

Cambridge International AS & A Level

COMPUTER SCIENCE**9618/11**

Paper 1 Theory Fundamentals

May/June 2026

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

This document consists of **17** printed pages.

General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: - the specific content defined in the mark scheme - the specific skills defined in the mark scheme or in the level descriptions - the standard of response required as exemplified by the standardisation scripts.
2	Examiners must award whole marks (not half marks, or other fractions).
3	Examiners must award marks positively . This means that: - marks are not deducted for errors or omissions - marks are awarded for correct/valid answers as defined in the mark scheme and also for other valid answers which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate - the quality of spelling, punctuation and grammar are judged only when the mark scheme indicates that these features are specifically assessed in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must consistently apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the full range of marks defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and must not award marks with grade thresholds or grade descriptions in mind.

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	Correct
	Incorrect
	To indicate where a key word/phrase/code is missing.
	Not relevant or used to separate parts of an answer.
	Indicates a part of the answer that is incorrect.
Highlighter	To draw attention to a particular aspect or to indicate where parts of an answer have been combined.
	Too vague.
	Repetition
	No examples or not enough.

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BOD	Benefit of Doubt.
NAQ	Not Answered Question.
SEEN	Indicates that work or a page has been seen including blank answer spaces and blank pages.
FT	Follow through.
I	Ignore

Question	Answer	Marks	Guidance																				
1(a)(i)	1 mark for each correct value <table border="1"> <thead> <tr> <th>Character</th><th>Denary</th><th>Binary</th><th>Hexadecimal</th></tr> </thead> <tbody> <tr> <td>☼</td><td>489</td><td>0001 1110 1001</td><td>1E9</td></tr> <tr> <td>@</td><td>64</td><td>0100 0000</td><td>40</td></tr> <tr> <td>Ω</td><td>911</td><td>0011 1000 1111</td><td>38F</td></tr> <tr> <td>Ψ</td><td>5590</td><td>0001 0101 1101 0110</td><td>15D6</td></tr> </tbody> </table>	Character	Denary	Binary	Hexadecimal	☼	489	0001 1110 1001	1E9	@	64	0100 0000	40	Ω	911	0011 1000 1111	38F	Ψ	5590	0001 0101 1101 0110	15D6	4	Correct answers only
Character	Denary	Binary	Hexadecimal																				
☼	489	0001 1110 1001	1E9																				
@	64	0100 0000	40																				
Ω	911	0011 1000 1111	38F																				
Ψ	5590	0001 0101 1101 0110	15D6																				
1(a)(ii)	1 mark for the identification - ASCII 1 mark for each difference to max 2 - There are fewer bits per character // ASCII has 7/8 bits per character, UNICODE has many more - Fewer different characters can be represented // ASCII only represents the Latin alphabet - ASCII Cannot be expanded indefinitely	3	Accept extended ASCII, or any other valid character set. English Language BOD																				
1(b)	107	1	Correct answer only																				

Question	Answer	Marks	Guidance
1(c)	1 mark for correct working - showing/working binary subtraction 1 mark for correct answer 0100 1101 Method 1: Change +30 to -30 and add 30 in binary: 0001 1110 Flip bits: 1110 0001 Add the 1: <u>1110 0001</u> Add -30: 0110 1011 <u>1110 0010</u> (1) 0100 1101 Method 2: Direct Subtraction 0110 1011 <u>-0001 1110</u> 0100 1101 11 1 Carries	2	No marks for converting to denary and back Method 1: Direct subtraction Needs to show the carries for the working mark Method 2: Change +30 to -30 and add Needs to show the conversion and the addition
1(d)	1 mark each - Binary is in powers of 2 whilst decimal is in powers of 10 - Any example of values e.g. Kibibyte is 1024 bytes whilst Kilobyte is 1000 bytes	2	Do not allow: Decimal uses the digits 0,1,2,3,4,5,6,7,8,9 binary only uses the digits 0 and 1 The question asks about binary and denary prefixes MP2: Binary is mebibyte, denary is megabyte is ok, binary is mebibyte, denary is kilobyte is not

