

GCE

Computer Science

H046/01: Computing principles

AS Level

Mark Scheme for June 2025

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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MARKING INSTRUCTIONS**PREPARATION FOR MARKING
SCORIS**

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training: OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor
3. Log-in to RM Assessor and mark the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

MARKING

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the RM assessor 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone or the RM assessor messaging system, or by email.
5. **Crossed Out Responses**
Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

Rubric Error Responses – Optional Questions

Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

Multiple Choice Question Responses

When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).

When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only **one mark per response**)

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth **two or more marks**)

If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)

Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add a tick to confirm that the work has been seen.
7. There is a NR (**No Response**) option. Award NR (No Response):
 - if there is nothing written at all in the answer space
 - OR if there is a comment which does not in any way relate to the question (e.g., 'can't do', 'don't know')
 - OR if there is a mark (e.g., a dash, a question mark) which is not an attempt at the question.

Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

8. The RM assessor **comments box** is used by your team leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
If you have any questions or comments for your team leader, use the phone, the scoris messaging system, or e-mail.
9. *Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.*
10. For answers marked by levels of response: **To determine the level** – start at the highest level and work down until you reach the level that matches the answer
- a. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

11. Annotations

Annotation	Meaning
	Omission mark
	Benefit of the doubt
	Incorrect point
	Off page comment
	Follow through
	Not answered question
	No benefit of doubt given
	Point being made
	Repeat
Highlight	Highlight
	Correct point
	Too vague
	Zero (big)
	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	Level 1
	Level 2
	Level 3

12. Subject Specific Marking Instructions

Question		Answer	Mark	Guidance								
1	(a)	1 mark for each correct register. <table border="1" style="margin-left: 20px;"> <tr> <td style="text-align: center;">Register A</td> <td>PC // Program Counter</td> </tr> <tr> <td style="text-align: center;">Register B</td> <td>MAR // Memory Address Register</td> </tr> <tr> <td style="text-align: center;">Register C</td> <td>MDR // Memory Data Register</td> </tr> <tr> <td style="text-align: center;">Register D</td> <td>CIR // Current instruction Register</td> </tr> </table>	Register A	PC // Program Counter	Register B	MAR // Memory Address Register	Register C	MDR // Memory Data Register	Register D	CIR // Current instruction Register	(4)	Accept Memory buffer register for B
Register A	PC // Program Counter											
Register B	MAR // Memory Address Register											
Register C	MDR // Memory Data Register											
Register D	CIR // Current instruction Register											
1	(b)	(i) More/multiple (F-D-E) cycles can be completed at the same time.	(1)									
		(ii) More (F-D-E) cycles can be completed per second /per unit time.	(1)									
2		Mark Band 3–High Level (7-9 marks) The candidate demonstrates a thorough knowledge of all roles of an operating system and are able to justify why they are necessary for the accountant’s situation. All detail is generally accurate and relevant. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate will come to a clear conclusion that must be justified by their comments <i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i>	(9)	Indicative content AO1 <ul style="list-style-type: none"> • Resource management - Allows multiple processes to share the same processor(s). Can have different scheduling algorithms depending on the needs of the server. Allows Multi-tasking. Allows multiple processes to share the same primary storage. • File management- The OS will manage the storage of files on the secondary storage. 								

