

Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE In Computer Science (4CP0/01)

Paper 01: Principles of Computer Science

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Summer 2025
Question Paper Log Number P78637A
Publications Code 4CP0_01_2506_MS
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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.

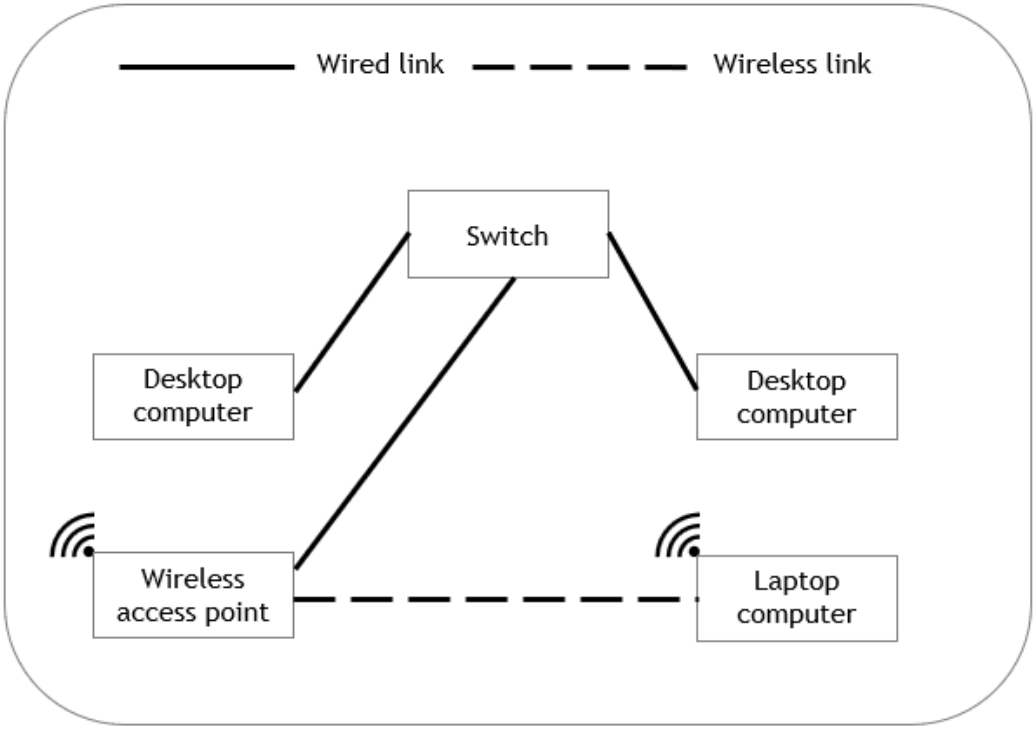
<table>
<tr><th>Question</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>1(a)</td><td>Award one mark for each correct row:

<table>
<tr><th>Statement</th><th>DNS</th><th>PAN</th><th>WAN</th><th>WWW</th></tr>
<tr><td>A network of networks not limited to a single location</td><td></td><td></td><td>✓</td><td></td></tr>
<tr><td>A network that connects devices within the range of a single user</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>A set of hypertext documents accessed through the HTTP protocol</td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td>A system that maps domain names to IP addresses</td><td>✓</td><td></td><td></td><td></td></tr>
</table></td><td>Do not award a mark for a row containing more than one tick.</td><td>4</td></tr>
<tr><th>Question</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>1(b)</td><td>Award one mark for each of:

• Transport (layer) (1)
• (Data) link / network link / network interface (layer) (1)</td><td>Accept
• transfer or transmission for Transport

Do not accept:
• Network layer and Application layer (in the question)
• Data access layer, Internet layer (alternative names for network layer)
• Data’ or ‘network’ without ‘link’ or ‘interface’</td><td>2</td></tr>
<tr><th>Question</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>1(c)</td><td>The only correct answer is D

A is not correct because HTTP is used to transfer hypertext
B is not correct because it is used to view email held on a server
C is not correct because it is used to download email from a server</td><td></td><td>1</td></tr>
</table>

Question	Answer	Additional Guidance	Mark
1(d)	Award **one** mark for each correct connection: • One solid line from wireless access point to switch (1) • One solid line from each desktop to switch (1) • One dashed line from laptop computer to wireless access point (1)  	No marks should be awarded if any additional lines have been drawn for each mark point. Do not double penalise (e.g. if you have penalised a second line from desktop to WAP then don't penalise extra line from WAP to desktop)	**3**

