



GCSE MARKING SCHEME

SUMMER 2024

**COMPUTER SCIENCE - COMPONENT 1
C500U10-1**

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
EDUQAS GCSE COMPUTER SCIENCE**

COMPONENT 1: UNDERSTANDING COMPUTER SCIENCE

SUMMER 2024 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

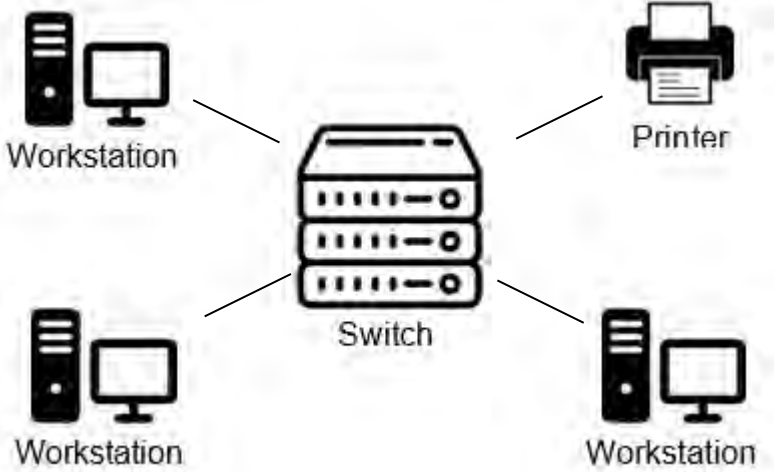
Once the band has been decided, examiners can then assign a mark. During standardising (marking conference), detailed advice from the Principal Examiner on the qualities of each mark band will be given. Examiners will then receive examples of answers in each mark band that have been awarded a mark by 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	AO1	AO2	AO3	Total
1 (a)	Award one mark for the following: - This stage involves scanning the source code character-by-character and tokenising it based on language rules and patterns - Lexical - This stage examines a program's meaning and determine if it adheres to the norms and rules of the programming language being used - Semantic - This stage examines a series of tokens to see if they adhere to a language's grammar rules. It is also known as parsing – Syntax	3			3
1 (b)	Award one mark for naming the error and up to a maximum of two marks for each description: - Syntax error - An error that occurs when a command does not follow the expected rules / syntax of the language - e.g. when a keyword is incorrectly spelt. - Logical error - A logical error is a mistake in the program instructing the program to do the wrong thing - so the program works but produces the wrong output. - Runtime / Execution error - An execution error is when the program unexpectedly stops - as a result of an invalid operation during execution. - Rounding error - A rounding error is when the program rounds a real number to a fixed number of decimal places - resulting in losing some information as the number becomes less accurate. - Truncation error - A truncation error is when the program truncates a real number to a fixed number of decimal places - resulting in losing some information as the number becomes less accurate - Linking error - A linking error occurs when a compiler can't find the sub procedure - as the programmer might have declared it incorrectly / did not instruct the compiler to include the sub program (library) in the code. Accept other suitable examples of programming errors	6			6

Q	Answer	AO1	AO2	AO3	Total
2 (a)	Award one mark for the following: OR Accept A + B		1		1
2 (b) (i)	Award one mark for the following: $R.\bar{S}$		1		1
2 (b) (ii)	Award one mark for the following: $\overline{X + Y}$		1		1
3 (a)	Award one mark for the following: - A remote data storage service accessed over the internet - Cloud - The use of laser technology to store and retrieve data on discs such as CDs, DVDs, and Blu-ray - Optical - A type of data storage technology that stores information on rotating disks or tapes – Magnetic	3			3
3(b)	Award one mark for each of the following, up to a maximum of four marks - Fast data access times / faster than traditional mechanical hard drives - Faster boot and load times for operating systems and applications - Low power consumption / more energy efficient - No moving parts / more durable / less prone to physical damage / improved shock resistance - Longer lifespan compared to mechanical hard drives - Quiet operation - Smaller form factor, allowing for smaller and lighter devices / aids portability - Consistent performance even in high-use scenarios - Supports TRIM command for optimised write performance in solid state drives (SSDs) - Higher endurance for read/write operations compared to traditional hard disk drives (HDDs).	4			4
4 (a)	Award one mark for each correct simplification, up to a maximum of two marks: $X.(X) + Y.(1 + X)$ $X + Y.(1 + X)$ Award three marks for the correct simplification: $X + Y$ Award 0 marks where it is clear that a truth table has been used to simplify the expression. Ignore truth tables used to check accuracy		3		3

