark for each of the following up to a maximum of two marks: - Line 11: Incorrect calculation of perimeter - use addition instead of multiplication <code>perimeter</code> = 2 * (length + width) - Line 12: Incorrect calculation of area - use multiplication instead of subtraction <code>area</code> = length * width	2		1b		2

Q	Answer	Marks	AO1	AO2	AO3	Total																																												
8.(a)	Indicative content	6		1b		6																																												
	<table><tr><th>FIELD NAME</th><th>DATA TYPE</th><th>EXAMPLE DATA</th><th>VALIDATION CHECK</th></tr><tr><td>Customer ID</td><td>Integer</td><td>12345</td><td>Presence check</td></tr><tr><td>First name</td><td>String</td><td>Sam</td><td>Presence check</td></tr><tr><td>Surname</td><td>String</td><td>Jones</td><td>Type Check</td></tr><tr><td>House Number</td><td>Integer</td><td>41</td><td>Type check</td></tr><tr><td>Address</td><td>String</td><td>William Street</td><td>Presence check</td></tr><tr><td>Postcode</td><td>String</td><td>CF41 9HG</td><td>Format check</td></tr><tr><td>Telephone number</td><td>String</td><td>02920 123456</td><td>Length check</td></tr><tr><td>Email address</td><td>String</td><td>sam.jones@e-mail.co.uk</td><td>Format check</td></tr><tr><td>Gender</td><td>Character</td><td>M</td><td>Length check</td></tr><tr><td>DOB</td><td>Date</td><td>23/1/2007</td><td>Range check</td></tr></table>						FIELD NAME	DATA TYPE	EXAMPLE DATA	VALIDATION CHECK	Customer ID	Integer	12345	Presence check	First name	String	Sam	Presence check	Surname	String	Jones	Type Check	House Number	Integer	41	Type check	Address	String	William Street	Presence check	Postcode	String	CF41 9HG	Format check	Telephone number	String	02920 123456	Length check	Email address	String	sam.jones@e-mail.co.uk	Format check	Gender	Character	M	Length check	DOB	Date	23/1/2007	Range check
	FIELD NAME						DATA TYPE	EXAMPLE DATA	VALIDATION CHECK																																									
	Customer ID						Integer	12345	Presence check																																									
	First name						String	Sam	Presence check																																									
	Surname						String	Jones	Type Check																																									
	House Number						Integer	41	Type check																																									
	Address						String	William Street	Presence check																																									
	Postcode						String	CF41 9HG	Format check																																									
	Telephone number						String	02920 123456	Length check																																									
	Email address						String	sam.jones@e-mail.co.uk	Format check																																									
	Gender						Character	M	Length check																																									
	DOB						Date	23/1/2007	Range check																																									
	• Award one mark for each <u>different</u> correct data type up to a maximum of three mark • Award one mark for each <u>different</u> correct validation check up to a maximum of three marks																																																	
(b)	Award one mark for each of the following up to a maximum of two marks: • It is not desirable that every user should be able to access all the data on a computer system. • User access levels are one method used to allow certain users read and/or write access to data on a computer system • An administrator will have read and write access to all data on the system. • Another user, however, will only have access to their own personal data. • User access levels will define which users can change and view, view but not change, or not view stored data. Accept any suitable example	2	1b			2																																												
							(i)																																											
(ii)	Award one mark for each of the following up to a maximum of two marks: • Encryption is the conversion of data that cannot be easily understood by people. • Original data is encrypted using a secret key. • The secret key is then used to decrypt the encrypted data.	2	1b			2																																												

Q	Answer	Marks	AO1	AO2	AO3	Total
9.	Award one mark for naming each facility and one mark for describing its use up to a maximum of six marks: • Editor ○ Allows a programmer to enter, format and edit source code. • Automatic formatting ○ Correctly indents code. • Automatic colour coding ○ Changes key words, literals and annotation to different colours • Linker ○ this is a program which allows previously compiled code, from software libraries, to be linked together. • Loader ○ this is a program which loads previously compiled code into memory. • Debugger ○ this is a program which helps locate, identify, and rectify errors in a program. • Syntax error detection ○ Highlighting syntax errors before code is translated. • Trace ○ this is a facility which displays the order in which the lines of a program are executed, and possibly the values of variables as the program is being run • Break point ○ this is a facility which interrupts a program on a specific line of code. • Variable watch ○ this is a facility which displays the current value of any variable. • Memory inspector ○ this is a facility which will display the contents of a section of memory • Threading ○ Allows user to see threads currently running. • Output Window ○ Allows users to see the runtime outputs of the program. DO NOT accept line numbers	6	1b			6

