



Mark Scheme (Results)

Summer 2025

Pearson Edexcel GCSE

In Computer Science (1CP2/01)

Paper 01: Principles of Computer Science

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General marking guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed-out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Additional Guidance	Mark
1(a)(i)	<p>The only correct answer is A</p> <p><i>B is not correct because a kibibyte contains 8192 bits</i> <i>C is not correct because a mebibyte contains 8192 x 8192 bits</i> <i>D is not correct because a nibble contains 4 bits</i></p>	The correct answer is gibibyte	(1)

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	<p>Award one mark for any of the following:</p> <ul style="list-style-type: none"> • 2^7 (1) • 128 (1) • $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ (1) 	Allow equivalent	(1)

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	<p>Award one mark for:</p> <ul style="list-style-type: none"> • 71 (1) 		(1)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	<p>Award one mark for any of the following up to a maximum of two marks:</p> <ul style="list-style-type: none"> • Base 16 number (1) • Needs 16 different symbols to represent the range of values (1) • Hexadecimal uses the digits 0-9 (to represent values between denary 0 and 9) (1) • Hexadecimal uses the letters A-F (to represent values between denary 10 and 15) (1) • Each hexadecimal symbol requires 1 nibble/4 bits to represent it (1) • Because there are more (hexadecimal) digits/symbols than there are (denary) digits, it uses letters (1) 	<p>Do not award responses comparing hexadecimal to binary/denary</p> <p>Do not award responses indicating 'number' instead of 'digit', without clarification (0-9, A-F)</p> <p>Responses must be related to characteristics and not benefits or drawbacks of hexadecimal notation.</p>	(2)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	<p>Award up to two marks for a linked explanation such as:</p> <ul style="list-style-type: none"> Hexadecimal numbers are easy to understand/remember (1) because they contain fewer digits (than binary) (1) Hexadecimal numbers are easier to read/write (1) because they are not just 1s and 0s (1) Hexadecimal numbers are shorter/easier for programmers to read/write (1) because memory addresses are binary patterns (1) Hexadecimal numbers are less prone to error when entering values (1) because there are fewer symbols to type (1) Memory addresses are long binary patterns (1) so hexadecimal numbers are shorter/easier to read/write (1) 	<p>For both marks, the expansion must follow/associate with the statement.</p> <p>Do not accept 'easier' on its own without expansion as to what is easier.</p>	(2)

Question Number	Answer	Additional Guidance	Mark
1(c)(i)	<p>Award up to two marks for a linked explanation such as:</p> <ul style="list-style-type: none"> • Some frequencies/data can be removed permanently (1) because they are out of human hearing range (1) • Because the sounds/data outside the range of human hearing (1) can be completely removed (1) • Improves streaming (1) because it decreases the download time (1) • To achieve a higher compression ratio than lossless (1) because the sound will be understandable with some content removed (1) • More files can be saved (on a finite resource) (1) because it reduces the amount of storage space each file uses (1) 	<p>For both marks, the expansion must follow/associate with the statement.</p> <p>Do not award responses indicating quality of playback</p>	(2)

Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	Award one mark for each of the following: <ul style="list-style-type: none">• 315 and 923 in the numerator (1)• 7 in the numerator (1)• 8 in the denominator (1)	Award equivalent expressions	(3)

Question Number	Answer	Additional Guidance	Mark
1(d)(i)	<p>The only correct answer is C</p> <p><i>A is not correct because a shift has not been applied (0001 1100)</i> <i>B is not correct because 1101 1000 is the result of a left binary shift of 1</i> <i>D is not correct because 1011 0000 is the result of a left binary shift of 2</i></p>	The correct answer is: 0001 1011	(1)

Question Number	Answer	Additional Guidance	Mark
1(d)(ii)	<p>Award one mark for each nibble:</p> <p>0001(1) 1001(1)</p>	<p>Nibbles must be in the right order</p> <p>Each nibble must be 4 bits</p>	(2)

Question Number	Answer	Additional Guidance	Mark
1(d)(iii)	<p>Award one mark for each nibble:</p> <p>1111(1) 0011(1)</p>	<p>Nibbles must be in the right order</p> <p>Each nibble must be 4 bits</p>	(2)