Q	Answer	AO1	AO2	AO3	Total
4 (b)	Award one mark for each correct simplification, up to a maximum of four marks: • $B.B + B.A + A.B + A.A$ • $B + B.A + A.B + A$ • $B + A.B + A$ • $B.(1 + A.B) + A$ Award five marks for the correct simplification: • $B + A$ Award 0 marks where it is clear that a truth table has been used to simplify the expression. Ignore truth tables used to check accuracy.		5		5
5 (a) (i)	Award one mark for the following: 		1		1
5 (a) (ii)	Award one mark for each of the following, up to a maximum of three marks: • Good performance / fast network speed • Easy to set up • Possible to add more nodes / devices without taking the network down • Scalability • Any non-centralised failure will have very little effect on the network • Minimal network collisions / reduced bottleneck • Better security.	3			3

Q	Answer	AO1	AO2	AO3	Total															
5 (b)	Award one mark for each protocol and one marks for each purpose, up to a maximum of four marks: - Ethernet - Defines standards for network communications used at the physical layer (and corresponding transmission speeds) - IP - A protocol that sets out the format of packets and an addressing system - TCP - A protocol that allows packets to be sent and received between computer systems - HTTP - HTTP is a protocol than can be used to transfer multimedia web pages over the internet - HTTPS - HTTPS is a protocol than can be used to <u>securely</u> transfer multimedia web pages over the internet - FTP - A protocol that can be used when copying a file from one location to another via a network or the internet - SMTP - A protocol used to send email messages to an email server. - IMAP - An email protocol that stores email messages on a mail server - POP3 - A protocol used to receive email messages to an email server.	4			4															
6	Award one mark for each correct cost <u>and</u> route, up to a maximum of four marks: <table><tr><th>Destination</th><th>Lowest Cost</th><th>Route</th></tr><tr><td>B</td><td>3</td><td>A > C > B</td></tr><tr><td>C</td><td>2</td><td>A > C</td></tr><tr><td>D</td><td>6</td><td>A > C > D</td></tr><tr><td>E</td><td>11</td><td>A > C > D > E</td></tr></table>	Destination	Lowest Cost	Route	B	3	A > C > B	C	2	A > C	D	6	A > C > D	E	11	A > C > D > E		4		4
Destination	Lowest Cost	Route																		
B	3	A > C > B																		
C	2	A > C																		
D	6	A > C > D																		
E	11	A > C > D > E																		
7 (a) (i)	Award one mark for the following: B7₁₆		1		1															

Q	Answer	AO1	AO2	AO3	Total
7 (a) (ii)	Award one mark for the following: • $4B_{16}$		1		1
7 (b)	Award one mark for each of the following, up to a maximum of four marks: • 28_{10} 00011100_2 • 115_{10} 01110011_2 • Carry 111 • Answer 10001111_2		4		4
7 (c)	Indicative content • $\begin{array}{r} 11010010_2 \\ 11111100_2 \\ \hline 111001110_2 \end{array}$ Award one mark for each of the following • Choosing two suitable binary numbers that produce an overflow • Correct binary addition of chosen numbers • Identification that number too big to be stored in the register / left-most bit cannot be stored.	3			3
8	One-dimensional array Award one mark for each of the following, up to a maximum of two marks: • A collection of elements • Each element is identified by an index / subscript • The elements are stored in contiguous memory locations • Stores data of a single type. Award one mark for a suitable 1D array example. Two-dimensional array Award one mark for each of the following, up to a maximum of two marks: • An array of arrays / element of the outer array is an array in itself • Elements are stored in rows and columns • It can be accessed using two indices • It can only store data of a single type. Award one mark for a suitable 2D array example.	6			6