		<p>Mark Band 2-Mid Level (4-6 marks) The candidate demonstrates reasonable knowledge of most roles of an operating system and will have applied them to this context; the material is generally accurate but at times underdeveloped. The candidate may not have fully justified this importance. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation. The candidate will attempt to come to a conclusion, although it may not be fully justified by their answer,</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.</i></p> <p>Mark Band 1-Low Level (1-3 marks) The candidate demonstrates a basic knowledge how operating systems work and has made some attempt at applying this knowledge. The material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides nothing more than an unsupported assertion.</p> <p><i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p>0 marks</p>	<ul style="list-style-type: none"> • Interrupt Handling - Allows processes to request immediate access to the processor based in priorities. • Security – Provides a means of protecting the system from unauthorised use by requiring a username/password before using the system. Provides user access levels to allow certain resources to be usable to restricted to certain users or groups of users • Providing a platform for software to run – Allows different software to be loaded from file stores into primary memory and provides access to processors for the code. • User Interface - Allows user access to the hardware and software on the computer system. <p>AO2</p> <ul style="list-style-type: none"> • Resource management- A number of services will need to run simultaneously, such as web server and file server. • File management- As they are using the server to manage files the file management will need to allow for fast seeking and retrieval of files. • Interrupt Handling – A machine that is running multiple server processes that will be accessing a number of peripherals will need to allow interruptible access to
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		<p>No attempt to answer the question or response is not worthy of credit.</p>	<p>processing resources to allow smooth running.</p> <ul style="list-style-type: none"> • Security - As this server will contain all their client files they will need to make sure they are protected. Reference to DPA. As there are a lot of employees they will want to look at allowing different staff access to different resources • Providing a platform for software to run – As the machine is designed to run multiple servers it needs to be able to load in multiple programs and allow them access to processing resources. • User Interface - As it is a server, a GUI would be an unnecessary waste of resources. A text based UI would be more efficient <p>AO3</p> <ul style="list-style-type: none"> • Resource management - As they are placing it all on one machine the ability to manage multiple processes is essential • File management- As the server will be storing sensitive files the organisation of these files will be essential. • Interrupt Handling – As devices are swapped in or out the OS needs to be able to respond to interrupts when they are ready.
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					<ul style="list-style-type: none"> • Security - It will be a legal requirement to protect client data, so it is essential that the OS is able to maintain this security. • Providing a platform for software to run – As the system is running multiple processes and may need to run more as the companies needs grow the ability to dynamically allow software to load and change is crucial • User Interface - Only IT support would be directly accessing UI, so steep learning requirements of a text UI would not be a problem
3	(a)		<p>1 mark for each suitable method and 1 mark for suitable benefit up to a maximum of 4 marks:</p> <ul style="list-style-type: none"> • OMR E.g. • Answers can be quickly scanned • Reduces human error • Online Form E.g. • User input can be (automatically) validated • Results are easier to export/import 	(4)	<p>Mark in pairs.</p> <p>The benefit must match the data capture method stated.</p> <p>Accept Digital Form for Online Form</p> <p>Accept Survey/questionnaire for Form</p> <p>Do not accept meeting/interview</p>

			<ul style="list-style-type: none">• Form (Paper) E.g.<ul style="list-style-type: none">• Answers can be scanned by OMR• No technical knowledge needed• No need to consider devices / platforms• No internet connection required• OCR E.g.<ul style="list-style-type: none">• Answers can be quickly scanned		
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3	Question	Answer	Mark	Guidance
	(b)	<p>1 mark per bullet up to a maximum of 7 marks:</p> <ul style="list-style-type: none"> • Initialising variables for A, B and C and use of correct name for the array • Correct logic to loop through every row // column • Correct logic to check the value in the first column //row • Correct logic to check the value in the second and third columns//rows • Correct logic to increment the counter variables • Correct logic to determine the most selected option • Correct output of the most selected option and the value of this 	(7)	<p>If structure in the loop can be separate if statements instead of else if</p> <p>Accept [column,row] or [row,column] as long as consistent.</p> <p>Accept [row][column] as equivalent to [row,column]</p> <p>Example solution</p> <pre> a = 0 b = 0 c = 0 for row = 0 to 9 if resultsQ1 [row, 0] == True then a = a + 1 if resultsQ1 [row, 1] == True then b = b + 1 if resultsQ1 [row, 2] == True then c = c + 1 next row highestOption = "a" highestTotal = a if b > a then highestOption = "b" highestTotal = b if c > highesttotal then highestOption = "c" highestTotal = c print (highestOption) print (highestTotal) </pre>