Question Number	Answer	Additional Guidance	Mark
2(a)	<p>Award one mark for any of the following up to a maximum of two marks:</p> <ul style="list-style-type: none"> • Control water temperature (1) • Select wash cycle (1) • Control timer (1) • Lock door (1) • Display time left (1) • Optimise water usage (1) • Weigh the load/monitor soil levels (1) • Control spin/drum speed (1) 	<p>Allow any specific function of a washing machine that could be controlled by an electronic embedded system</p> <p>Do not award wash clothes as this function is given in the question</p> <p>Do not award statements such as 'spin speed', 'temperature', 'cold wash' on their own without indication that these things are being controlled i.e. do not accept copying a label from the picture.</p>	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	<p>Award one mark for any of the following:</p> <ul style="list-style-type: none"> • To store data/files/programs (1) • To backup data/files (in case of loss) (1) • To store BIOS/bootstrap/start up instructions (that are used when the computer is powered on) (1) • Non-volatile storage has higher capacity (than volatile) (1) • Non-volatile storage is more portable (than volatile) (1) 		(1)

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	<p>Award one mark for:</p> <ul style="list-style-type: none"> • Optical (1) 	Allow CD, DVD, Blu-ray Disc	(1)

Question Number	Answer	Additional Guidance	Mark
2(c)(i)	<p>Award one mark for any of the following up to a maximum of two marks:</p> <ul style="list-style-type: none"> • The source code is read/translated one line at a time (1) • The code is executed immediately after translation (1) • Errors are reported as soon as they are found (1) • Program translation/execution stops when an error is found (1) 	Responses must refer to how the interpreter translates code. Do not accept benefits/drawbacks or comparisons to compilers.	(2)

Question Number	Answer	Additional Guidance	Mark
2(c)(ii)	<p>Award one mark for any of the following up to a maximum of two marks:</p> <ul style="list-style-type: none"> • Mnemonics/key command words/shortened command words (1) • Hardware/chip/architecture specific / not portable across machines (1) • Manipulates contents of memory/registers/hardware features directly (1) • One assembly language instruction maps to one CPU operation/instruction (1) 	<p>Do not award:</p> <ul style="list-style-type: none"> • hard to learn or no tools • must be translated • is low level <p>Responses must relate to characteristics and not benefits or drawbacks relative to high-level languages.</p>	(2)

Question Number	Answer	Additional Guidance	Mark
2(c)(iii)	<p>Award one mark for:</p> <ul style="list-style-type: none"> • Audit trail/log (1) 	<p>Do not award:</p> <ul style="list-style-type: none"> • change log • version control <p>Responses must specify audit.</p>	(1)

Question Number	Answer	Additional Guidance	Mark
2(d)	<p>Award up to two marks for a linked description such as:</p> <ul style="list-style-type: none"> • Processes/programs/instructions/data (not using the CPU) are temporarily moved out of RAM/main memory (1) into secondary storage/on the hard disk/SSD (1) • When it is time for a process to use the CPU and it is stored in secondary storage/on hard disk/SSD (1) it is swapped back into RAM/main memory (1) • RAM/main memory is divided into pages (allocated to each process) (1) and a paging algorithm swaps processes between RAM/main memory and secondary storage/hard disk/SSD (1) 	<p>For both marks, the expansion must follow/associate with the statement.</p> <p>Do not award</p> <ul style="list-style-type: none"> • names of scheduling algorithms • RAM/memory being full 	(2)

Question Number	Answer	Additional Guidance	Mark
2(e)	<p>Award up to two marks for a linked explanation, such as:</p> <ul style="list-style-type: none"> • If a file is corrupted (1) content can be retrieved (1) • A file is corrupted (1) because of a hardware fault (1) • A file cannot be opened (1) because it is damaged/corrupted (1) • Files can be moved from one area of a disk to another/recovered (1) because part of the disk has been/is corrupted (1) • Reconstruct files/extract parts of a file (1) because part of the disk is corrupted (1) 	For both marks, the expansion must follow/associate with the statement.	(2)

Question Number	Answer	Additional Guidance	Mark
2(f)	<p>Award one mark for each correct cell:</p> <p>A. Control Unit/CU (1)</p> <p>B. Address Bus (1)</p> <p>C. Clock (1)</p> <p>D. Memory/Main Memory/RAM (1)</p>	Allow ROM for RAM	(4)