Q	Answer	AO1	AO2	AO3	Total
9 (a) (i)	Award one mark for the following: TRACE 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.	1			1
9 (a) (ii)	Award one mark the following: DEBUGGER is a program which helps locate, identify and rectify errors in a program.	1			1
9 (a) (iii)	Award one mark for the following: A program which allows previously compiled code, from software libraries, to be joined together is called a LINKER.	1			1
9 (a) (iv)	Award one mark for each of the following, up to a maximum of four marks: STATEMENT COMPLETION is a context-aware feature that speeds up the process of writing code by reducing typos and other common mistakes.	1			1
9 (b) (i)	Award one mark for each of the following, up to a maximum of two marks: - Interrupts / stops a program on a specific line of code - Allows the programmer to compare the values of variables against expected values - The program code can then usually be executed one line at a time - This is called single-stepping	2			2
9 (b) (ii)	Award one mark for each of the following, up to a maximum of two marks: - A facility that displays the current value of any variable - The value can be 'watched' as the program code is single-stepped to see the effects of the code on the variable - Alternatively, a variable watch may be set which will interrupt the program flow if the watched variable reaches a specified value.	2			2

Q	Answer	AO1	AO2	AO3	Total
10	Indicative content <pre> 1 Declare seaLevelAnalysis 2 set totalChange = 0.00 3 set totalReadings = 0 4 set mean = 0.00 5 set largestIncrease = 0.00 6 set smallestIncrease = 10.00 7 8 do 9 output "Enter reading: " 10 input reading 11 if val(reading) = reading then 12 totalChange = totalChange + reading 13 totalReadings = totalReadings + 1 14 15 if (reading > largestIncrease) then 16 largestIncrease = reading 17 end if 18 19 if (reading < smallestIncrease) then 20 smallestIncrease = reading 21 end if 22 else 23 "Please enter a valid reading." 24 end if 25 while (user has more readings to enter) 26 27 mean = totalChange / totalReadings 28 29 output "Total change over time = ", totalChange, " mm" 30 output "Number of readings = ", totalReadings 31 output "Mean change = ", mean, " mm" 32 output "Largest increase = ", largestIncrease, " mm" 33 output "Smallest increase = ", smallestIncrease, " mm" 34 End Subroutine </pre> Award one mark for each of the following, up to a maximum of ten marks: • Declare / initialise variable(s) • Input reading • Validate reading • Loop for several readings • Correctly determine total overall change • Correctly determine number of readings • Correctly determine mean • Correctly determine largest increase • Correctly determine smallest increase • Correct string handling for one output, e.g. Largest monthly increase = " + "mm".			10	10

Q	Answer	AO1	AO2	AO3	Total
11	Award one mark for each of the following, up to a maximum of two marks: • Providing clear and comprehensive guidelines / rules / expectations for employees to follow in the workplace • Promoting a culture of professionalism / respect / integrity. Award one mark for each of the following, up to a maximum of five marks: • An introduction - purpose and scope of the code • Organisation's values and ethical principles • Guidelines for workplace behaviour, including: - o Conflict of interest - o Discrimination and harassment - o Confidentiality and privacy - o Use of company resources - o Gifts and gratuities - o Reporting of violations • Explanation of consequences for violating the code • Information on how employees can seek guidance and report violations • A signature page for employees to acknowledge their understanding and agreement to comply with the code.	6			6
12 (a)	Award one mark for each of the following: • An interface with an ability to respond to natural language input in real-time – Voice-driven • An interface that allows for user interaction through the use of visual elements, such as buttons and icons - GUI • An interface that can often involve a non-graphical way of inputting and receiving information – CLI / Voice-driven	3			3
12 (b) (i)	Award one mark for each of the following, up to a maximum of two marks: • Ensures that different processes can utilise the CPU • Ensures that different processes do not interfere with each other or crash • Ensures that all tasks appear to run simultaneously.	2			2