Q	Answer	Marks	AO1	AO2	AO3	Total
10.(a)	SPYWARE installs malicious software without consent, letting cybercriminals secretly gather sensitive information like keystrokes, browsing habits, and personal data.	1		1a		4
(i)						
(ii)	A BRUTE FORCE attack involves repeatedly guessing passwords until the correct one is found by trying all possible combinations.	1				
(iii)	A VIRUS is a harmful program that lays dormant in your system until you execute it or take some other required action, such as enabling macros on an infected file.	1				
(iv)	A TROJAN attack involves deceptive software that disguises itself as legitimate, providing unauthorised access for activities like data theft or remote control.	1				
(b)	Award one mark for the following up to a maximum of two marks:	2	1b			4
(i)	- The tester work with the organisation - The tester has comprehensive knowledge of the target system's architecture, design, and source code - This approach allows for a more focused and thorough examination of specific vulnerabilities - making it effective for identifying deeper and more complex issues within the system.					
(ii)	Award one mark for the following up to a maximum of two marks:	2				
	- The tester has limited or no prior knowledge of the target system - This approach helps assess how well a system can withstand attacks from external sources, identifying vulnerabilities that an external attacker might exploit - It provides a more realistic assessment of a system's security posture from an outsider's point of view.					

Q	Answer	Marks	AO1	AO2	AO3	Total
11.	Indicative content Text - When characters are stored on a computer system, they are stored as a binary number. - A character set is a table that maps a character with a unique binary number. - ASCII - Unicode Graphics Bitmap - RGB colour uses three colour components for each pixel. - A bitmap graphic stores the colour of every individual pixel in a 2D array - The number of colours that an image can represent depends on its colour depth - A black and white image has a colour depth of 1 - The simplest grey scale image would have a colour depth of 2 - representing four colours - Increasing the colour depth will increase the amount of storage needed to store the image - but will result in a better-quality image. Vector - Vector graphics use mathematical formulas to represent images - They are made up of paths, such as lines, curves, and shapes - Scalable without loss of quality – can be resized infinitely without becoming pixelated - Ideal for logos, icons, and illustrations that need to be sharp at any size - Typically use less storage space than bitmap images for simple designs. Sound - Sampling is a method of converting an analogue sound signal into a digital file. - At specific intervals (frequency – bit rate) - a measurement of the amplitude (bit depth) of the signal is taken - The amplitude of each sound sample is converted into the equivalent binary number.	12	1b			12

Q	Answer	Marks	AO1	AO2	AO3	Total
	Compression • Lossy Compression: ○ Lossy compression reduces file size by discarding some of the data. ○ Decompressing the file does not exactly reconstruct the original data / some information is permanently lost. • Lossless Compression: ○ Lossless compression retains all the original data, and the decompressed file is identical to the original. ○ Compression and decompression processes are reversible without any loss of information. • Text Compression: ○ Run-Length Encoding (RLE): Replaces sequences of the same character with a single character and a count. ○ Huffman Coding: Assigns shorter codes to more frequently used characters, reducing the overall length of the representation. ○ Lempel-Ziv: Identifies repeated sequences of characters and replaces them with references to a single copy. • Graphics Compression: ○ JPEG: Lossy compression for images, particularly photographs, by reducing detail and colour information. ○ PNG: Lossless compression for images, often used for graphics with transparency or sharp edges. ○ GIF: Uses a form of lossless compression and is suitable for simple graphics and images with limited colours. ○ Vector Graphics: Instead of storing individual pixels, vector graphics store mathematical descriptions of shapes, reducing file size. • Sound Compression: ○ MP3: Lossy compression for audio files by removing frequencies that may not be easily perceptible to the human ear. ○ AAC: Similar to MP3 but often provides better sound quality at lower bit rates. ○ FLAC: Lossless compression for audio files, preserving the original audio quality without any loss. ○ OGG Vorbis: A lossy audio compression format that aims to provide high-quality sound while maintaining a smaller file size.					

Band	AO1.1b (Max 12 marks)
	9 - 12 marks
3	The candidate has: • shown clear understanding of the requirements of the question and a clear knowledge of the indicative content. Clear knowledge is defined as a response that provides nine to eleven relevant detailed points from the indicative content. • addressed the question appropriately discussing the digital storage and compression. • used appropriate technical terminology referring to the indicative content accurately.
2	5 - 8 marks The candidate has: • shown adequate understanding of the requirements of the question and a satisfactory knowledge of the indicative content. Satisfactory knowledge is defined as a response that provides four to eight points from the indicative content. • addressed the question by discussing at least two from the digital storage and/or compression. • used appropriate technical terminology referring to the indicative content.
1	1 - 4 marks The candidate has: • attempted to address the question but has demonstrated superficial knowledge of the indicative content. Superficial knowledge is defined as a response that provides one to three points from the indicative content. • addressed the question by discussing only one digital storage or compression method. • used limited technical terminology referring to the indicative content
0	0 marks Response not credit worthy or not attempted.

	Marks	AO1	AO2	AO3	Total
TOTAL	100	52	48	0	100