Question	Answer	Additional Guidance	Mark
1(e)	Award up to **two** marks for a linked description such as: • To find weaknesses in a system (1) fix/repair weakness (1) • To find vulnerabilities in a system (1) by testing the effectiveness of the security measures in place (1) • An ethical hacking attack on a network (1) to identify vulnerabilities / recommend measures/take action to improve security (1) • Tests whether users of the network (1) can be tricked into giving away information / giving criminals access to the network / downloading malware (1) • To test the system security (1) / sanctioned by the owner (1)	Explanation can be a combination of different marking points. E.g. MP1a and MP2b	**2**
		Total for question 1	**12**

Question	Answer	Additional Guidance	Mark
2(a)	Award **one** mark for any of the following up to a maximum of **two** marks: • (Touch)screen (1) • Speaker (1) • Vibration (motor) (1) • Flashlight/LED light/torch (1) • NFC chip (1)	**Accept:** • display for screen **Do not accept:** • monitor • printer • headset • other peripheral devices	**2**
Question	Answer	Additional Guidance	Mark
2(b)(i)	**The only correct answer is D** *A is not correct because cache is located closer to the CPU* *B is not correct because random-access memory is a physical card on the motherboard* *C is not correct because read-only memory cannot be written to*		**1**
Question	Answer	Additional Guidance	Mark
2(b)(ii)	Award **one** mark for any of the following up to a maximum of **two** marks: • Often held/stored remotely/stored on the internet (1) • Held/managed by a third party (1) • Requires internet connectivity to access (1)		**2**

Question	Answer	Additional Guidance	Mark
2(c)(i)	Award **one** mark for any of the following up to a maximum of **three** marks: • Clock speed/number of cycles per second (1) • Number of processor cores (1) • Size of cache (memory) (1) • Type of cache (1) • Width of data bus/word length (1) • Width of address bus (1) • Whether the CPU is overclocked or not (1) • Pipelining architecture (1) • Thermal throttling / cooling system (reducing clock speed) (1)	**Accept**: • units of clock speed e.g. GHz for MP1 • width of bus for either MP5 or MP6 but not both **Do not accept**: cache without clarification of size or type	**3**
Question	Answer	Additional Guidance	Mark
2(c)(ii)	Award up to **two** marks for a linked description such as: • The CPU places an address on to the address bus (1) to specify the location in main memory (1) • (The address bus) contains the location in RAM (1) to read from/write to (1) • The value in the memory address register (MAR) is placed on the address bus (1) to access the correct location in RAM (1) • The address bus carries the memory location (1) of the current/next instruction (1)	Explanation can be a combination of different marking points. E.g. MP1a and MP2b	**2**
Question	Answer	Additional Guidance	Mark
2(d)	Award **one** mark for any of the following up to a maximum of **two** marks: • Sub-atomic particles (1) • Qubit(s) (1) • Entanglement (1) behaviour of a pair of qubits can influence each other • Quantum parallelism (1) – allowing a quantum computer to evaluate multiple computational paths simultaneously	**Do not accept:** 'Qubits can exist in a state of 1 and 0 at the same time' as this is the same as 'superposition' given in the question	**2**
		Total for question 2	**12**

Question	Answer	Additional Guidance	Mark
3(a)(i)	Award **one** mark for each correct hexadecimal character in the correct order: • B9		**2**
Question	Answer	Additional Guidance	Mark
3(a)(ii)	**The only correct answer is B** *A is not correct because both are processed at the same speed by a computer* *C is not correct because both use the same amount of storage* *D is not correct because hexadecimal uses number base 16*		**1**
Question	Answer	Additional Guidance	Mark
3(a)(iii)	Award **two** marks for a linked description such as: • (logical/arithmetic) right shift (1) by 2 places (1)		**2**
Question	Answer	Additional Guidance	Mark
3(b)(i)	Award **one** mark for: Pixel/picture element (1)	Accept additional words. Accept incorrect spelling if word is recognisable as pixel	**1**

<table>
<tr><th>Question</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3(b)(ii)</td><td>Award one mark for each of:

• 16x16 pixels (1)
• Multiplying (16x16) by 2 bits per pixel in the numerator for colour depth (1)
• Dividing by 8 in the denominator to convert to bytes (1)
• Dividing 1000 by the number of bytes used for one image (1)

