Paper 1 Mark scheme

Question Number	Answer	Additional Guidance	Mark
1(a)	The name of the required component: • Main memory/RAM/Random Access Memory (1)	• Do not award memory alone.	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(b)	• B [Cache] (1)		**(1)**

Question Number	Answer	Additional Guidance	Mark
1(c)	Derivation of the required ASCII code: • Derive the fact that 74 denary is the ASCII value for the letter 'J' (1) Example: D, E, F, G, H, I, J == 68, 69, 70, 71, 72, 73, 74 J – D = 6; 68 + 6 = 74	/01	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(d)(i)	Calculation: • 1 kilobyte = 1024 bytes (1) • 3 x 1024 or 3072 (1)	• Units are not required. • Award full marks for the correct numerical answer.	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(d)(ii)	Calculation: • 1 Megabit = 1000000 bytes (1) • 3 x 1000000 or 3000000 (1)	• Units are not required. • Award full marks for the correct numerical answer.	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(e)	• D [IMAP] (1)		**(1)**

Question Number	Answer	Additional Guidance	Mark
1(f)	A description that makes reference to the following points: • A client uses the address of the server to make a connection (1) • then the client sends a request to the server/client request services from the server (1) • The server obtains the address of the client once that client makes a connection to the server (1) • then the server sends the requested data/services (to the client) (1)	• Do not award examples only, such as a web page and browsers.	**(4)**

Question Number	Answer	Additional Guidance	Mark
1(g)	• C [Hexadecimal is easier for humans to read] (1)		**(1)**

Question Number	Answer	Additional Guidance	Mark
2(a)	An explanation that makes reference to the following points: • lossless compression ensures that no data is lost (1) • so that the desktop published file can be restored so that it is exactly the same as the original (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
2(b)	Any two from: • Data is removed during the compression process (1) • The removed data is not normally noticed by a human (sight, sound) (1) • The original contents of the file cannot be restored exactly (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
2(c)	• Letters in correct order (1) • Correct number (1) Either: 3b 1r 4g 2r Or b3 r1 g4 r2	• Disregard spacing. • The single instance of 'r' in position 2, must be denoted by '1r' or 'r1'. The numeric value is necessary.	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(a)	An explanation that makes reference to two of the following points: • Defragmentation software moves file blocks closer together (1) • Compression software reduces file sizes using less space (1) • Use backup software to move files to a secure place and deleting files on the hard disc frees up space (1) and • this speeds up disc access times to the files (which will improve the speed of the disc) (1)	• Allow archive as equivalent to backup and delete.	**(3)**

Question Number	Answer	Additional Guidance	Mark
3(b)	Any two reasons from: • Instructions are close to English/easier for humans to read/write than a low-level language/makes fewer errors (1) • It's quicker to develop code/easier to maintain code (than if it were written in a low-level language) (1) • They are usually available across many platforms/chipsets/operating systems (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
3(c)	An explanation that makes reference to the following point: • Intellectual property can be protected by copyright/patent laws (1) Plus one from: • so that by registering the patent the patent holder has exclusive rights to make/use/sell the software (1) • so that by registering the copyright the source/(object) code is protected (1)	• Do not award marks for examples only. • Do not accept 'prevents theft'.	**(2)**

Question Number	Indicative content	Mark
3(d)	Indicative content: • are written only once/no repeated/copied blocks of code (1) • only needs to be debugged once (1) • can be reused/called from anywhere in the program (1) • make main program more readable/shorter (1) • can reduce the need for global variables (1) • can be put into libraries/reused in other programs/shared with others (1) • can be used to hide complex code/functionality (1) • can be written in low-level languages for special purpose/interact with hardware/optimise performance (1)	**(6)**

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 Number	Answer	Additional Guidance	Mark
4(a)	A description that makes reference to the following points: • the protocol allows the devices on a network to communicate with each other (1) • by the use of a common set of rules (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
4(b)	An explanation that makes reference to the following points: • A patch will fix any known security issues (1) • so the machine running the application is less vulnerable to successful cyberattacks (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
4(c)	A description that makes reference to the following points: • device B puts the address of device C into a packet/message to send (1) • then device A reads that address and sends the packet to device C (1)		**(2)**