Question	Answer	Marks	Guidance
2(a)	1 mark each to max 2 - To convert a high-level language to a low-level language/assembly/machine code - Computers use machine code and programmers use high-level languages - To allow the computer to process the coded statements	2	Accept human language for HLL in MP2 MP3: Read is NE
2(b)	1 mark for each benefit and 1 mark for an appropriate expansion to max 4 (2 × 2) For example: - Amend the code or debug in real time - and see the changes immediately instead of having to recompile - Stops as soon as an error is encountered - so the position of the error can be easily seen - Only one error is displayed at a time // no dependent errors generated - individual errors are easier to identify/debug/fix - Incomplete code can be tested/run - so the program does not need to be complete to see if it works/see the output	4	
2(c)	1 mark for a correct answer Assembler	1	Correct answer only

Question	Answer	Marks	Guidance								
2(d)	1 mark for each correct licence <table><tr><th>Software licence</th><th>Description</th></tr><tr><td>Shareware</td><td>The software is released on a trial period. After the trial period ends, a fee may be required to continue using the software.</td></tr><tr><td>Commercial // proprietary</td><td>The software is purchased for a fee. There is no access to the source code.</td></tr><tr><td>Open source initiative // free software</td><td>The software is released with the source code. The software can be changed and distributed with the changes under the same licence restrictions.</td></tr></table>	Software licence	Description	Shareware	The software is released on a trial period. After the trial period ends, a fee may be required to continue using the software.	Commercial // proprietary	The software is purchased for a fee. There is no access to the source code.	Open source initiative // free software	The software is released with the source code. The software can be changed and distributed with the changes under the same licence restrictions.	3	Do not accept copyleft for open source Do not accept freeware for open source
Software licence	Description										
Shareware	The software is released on a trial period. After the trial period ends, a fee may be required to continue using the software.										
Commercial // proprietary	The software is purchased for a fee. There is no access to the source code.										
Open source initiative // free software	The software is released with the source code. The software can be changed and distributed with the changes under the same licence restrictions.										

Question	Answer	Marks	Guidance												
3(a)	1 mark for each correct row <table><thead><tr><th>accumulator current data</th><th>set of instructions</th><th>new accumulator data</th></tr></thead><tbody><tr><td>B11001010</td><td>ADD B00000010 INC ACC</td><td>B11001101</td></tr><tr><td>#100</td><td>LDM #200 ADD 200</td><td>#301</td></tr><tr><td>#103</td><td>LDD 103 DEC ACC DEC ACC</td><td>#48</td></tr></tbody></table>	accumulator current data	set of instructions	new accumulator data	B11001010	ADD B00000010 INC ACC	B11001101	#100	LDM #200 ADD 200	#301	#103	LDD 103 DEC ACC DEC ACC	#48	3	Correct answers only
accumulator current data	set of instructions	new accumulator data													
B11001010	ADD B00000010 INC ACC	B11001101													
#100	LDM #200 ADD 200	#301													
#103	LDD 103 DEC ACC DEC ACC	#48													
3(b)(i)	1 mark for AND 1 mark for #0 // &0 // B00000000 Answer: AND B00000000 // AND &0 // AND #0	2	Accept correct shift instructions Bit manipulation so no load commands												
3(b)(ii)	1 mark for the correct answer 0000 0110	1	Correct answer only												

Question	Answer	Marks	Guidance
3(c)	1 mark for a correct name 1 mark for a matching description 1 mark for a reasonable example • Indirect • the operand stores the address where the data is found // the data is held in the address stored in the given address • example: LDI 23 loads the data in the address stored in address 23 • Indexed • the address is calculated by adding the operand to the contents of the index register • example: LDX 20 adds 20 to the contents of the index register to calculate the address	3	Do not accept Immediate, relative, direct, absolute, symbolic.

Question	Answer	Marks	Guidance
4(a)	1 mark for each correct point - CUSTOMER BORROW is a one-to-many relationship // 1:M - TOY_INSTANCE to TOY is a many-to-one relationship // M:1 - Identifying the correct Primary Key and matching Foreign Key in both relationships - Stating how the keys form the relationship	4	
4(b)	1 mark for each correct point - Selecting the contact name, customer ID and totalling the number of days - needs all 3 - Using an appropriate name - Linking or joining the correct tables - Grouping the results Example 1: <pre>SELECT CUSTOMER.ContactFirstName, CUSTOMER.CustomerID, SUM(NumberDays) AS TotalDays FROM BORROW, CUSTOMER WHERE CUSTOMER.CustomerID = BORROW.CustomerID GROUP BY CUSTOMER.CustomerID;</pre> MP1 MP2 MP3 MP4 Example 2: <pre>SELECT CUSTOMER.ContactFirstName, CUSTOMER.CustomerID, SUM(NumberDays) AS TotalDays FROM BORROW, INNER JOIN CUSTOMER ON CUSTOMER.CustomerID = BORROW.CustomerID GROUP BY CUSTOMER.CustomerID;</pre> MP1 MP2 MP3 MP4	4	CustomerID needs the table reference Accept any correct method of joining the tables, but no mix and match between methods