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	<p>The only correct answer is A</p> <p><i>B is not correct because gaining consent is an issue with collecting and storing data</i></p> <p><i>C is not correct because copyright is an issue with ownership of digital assets</i></p> <p><i>D is not correct as no intellectual property law is broken</i></p>	The correct answer is computer misuse	(1)

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	<p>Award one mark for any of the following up to a maximum of three marks:</p> <ul style="list-style-type: none"> • Consent must be obtained/given to collect data (1) • Individuals have a right to have data removed/withdraw consent (1) • Individuals have a right to see data held on them (1) • Data can only be collected for a specified purpose (1) • Only necessary data may be collected (1) • Data must be accurate (1) • Data must be kept up to date (1) • Data may not be kept for longer than necessary (1) • Data must be kept securely (1) • Data cannot be shared with third parties without consent (1) • Data controllers must be able to prove data protection measures are sufficient. (1) 		(3)

Question Number	Answer	Additional Guidance	Mark
3(b)	<p>Award one mark for any of the following:</p> <ul style="list-style-type: none"> • Source code is accessible (1) • Source code can be edited (1) • Source code can be amended/redistributed (1) • Support may not be provided (1) 	Do not award free/costs no money	(1)

3(c)(i)	<p>Award two marks for a linked explanation such as:</p> <ul style="list-style-type: none"> • Users are deterred from unsafe practices (1) because consequences are clarified (1). • People follow safe/good practices (1) because permitted activities are defined/set out (1). • Users will follow the rules of the policy (1) because they want to keep their files safe (1) 	<p>For both marks, the expansion must follow/associate with the statement.</p> <p>Accept responses that use examples. e.g. AUPs contain guidance such as to not open links from unknown sources (1) to prevent malware infection (1)</p>	(2)
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Question Number	Answer	Additional Guidance	Mark
3(c)(ii)	<p>The only correct answer is C</p> <p><i>A is not correct because a keylogger only records key strokes</i> <i>B is not correct because a trojan masquerades as another file type</i> <i>D is not correct because a worm runs by itself</i></p>	The correct answer is Virus	(1)

Question Number	Answer	Additional Guidance	Mark
4(a)	Award one mark for: <ul style="list-style-type: none"> • WAN/Wide Area Network (1) 	Allow internet, VPN	(1)

Question Number	Answer	Additional Guidance	Mark								
4(b)	<p>Award one mark for each correct cell:</p> <table><tr><th>Description</th><th>Network protocol</th></tr><tr><td>Allows two computers to establish a connection across a network</td><td>TCP / Transmission Control Protocol (1) Ethernet (1)</td></tr><tr><td>Allows connection to a network using radio waves</td><td>Wi-Fi / Wireless (1) Bluetooth (1) Zigbee (1)</td></tr><tr><td>Allows upload and download of files across a network</td><td>FTP / File Transfer Protocol (1) HTTP / HTTPS (1)</td></tr></table>	Description	Network protocol	Allows two computers to establish a connection across a network	TCP / Transmission Control Protocol (1) Ethernet (1)	Allows connection to a network using radio waves	Wi-Fi / Wireless (1) Bluetooth (1) Zigbee (1)	Allows upload and download of files across a network	FTP / File Transfer Protocol (1) HTTP / HTTPS (1)	Accept SSH for allows upload and download of files across a network.	(3)
Description	Network protocol										
Allows two computers to establish a connection across a network	TCP / Transmission Control Protocol (1) Ethernet (1)										
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Question Number	Answer	Additional Guidance	Mark
4(c)	<p>Award up to three marks for a linked description, such as:</p> <ul style="list-style-type: none"> • Employed/authorised by a company/owner of the network (1) to question/test employees about security (1) in order to report vulnerabilities/make recommendations (1) • May use penetration testing (1) to attack a network (1) in order to gain access (1) • Given a list of the organisation's websites (1) to see if they can identify vulnerabilities/open ports/SQL injection (1) to highlight security issues (1) • Given access to internal network (1) attempt to access unauthorised resources (1) to send data out of the organisation through the network (1) • Perform penetration testing (1) that can be black box without having any credentials (1) or white box with system details/credentials (1) 	<p>Accept three relevant points</p> <p>Do not accept 'hacking a network' in isolation. There must be a clear indication that 'hacking' is attacking/trying to gain access to a system in the context of this question.</p>	(3)