Example:

1000 / $\frac{16\ x\ 16\ x\ 2}{8}$ bytes

Allow follow-through</td><td>4 marks for any of:
1000 X 8 / 16 x 16 x 2
8000 / 256 x 2
1000 / 16 x 2 x 2
1000 / 16 x 4
8000 / 512</td><td>4</td></tr>
<tr><th>Question</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3(b)(iii)</td><td>Award up to two marks for a linked explanation such as:

• high compression ratio (1) repeated/continuous runs (of the same pixel colour) (1)
• requires less storage space (1) encoding 16W for line 1 (1)</td><td>Allow valid RLE examples from the image.

Explanation can be a combination of different marking points. E.g. MP1a and MP2b</td><td>2</td></tr>
<tr><th>Question</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3(c)</td><td>Award one mark for each correct cell:

<table><tr><th>Encrypted text</th><th>Plain text</th></tr><tr><td></td><td>RED</td></tr><tr><td></td><td>COT</td></tr></table></td><td>Ignore capitalisation
Must be correct spelling</td><td>2</td></tr>
<tr><td colspan="3">Total for question 3</td><td>14</td></tr>
</table>

Question	Answer	Additional Guidance	Mark
4(a)(i)	Award **one** mark for any of the following up to a maximum of **two** marks: • It has high bandwidth/transmission speed (1) • It has low latency (1) • It has low energy consumption (1) • It has high capacity (1) • It has high security (1)	Allow 'more users can be connected' for MP4	**2**
Question	Answer	Additional Guidance	Mark
4(a)(ii)	Award up to **two** marks for a linked description such as: • Biometric identifiers (fingerprint, iris, face) (1) matched against those stored in the app/database (1) • Two-factor authentication / 2FA (1) requiring users to enter a code delivered to a separate system (1) • Users can be asked for memorable information/security question (1) that only they will know the answer to (1)	System in MP2b may be on a separate device or a separate app	**2**
Question	Answer	Additional Guidance	Mark
4(a)(iii)	Award **one** mark for any of the following up to a maximum of **two** marks: • To identify any bad programming practices/shortcuts/bugs (1) • To highlight code vulnerabilities / enhance security (1) • To make sure code is robust/will deal with exceptions (1) • To make sure that good programming practices/company policies are maintained (1) • To assess the efficiency of the code (1) • To improve code quality (1) • To share good practice/new techniques (1)		**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>4(b)</td><td>Award one mark for each correct row:
<table>
<tr><th></th><th>8-bit binary pattern</th><th>Denary value</th></tr>
<tr><td>Lowest value</td><td>1111 1111</td><td>–127</td></tr>
<tr><td>Highest value</td><td>0111 1111</td><td>(+)127</td></tr>
</table></td><td></td><td>2</td></tr>
<tr><th>Question</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>4(c)(i)</td><td>Award one mark for each correct column:
<table>
<tr><th>O</th><th>S</th><th>P</th><th>O AND S</th><th>NOT P</th><th>(O AND S) AND (NOT P)</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td></tr>
</table></td><td></td><td>3</td></tr>
<tr><th>Question</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>4(c)(ii)</td><td>Award up to two marks for a linked explanation such as:

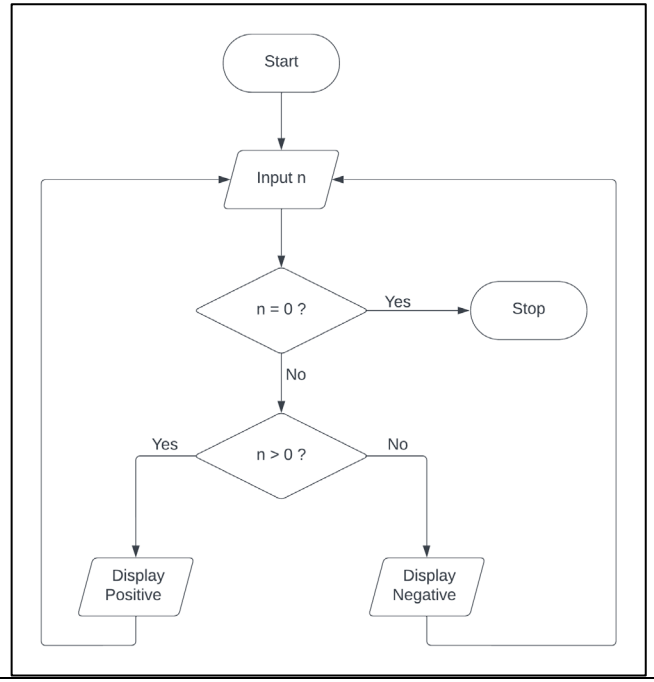
• ROM is non-volatile/permanent (1) therefore it retains its contents when the power is switched off / data won’t be lost when power is lost (1)
• The contents of ROM cannot be changed (1) which makes it suitable for storing the manufacturer’s instructions (1)</td><td>Explanation can be a combination of different marking points. E.g. MP1a and MP2b
Do not accept MP1a and MP2a or MP1b and MP2b</td><td>2</td></tr>
<tr><td colspan="3">Total for question 4</td><td>13</td></tr>
</table>