Q	Answer	AO1	AO2	AO3	Total
12 (b) (ii)	Award one mark for each of the following, up to a maximum of three marks: • The operating system keeps track of interrupt requests (from various devices / software such as the keyboard, mouse, and network card) • The operating system prioritises the interrupts based on their urgency • When an interrupt is received, the operating system temporarily stops the current task • The operating system then transfers control to the appropriate interrupt service routine (ISR) to handle the request • The ISR performs the necessary operations to complete the request and sends a signal to the operating system indicating that the interrupt has been handled • The operating system then restores the previous task and resumes its execution.	3			3
13 (a)	Award one mark for each of the following, up to a maximum of three marks: • Allows public authorities to conduct surveillance and intercept communications • It is used for the purpose of preventing or detecting crime / ensuring national security / protecting public safety • Governs the use of investigatory powers by public authorities • Outlines the types of surveillance activities that are allowed and requires prior authorisation • RIPA requires public authorities to demonstrate the necessity of the use of covert surveillance and interception powers • The act provides for safeguards to protect individuals' rights and freedoms • The act provides for the protection of sensitive information obtained and restricts its use and disclosure • Misuse of investigatory powers or disclosure of sensitive information is a criminal offense under RIPA.	3			3

Q	Answer	AO1	AO2	AO3	Total
13 (b)	Award one mark for each of the following, up to a maximum of three marks: • Regulates the telecommunications industry • Ensures access to basic communication services for all • Ensures consumer protection • Modernises policies to adapt to technological advancements • Promotion of competition in the sector • Technical standards for service quality and reliability • The act sets out the legal framework for employers to monitor communications • It stipulates the conditions under which such monitoring is lawful • It defines the procedures and requirements for obtaining authorisation for monitoring communications.	3			3

Q	Answer	AO1	AO2	AO3	Total
14	Indicative content Clock speed - PC 2 has a faster clock speed. It will be able to: - run the fetch-decode-execute cycle faster than PC 1 - process more instructions - PC 2 will require more power which creates greater requirements for heat dissipation and costs more to run. Number of cores - PC 1 has a 12-core CPU, which means it is able to process twelve instructions at the same time, - whereas PC 2 is an 8-core CPU and eight instructions may be processed at the same time - Performance may be affected where one core is waiting on the result of another and therefore cannot carry out any more instructions, leading to the performance of PC 2 being no better than PC 1 Cache size - PC 2 has more cache memory than PC 1, which improves the performance as it can: - provide more instructions and data to the CPU - at a much faster rate than other system memory such as RAM - PC 2 will allow more instructions that are repeatedly used by the CPU to be stored - and therefore has a better hit rate than PC 1; increasing performance as a result. Memory - PC 1 has more RAM than PC 2 - This means that it can store more currently running programs and data - Lead to better multitasking capabilities - Less likelihood of needing to use virtual memory Secondary storage - PC1 has less secondary storage space than PC 2 - PC1 uses an SSD drive which has: - A faster disk access speeds than the HDD - Is more durable than the HDD - Due to no moving parts - More expensive costs per bit. Similarities - Both computers have the same graphics card / Windows 11 Home, WiFi and a 3-year warranty, providing a similar user experience and peace of mind for hardware issues.		8		8

Q	Answer		AO1	AO2	AO3	Total
	Band	AO2.1b (Max 8 marks)				
		7 - 8 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 seven to eight relevant detailed points from the indicative content • addressed the question appropriately comparing the two specifications. • used appropriate technical terminology referring to the indicative content accurately.				
	2	3 - 6 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 three to six points from the indicative content. • addressed the question, comparing the two specifications. • used appropriate technical terminology referring to the indicative content.				
	1	1 - 2 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 two points from the indicative content. • used limited technical terminology referring to the indicative content				
	0	0 marks Response not credit worthy or not attempted.				
TOTAL			60	30	10	100