Question Number	Answer	Additional Guidance	Mark
4(d)	<p>Indicative content:</p> <p>Media</p> <p>Ethernet/wired connection</p> <ul style="list-style-type: none"> • Reliable because the cables are shielded from interference • Secure as it is difficult to intercept data/packets on physical wire • Consistent transmission speed • Low latency • Employees cannot move around while connected <p>Wireless</p> <ul style="list-style-type: none"> • Flexible/allows users to connect from anywhere in the office • Health and safety/no wires • Additional users can be added simply by giving them an access password • Subject to interference • Slows down if lots of devices added • Easy to intercept wireless transmissions • Blind spots/areas where there is no accessibility <p>Hybrid</p> <ul style="list-style-type: none"> • Combination of both, but need to clarify which type of connectivity is being described 	<p>Responses do not have to compare different media or topologies</p> <p>Do not allow server as equivalent to switch/central device</p> <p>Level 3 responses must cover both media and topology.</p>	(6)

Topology

Bus topology

- Easy to install, as long as no major building work is required
- Easy to install extra devices, as every device only needs a connector and a cable to join the bus
- Doesn't require much cable, as each device is attached directly to the main cable
- It could be used as a backbone for the attached Wi-Fi access points
- If the cable breaks, the whole network goes down
- The number of devices affects throughput, i.e. the more devices, the lower the throughput

Star topology

- Each node is separately connected to the central switch so failures don't affect other nodes
- Fast as packets can be sent directly to destination if it is connected to the same switch as the source
- Limited to the number of available connections on the central switch
- Uses a switch, which is the central device
- If switch goes down, then entire network goes down
- Data is only sent from the switch to the destination device

Mesh topology

- No central point of failure, as the devices are connected directly
- Data can be sent by many routes when one device is faulty
- Nodes have multiple connections, as each device may be connected directly to each other
- Can transmit and receive at the same time

	<ul style="list-style-type: none"> • Easy to add devices if the mesh is implemented in software • Hard to add devices when physical cables and network interface cards are required 		
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Level	Mark	Descriptor
	0	No rewardable content.
Level 1	1–2	<p>Basic, independent points are made, showing elements of understanding of key concepts/principles of computer science. (AO1)</p> <p>The discussion will contain basic information with little linkage between points made or application to the context. (AO2)</p>
Level 2	3–4	<p>Demonstrates adequate understanding of key concepts/principles of computer science. (AO1)</p> <p>The discussion shows some linkages and lines of reasoning with some structure and application to the context. (AO2)</p>
Level 3	5–6	<p>Demonstrates comprehensive understanding of key concepts/principles of computer science to support the discussion being presented. (AO1)</p> <p>The discussion is well developed, with sustained lines of reasoning that are coherent and logically structured, and which clearly apply to the context. (AO2)</p>

Question Number	Answer	Additional Guidance	Mark																																																												
5(a)	Award one mark for each of: <ul style="list-style-type: none">S = A AND C (1)T = B OR C (1)Correct values in column Q (1) <table><tr><th>A</th><th>B</th><th>C</th><th>S</th><th>T</th><th>Q</th></tr><tr><td></td><td></td><td></td><td>A AND C</td><td>B OR C</td><td>NOT S AND T</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td></tr></table>	A	B	C	S	T	Q				A AND C	B OR C	NOT S AND T	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	1	1	0	1	1	0	1	1	1	0	0	0	0	0	1	0	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1	0	Ignore capitalisation	(3)
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Question Number	Answer	Additional Guidance	Mark						
5(b)(i)	<p>Award one mark for each correct cell:</p> <table><tr><td></td><td>Line numbers</td></tr><tr><td>Traverses the records</td><td>17 (1)</td></tr><tr><td>Traverses the fields</td><td>19 (1)</td></tr></table>		Line numbers	Traverses the records	17 (1)	Traverses the fields	19 (1)		(2)
	Line numbers								
Traverses the records	17 (1)								
Traverses the fields	19 (1)								

Question Number	Answer	Additional Guidance	Mark
5(b)(ii)	<p>Award one mark for any of the following:</p> <ul style="list-style-type: none"> • if (item > currMax): (1) • item > currMax (1) 	<p>Do not award relational symbol only, as there is no indication which line the error is on</p> <p>Allow equivalent expressions: item >= currMax currMax < item currMax <= item</p>	(1)