Question Number	Indicative content	Mark
4(d)	Indicative content: • The school/technical team will be responsible for backing up/disaster recovery if the data is stored on hard discs (connected to the school's servers) • The storage provider is responsible for backup/disaster recovery if the school stores its data in the 'cloud' • The school's files are available without an internet connection if data is stored on hard discs (connected to the school's servers) • An internet connection is required to access the school's files if they are stored in the 'cloud' • Staff at the school can access their files anywhere by using mobile devices if the school's files are stored in the 'cloud' • The staff can access their files at school only if the data is stored on hard discs (connected to the school's servers) • The school will be responsible for maintaining the servers, replacing them when they age/technology becomes outdated • The storage provider is responsible for updating the storage system in the cloud and providing new technology as it evolves • The school will be responsible for increasing the storage capacity of their servers as demands evolve • The storage provider is able to provide additional storage space on demand.	**(6)**

Level	Mark	Descriptor
	0	No rewardable content.
Level 1	1–2	A comparison may be attempted but with limited application of knowledge and understanding of key concepts of computer science to the theoretical context. The comparison will contain basic information with some attempt made to link knowledge and understanding to the given context.
Level 2	3–4	A comparison will be given with adequate application of knowledge and understanding of key concepts of computer science to the theoretical context. Are occasionally supported through a linkage. The comparison shows some linkages and lines of reasoning with some structure.
Level 3	5–6	A comparison will be given with comprehensive application of knowledge and understanding of key concepts of computer science to the theoretical context. Line(s) of reasoning are supported throughout by sustained application of relevant evidence. The comparison shows a well-developed and sustained lines of reasoning which is clear, coherent and logically structured.

Question Number	Answer	Additional Guidance	Mark
5(a)	An explanation that makes reference to the following points: • monitors weight of load (1) • so that it can adjust water levels for small/large loads (1) **OR** • monitors water temperature (1) • so it can maintain the required value by turning heating element on/off (1) **OR** • monitors soaking button setting (1) • so that it can add additional time at the right place in the programme cycle (1) **OR** • monitors maximum spin switch setting (1) • so that it can set required motor revolutions (1)	• Other appropriate responses can be awarded.	**(2)**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>5(b)</td><td>A truth table for the function of the operator AND:
• four different input combinations and four different correct output combinations

Examples

<table>
<tr><th>Input 1</th><th>Input 2</th><th>Output</th></tr>
<tr><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>1</td></tr>
</table>

<table>
<tr><th>Input 1 / Input 2</th><th>0</th><th>1</th></tr>
<tr><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>1</td></tr>
</table>

False AND False = False
False AND True = False
True AND False = False
True AND True = True</td><td>Any format for the truth table is acceptable as long as four different distinct inputs and four different distinct outputs are discernible.</td><td>(1)</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
5(c)	A logic statement that includes: • Correct use of 'OR' (1) • Correct use of 'AND' (1) • Correct use of brackets or order of precedence if brackets not used (1) Examples: • (O OR M) AND P • P AND (M OR O) • (O AND P) OR (P AND M) • O AND P OR P AND M	• Disregard capitalisation. • Overriding order of precedence (NOT, AND, OR) **may** require use of brackets. • Expression or parts of expression may be in different orders. • Any alternative equivalent expression should be awarded.	**(3)**

Question Number	Answer	Additional Guidance	Mark
5(d)	• B [1010 1000] (1)		**(1)**

Question Number	Answer	Additional Guidance	Mark
6(a)	A statement that includes: • an algorithm is a sequence of steps/step-by-step instructions (1) • which (if followed exactly) will perform a specific task (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
6(b)	Two reasons: • Encrypted data is encoded/scrambled so that it cannot be understood (1) • The unauthorised person would not have the key to decrypt the data (1)	• Disregard responses indicating 'access'; encryption only makes the data uninterpretable. • Do not award secure/secret alone.	**(2)**