Question	Answer	Additional Guidance	Mark
5(a)(i)	Award **one** mark for any of the following up to a maximum of **two** marks: • Heart rate (1) to measure blood flow/pulse rate (1) • Barometric pressure (1) to determine altitude (1) • Microphone (1) for voice activation control (1) • Temperature/Thermometer (1) to measure ambient/body temperature (1) • GPS (1) to calculate longitude/latitude (1) • Light (1) to adjust screen brightness/charge watch battery (1) • Magnetometer (1) to act as a compass (1) • ECG (1) measure heart rhythm (1) • Blood pressure monitor (1) measure pressure in arteries / can report heart rate/pulse rate (1)	Allow any reasonable sensor that might be embedded within a smart watch. Purpose must be linked to the sensor Purpose must expand on name (e.g. heart rate sensor – monitor user's heart rate is not sufficient for second mark) Allow purpose mentioned in second column if nothing in first column	**2**
Question	Answer	Additional Guidance	Mark
5(a)(ii)	Award **one** mark for any of the following up to a maximum of **two** marks: • It has a low power requirement (1) • It can use a low processor speed (1) • It has built in/integrated storage (1) • It relies on flash memory (1) • It can be mass produced at a low cost per device (1) • It is small (1) • It can work in a large range of operating temperature ranges (1) • It is robust (1) • It has its operating software set by the manufacturer (1) • It is designed to do one particular task (1)		**2**

Question	Answer	Additional Guidance	Mark
5(b)(i)	**The only correct answer is B** *A is not correct because low-level languages are not converted into high-level languages* *C is not correct because assemblers translate assembly code to produce machine code but do not execute it* *D is not correct because compilers and interpreters translate high-level languages*		**1**
Question	Answer	Additional Guidance	Mark
5(b)(ii)	Award up to **two** marks for a linked explanation such as: • Makes best use of the hardware (1) because they can directly access (specific) hardware (features) (1) • It reduces manufacturing costs (1) because of a lower processor specification/expense (1) • Optimise their code for hardware (1) directly access/control registers (1)	Do not accept references to translation time	**2**
Question	Answer	Additional Guidance	Mark
5(b)(iii)	Award **one** mark for any of the following up to a maximum of **two** marks: • Abide by the law / avoid plagiarism / copyright infringements (1) • Adhere to a professional code of conduct (1) • Maintain/enhance their skills through further learning/keep up to date/attend (relevant) conferences (1) • Test code thoroughly/do not release code with known errors/vulnerabilities (1) • Respect privacy and security of data (1) • Preserve the environment (1) • Make software accessible/unbiased (1)		**2**

Question	Answer	Additional Guidance	Mark
5(b)(iv)	**The only correct answer is A** *B is not correct because 500 KiB is 512,000 bytes* *C is not correct because 0.5 MiB is 524,288 bytes* *D is not correct because 5MB is 5,000,000 bytes*		**1**
Question	Answer	Additional Guidance	Mark
5(c)	Indicative content: • Can use sensors to take/track readings such as heart rate • Can track location via GPS and record routes taken/distance travelled • Can calculate exercise/movement undertaken such as steps/calories burned • Can be linked via 5G/Internet Of Things/Personal Area Network (PAN) to other devices/apps that can record and analyse the data • Can trigger alerts when users are inactive • Can monitor blood oxygen/blood sugar/sleep patterns • Can applaud/give kudos when an achievement/event takes place • Can increase motivation of the wearer to be healthy/perform exercise due to feedback loop • Workouts/alerts can be synced to the watch • Linked apps can perform more in-depth analysis • No guarantee that users will buy into benefits and lead a healthier lifestyle • Monitoring vulnerable people allowing independent living	Allow content referring to other wearable technology which is not a smartwatch	**6**
		Total for question 5	**16**