Question Number	Answer	Additional Guidance	Mark																																																
5(c)	<p>Award one mark for each of the following:</p> <ul style="list-style-type: none"> • Number column is correct (goes from 1-6) (1) • Rows where number is 1, 2, 3 are correct (1) • Rows where number is 4, 5, 6 are correct (1) • Single accurate output only (1) <table border="1"> <thead> <tr> <th>number</th><th>remainder</th><th>total</th><th>output</th></tr> </thead> <tbody> <tr> <td></td><td></td><td>0</td><td></td></tr> <tr> <td>1</td><td>0</td><td>1</td><td></td></tr> <tr> <td>2</td><td>0</td><td>3</td><td></td></tr> <tr> <td>3</td><td>0</td><td>6</td><td></td></tr> <tr> <td>4</td><td>2</td><td>6</td><td></td></tr> <tr> <td>5</td><td>1</td><td>6</td><td></td></tr> <tr> <td>6</td><td>0</td><td>12</td><td></td></tr> <tr> <td></td><td></td><td></td><td>12</td></tr> <tr> <td></td><td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td><td></td></tr> </tbody> </table>	number	remainder	total	output			0		1	0	1		2	0	3		3	0	6		4	2	6		5	1	6		6	0	12					12													<p>Interpret empty cells as unchanged values</p> <p>Ignore spacing/empty cells on first bullet as long as numbers in sequence</p> <p>Other formats of trace table are acceptable</p>	(4)
number	remainder	total	output																																																
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5	1	6																																																	
6	0	12																																																	
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Question Number	Answer	Additional Guidance	Mark
5(d)(i)	<p>Award up to two marks for a linked explanation, such as:</p> <ul style="list-style-type: none"> When the target is the last item/is not in the array (1) because the number of comparisons equals the number of items in the array / every item in the array must be compared to the target (1) 	For both marks, the expansion must follow/associate with the statement.	(2)

Question Number	Answer	Additional Guidance	Mark
5(d)(ii)	<p>Award up to two marks for a linked explanation, such as:</p> <ul style="list-style-type: none"> Only one pass of the array is needed (1) because the array is already in order (1) A single pass will be done (1) because after one pass it can detect if the array is already sorted (1) No swaps are needed/detected (1) because the array is already sorted (1) 	For both marks, the expansion must follow/associate with the statement.	(2)

Question Number	Answer	Additional Guidance	Mark
5(e)	<p>Award one mark for each point for a maximum of six marks:</p> <ul style="list-style-type: none"> • 0 and 10 in first row (1) • Evidence of a calculation for midpoint that would result in 5 shown in first row (1) • N and lower in first row (1) • 6, 10, calculation/8, N, higher in second row (1) <p>Rounding down method</p> <ul style="list-style-type: none"> • 6, 7, calculation/6, N, lower in third row (1) • 7, 7, calculation/7, N, higher/none/<blank> in fourth row (1) <p>Rounding up method</p> <ul style="list-style-type: none"> • 6, 7, calculation/7, N, higher in third row (1) • 6, 6, calculation/6, N, lower/none/<blank> in fourth row (1) 	<p>Penalise only once on bullet 2 if mid-point value given instead of calculation shown</p> <p>For BP2 there needs to be some evidence of a calculation that would yield the result 5 for the first midpoint.</p> <p>Allow midpoint calculation method to be either rounding down or rounding up.</p>	(6)

Method 1: DIV 2 rounding down

Start index	End index	Calculation of mid-point	Found Y or N	Discard lower, higher or none
0	10	$(0 + 10) // 2 = 5$	N	lower
6	10	$(6 + 10) // 2 = 8$	N	higher
6	7	$(6 + 7) // 2 = 6$	N	lower
7	7	$(7 + 7) // 2 = 7$	N	(higher) none / <blank>
7	6			

Method 2: rounding up midpoint calculation

Start index	End index	Calculation of mid-point	Found Y or N	Discard lower, higher or none
0	10	$(0 + 10) / 2 = 5$	N	lower
6	10	$(6 + 10) / 2 = 8$	N	higher
6	7	$(6 + 7) / 2 = 6.5 \rightarrow 7$	N	higher
6	6	$(6 + 6) / 2 = 6$	N	(lower) none / <blank>
7	6			