Question Number	Answer	Additional Guidance	Mark
6(c)	• Applying a double shift to 'pink' to obtain unsp (1) • Identifying +5 as the equivalent single shift to obtain unsp (1) • Recognise that both shifts give the same result, so the double shift is no more secure than the single shift (1) | | pink | |---|---| | +7 | wpur | | -2 | unsp | | | pink | |---|---| | +5 | unsp | | | |	Other forms of diagrams are acceptable. A simple statement to say that the double shift is not as secure can score a mark only if explained in full.	**(3)**

Question Number	Answer	Additional Guidance	Mark
6(d)(i)	A statement that includes: • a pixel is the smallest identifiable unit in a graphic image (1)	Do not accept picture element.	**(1)**

Question Number	Answer	Additional Guidance	Mark
6(d)(ii)	• Mathematical expression (1) • 15000 bytes (1) Example: $\frac{300 \times 100 \times 4}{8} = 15000$	• Accept any other equivalent mathematical expression. • Units not required.	**(2)**

Question Number	Answer	Additional Guidance	Mark
6(e)	• Award 1 mark for each row of the process. 84 | 52 | 4 | 6 | 68 | 39 | 53 | 1 52 84 4 6 39 68 1 53 (1) 4 6 52 84 1 39 53 68 (1) This leads to: 1 | 4 | 6 | 39 | 52 | 53 | 68 | 84	• Award 1 mark for each step. • Marks should not be awarded for the last row. • Any notation showing distinct lists at each stage is acceptable.	**(2)**

Question Number	Answer	Additional Guidance	Mark
6(f)	An explanation that makes reference to the following points: • The set-top box must process data quickly (1) • so a compiler is used because compiled code runs faster than interpreted code (1)	• Disregard reference to cross-platforms; question context is a new chip.	**(2)**

Question Number	Answer	Additional Guidance	Mark
6(g)	A statement that includes: • (Abstracting means) removing unnecessary detail/simplifying (1) • so that we can focus on the essence/real part/important part of the problem (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
6(h)(i)	A statement that includes: • The purpose of 'roll' is to generate a single number, chosen randomly, between 1 and 12, inclusive (1) OR • Two numbers between 1 and 6	• Accept between 1 and 12 • Do not award 'simulate a roll of dice' or equivalent.	**(1)**

Question Number	Answer	Additional Guidance	Mark
6(h)(ii)	One of the following reasons: • 'Roll' is an abstraction because it allows the programmer to focus on the result of a roll, rather than on how to implement the roll algorithm (1) **OR** • 'Roll' is an abstraction because it is a model/simulation/representation of a real/physical activity/action (1)		**(1)**

Question Number	Answer	Additional Guidance	Mark
7(a)(i)	• One mark for each correct row (2): 0 0 0 0 0 1 1 0 1 1 1 1 1 0 1 0		**(2)**

Question Number	Answer	Additional Guidance	Mark
7(a)(ii)	The comparison should include reference to both two's complement and signed-magnitude numbers for any **two** of the following: • Addition of two's complement will always work (1) • Addition of sign-magnitude numbers does not always work (1) • There is only one way to represent the number 0 in two's complement (1) • There are two ways to represent the number 0 in sign-magnitude numbers (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
7(a)(iii)	D [None of the above are accurate] (1)	• Overflow has occurred so 8-bits are not large enough to hold the result. • 325 = 1 0100 0101	**(1)**

Question Number	Answer	Additional Guidance	Mark
7(b)(i)	Correct identification of the labelled items: A. Analogue signal/sound wave (1) B. Sample interval (1) C. Amplitude (1)	• Do not allow sampling frequency as equivalent to sampling interval.	**(3)**

Question Number	Answer	Additional Guidance	Mark
7(b)(ii)	An explanation that makes reference to the following points: • (Higher sampling frequencies) generate more sampling data (1) • which increases memory/storage requirements (1) • and gives a more accurate digital representation (of the original signal) (1)	• Do not award responses referring to bit rate. • Do not award responses indicating quality of playback.	**(3)**