Level	Mark	Descriptor
	0	No rewardable content.
Level 1	1–2	Basic, independent points are made showing elements of knowledge and understanding of key concepts/principles of computer science. The discussion will contain basic information with little linkage between points made.
Level 2	3-4	Demonstrates adequate knowledge and understanding of key concepts/principles of computer science. The discussion shows some linkages and lines of reasoning with some structure.
Level 3	5-6	Demonstrates comprehensive knowledge and understanding by selecting relevant knowledge and understanding of key concepts/principles of computer science to support the discussion being presented. The discussion shows a well-developed, sustained line of reasoning which is clear, coherent, and logically structured.

Question	Answer	Additional Guidance	Mark
6(a)	Award **one** mark for each of: • Start and Input n identified (accept number or num) (1) • Decision box test for n = 0/n<>0 with yes & no/true & false labels that correctly lead to End/Stop (1) • Decision box test for n > 0 or n<0 with yes & no/true & false labels (1) • Correct messages output including leads from correct yes & no/true & false (1) • Flowchart is fully connected and functionally correct (1) • Correct flowchart symbols used throughout for terminators, input/output and decision boxes (1) Example:  	Accept == for MP2 For MP2 and MP3 decision boxes must have yes/no or true/false labels. For MP5 there must be arrows on connections	**6**

<table>
<tr><th>Question</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>6(b)(i)</td><td>Award one mark for each pair of columns:

<table>
<tr><th>number</th><th>flag</th><th>testNum</th><th>DISPLAY</th></tr>
<tr><td>7</td><td>FALSE</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>3</td><td></td></tr>
<tr><td></td><td></td><td>4</td><td></td></tr>
<tr><td></td><td></td><td>5</td><td></td></tr>
<tr><td></td><td></td><td>6</td><td></td></tr>
<tr><td></td><td>TRUE</td><td>7</td><td></td></tr>
</table></td><td>Accept for first pair

<table>
<tr><th>number</th><th>flag</th></tr>
<tr><td>7</td><td>FALSE</td></tr>
<tr><td>7</td><td>FALSE</td></tr>
<tr><td>7</td><td>FALSE</td></tr>
<tr><td>7</td><td>FALSE</td></tr>
<tr><td>7</td><td>FALSE</td></tr>
<tr><td>7</td><td>FALSE</td></tr>
<tr><td>7</td><td>TRUE</td></tr>
</table>
Do not award either mark point if first row is 7 FALSE 2</td><td>2</td></tr>
<tr><td>Question</td><td>Answer</td><td>Additional Guidance</td><td>Mark</td></tr>
<tr><td>6(b)(ii)</td><td>Award one mark for each pair of columns:

<table>
<tr><th>number</th><th>flag</th><th>testNum</th><th>DISPLAY</th></tr>
<tr><td>9</td><td>FALSE</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>2</td><td></td></tr>
<tr><td></td><td>TRUE</td><td>3</td><td></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>
<tr><td></td><td></td><td></td><td></td></tr>
</table></td><td>Accept for first pair

<table>
<tr><th>number</th><th>flag</th></tr>
<tr><td>9</td><td>FALSE</td></tr>
<tr><td>9</td><td>FALSE</td></tr>
<tr><td>9</td><td>TRUE</td></tr>
</table>
Do not award either mark point if first row is 9 FALSE 2</td><td>2</td></tr>
</table>

Question	Answer	Additional Guidance	Mark
6(b)(iii)	Award **one** mark for: • To determine if a number is a prime number/none of the test numbers divide exactly into it (1)	Ignore reference to display the number	**1**
Question	Answer	Additional Guidance	Mark
6(b)(iv)	Award up to **two** marks for a linked explanation such as: • It makes the algorithm more efficient (1) because the loop will terminate as soon as a test number divides exactly into the number entered (1) • A count-controlled loop could make more comparisons/be less efficient (1) because it would not terminate as soon as the test number divides exactly into the number entered (1) • A count-controlled loop executes a fixed number of times/even after condition is met (1) post-condition loop stops when condition is met (1)	Explanation can be a combination of different marking points. E.g. MP1a and MP2b	**2**
		Total for question 6	**13**

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