				<p>Alternative approach</p> <pre>colNames=["A","B","C"] maxVotes=0 maxCol=0 for col=0 to 2 votes=0 for row=0 to 9 if resultsQ1[row,col] then votes=votes+1 endif next row if votes>maxVotes then maxVotes=votes maxCol=col endif nextCol print (colNames[maxCol]) print (maxVotes)</pre>
<p>4</p>		<p>Mark Band 3–High Level (7-9 marks) The candidate demonstrates a thorough evaluation of a wide range of considerations and are able to justify why they may cause a problem for the company’s plan. All detail is generally accurate and relevant. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate will come to a clear conclusion that must be justified by their comments</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Mark Band 2-Mid Level (4-6 marks)</p>	<p>(9)</p>	<p>Moral/Ethical issues</p> <ul style="list-style-type: none"> • Delivery drivers will lose their jobs • New drone technician jobs require technical skills • Drones may go over houses of people not being delivered to • There may be no guarantee that the product will be collected by the correct customer • Customers may have to pay higher prices for delivery. Lower income families may struggle.

		<p>The candidate demonstrates a reasonable evaluation of some considerations and will have applied them to this context with some justification as to the problems faced; the material is generally accurate but at times underdeveloped. The candidate may not have fully justified this importance.</p> <p>The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed.</p> <p>Evidence/examples are for the most part implicitly relevant to the explanation.</p> <p>The candidate will attempt to come to a conclusion, although it may not be fully justified by their answer,</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.</i></p> <p>Mark Band 1-Low Level (1-3 marks)</p> <p>The candidate demonstrates a basic evaluation of one or more considerations and has made some attempt at applying this knowledge. The material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided.</p> <p>The candidate provides nothing more than an unsupported assertion.</p> <p><i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p>0 marks</p> <p>No attempt to answer the question or response is not worthy of credit.</p>	<ul style="list-style-type: none"> • You may have to program the self-driving vehicle with rules to follow about how to handle accidents • There may be safety concerns with drones / cars injuring people or crashing into vehicles or objects Alternatively self-driving cars may be safer than overworked delivery drivers in a rush. <p>Legal issues</p> <ul style="list-style-type: none"> • Data about customers stored on the drones/vehicles needs to be protected • Drones may need to register with relevant aviation authority • Drone may not be able to fly in certain areas or certain times • If the self-driving vehicles are involved in a crash, it's not clear who is to blame <p>Environmental issues</p> <ul style="list-style-type: none"> • Drones may create noise/light pollution in the sky • Increased use of electric to charge the drones/vehicles • Increasing the use of drones/vehicles may increase the amount of e-waste in the future.
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5	(a)		B7	(1)	Correct Answer Only
5	(b)		<p>1 mark per bullet up to a maximum of 2 marks:</p> <ul style="list-style-type: none"> • 1 Mark for the correct answer 100111110 • 1 Mark for correct working out $ \begin{array}{r} 01010011 \\ 11101011 \\ \hline 100111110 \\ 1 \quad 11 \end{array} $	(2)	<p>Accept 00111110 with the leading one clearly having been removed through overflow.</p> <p>For BP2, allow any suitable method</p> <p>No marks for converting to denary and then adding without evidence of binary addition.</p>
5	(c)		<p>1 mark per bullet up to a maximum of 2 marks:</p> <ul style="list-style-type: none"> • 1 Mark for the correct answer 10110100 • 1 Mark for correct working out $ \begin{array}{r} 02 \quad 02 \\ 1\cancel{1}01\cancel{1}001 \\ 00100101 \quad - \\ \hline 10110100 \end{array} $	(2)	<p>For BP2, allow any suitable method</p> <p>No marks for converting to denary and then subtracting without evidence of binary subtraction.</p>