Question	Answer	Marks	Guidance
5(a)	1 mark for each point to max 3 - The image is made of pixels - Each pixel has one colour - Each colour has a unique binary code - The code for the colour of each pixel is stored in sequence / order	3	
5(b)	1 mark for each correct term - drawing object - property - drawing list A drawing object is an individual element of an image, for example: a line, a square. A property is an attribute of one part of the image, for example: a line colour, the width of a line. A drawing list is all of the elements that are included in the vector graphic.	3	

Question	Answer	Marks	Guidance
5(c)	No mark for the choice. 1 mark for each point for a matching justification to max 3 Bitmap image: • The logo might include something like a photograph • Bitmaps can be more detailed/precise/high quality • which may be more attractive/appealing on documents • Bitmaps can be edited more precisely • in case changes need to be made to the logo in future Vector graphic: • A logo should be made of simple shapes which are calculated mathematically • A vector graphic logo can be resized without pixelation • so, it could be used on different documents without losing quality • The file size is smaller than a bitmap image • so, the logo will not use excessive file storage if used in many documents	3	Justification must match the candidate's choice. No mix and match. Accept any sensible justification of their choice Accept other examples such as tee shirts for documents in MP3 and MP8

Question	Answer	Marks	Guidance															
6(a)	1 mark for each correct answer Y = NOT (B OR NOT C) Z = E NOR (NOT C XOR D)	2	Accept any recognized notation Accept Y = B NOR NOT C															
6(b)	1 mark for drawing a truth table with correct inputs 1 mark for the correct outputs in the NAND column <table border="1"><thead><tr><th>Input 1</th><th>Input 2</th><th>NAND</th></tr></thead><tbody><tr><td>0</td><td>0</td><td>1</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></tbody></table>	Input 1	Input 2	NAND	0	0	1	0	1	1	1	0	1	1	1	0	2	Ignore extra columns for working
Input 1	Input 2	NAND																
0	0	1																
0	1	1																
1	0	1																
1	1	0																

Question	Answer	Marks	Guidance
7(a)	1 mark for each point to max 2 - Data is not stored on the client computer // all data is stored on the server - The client computer is reliant on access to server - The client computer is heavily reliant on the network connection - The client computer requires few local resources, for example, memory / processing power / storage - The client computer performs minimal functions / processes	2	
7(b)(i)	1 mark for each point to max 5 Bus: - Both nodes are connected to a bus/cable - Data is broadcast on the cable - but is only accepted by the intended recipient Ethernet: - Uses the IP/MAC addresses of the two nodes - Ethernet transmits data as frames - Ethernet uses Carrier Sense Multi-Access / Collision Detection / CSMA/CD - The transmitting node listens to see if the line is free and only submits data when the line is free - The node waits a random time if a collision is detected and then tries to send again	5	Award a maximum of 4 marks if only Ethernet referenced
7(b)(ii)	1 mark for each point to max 2 - Bus networks are inefficient with a large number of nodes - because only one transmission can be on the line at once - Bus networks are inefficient with large numbers of simultaneous data transmissions - because of the need for nodes to wait for the line to be free - Bus networks are not easily scalable - If the bus/cable goes down the whole/part of the network is unusable - Transmissions are broadcast to all nodes, so could be privacy/confidentiality/security issues	2	The answer spaces are numbered, so mark the first answer in each space

Question	Answer	Marks	Guidance
7(c)(i)	1 mark for a complete answer It does not change and it is only visible/accessible within the network/LAN	1	The answer needs both static and private
7(c)(ii)	1 mark for each point to max 3 For example: - Subnetting splits a larger network into smaller/more manageable parts - The network has increased efficiency – just faster is NE - Congestion is reduced // fewer collisions happen - Security is improved - It can be more straightforward to isolate faults - Easier to scale a network with subnets	3	Accept any sensible benefit.