5	(d)		<p>1 mark for each correct match.</p> <table border="1" data-bbox="465 236 1285 389"> <thead> <tr> <th></th> <th>String</th> <th>Float</th> <th>Character</th> </tr> </thead> <tbody> <tr> <td>3.14</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>"j"</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>"Hello World"</td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table>		String	Float	Character	3.14		✓		"j"			✓	"Hello World"	✓			(3)	
	String	Float	Character																		
3.14		✓																			
"j"			✓																		
"Hello World"	✓																				
6	(a)		<p>1 mark for data type and 1 mark for reason.</p> <p>Data Type:</p> <ul style="list-style-type: none"> Integer/real/float/single/double <p>Reason:</p> <ul style="list-style-type: none"> To complete calculations 	(2)																	
6	(b)	(i)	<p>1 mark per bullet:</p> <ul style="list-style-type: none"> An array is static/cannot grow/shrink (at run-time) A list is dynamic/can grow/shrink Array values must be of the same type List values can be of different types 	(4)																	
6	(b)	(ii)	<p>1 mark per bullet up to a maximum of 5 marks:</p> <ul style="list-style-type: none"> Defining function and passing <code>steps</code> as parameter Initialising total to 0 Correct logic to loop though all items in array Correct logic to add each item to the total Correct logic for calculating and returning the average 	(5)	<p>maximum mark of 4 if the function does not return a value</p> <pre>function findAverage(steps) total = 0 for count = 0 to steps.length - 1 total = total + steps[count] next count average = total / 7 return average end function</pre>																

6	(c)		1 mark per bullet up to a maximum of 2 marks: <ul style="list-style-type: none"> • Only needs to be translated once... • ... saving time when the program is run • Generates an executable file ... • ... doesn't need a compiler/interpreter to run it • Reports all errors (syntax)... • ... to assist with debugging • The program may run faster... • ...as the executable code is run directly by the CPU 	(2)	Do not accept "translates all at once"
7	(a)		1 mark per bullet up to a maximum of 2 marks: <ul style="list-style-type: none"> • It has more bits // possible combinations • Can represent more characters/emojis • Can represent more worldwide languages or by example 	(2)	
7	(b)		1 mark per bullet up to a maximum of 2 marks: <ul style="list-style-type: none"> • Each character is stored using more bits • Increases file size 	(2)	

8	(a)		1 mark per bullet up to a maximum of 4 marks: <ul style="list-style-type: none"> • 1 mark for filling in the table correctly • 1 mark for the group shown in red • 1 mark for the group shown in green • 1 mark for the simplified expression $\neg C \vee (A \wedge \neg B)$ 	(4)	Zeros in the table can be left blank. Simplified expression is valid with or without the brackets Engineering notation is also acceptable.
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			<p>Solution:</p> <table border="1"> <tr> <td></td> <td></td> <td>AB</td> <td>AB</td> <td>AB</td> <td>AB</td> </tr> <tr> <td></td> <td></td> <td>00</td> <td>01</td> <td>11</td> <td>10</td> </tr> <tr> <td>CD</td> <td>00</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> <tr> <td>CD</td> <td>01</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> <tr> <td>CD</td> <td>11</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>CD</td> <td>10</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> </tr> </table>			AB	AB	AB	AB			00	01	11	10	CD	00	1	1	1	1	CD	01	1	1	1	1	CD	11	0	0	0	1	CD	10	0	0	0	1		
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CD	11	0	0	0	1																																				
CD	10	0	0	0	1																																				
8	(b)	i	XOR // Exclusive Disjunction // Excusive OR // EOR	(1)																																					
	(b)	ii	<p>1 mark for all correct outputs.</p> <table border="1"> <tr> <td>A</td> <td>B</td> <td>C</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </table>	A	B	C	0	0	0	0	1	1	1	0	1	1	1	0	(1)																						
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9	(a)		<p>1 mark per bullet up to a maximum of 2 marks:</p> <ul style="list-style-type: none"> • Protocols define rules/standards (plural) for transmitting data • Ensures data can be exchanged (reliably/successfully) between different devices 	(2)																																					

	(b)	1 mark per bullet up to a maximum of 2 marks: <ul style="list-style-type: none">• Create a connection between two devices• Agrees the communication settings• Add error correction data• Agrees the size of the <u>packets</u> they will send /receive.• Splits data into <u>packets</u>• Adds a <u>packet</u> number• Adds the total number of <u>packets</u>• Adds the sequence of <u>packets</u>• Adds the port number the <u>packets</u> should use	(2)	
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